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COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

Proposal for a Regulation of the European Parliament and of the Council

establishing a framework for setting ecodesign requirements for sustainable products and repealing Directive 2009/125/EC

{COM(2022) 142 final} - {SEC(2022) 165 final} - {SWD(2022) 81 final} - {SWD(2022) 83 final}

Annex 9: Policy Options and Measures

WHAT IS THE BASELINE FROM WHICH THE OPTIONS ARE ASSESSED?

See below

DESCRIPTION OF THE POLICY OPTIONS

Option 1 - Business As Usual

The Baseline scenario consists of a continuation of existing policies, taking into account also ongoing parallel work on related initiatives. Under the baseline, the Ecodesign Directive would continue to exist in its current form, i.e. as described in detail in *Annex 6: The current Ecodesign framework*, and with the limitations highlighted in the problem definition. The ecodesign working plan provides an indication of the implementing measures that could still be expected to be adopted in the coming years. However, because of the constraints explained in sub-problem 3, the number of new products that could effectively be regulated by 2030 will remain limited, with existing resources being rather focused on the necessary reviews of the most significant existing product regulations. In addition, a number of related regulatory instruments are likely to be revised or newly introduced (e.g. on green claims, empowering consumers, sustainable corporate governance, etc.). More details on these initiatives is provided in *Annex 14: Articulation with existing legislation and other initiatives*. While their adoption is not certain at this point, they are considered in a qualitative way whenever relevant for the policy options being assessed. Furthermore, a set of EU voluntary instruments (e.g. Ecolabel, Green Public Procurement, Environmental Technology Verification) and funding programmes for innovation, research, development, and market uptake are expected to promote innovative products and business models.

Option 2: Extension of the product scope of Ecodesign legislation

Sub-problem	Specific objective
1) Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects **2) Too difficult for economic operators and consumers to make sustainable choices in relation to products**	**SO1: Improve products sustainability**

The Circular Economy Action Plan (CEAP) indicated that one of the key aspects of the sustainable products initiative would be the extension of the Ecodesign Directive beyond "energy-related products". Option 2 follows the approach suggested in CEAP, which is based on the analysis reflected in the Inception Impact Assessment and on previous preparatory work summarised in the Commission Staff Working Document 'Sustainable Products in a Circular Economy - Towards an EU Product Policy'[1]. This SWD analysed the variety of policy tools relevant to improve products circularity. It

[1] (SWD(2019)91)

concludes that policy tools setting minimum requirements for sustainable performance of products are less widely in place than other types of policy intervention. The main pieces of legislation identified are the Ecodesign Directive, that covers only energy-related products, and the Packaging and Packaging Waste Directive. In this context, the broader approach of Ecodesign, in comparison with other product legislation setting requirements, forms an excellent basis for a framework on sustainable products[2]. In addition, the framework already provided for some circularity provisions in product specific rules; this was highlighted in the Ecodesign Working Plan 2016-2019 and materialised in circularity provisions for a series of products in measures adopted in 2019. Thus, widening the current framework to accommodate more products and new sustainability requirements is considered reasonable. Finally, the Ecodesign Directive is widely recognised as an effective instrument for the products it covers, as mentioned in the final report of the 2014 evaluation, enjoying wide support from all types of stakeholders (industry, NGOs, MSs) and international recognition. The approach indicated in the Inception Impact Assessment was largely supported by stakeholders providing feedback on the IIA (see Annex 2, Section 1) and the same approach underpinned the questions in the open public consultation (Section 2) and in the workshops (Section 3).

Similar to the current Ecodesign Directive, SPI will establish conditions for laying down product-specific requirements in acts adopted by the European Commission. The order of product prioritisation will be decided based on clear criteria, similar to those already foreseen in Article 15 of the current Ecodesign Directive, such as their relative environmental, energy and social impacts and the related potential for cost-effective reduction of these impacts. The selection will follow a fully transparent process culminating in working plans outlining the priorities for the development of SPI measures. These SPI measures will set out product-specific requirements, following a concerted analysis of the product group in question and an impact assessment of the proposed requirements.

As noted in the introduction to this impact assessment, it excludes food and feed as defined in the General Food Law (Regulation EC 178/2002), which are addressed through the Farm to Fork Strategy[3] and raw materials as final products, meaning that raw materials are included only when they are embedded in intermediate or final goods in scope of SPI.

Presented below are the three approaches to extending the scope of the Ecodesign Directive that have been retained for analysis: 2a) extension to a limited number of pre-defined (priority) products; 2b) extension to all physical goods; and 2c) extension to all physical goods as well as services.

It should be noted from the outset that, given the architecture of the Ecodesign instrument (where detailed product rules are adopted only in a second stage via implementing measures), the decision to extend the scope is not in itself expected to have a direct impact on the product sectors concerned. Rather the effects will be felt following the adoption of the SPI measures for particular products or groups of products, which in all cases will be preceded by thorough analysis, consultation with stakeholders and impact assessment.

Sub-option 2a: Extension to a limited number of priority products

Ecodesign currently covers "energy related products". Under this sub-option, a targeted extension of its scope, to a *limited* number of priority products, is envisaged.

The products in question have been identified taking into account their **sustainability credentials** as well as their general **potential for** improvement potential from a sustainability point of view, including their circularity potential. This builds notably on the results of a scoping study to identify

[2] For instance, the combined Ecodesign measures have decreased GHG by 170 Mt CO2eq (4.5% of the EU27 total emissions in 2018), entailing a EUR 60 billion saving on consumer expenditure and an increase of EUR 21 billion in business revenue in 2020. *Ibidem*

[3] A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system, COM(2020)381 final

potential circular economy actions, priority sectors, material flows and value chain[4], the European Commission Staff Working Document "Sustainable Products in a Circular Economy - Towards an EU Product Policy"[5] and an Environmentally Extended Multi-Regional Input-Output (EE-MRIO) Analysis[6].

Following analysis of the above-mentioned sources, a key decision criterion for inclusion of a product in the priority list was the **extent to which their sustainability dimensions are already covered, or capable of being covered, by existing EU level instruments**. While e.g. *certain* environmental impacts of some of the products included in the priority list are covered through existing EU level legislation (see *Annex 14: Articulation with existing legislation and other initiatives*), **those for which significant regulatory gaps still exist *vis-à-vis* sustainability dimensions have been included**.

Based on the above, this sub-option proposes to extend the scope of the current Ecodesign Directive to enable the adoption of SPI measures for the following range of products:

- **Energy related products** (including means of transport): While the continued inclusion of energy-related products under SPI would be a logical evolution of the Ecodesign instrument, the extension of this category to *means of transport* would bridge an existing regulatory gap. Despite the fact that, at the EU level, a comprehensive policy framework is in place to address aspects such as vehicle emissions and safety requirements, and more recently the labelling of tyres to highlight their performance on fuel efficiency, safety and noise[7], the **regulatory tools to harness the remaining sustainability and circularity-related potential of this sector are still missing**: for example, taking additional action on components of transport products, such as tyres – for which no design requirements e.g. to prevent the use of materials in their design that inhibit recycling currently exist – is expected to contribute to reducing the estimated more than one million tonnes of end of life tyres being incinerated annually in the EU[8].

- **Textiles**: Despite the negative environmental impacts being generated throughout the lifecycle of the millions of textile products consumed in the EU per year, **no EU instrument to address the product-level sustainability dimensions of these products currently exists**. Large potential therefore remains for increased sustainability and circularity in this sector, as confirmed also by public opinion[9]. In addition, while several existing and emerging initiatives are aimed at addressing the well documented concerns about the social conditions under which textiles are being produced, none to tackle the issue from a product-level perspective currently exists.

- **Furniture**: While various aspects of furniture are addressed at EU level (e.g. safety, chemical content etc.), **no specific legislation exists to cover furniture's product-level suitability dimensions** (or for furniture in general). Taking into account that approximately 10 million tons of furniture is discarded in the EU every year, and that overall recycling rates for furniture are estimated at only 10%[10] – there appears to be large remaining potential, specifically in the areas of material substitution, increased recycling and/or increased reuse or

[4] Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains, IVM et al for the European Commission, 2014
[5] SWD(2019)91 final
[6] Using Exobiase (https://www.exiobase.eu/index.php), for further details refer to annex 4.
[7] EU Regulation (EU) 2020/740
[8] 2020 EuRIC Mechanical Tyres Recycling Brochure
[9] 62% of respondents to a 2019 public consultation stated that EU policy instruments do not adequately cover sustainable design and production in the textiles sector; 72% believed that EU instruments are not sufficient in informing consumers on the environmental performance of clothes
[10] Circular Economy Opportunities in the Furniture Sector, EEB, 2017

preparing for reuse, and requirements on circular design of furniture – something which public and stakeholder opinion seem to confirm[11].

– **High impact intermediary products**: This includes products such as steel, often used in the construction or related sectors, for which **no instrument currently covers overall life cycle performance**. While the Construction Products Regulation is currently being revised and will include reinforced sustainability requirements for construction products, certain intermediary products can be produced for areas outside of construction, and would therefore need to fall under SPI. In addition, as the revised Construction Products Regulation will also have other objectives to take into account, SPI will need to act as a benchmark for the sustainability rules it will set and intervene if needed for these products.

– **Chemicals**[12]: While EU policies are in place addressing safe use of chemicals and reducing certain environmental impacts, **their sustainability – in the sense of their circularity and material efficiency – remains under-addressed**. In addition, the availability of sustainability-related information is jeopardizing processes such as mechanical recycling processes and use of recycled material (see sub-problem 2) and remains as yet unaddressed by an EU-level instrument.

Detailed impact assessments will precede the adoption of any SPI measures for the above-mentioned products. SPI will only intervene for issues that no other instrument is addressing or addressing sufficiently. For example, for chemicals, SPI will not regulate aspects that are already covered under other frameworks such as REACH, the Waste Framework Directive and RoHS. For high impact intermediary products, as mentioned above the SPI legal framework will only be used to set specific measures for products on which CPR could not deliver high ambition sustainability requirements[13]. The adoption of the SPI Working Plan and SPI measures will be done in close coordination with other legislative frameworks to ensure complementarity.

Together, throughout their lifetime, the option 2a products are estimated to cover an additional 14% of GHG emissions, 38% of human toxicity impacts and 15% of primary energy consumption compared to the baseline as discussed in Annex 10. In total, including the baseline, the SPI would cover 63 % of GHG emissions, and 66 % of primary energy use and 60 % of human toxicity impacts resulting from European consumption.

Sub-option 2b: Extension to all physical goods

Under this sub-option, all physical products placed on the market[14] can, in principle, eventually be subject to SPI implementing measures. As under sub-option 2a, SPI requirements will only be adopted when EU sectoral legislation does not provide for requirements on similar product parameters or is not efficient enough in achieving the objectives of sustainability pursued by SPI.

[11] From 2019 stakeholder workshops, public consultation and policy papers from the sector itself, it is clear that stakeholders are interested in developing EU policy tools in pursuit of more circular design of furniture, taking into account the whole life cycle. Respondents to the public consultation perceived an insufficient policy coverage by the EU in this sector. 43% of them consider EU policy instruments coverage of sustainable design and production of furniture as inadequate, with 54% believing the current framework is not enough developed in providing consumers with information on sustainability.

[12] Understood as intermediate products (e.g. industrial solvents) or final products e.g. such as detergents or cosmetics. Where chemicals are destined/used for food related purposes and are not considered as food or feed, they will be subject to the relevant sectoral legislation, including the future sustainable food systems framework legislation, as announced in the Farm to Fork Strategy

[13] For the relationship between a revised CPR and SPI, please see *Annex 14: Articulation with existing legislation and other initiatives* for more detail.

[14] For practical and ethical purposes, as well as to ensure coherence with other initiatives, some exceptions will nevertheless need to be made to this coverage. For example, as previously mentioned, food and feed as defined in the General Food Law (Regulation EC 178/2002) will not be covered as these products will be addressed through the Farm to Fork Strategy.

The working plan and preparatory studies for specific SPI measures would allow to prioritise products based on their estimated environmental, economic and social impacts. Based on the reasoning set out in the previous section, there is a high likelihood that the list of priority products set out in sub-option 2a would be among those addressed with first priority under this sub-option (with exact order of prioritisation to be decided based on dedicated work plans). Annex 16 sets out details on the criteria and process for prioritisation, and which would lead to a focus on those products with the most value-added first.

Compared to sub-option 2a, this sub-option would present the added value of not having to revise the overarching legislative framework should action need to be taken for new or future product categories. If a wide scope is chosen for SPI, it will be in a position to respond to novel products and future product trends, thereby avoiding the occurrence of problematic regulatory gaps in the future

Based on best current estimates, throughout their lifetime, the products considered under option 2b *could* cover an additional 16% of GHG emissions, 42% of human toxicity impacts and 18% of primary energy consumption compared to the baseline as discussed in Annex 10. In such a case, including the baseline, the SPI would cover 65 % of GHG emissions, and 69 % of primary energy use and 64 % of human toxicity impacts resulting from European consumption. It should nevertheless be underlined that, given the wide scope of this sub-option, and the possible emergence of novel products with as yet unknown impacts, the full coverage potential of this sub-option cannot be calculated with accuracy and may be higher than the above-mentioned figures.

Sub-option 2c: Extension to services

Under this sub-option, SPI is extended to services. Services represent a significant proportion of environmental impacts.

Services have been considered under a separated sub-option due to their specificities compared to physical goods. The inclusion of services must follow a different rationale from the one used for products under Ecodesign as the provision of services does not imply the transfer of a physical product. Nonetheless, service provision relies on infrastructure and products which have their own environmental and social impacts, which can be considered as externalities of the service. The selection and use of the products in the framework of the provision of services, while not necessarily impacting the quality, has consequences on the environmental and social impacts of a service. Accordingly, requirements can be set on business practices related to the provision of services.

For example, information requirements based on the performance of products used to provide the services may inform customers about the sustainability of a service. Consumers would then be able to choose the most environmentally performant services. Similarly, minimum requirements could be set on resource intensive services, setting minimum environmental performance requirements for a given output (such as cleaning of $1m^2$ of hard floor surface) or for a standardised service (for example, cleaning of a standardised 80 m^2 apartment).

This option could build notably on the experience of the EU Ecolabel, which has set requirements on some services, such as indoor cleaning services or tourist accommodations and of the Green Public Procurement, which proposes criteria -amongst others- for cleaning products and services, print services and cloud services. It could also build on the EU Eco-Management and Audit Scheme (EMAS), a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance, which applies to e.g. banking services and travel agencies.

The extension under option 2c to services as well as all products is estimated to cover an additional 34% of GHG emissions, 66% of human toxicity impacts and 37% of primary energy consumption compared to the baseline as discussed in Annex 10. In total, including the baseline, the SPI would

cover 83 % of GHG emissions, and 88 % of energy use and 88 % of human toxicity impacts resulting from European consumption.

Option 3: Extension of sustainability requirements for products

Sub-problems	Specific objective
1) Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects **2) Too difficult for economic operators and consumers to make sustainable choices in relation to products**	**SO1: Improve products sustainability**

As shown in the analysis of sub-problem 1, there is a need for EU product policy to influence the design of products in a way that it better takes into account environmental and social impacts over the life cycle of products, including circularity aspects. A key instrument to improve the products sustainability is to set requirements for the placing on the EU markets of products in the scope of legislation, as discussed under Option 2. The existing Ecodesign Directive provides for the setting of generic or specific requirements on the energy efficiency and other environmental aspects of energy-using products. This policy option assesses ways to complement this approach with other types of requirements, or reinforced requirements covering better the objectives of a sustainable products legislation.

Under option 3, a number of new or reinforced sustainability requirements on products would be introduced, understood as minimum requirements allowing the placing of these products on the EU market, along those aspects described in the Circular Economy Action Plan of 2020 that are related to the product's life cycle and value chain.

This policy option thus sets out potential product requirements for:

- Circularity aspects (durability, reusability, upgradability, reparability, recyclability);
- Addressing the presence of hazardous chemicals in products;
- Increasing the energy and resource efficiency of products;
- Increasing recycled contents in products, while ensuring their performance and safety;
- Enabling remanufacturing and high-quality recycling;
- Reducing carbon and environmental footprints;
- Restricting single-use products, countering premature obsolescence;
- Social aspects along the value chain.

Three sub-options on the extension of sustainability requirements for products are considered in this impact assessment. The sub-options are cumulative: measures included in sub-option 3a are also part of sub-options 3b and 3c, measures included in sub-option 3b are also part of sub-option 3c. The distribution of the envisaged measures in the 3 distinct sub-options follows this logic: sub-option 3a reinforces requirements of the existing Ecodesign Directive. Sub-option 3b goes beyond 3a by introducing the possibility of horizontal requirements, applicable to group of product (e.g. requirements on reparability). It also includes measures enabling the remanufacturing of components

and the setting of requirements on social aspects along the value chain of products - both not possible in the current Ecodesign Directive. Sub-option 3c includes all measures presented in sub-option 3a and 3b, but in addition would include the possibility to introduce explicit prohibitions on some products, based on certain criteria.

Sub-option 3a: Enhanced sustainability requirements

Sub-option 3a reinforces requirements that can already be placed on products by the existing Ecodesign Directive, but have not been fully implemented yet, and adds new requirements based on possibilities latent in that directive. As described in previous section, these requirements would be set in SPI measures specific to groups of products and detailing the parameters regulated, the thresholds required and the measurement or calculation methods.

Measure 3a.1 - Minimum requirement on the durability or reliability of the product or its components

This measure would build on existing longevity requirements under Ecodesign for LEDs and OLEDs[15] and for the hoses and motors of vacuum cleaners[16]. It would assess more systematically the possibility and added value of setting requirements on:

- minimum life duration of use of the product (technical lifetime), expressed in relevant units (e.g. cycles, years of use for textile), differentiated according to whether the prescribed preventive maintenance operations have been performed or not; or
- minimum reliability of the product (expressed as Mean Time Between Failures), potentially differentiated as above.
- Where feasible, integration of a use-meter on the product to relate durability and reparability information to the real use of appliances (e.g. number of washing cycles, duration of use).

Measure 3a.2 - Minimum requirements on reparability and upgradability

The measure would build on existing requirements under Ecodesign on the availability of spare parts, maximum delivery time of spare parts, access to Repair and Maintenance Information for refrigerators[17], for washing machines and washer-dryers[18] for dishwashers[19] and for electronic displays[20,21]. It would also work in synergy with and complement related measures set to be introduced under the Empowering Consumers for the Green Transition Initiative (see *Annex 14: Articulation with existing legislation and other initiatives*).

Reinforced requirements could include:

- ease of dis-assembly and re-assembly, using standard tools: number of steps, overall duration (for end-users and for professional maintainers and repairers), qualification of personnel, capacity for operations to be automated;

[15] Commission Regulation (EU) 2019/2020 laying down ecodesign requirements for light sources and separate control gears
[16] Commission Regulation (EU) No 666/2013 implementing Directive 2009/125/EC with regard to ecodesign requirements for vacuum cleaners
[17] Commission Regulation (EU) 2019/2019 laying down ecodesign requirements for refrigerating appliances
[18] Commission Regulation (EU) 2019/2023 laying down ecodesign requirements for household washing machines and household washer-dryers
[19] Commission Regulation (EU) 2019/2022 laying down ecodesign requirements for household dishwashers
[20] Commission Regulation (EU) 2019/2021 laying down ecodesign requirements for electronic displays
[21] The ongoing IA on mobile phones and tablets is extensively looking at circularity aspects (in particular regarding repairs and obsolescence)

– reversibility of dis-assembly and re-assembly, so that parts remain intact and the system operational after several sequences of dis-assembly and re-assembly;

– ease of repair and maintenance: compatibility with commonly available spare parts, modular design when appropriate;

– requirements on the material efficiency of maintenance / repair, eventually with additional requirements regarding Critical Raw Materials[22];

– availability of maintenance and repair instructions.

– requirements on choice of materials and design (e.g. of textiles) in order to facilitate reuse, repair or adjustments.

Measure 3a.3 - Restricting the presence of substances hindering circularity

Existing EU chemicals legislation (particularly Registration, Evaluation, Authorisation and Restriction of Chemicals – REACH, and Classification, Labelling, Packaging, complemented via sectoral legislation) offer the legislative tools for assessing and, where appropriate, restricting hazardous substances in the EU on the basis of chemical safety considerations. SPI would continue the approach followed by the Ecodesign Directive not to set restrictions on substances on the basis of chemical safety. However, it might occur that restricting the presence of a substance in a specific product would lead to an improvement on the aspects to be addressed by SPI (e.g. recyclability, high-quality recycling, upgradability, durability, reparability. See examples and analysis in *Sub-problem 1: Product design does not sufficiently take into account environmental impacts over the life cycle, including circularity aspects* above).

SPI will therefore allow for the restriction of the use of certain substances in specific products if the main reason is to improve a product's performance in terms of the sustainability aspects addressed by SPI and not to improve chemical safety (although this could be a secondary effect of the restriction). Where the main reason for a restriction is to improve chemical safety, REACH (or another relevant chemical safety legal instrument) would continue to be used. The SPI could, for example, promote the substitution of substances in existing products known to hamper recycling by banning or imposing a maximum concentration in future products. Such restrictions would be based on a thorough analysis of the sustainability (including chemical safety) of the identified alternative(s), and should not negatively affect human health or the environment in a significant way.

However, where the SPI process leads to the consideration of a potential restriction on the use of substances in electrical and electronic equipment (EEE) covered by the RoHS Directive[23], and where such a restriction can be defined as contributing to "environmentally sound recovery and disposal of waste EEE", there could be overlap with measures taken in application of Article 6 of the RoHS Directive. This should be avoided, and therefore close coordination between the two instruments will take place to prevent overlaps.

Measure 3a.4 - Minimum requirements on recycled content on the product or its components

The use of secondary raw materials (i.e. materials coming from the recycling of discarded products) is essential to close the loop on these materials, provide markets for recycling activities and reduce the need for raw materials. To accelerate the increase in use of secondary raw materials, this measure

[22] https://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

would require a minimum proportion of such materials (or 'recycled content') in the products placed on the EU market, their components or the materials used.

Such requirements may be set on specific materials (for example a proportion of the polyethylene included in the product or in specific parts), on materials at a more generic level (a proportion of all plastics used in the product) or on all materials used in the product. The SPI measure setting the requirement would include the measurement and calculation methods to be used for compliance verification. These methods may be further detailed in harmonised standards, developed by European standardisation organisations on request of the European Commission following the approach of the 'New Legislative Framework'.

Measure 3a.5 - Minimum requirements to reduce carbon and environmental footprints set at process and/or life cycle environmental impact(s) level

This measure is complementary to the set of measures to fight climate change adopted in the Fit for 55 package in July 2021. Those measures (especially ETS and Carbon Border Adjustment Mechanism) target the production of basic materials and basic material components, excluding final products. This measure, on the contrary, mainly addresses carbon emissions taking place along the entire values chain of final and intermediate products. Addressing also those emissions will directly contribute to the Green Deal objectives (by applying to final products, currently not in scope of Fit for 55 measures) but will also contribute to the global reduction of climate change impacts, by fostering the environmental optimisation of value chain management through footprint reduction.

Based on a complete assessment of the environmental impacts over the life cycle of a product, and assessment of the expected evolution of technologies and performance of products, this measure would set minimum requirements for the placing of the product on the EU market, resulting in a reduction of its carbon footprint or more largely its environmental footprint. Minimum requirements shall aim to reduce the most important negative impacts for a given product, without increasing the other impacts, or alternatively to reduce all negative impacts simultaneously. Hence the added value of a LCA approach.

Depending on the product and the conclusions of the assessment, minimum requirements may be set on technical parameters, on the use phase as is done under Ecodesign currently or on other processes of the product life cycle. Minimum requirements could also be set on environmental impact categories, as defined and calculated using the Environmental Footprint (EF) methods[24] or other methods as relevant – the impact categories being considered individually or combined through normalisation and weighting into a single score.

In the case where specific technical parameters are used, the SPI measure setting the requirement should include the measurement and calculation method and the level required. Tests and measurement methods may be further detailed in harmonised standards, developed by European standardisation organisations on request of the European Commission following the approach of the 'New Legislative Framework'. A harmonised methodology for the calculation of the environmental footprint exists already and corresponds to the Product Environmental Footprint and Organisation Environmental Footprint methods developed by the European Commission and adopted in the

[24] Product Environmental Footprint (PEF) and Organisation Environmental Footprint (OEF) are methods developed by the European Commission and adopted in the Commission Recommendation (2013/179/EU) of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations. The PEF establishes a common methodological approach for quantifying the life cycle environmental performance of any product or service. It comprises 16 impact categories (Climate change; Ozone depletion; Human toxicity, cancer; Human toxicity, non-cancer; Particulate matter; Ionising radiation, human health; Photochemical ozone formation, human health; Acidification; Eutrophication, terrestrial; Eutrophication, freshwater; Eutrophication, marine; Ecotoxicity, freshwater; Land use; Water use; Resource use, minerals, and metals; Resource use, fossils). This includes the development of product-specific rules (Product Environmental Footprint Category Rules, PEFCRs) harmonising PEF studies for specific product groups/categories.

Commission Recommendation 2013/179/EU; an update of this Recommendation is planned for adoption in December 2021. These methods can be applied in a number of policies, not only in SPI.

The SPI framework act will not pre-determine the choice of the methodology or tool to assess the environmental impacts over the life cycle of a product: this will be decided depending on the product and the typology of requirements to be included, and will be reflected in the SPI measure setting those requirements.

For this purpose, the PEF method will be the reference tool, while keeping the flexibility necessary to, at the level of the SPI measure, integrate methods or tools addressing other objectives and aspects. In the case where the Product Environmental Footprint method will be used, manufacturers could be required to perform a PEF study for each product model to prove compliance with the requirement, for example using IT-tools that would be made available by the European Commission (e.g. like the one currently under development for Photovoltaic, PV, modules). If this option is chosen, the study would follow the rules and calculation methods set in Product Environmental Footprint Category Rules, developed following the dedicated European Commission Recommendation. This is further explained in Annex 16.

Measure 3a.6 – Requirements enabling high-quality recycling

The quality of recyclates issued from recycling processes, in particular the level and composition of impurities, determines the possible uses of the recycled material. A low quality level results in the down-cycling of the material, i.e. its use for applications of lower complexity and value than the products at the origin of the recycled material. Recycling is considered of high quality if the quality of recyclates enables the use of recycled materials in the manufacturing of products of the same or similar level of complexity and value as the original products. This can be facilitated by the design choices in terms of materials, material composition of parts and assembling of parts in the final product. Improved recyclability would be particularly relevant for CRMs. EU initiatives for sustainability of CRMs should develop resilient value chains for EU industrial ecosystems and reduce dependency on primary CRMs through circular use of resources, sustainable products and innovation). Further assessments of the amount of materials in stock, i.e. contained in products that are in use, could shed light on where CRMs are present and when these would become available for recycling (also considering the average lifetime of products). Moreover, recycling systems should be adapted e.g. through standards, to better recover CRMs contained in end-of-life products[25].

This measure would set requirements for this purpose, such as:

- Requirement on the material composition of parts: the product must be susceptible to be disassembled into parts, each of which made of a single homogeneous material when above a certain mass (electronic components would be exempted);

- Restrictions on the variety of alloys / of textile mixtures / of plastic additives permitted for some applications (e.g. textiles) to enable high-purity sorting;

[25] Blengini, G.A., Mancini, L., Eynard, U., Ardente, F., Mathieux, F. JRC notes on Critical Raw Materials in MEErP. Critical discussion on past approach and proposed methodology to identify priorities (2021). (draft – to be published

Sub-option 3b: Far-reaching sustainability requirements

Sub-option 3b includes the same measures as Sub-option 3a and goes further by introducing the possibility of horizontal requirements (applying to a broad range of products). This sub-option also includes measures enabling the remanufacturing of components and the setting of requirements on social aspects along the value chain of products - both not possible in the current Ecodesign directive.

Measure 3b.1 – Adoption of SPI measures setting out requirements covering large groups of products

So far, the Ecodesign Directive only explicitly allows for setting rules for individual products, not allowing for the setting of requirements for product categories, with the exception of the stand-by regulation[26], explicitly provided for in the Directive, which has extended to electrical and electronic household and office equipment.

However, when looking at circularity aspects in particular, there can be merit to addressing some issues for more than one product at a time and, rather, to categories of products. Amongst others, aspects such as minimum reparability requirements, availability of spare parts, minimum recycled contents can be common to entire categories of products.

With this measure, the European Commission is mandated to design measures to be set in SPI measures applying to more than one product type, extending to product categories or even to all products covered by SPI, if appropriate. This would apply to both performance and information requirements. For example, the European Commission could propose the setting up of a reparability index for an entire category of products (e.g. "electronic products") at once, thereby increasing legislative efficiency.

Measure 3b.2 – Minimum requirements on re-manufacturability

Re-manufacturing, understood as the re-use of parts of discarded products in the manufacturing process of the same or different products, or as spare parts in the maintenance and repair processes, is a key part of circular economy as it maintains the value of product parts, when the re-use of the complete product is not possible or appropriate, and avoids the cost and impacts of recycling. However, it is a complex operation, which can be facilitated if the original manufacturer of the products takes account of the possibility of re-manufacturing later on.

This measure, provided that the protection of trade secrets is guaranteed, may include requirements for this purpose, addressed to the original manufacturer or to the re-manufacturer, for example related to:

- Conditions for access to data for re-manufacturing: Bill of Materials, specification of parts, electric schematics, mechanical drawings / 3D printing files, and software code, which should include sufficient technical specifications (e.g. on the components or material to be used for 3D printing) to ensure the safe re-manufacturing of these parts;

- Tests and performance guarantees for re-furbished or remanufactured products, or for products proposed by professionals for re-use;

[26] Commission Regulation (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment.

– Conditions placed on the licencing regime applicable for re-manufacturers, re-furbishers and upgraders of products to use technologies protected by Intellectual Property Rights:

  – Maximum royalty rate applicable for the usage of the patents incorporated into the product, to be paid by the re-manufacturer to the original manufacturer after the end of the period during which the product is supported;

– Obligation placed on the original manufacturer to grant the licence to any legal or physical person, with a royalty fee complying with these requirements;

Measure 3b.3 – Requirements of due diligence on the supply chain of products

"Due diligence" refers to a requirement for companies to establish a reiterative process for identifying, preventing and mitigating certain risks. In the context of the SPI, it can be used as a tool to reduce the risk that products placed on the EU market are linked to adverse human rights impacts along their supply chain.

One element of the Sustainable Corporate Governance initiative (SCGI), currently in preparation, would be to establish a general due diligence duty for companies related to all company activities (including all relevant product value chains), applicable to companies of a certain size or generating a certain turnover in the EU. This would entail a general obligation to put in place a due diligence process including the following steps:

- identification of actual or potential adverse human rights and environmental impacts in own operations, in subsidiaries and in the value chain
- prevention and mitigation of adverse impact in own operations, in subsidiaries and in the value chain
- tracking the effectiveness of measures
- establishment of a complaint mechanism
- communicate how adverse impacts are addressed

The adverse environmental and human rights impacts covered would be specified by referencing a list of international human rights conventions (e.g. International Labour Organisation (ILO) labour conventions) and international environmental conventions[27]. As set out in the main problem section in Annex 7 and in Annex 14, given its broad nature and scope, the SCGI will include due diligence steps applicable to a wide range of risks. Therefore, there may potentially be specific risks associated with specific products placed on the EU market to which the SCGI does not address rules tailored to the individual case.

This measure would enable the SPI to set due diligence requirements, in line with the procedure set in SCGI, in relation to specific social or human rights risks associated with specific materials, components or production processes relevant to specific products or product groups. This empowerment is intended to be used where a preparatory study identifies such specific risks and finds

[27] A complete list is provided in Annex 17 of the impact assessment report of the Sustainable Corporate Governance Initiative

that other instruments, including the SCGI, do not sufficiently address them. The aim is to progressively reduce the risk that products available on the EU market are not linked to human rights violations, when such risk can be clearly identified - as most relevant for products' individual supply chains.

All manufacturers or importers placing the relevant product on the EU market would have the obligation to identify, prevent and mitigate the adverse impacts identified according to concrete due diligence steps spelled out in the measure. Those steps will be adapted to the risk at hand as well as to the specificities of the relevant product, taking account of the impacts on the companies placing it on the market, including SMEs. This product-specific approach allows for targeted and specific due diligence obligations in so far as they relate to the product covered. This ensures a minimum level of effort on the part of all companies placing on the market a particular product, where that product is linked to specific social or human rights risks.

SPI due diligence would be formulated in a way as to ensure that companies are able to integrate compliance with SPI due diligence obligations into their overall due diligence system in case they have one.

Due diligence under the SPI in terms of compliance and enforcement could:

- require the involvement of independent third parties in the pre-market conformity assessment procedure, leading to third party verification of whether a company's due diligence system meets the SPI due diligence requirements (possibly involving audits and continued periodic surveillance). Relevant economic operators would be required to have available documentation demonstrating compliance with the due diligence obligations, including the results of the third-party verification; and

- In addition, allow, in specific circumstances, for the prohibition or restriction of products placed on the market by economic operators not complying with their due diligence obligation set through SPI by national market surveillance authorities.

Annex 14.1 sets out in more detail the differences and coherence between this measure and the SCGI.

Sub-option 3c: Bans on some products

This sub-option would be cumulative with sub-options 3a and 3b. It would include the possibility to prohibit some products or materials in specific products. This would build on a possibility latent in the current Ecodesign Directive[28], and would explicitly allow for such a possibility, in cases where a set of clear criteria are met. This is in essence what was done, among other measures, in the Single-Use Plastics (SUP) Directive.

This measure would go one step further by explicitly allowing for such a possibility where the assessment shows the following:

– important negative impacts on sustainability of specific products (e.g. single use items);

[28] Among the possible specific requirements mentioned in Annex II to the Ecodesign Directive, there is the possibility to limit the quantities of a given substance/material incorporated in the product, which would in principle allow to ban some substance/materials in specific products where the technical, environmental and economic assessment shows the need, feasibility and cost-effectiveness of such measure.

– the existence of alternatives fulfilling the same function (for example another product, including possibly a service) in a more sustainable manner;

– the feasibility and cost-effectiveness of a ban.

Option 4: Sustainability information for consumers and B2B

Sub-problems	Specific objective
1) Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects **2) Too difficult for economic operators and consumers to make sustainable choices in relation to products**	**SO2: Better access to sustainability information along the supply chain**

Providing more transparent and reliable information to economic operators and consumers, on sustainability aspects of the products they can purchase should lead them to make more sustainable choices and, ultimately, drive businesses in the direction of sustainability. The information provided could support sustainable choices by consumers or by economic operators along the supply chain and enable value retaining operations such as: (preventive or predictive) maintenance, repair, re-manufacturing / re-furbishing / upgrade, recycling. This information could also facilitate the work of authorities in charge of market surveillance or customs and increase the effectiveness of the measures proposed under Option 7.

This information may be of different types:

- Information related to sustainability, potentially supporting or complementing requirements developed under Option 3 (for example on environmental impacts, circularity aspects, social aspects or on the tracing of chemicals of concern);
- Information taking the form of a scale of performance levels, with categories of performance enabling to easily compare an individual product with other similar products on the basis of their sustainability performance, and not only on the basis of technical performance and price;

Three sub-options on sustainability information for consumers and economic operators are considered in this impact assessment. The sub-options are cumulative: measures considered in sub-option 4a are also part of sub-options 4b and 4c. Sub-option 4c builds on sub-option 4b by complementing measure 4b.1.

Sub-option 4a: Enhanced information requirements

Sub-option 4a creates an obligation through secondary legislation for manufacturers to disclose and make available the information necessary for consumers and economic operators along the supply chain to make informed choices about the environmental and social impacts of the purchases or procurement and further management of products.

Measure 4a.1 – Information requirement on the durability or reliability of the product or its components

This measure requires from manufactures to provide information on the durability (technical lifetime) or reliability (mean time between failures) of the product or its components. It can accompany a

minimum requirement set in measure 3a.1, which provides for minimum requirements on the same aspects. It can also set an information requirement of its own, where this information would be likely to have a significant effect in driving the market towards more durable and reliable products, without eliminating the less durable or reliable products from the market. For example, this would be useful if these less durable products fulfil specific needs or if the switch to more durable products is likely to be too costly for some consumers. This information could take the form of a durability index, with classes of durability or reliability, where appropriate.

This measure will be implemented in synergy with the option on *'commercial guarantee*' (guaranteed durability) in the Impact Assessment of the "Empowering consumers for the green transition" initiative. The option is described as follows:

Inform consumers at the point of sale of the existence or absence of a producer's commercial guarantee for durability – and of its length - for the entire good and for a duration of at least 2 years.

Measure 4a.2 – Information requirements on reparability and upgradability, including a reparability scoring

This measure works identically to measure 4a.1 in relation to reparability and upgradability, including the availability of spare parts, availability of instructions/software for maintenance / repair operations, delivery time. It can accompany a minimum requirement set in measure 3a.2, which provides for minimum requirements on the same aspects. It includes the possible introduction of a reparability score, building on the scoring system for repair and upgrade of products developed by the European Commission's Joint Research Centre[29]. A similar scoring has been introduced in France with the French reparability index[30]. Preliminary feedback in media articles indicate that progress in the implementation of the French index has already induced behavioural change of economic operators in terms of access to information for self-repairs, with mobile phone producer Samsung being the first manufacturer to publish an online manual for the repair of a proprietary mobile phone model.[31]

This measure will be implemented in synergy with the option on 'repair information' in the Impact Assessment of the "Empowering consumers for the green transition" initiative. The option is described as follows:

Provide consumers, at the point of sale, with a repair scoring index, showing how reparable a product is (for example, with 3 to 5 classes), whenever this is available, or required for that product in accordance with EU or national applicable laws. When no such repair scoring index is required or available, provide consumers at the point of sale with other relevant repair information when made available by the manufacturer, such as information about the availability of spare parts, including a procedure for ordering them, information about the availability of repair services, or the availability of a repair manual.

In relation to software updates or upgradability, this measure will be implemented in synergy with the option on software updates in the Impact Assessment of the "Empowering consumers for the green transition" initiative. This option is described as follows:

Inform consumers at the point of sale about the existence or absence of a minimum period of time (in number of years) during which the producer commits to provide free software updates, including security updates, for goods with digital elements as well as digital content and digital services to keep them in conformity, if this period is longer than the period of the producer's commercial guarantee.

[29] JRC (2019). Analysis and development of a scoring system for repair and upgrade of products. JRC Technical Report. Seville.

[30] The Repairability Index regulation came into force in France on January 1, 2021. It aims to achieve a 60 % repair rate of electrical and electronic products within 5 years. See https://www.economie.gouv.fr/particuliers/tout-savoir-indice-reparabilite

[31] https://www.lemonde.fr/pixels/article/2021/02/01/droit-a-la-reparation-des-appareils-electroniques-premiers-succes-pour-l-indice-de-reparabilite_6068400_4408996.html and https://www.samsung.com/fr/support/repair-guides-spare-parts/

Measure 4a.3 – Informing on the presence of substances of concern and tracing them

As flagged in the Chemicals Strategy for Sustainability, substances of concern[32] should be minimised in products. Where they cannot be avoided, they should be traced to ensure that the products can be handled safely during use, efficiently treated in the waste management phase and, when relevant, that those substances are not perpetuated in material cycles, including in new products produced from recycled materials.

To achieve this, this measure would ensure the tracing of such substances through an information requirement. The main legal consequence (and driver for the avoidance of substances of concern) would be the obligation for manufacturers to ensure traceability of their presence in the product and its main components, throughout the lifecycle of the product.

This measure would aim to ensure that:

- Any economic actor in the value chain, including consumers, is able to receive sufficient information, at the time of purchase, on the substances of concern present in a product at concentrations exceeding a level depending on the product and the substance, including, as a minimum:
    - the name of the substances,
    - their location within the product,
    - the safe use instructions of the product if applicable,
    - and, at least for those substances identified as substances of very high concern under REACH, their concentration levels, at the level of the product as placed on the market, its components and spare parts.
- Waste operators receive information on the relevant product and material categories, when these are not confidential, as well as chemical information relevant for safe disassembly, where appropriate.

Tracing requirements would be set at two levels by:

- Laying down substances harmful to human health or the environment to be tracked for all or for groups of products (starting with those substances for which information requirements exist already today - substances identified as Substances of Very High Concern (SVHC) under REACH - to be gradually increased to substances of concern) - possibly via SPI measures, if 3b.1 enabling the adoption of SPI measures for groups of products is retained.
- Specifying other substances of concern, including those that are not necessarily hazardous, but affecting the broader sustainability of the product, namely recycling, reuse, remanufacturing, to be tracked in product-specific measures.

For the products to which it applies, this measure would aim to overcome the limitations of existing requirements on the tracing of substances in products (in REACH and the Waste Framework Directive[33]) by better defining the reporting level and the data to be provided and by enabling the extension of tracing to a larger group of substances. The manner in which information is made

[32] These include, as described in the recently adopted Chemicals Strategy for Sustainability, substances having a chronic effect for human health or the environment (Candidate list in REACH and Annex VI to the CLP Regulation) but also those which hamper recycling for safe and high quality secondary raw materials.

[33] For detailed articulation with these existing requirements, see *Annex 14*.

available should be adapted to the product and how it is used.[34] Where relevant the resulting information would also be integrated in a digital product passport as provided in Measure 4b.1.

Tracing requirements can either accompany restrictions set by means of existing chemicals legislation on the basis of chemical safety or through measure 3a.3, which provides the possibility to restrict the presence of substances hindering circularity, or be set on their own. Restriction and, in case substances of concern cannot be avoided, tracing requirements set under SPI would both contribute to the minimisation of substances of concern in products.

Measure 4a.4 – Information requirements on recycled content on the product or its components

This measure requires manufactures to provide information on recycled content on the product or its components, for example plastic parts. It can accompany a minimum requirement set in measure 3a.4, which provides for minimum requirements on the same aspects. It can also set an information requirement of its own, where setting a minimum requirement is not feasible or not appropriate, for example where quality specifications vary a lot between products or where the capacity of recycling processes to provide the quality needed in acceptable economic conditions is not certain.

Measure 4a.5 – Information requirements on the environmental impacts along the life-cycle of the product, for example in the form of an Ecological profile

This measure requires manufactures to provide information on the environmental impacts along the life-cycle of the product. It can accompany a minimum requirement set in measure 3a.5, which provides minimum requirements to reduce carbon and environmental footprints through minimum requirements set at process and/or life cycle environmental impact(s) level.

This information could take the form of a product's ecological profile, as provided in Annex I Part 3 of the Ecodesign Directive. The Directive defines such a profile as *'a description, in accordance with the implementing measure applicable to the product, of the inputs and outputs (such as materials, emissions and waste) associated with a product throughout its life cycle which are significant from the point of view of its environmental impact and are expressed in physical quantities that can be measured*.' Even if it has never been implemented so far, the use of the Product Environmental Footprint method could facilitate its definition and implementation.

In the case where specific technical parameters are used, the SPI measure setting the requirement should include the measurement and calculation method and the level required. Tests and measurement methods may be further detailed in harmonised standards, developed by European standardisation organisations on request of the European Commission following the 'New Legislative' approach. The SPI framework act will not pre-determine the choice of the methodology or tool to assess the environmental impacts over the life cycle of a product: this will be decided depending on the product and the typology of requirements to be included, and will be reflected in the SPI measure setting those requirements. In the case where the Product Environmental Footprint method will be used, manufacturers could be required to perform a PEF study for each product model to prove compliance with the requirement, for example using IT-tools that would be made available by the European Commission (similar to the one currently under development for PV modules). If this option is chosen, the study would follow the rules and calculation methods set in Product Environmental Footprint Category Rules, developed following the dedicated Commission Recommendation.

[34] See final report of the recent study on 'Information flows on substances of concern in products from supply chains to waste operators' (DOI:10.2873/289169, 2020, COM).

For articulation with the Green Claims Initiative, see *Annex 14*.

Measure 4a.6 – Information requirements in the form of sustainability performance classes

This measure builds on the information requirements as defined in Measure 4a.5 and includes the definition of life cycle environmental performance levels, with categories of performance enabling to easily compare an individual product with other similar products on the basis of their life cycle environmental performance, and not only on the basis of technical performance and price. This could take the form of a label on the product or as part of the information provided to consumers. This can be a powerful driver to move the market towards more sustainable products. This is in essence the rationale of the Energy Labelling for energy efficiency on the use phase and other environmental and performance characteristics.

This approach could be used when the repartition of the performance of products on the market makes such performance classes technically possible and relevant. Relevant parameters would represent hotspots in the product life cycle, i.e. major environmental impacts in specific or all phases of the life cycle. The environmental impact categories of the Product Environmental Footprint method (individually or combined through normalisation and weighting giving a single score) could be used to provide parameters covering the whole life cycle of products.

In the case where specific technical parameters are used, the SPI measure setting the requirement should include the measurement and calculation method and the level required. Tests and measurement methods may be further detailed in harmonised standards, developed by European standardisation organisations on request of the European Commission following the 'New Legislative' approach. The SPI framework act will not pre-determine the choice of the methodology or tool to assess the environmental impacts over the life cycle of a product: this will be decided depending on the product and the typology of requirements to be included, and will be reflected in the SPI measure setting those requirements. In the case where the European Commission Product Environmental Footprint method will be used, manufacturers could be required to perform a PEF study for each product model to prove compliance with the requirement, using IT-tools that would be made available by the European Commission (similar to the one currently under development for PV modules). If this option is chosen, the study would follow the rules and calculation methods set in Product Environmental Footprint Category Rules, developed following the dedicated European Commission Recommendation.

In addition, environmental performance levels, once established, can be used in the definition of purchasing criteria by public authorities or private companies purchasing departments, and is the basis for incentives schemes mentioned in several measures under Option 5.

For articulation with the Green Claims Initiative, see *Annex 14*.

Measure 4a.7 – Information requirements on a set of social indicators

This measure would build on an assessment of social aspects in the value chain of products, with a view to identify hotspots, i.e. to identify which value-chain actors may have significant positive or negative social impacts. This identification should help identifying the most suitable indicators to be used among a basket of indicators listed in the legislation.

From a policy making perspective the hotspot identification and selection of the indicators could either take place at central level, per sector (increasing the comparability of information) or it could be left at the level of each company (increasing the materiality of the information).

The set of social indicators (or if decided at the level of each company, the method to be followed for establishing the indicators) would be established through SPI measures, including compliance with ILO fundamental conventions. The reporting format and calculation method where relevant, would be

set in the same acts and could provide the inclusion of the reporting on indicators in the European Digital Product Passport provided in Measure 4b.1.

Sub-option 4b: European Digital Product Passport

Sub-option 4b includes the measures of sub-option 4a and develops their ambition by requiring that the information requirements placed on products be displayed in the form of a European Digital Product Passport and include social information and other indicators. Information requirements are added to support the implementation of requirements placed on products as per sub-option 3b. The EU DPP requirements would be set out through the SPI measures, which would also determine the products in scope (see Annex 18 for more details).

Measure 4b.1 – Information requirements in the form of a European Digital Product Passport through SPI measures

Digital technologies provide the possibility to tag, track, trace, localise, and share product related data, down to the level of the individual components and materials. The EU DPP is a structured collection of product related data with predefined scope and agreed data ownership and access rights. Therefore, EU DPP is a combination of unique product identification and data collected by different value chain actors linked to a unique identifier.

The data to be collected and conditions of access would be defined in product-specific SPI measures and could include track & tracing information (e.g. the name of the manufacturer, the geographical origin of the different components, the global trade item number, the name of the authorised representative, etc.), and attributes such as its composition, as well as the information referred to under sub-option 4a above. While the EU DPP data could be unique for each individual product or set at batch/model level, the EU DPP structure would be common for a given product category.

The information made available through the EU DPP should enable consumers and other economic actors to make better-informed decisions on the basis of clear, reliable data[35]. It will boost the visibility and credibility of sustainable businesses and products. The EU DPP will build on existing data and related initiatives[36], linking possibly to existing databases such as the EPREL database. It will be based on a decentralised[37] system, allowing most of the data to remain where they are produced. It may facilitate customs and market surveillance authorities to better carry out their duties on the basis of standardised information, in some cases already verified through independent third-parties.

[35] While preserving confidentiality when required, the data collection of the passport, especially if mandatory, would allow to build anonymised datasets of a number of product impact indicators. Such anonymised datasets are key to enable a transparent technical discussion with Member States and Stakeholders to define environmental (Ecodesign/SPI) criteria. The European Commission hosts for decades several of such very technical consensus-aiming processes to coin secondary legislation, one example being the 'Sevilla Process' that develops mandatory emission limit values and Best available Technique Documents (BREFS) under the Industrial Emissions Directive. https://en.wikipedia.org/wiki/Best_available_technology

[36] Synergies will be sought where possible with other emerging initiatives, such as the initiative related to the digital labelling of mandatory product information of chemicals and the 'empowering consumers for the green transition' on circularity information.

[37] While the proposed system is mostly decentralised, some elements, e.g. the standard setting, will remain centralised.

Measure 4b.2 – Integrating the SCIP Database (implementing Article 9 (1) (i) of the Waste Framework Directive) with SPI requirements

Communication of information on the presence of substances of concern throughout the supply chain and to waste operators (as described in Measure 4a.3) is a challenge. A recent study performed for the European Commission concludes that part of the solution should be digital.[38] Whereas measure 4a.3 provides for information requirements on the presence of substances of concern and their traceability, this measure would go a step further by including that information in the DPP provided in measure 4b.1. As such, the DPP could, where available, take on the digital aspects of the communication requirements provided in Measure 4a.3.

The development of product passports in the context of the SPI also provides an opportunity to further overcome some of the limitations of existing communication obligations related to substances of concern, particularly Article 33 REACH and Article 9 of the Waste Framework Directive.[39] By including information on substances of concern in the DPP it can, in addition to better defining what needs to be communicated as referred to under measure 4a.3, be more effectively communicated throughout the life-cycle and be better tailored to the product(s) to which it applies. Where the EU DPP effectively covers the communication on chemical substances of concern, the progressive transfer of communication obligations under the Waste Framework Directive and REACH to the SPI should be considered. This could eliminate the unnecessary administrative burden of having to provide the same information more than once.

This should also lead to integration with the existing database of information on "Substances of Concern in articles as such or in complex objects (Products)" (SCIP). Currently, the SCIP database contains information required by REACH on the presence of substances of very high concern in 'articles' (also including product components), which suppliers are required to notify to the European Chemicals Agency (see Article 9 of the Waste Framework Directive). Without integration, the introduction of communication obligations on the same (and possibly more) substances via the European Digital Product Passport would risk to create a third obligation to communicate (partly) the same information (under REACH, under the Waste Framework Directive and under the SPI).

Integration with the SCIP database could be realised in different manners. In this regard, the digital part of the proposed obligations to communicate information on the presence of substances of concern in products, could follow **three different paths**:

- Be notified only once to a designated organisation or agency (e.g. European Chemicals Agency, ECHA) that would provide centralised storage and management of the information (e.g. an updated version of the SCIP database). That organisation would provide a reference number/link for the submission that should accompany the product (as part of the EU DPP) and allow information retrieval by other actors;
- Remain under the responsibility of the actors in the supply chain, who should make it available (as part of the EU DPP) to consumers, authorities and waste operators in accordance with the relevant provisions in the relevant SPI measure, based on a decentralised storage approach;
- Give autonomy to companies to decide whether to notify, on a voluntary basis, to the designated organisation, which would store the information, or to make the information available (as part of the EU DPP) to consumers themselves. Whichever their decision, the

[38] See the final report of the recent study on 'Information flows on substances of concern in products from supply chains to waste operators' (DOI:10.2873/289169, 2020, COM).
[39] See for details on these limitations on the 'Tracing of chemicals in products' in Annex 14.

physical tagging of the product would still be under the responsibility of the actor placing the product on the market. The centralised database (e.g. an updated version of the SCIP database) could act as technical support for SMEs, while allowing for integrated value chains to provide the information autonomously. The centralised database could also act as a host to the information on products produced by companies that ceased to exist.

Sub-option 4c: Generalised European Digital Product Passport

While measure 4b.1 on the EU DPP is implemented through SPI measures defining horizontal aspects of the product passport, and detailing the specific features and content associated with groups of products, this sub-option goes one step further by introducing directly in the legislative proposal (revised Ecodesign Directive or separate legislative proposal) some "cross-sectoral" requirements and all the necessary information in terms of product scope, governance, obligation of stakeholders, content and technical features so that the product passport becomes directly applicable to all products in scope. The legislation could provide for a differentiated schedule of implementation, to take account of the various levels of complexity of this implementation on different products. Such direct application could still provide the possibility for SPI measures, should further detailed requirements be necessary for specific product groups or to supplement the common features of the EU DPP provided in the legislation.

Option 5: Reward more sustainable products through incentives

Sub-problem	Specific objective
1) Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects	**SO3: Incentivise more sustainable products and business models to improve value retention**

The use of economic and reputational incentives can be used to break away with linear patterns of sustainable consumption and production,[40] to incorporate environmental and social sustainability and circularity considerations in product design,[41] and to modify the behaviour of economic operators and citizens to make sustainable choices.

The evidence provided in *section 2 Problem definition* above demonstrates that more sustainable decisions in relation to products are not always the first choice for European market operators and citizens due to market, regulatory and behavioural failures.[42] The use of economic and reputational incentives can be used to modify these choices and break away with linear patterns of sustainable consumption and production. For some measures, pilot projects can be used to demonstrate the business case and public good rationale of choosing sustainable products, ultimately raising the level of ambition of Member States in setting up harmonised incentives-based product policies across the Union.

Three sub-options to reward more sustainable products through incentives are considered in the impact assessment. They build on the information requirements and classes of performance developed under Option 4. The three sub-options are cumulative, with an increasing number of measures (except

[40] See for example Ecorys (2010), Tukker, Diaz Lopez, et al (2011), BIO Intelligence service et al (2012), OECD (2016), UN Environment (2020).
[41] See for example European Commission (2019), UN Environment (2018).
[42] **Error! Reference source not found.**.

for measure 5b.1, which is alternative to 5a.1), which correspond to an increasing level of ambition as well as complexity. Sub-option 5a and 5b rely on measures (e.g. Member States incentives on green products, Green Public Procurement, Extended Producer Responsibility schemes) which correspond to already-existing EU instruments. In addition to them, sub-option 5c proposes a set of innovative instruments, which have not been implemented so far. All incentives considered under Option 5 need to be implemented in a way to avoid discrimination between the EU and imported goods and to be in compliance with State aid rules, where applicable.

Sub-option 5a: Enhanced incentives measures

This sub-option focuses on enhancing existing reputational and economic incentives, encouraging Members States to reward products based on their sustainability performance.

Measure 5a.1 Member States encouraged to introduce reputational and economic incentives and supported by the provision of guidelines

Member States have been implementing a number of economic incentives to encourage the uptake sustainable products with different degrees of success (see baseline for Option 5 in ***Annex 10: Impacts of the policy options***). To facilitate effective introduction of incentives at the national level, the European Commission will **provide guidelines** to support public authorities in Member States with the introduction of reputational and economic incentives. The European Commission will pay particular attention to incentives that reward products based on their sustainability performance, making use of the classes of performance developed under sub-option 4a[43]. Depending on the product group, incentives may include pricing mechanisms (including differentiated VAT, eco-vouchers and green taxation) and GPP.

Where appropriate product specific guidelines will also be provided concerning the modulation of financial contributions in the context of Extended Producer Responsibility (EPR), in addition to those already provided in accordance with Article 8 of the Waste Framework Directive. The envisaged outcome of the incentives is to contribute to the strengthening of markets and to increase consumer preference for sustainable products. It is also expected that incentives can contribute to bringing their costs down, making them more affordable.[44] The incentives may also contribute to generating trust in particular among earlier adopters of risky innovative products. The guidelines will be connected to the promotion of voluntary standards, which can play an important role for the uptake of sustainable products and the adoption of sustainable business models, as they can specify minimum levels related to the durability of products and support in the adoption of management systems[45]. Standards also have commercial benefits and can be used as marketing tools for economic operators[46]. In addition to the provision of guidelines, this measure is to be supported by activities focusing on exchange of best practices and training between/for public authorities (e.g. increasing technical capacities and legal expertise of procurers), product-related harmonisation of measures (e.g. revised Ecodesign directive,

[43] The performance classes are described in Measure 4a.6.

[44] OECD (2016) *Creating market incentives for greener products*. OECD Publishing. Paris.

[45] Through this measure, the European Commission can develop guidelines to encourage Member States to promote the wider adoption of circularity voluntary standards among economic operators in those product groups within the scope of the revised Ecodesign Directive (in particular the ISO-59000 series for circular economy and EN-45550 series for material efficiency aspects of eco-design). This is a complementary measure to the existing provisions included in the European Standardisation regulation (2012/1025/EU) and the Annual Union Work Programme on Standardisation, in particular those activities related to the product groups in the revised Ecodesign Directive. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012R1025&from=EN

[46] European Committee for Standardization, Benefits of standards, https://www.cencenelec.eu/research/innovation/benefits/Pages/default.aspx

EU Ecolabel and GPP), and support for the transposition to national law (e.g. eco-modulation of fees in EPR).[47]

Measure 5a.2 Mandatory Green Public Procurement requirements in SPI product–specific rules

Public authorities are major consumers in Europe: public procurement represents around 14 % of the EU's gross domestic product. There are many potential benefits to harmonising green public procurement for products, harmonising criteria used by Member States ensures the functioning of the internal market, improves EU-wide competition, and reduces the administrative burden for economic operators and authorities. Secondly, a direct reduction of the environmental impacts related to public authorities' activities can be achieved. Thirdly, public authorities, as representatives of the collective interest, bear the costs of negative externalities (e.g. as health-care costs or remediation costs) of unsustainable practices and greening procurement offers them a chance to take an active role in the reduction of those externalities.

For SPI, another important benefit could be to bring about a shift in the market towards more sustainable products by creating and sustaining demand for better performing products in terms of the aspects addressed by SPI. A certain, stable and sustained demand of such better performing products provides incentives to the industry to innovate and can drive down the costs of existing sustainable products via economy of scale.

This measure therefore allows for the setting of requirements on public authorities to purchase more sustainable products. Similarly to what was proposed in the recent proposal for a Batteries Regulation[48], this measure would empower the European Commission to set mandatory criteria or targets for contracting authorities and contracting entities (as defined in the legislation on public procurements, i.e. Directives 2014/24/EU and 2014/25/EU) when purchasing products covered by the SPI measures. These criteria and targets should be defined at the level of specific products or well-defined product groups and be based on requirements set for the relevant products through SPI (e.g. based on classes of performance and/or information requirements under Option 4).

The development of clear and implementable targets and criteria requires taking into account information on market availability and economic efficiency, as well as information collected from stakeholders of industry, civil society and Member States. Defining criteria or targets at the level of specific products or well-defined product groups allows for the careful assessment of impacts based on this information. It would allow to take into account the added value and proportionality of creating procurement targets or criteria depending on the market situation of the relevant products.

Sub-option 5b: Linking incentives to performance

This sub-option includes Measure 5a.2 while Measure 5a.1 is replaced by Measure 5b.1, which makes mandatory for Member States the use of classes of performance (see sub-option 4a) when adopting incentives for sustainable products.

[47] SPI Task 4 report – based on inputs from stakeholders.
[48] Art. 70, COM(2020) 798 final

Measure 5b.1 Member States obliged to use classes of performance for reputational and economic incentives

This measure would require Member States - if they provide incentives for products covered by a SPI measure- to target those incentives at the highest performance classes, similarly to the approach taken in the Energy Labelling framework[49].

Linking incentives to performance class has several precedents, for example bonus/malus in France on automobiles where the vehicles are incentivised (or disincentivised) according to their emission class. Another related example is tax relaxation on company passenger vehicles (Taxe sur les véhicules des sociétés) for hybrid (first 2 years) and electric vehicles (zero tax).

Measure 5b.2 Modulation of EPR fees to performance classes

Through product specific implementing measures adopted in the context of the revised Ecodesign legislation, Member States are required to ensure that the fees paid by producers in the context of existing or new Extended Producer Responsibility (EPR) schemes are modulated according to the sustainability performance classes of the relevant product (as described in measure 4a.6).

At present, Member States are required to introduce EPR schemes for several waste streams: waste, electrical and electronic equipment (WEEE), batteries and end-of life vehicles. Member states are also requires to ensure the establishment of EPR schemes for packaging by 31 December 2024. Several Member States have established EPR schemes for additional product categories, such as tyres, chemical products and textiles. The modulation of EPR fees is set out in Article 8a of the revised Waste Framework Directive 2008/98/EC which stipulates that in the case of collective fulfilment of EPR these fees:

"are modulated, where possible, for individual products or groups of similar products, notably by taking into account their durability, reparability, re-usability and recyclability and the presence of hazardous substances, thereby taking a life-cycle approach and aligned with the requirements set by relevant Union law, and where available, based on harmonised criteria in order to ensure a smooth functioning of the internal market"

Through modulation, the financial contribution paid by the producer (any natural or legal person who professionally develops, manufactures, processes, treats, sells or imports products) to comply with EPR obligations, will vary according to specific criteria relating to aspects of their sustainability. Products with a higher environmental performance will be charged at a lower rate than those with a lower environmental performance. Under this measure the modulation is harmonised by basing this on product performance classes.

Sub-option 5c: Consumption-oriented incentives

This sub-option is based on sub-option 5b plus the introduction of a set of innovative (and therefore more complex in their implementation) incentive measures.

Measure 5c.1 Bonus for EU citizens to reduce carbon footprint.

This option would be actionable only in case SPI will develop environmental requirements on the basis of an existing or on-purpose developed PEFCR[50]. For each product in scope of the new SPI

[49] Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU, Article 7(2) "*Where Member States provide incentives for a product specified in a delegated act, those incentives shall aim at the highest two significantly populated classes of energy efficiency, or at higher classes as laid down in that delegated act*"

[50] Product Environmental Footprint Category Rules, see https://ec.europa.eu/environment/eussd/smgp/PEFCR_OEFSR_en.htm

there will be available (through the corresponding PEFCR) the environmental profile of the representative product, meaning the average product placed on the EU market. The environmental profile provides a value for the environmental impact of the average product for each of the 16 PEF impact categories; it also allows, as an option, to have the value of the total weighted impact (single score).

Each product in scope of the new SPI will be assigned a carbon footprint score (calculated through PEF) and included in the European digital product passport (EU DPP). When the product is bought, the bill would indicate the carbon footprint value of the corresponding representative product (e.g. the carbon footprint of the average pair of jeans sold in Europe), the carbon footprint score of the specific product bought, and the difference between the carbon footprint of the average product and the specific one. At the end of each fiscal year, each family could calculate the amount of carbon "saved" through their consumption (compared to the carbon they would have consumed buying only "average products"). Member States would then be allowed to compensate each family proportionally to the amount of carbon saved (e.g. through eco-cheques or other financial incentives). This measure would promote the uptake of low carbon products, steer sustainability oriented consumption habits, and could help compensating families for their efforts in contributing to achieving societal-oriented objectives like carbon neutrality. The bonus would be a win-win solution. The manufacturer would have an incentive to place on the market products with lower carbon footprint, as this would lead to higher market uptake from the consumers. The consumers would be incentivised to buy products with lower carbon footprint, as they would receive a direct economic benefit through a tax rebate calculated as difference between the carbon footprint of the average product sold in the market and the carbon footprint of the specific product bought. This approach would also address the known "knowledge gap" for which people do not act if that does not translate into a direct economic saving for themselves. The implementation of the measure would require a calculation methodology, scoring system and tables with rates or equivalences between the tax return and the carbon savings. [51]

Measure 5c.2 Introduction of an excise proportional to the life cycle environmental performance of the products placed on the EU market.

The use of environmental taxes in European policy making is widespread (e.g., in the form of an excise on higher CO2 emission fuels).[52] At the EU level, the Energy Taxation Directive (Council Directive 2003/96/EC) defines the rate for the excise duty in place for energy products and electricity.[53] The "Energy Taxation directive" provides a minimum EU threshold and Member States define the level of ambition thereof. Member States can apply higher rates for certain usage of the products (petrol, gas oil, kerosene, heavy fuel oil, liquefied petroleum gas, natural gas, coal and coke, electricity and mineral oil). It also establishes reduced rates and exceptions for green electricity, biofuels and other energy efficient usages.[54]

This measure in a way similar to 5.b.1 which covers a wide range of incentives, but tackles the issue in a more horizontal manner through an excise duty. The excise duty, linked to the relevant performance class, would be levied on the products placed on the EU market, irrespective of where they are produced.

The introduction of an EU-level excise proportional to the environmental performance of products would need to be first implemented at the pilot level for few strategic products within the scope of the

[51] BIO Intelligence Service et al (2013). *Modelling of Milestones for Achieving Resource Efficiency*. Project for the European Commission, DG Environment. Paris.

[52] See also: Barhold (1994) Issues in the design of environmental excise taxes. *Journal of economic perspectives*. 8 (1) pp. 133-151

[53] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32003L0096

[54] https://ec.europa.eu/taxation_customs/sites/default/files/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf

revised Ecodesign directive, and considering available evidence on the environmental performance of said products (e.g., LCA studies, PEF, etc.). The implementation of the measure would require a calculation methodology, guidance documents and tables with the different rates for the products within scope of the excise duty, the life cycle addressed, and across the different Member States.

Option 6: Measures for circular economy and value retention

Sub-problem	Specific objective
1) Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects **2) Too difficult for economic operators and consumers to make sustainable choices in relation to products**	**SO3: Incentivise more sustainable products and business models to improve value retention**

Value retention and value maximization aims at capturing value that is lost through unoptimized systems or practices. This can mean that both economic and environmental value is wasted when products are not used to their maximal capacity.

For example, it happens that producers, importers or retailers destroy unsold goods through landfilling or incineration, due to various reasons, whether economic or logistical (e.g. warehousing) or marketing (e.g. launch of a new product, good scarcity, brand exclusivity). These goods are often still fully suitable for use.

It can be challenging for businesses, particularly SMEs, to launch circular and value retention activities in markets and value chains that are linear, policies are therefore needed to provide a conducive and supportive framework.

Circular business models (CBM) include (1) **value retention actions,** such as for example maintenance, repair, re-furbishing, re-manufacturing, component harvesting, upgrading and reverse logistics, (2) **value maximisation actions**, such as for example products-as-a-service,

Sub-option 6a: Promotion of value retention and value maximisation

This sub-option supports economic operators and citizens to make sustainable choices in relation to products, and incentivise development of markets for circular business models.

Measure 6a.1. Provide guidelines on supporting circular business models

To foster the change of paradigm towards the implementation of circular economy, a comprehensive knowledge on designing circular business models (CBM) is necessary. There is limited transferability of existing circular business models, and no exhaustive framework supporting both companies and policy-makers to design CBMs.

This measure focuses on the **provision of guidelines** for encouraging public authorities and economic operators in Member States to foster the uptake of CBM: such as for instance (but not limited to) product-as-a-service, maintenance, repair, re-furbishing, re-manufacturing, reverse logistics, upgrading, and collaborative and/or sharing economy. The guidelines are intended to provide support to public authorities and economic operators in addressing barriers and drivers analysed in Annex 7: Problem Definition. Through this measure, specific guidelines present existing EU-level instruments and share best practices from Member States-level programmes supporting CBMs, such as financial and technical support, reduced VAT rates for repair services, material brokerage services, public

procurement, identification of circular opportunities and target setting. The guidelines will cover direct or indirect financial support, e.g. access to information about available funding supporting economic operators interested in developing sustainable product initiatives, or direct access to public, private or blended financing, (e.g. lending and grants).[55] Covering both the improvement of current business models and the development of new ones, they will also assist stakeholders in defining the operation of CBMs and its various components, such as value proposition, customer segments, channels, costs and revenue streams, activities, partnerships, etc. The change of paradigm to a circular economy will require to address different kind of stakeholders, as both companies with significant market shares and emerging companies have a role to play.

The Guidelines can be used in combination with venture capital funding of the EIC fund in projects eligible for the EIC accelerator supporting certain types of CBMs, the support of specific CBMs used by SMEs in the EU Taxonomy (in particular for the objective of transition to a circular economy), guidance about the use of the Transformation Capital Initiative of Climate KIC[56], etc.

Measure 6a.2. EU-wide hub supporting the uptake of circular business models

This measure sets up an EU-wide hub supporting the uptake of circular business models, channelling information and services including awareness raising, cooperation, provision of training, exchange of best practices, etc.[57] Through case-studies and lessons-learnt sharing, the hub will support the geographical expansion of CBM across Europe, with a specific attention paid to avoid lock-in effects and hence ensure sustainability of the highlighted models. It responds to the need to address the market failure of imperfect information (CBM are not known or properly understood)[58] and that markets for circular business models are insufficiently developed. In its implementation, it will be closely linked to the European Circular Economy Stakeholder Platform (ECESP). The EU CBMs hub can follow the model of a one-stop shop that gathers existing information and services hosted / managed by other programmes and agencies at the EU and MS level. Such hub can be built on the "no wrong door" model and/or could be part of the services of the Enterprise Europe Network. The hub can be subsequently linked to the existing infrastructure, communication channels and community of practice/ network of initiatives such as the Circular Economy Stakeholder Platform, and the CircLean Network of businesses and SMEs for Industrial Symbiosis. Following the model of knowledge exchange implemented by the Canadian Clean Growth Hub for the support of cleantech,[59] existing measures would be presented across the environmental life cycle of a product (design phase, manufacturing, use phase, end of life). It would also highlight the type of horizontal support measure, for instance:

- Guidance: technical, administrative and policy guidance documents (from different product policies, e.g., EMAS, GPP)
- CBMs label and self-assessment tool to identify and design CBMs
- Training and capacity building (European Institute of Innovation & Technology, EIT, KIC's training on sustainable business models; reparability training for specific product groups, etc.)

[55] Impact Assessment, Sub-problem 1
[56] https://www.climate-kic.org/programmes/transformation-capital/
[57] For further references, see also: SITRA, 2020 Rethinking ownership (sitra.fi)
[58] See also in ***Error! Reference source not found.***, *section* ***Error! Reference source not found.***.
[59] https://www.ic.gc.ca/eic/site/099.nsf/eng/home

- Direct assistance in resource efficiency assessment, Intellectual Property Rights - IPR, certification, incubation, knowledge valorisation, and innovation services (EEN relay services, European Resource Efficiency Knowledge Centre - EREK, IPR helpdesk)
- Incubator and accelerator programmes
- Financial support (European Investment Bank, EIB, circular economy financing facility and investment criteria)
- Network and ecosystem building (EIT KICs incubation and acceleration services)
- Awards (European Business Awards for the Environment EBAE, Dutch Circular awards, Economy Startup Europe Award - Circular Economy Category 2018)

Sub-option 6b: Enhanced value retention and value maximisation

This option includes all measures included in option 6a, and goes further by introducing a transparency obligation and a ban on the destruction of unsold consumer products via SPI measures in the context of the revision of the Ecodesign directive.

Measure 6b Introduce a transparency obligation and a ban on the destruction of unsold consumer products via SPI measures

This measure first introduces a transparency obligation, requiring economic operators to disclose information on the number of unsold products destroyed, the reasons for their destruction and their subsequent treatment. Its purpose is to dis-incentivize destruction, while it can also facilitate monitoring the extent to which destruction of unsold products takes place in practice. This obligation also applies in case products were destroyed under applicable exemptions to a prohibition on destruction of unsold products, which would be introduced via SPI measures. In this case it serves as a dis-incentive for circumvention and as a tool for verification purposes. A transparency obligation is a relatively 'light' measure compared to a requirement to report to competent authorities, and would be in line with the approach under the Non-Financial Reporting Directive which requires all large companies and all companies listed on regulated markets (except listed micro-enterprises) to disclose information on the way they operate and manage social and environmental challenges. This transparency requirement gives companies flexibility on how to disclose relevant information following international, European or national guidelines according to their own characteristics or business environment.

The main implementation principle of the ban on the destruction of unsold consumer products is to prohibit the destruction of unsold consumer products via SPI measures for specific products or a group of products under the SPI scope. Instead of discarding unsold products these would remain available for sale, donation or possibly upgrading and remanufacturing. Destruction of unsold products can be considered the discarding or intentional damaging of these products after which they enter into the waste stage. Recycling of this waste would still be considered destruction, given the need to e.g. shred or take apart the products for this purpose. In principal the measure does not distinguish between unsold and returned products, which after their return remain unsold products.

A ban on the destruction of unsold products would incentivise stakeholders to improve product stock management across the value chain in order to prevent surpluses and in order to minimise the volume of unsold products. It would also make alternatives for destruction more attractive, notably sale (possibly at a reduced price) and donation.

The product scope of a ban on the destruction of unsold products is determined through SPI measures, based on an assessment of the extent to which destruction of unsold products occurs in different product categories and for which categories this measure would be proportionate. To this end, the Commission will collect and make use of information disclosed by economic operators under the transparency obligation on the destruction of unsold consumer products. Under this obligation economic operators are required to publicly disclose the number of unsold consumer products destroyed per year differentiated per type or category of products; the reasons for their destruction; and their subsequent treatment.

Based on this information the Commission will determine for which groups of unsold products a prohibition on their destruction should be considered. Taking into account the reported reasons for destruction the Commission will define exemptions to a prohibition on destruction to ensure proportionality of the prohibition. Exemptions may for instance include the destruction of unsold products: in view of health and safety concerns; in view of damage to such products; with a view to the remanufacturing of such products; in case the product has been refused for donation, or; by small and medium-sized enterprises.

While the measure prohibits the discarding of unsold goods, it does not stipulate what holders may or should do with these products instead. The measure applies to importers, traders and distributors of products covered by the SPI measure(s). Where exemptions apply discarded products should be treated in an environmentally sound manner, taking into account the waste hierarchy.

The SPI measure that introduces the ban on destruction of unsold products may exclude targeted economic operators, for instance by focusing on large companies and all companies listed on regulated markets (except listed micro-enterprises) holding unsold products in the EU covered by the SPI measure. This could be considered in order to ensure proportionality of the measure. The transparency obligation does not apply to SMEs. It is expected that this instrument is more effective as a disincentive when applied to large enterprises. SMEs seem to only cover a limited market share. In e-commerce of consumer goods this is an estimated 12.76%[60].

Circumvention, possibly by exporting unsold products for destruction in third countries, may be addressed by applicable waste legislation. If products are exported to be destructed this should be considered as an international shipment of waste. Shipments of waste from the Community to third countries (except EFTA countries) for disposal are prohibited under the Waste Shipment Regulation (WSR). Transport for recovery should, depending on the type of waste and destination, at least be compliant with general WSR information requirements and could be stopped in apparent cases of destruction of unsold products covered by applicable SPI measures. Transparency obligations provide a further dis-incentive for circumvention.

Option 7: Strengthened application of the Ecodesign framework

Sub-problem	Specific objective
3) Sub-optimal application of the current Ecodesign legislation	**SO4: Improve application of sustainable product legislative framework**

The Ecodesign framework has proven to be an efficient framework to regulate energy related products. However, some weaknesses have been identified, both during the definition of the implementing regulations and their enforcement. Potential remedies to these weaknesses have been

[60] As estimated based on Euromonitor data for e-commerce for 2021.

identified by evaluations[61], reports[62] and positions from various stakeholders including the European Parliament[63].

Three sub-options are identified, progressively extending the number of actors directly involved. Thus, the first sub-option (7a) focuses on improving the processes leading to the adoption of measures, sub-option (7b) focuses on better enforcement, with measures that focus on market surveillance, and sub-option (7c) proposes a model under which the European Commission is provided with executive capacities, to prepare measures and to support and complement Member States in fulfilling their role.

Sub-option 7a: Improve the current framework to increase efficiency

Measure 7a.1 Streamline the procedures for the development and adoption of Ecodesign implementing regulations

The process for adopting implementing measures under Ecodesign is subject to procedural and methodological requirements. In recent years, the Better Regulation steps were added to this already quite extensive process. The process currently followed for adopting Ecodesign measures is thus more lengthy and complicated than for the adoption by the European Commission of an ordinary legislative proposal, despite the typically rather narrow, product-specific scope. Over a time span of about 4 years, each review of the implementing measures (Ecodesign, often coupled to Energy labelling) for a product group entails detailed preparatory or review studies, expert stakeholder meetings, consultation forum meetings, roadmaps, impact assessments, open public consultation, feedback mechanism and Member States' committee vote in the final stages of adoption. This measure aims to streamline this process and make it more efficient by acting on its different steps.

Firstly, the combination of preparatory/review studies and impact assessment studies is proposed since there are many common aspects in the 2 processes. Consequently, the call for evidence, the consultation of stakeholders through the Consultation Forum and internal European Commission consultations could run partially in parallel allowing inputs to be used in a more dynamic manner. The underlying methodology (currently the MEErP) would continue to provide the structure for the studies (together with the Better Regulation impact assessment guidelines), but the integration of circularity aspects and clear timelines would have to be introduced. A new digital and more interactive platform (i.e. integrating functions of online fora) could facilitate and enhance stakeholder contributions. In addition, some of the meetings could be held online; recent experience has shown that they can be effective and inclusive.

The adoption of product specific regulations would be done individually, when they are ready, avoiding a package approach that has been criticised by the ECA[620], the European Parliament[621] and stakeholders.

Moreover, all the steps necessary to effectively follow this process should be codified by means of creating a handbook for policy officers. This handbook should provide guidance on the development of measures while a mechanism for updating it regularly should be set up. This mechanism should include among other things periodic meetings of policy officers who would flag identified areas for improvement, discussing remediation actions. In addition to the handbook, internal training modules/ sessions could be set up.

[61] See for example Ecofys, 2014 and CSES, 2012
[62] ECA 2020 Special Report: EU action on Ecodesign and Energy Labelling: important contribution to greater energy efficiency reduced by significant delays and non-compliance
[63] European Parliament resolution of 31 May 2018 on the implementation of the Ecodesign Directive (2009/125/EC) (2017/2087(INI))

Measure 7a.2 Introduce possibility to collect data from manufacturers and retailers regarding regulated products sales and usage

This measure would set out the possibility for the European Commission to collect data from manufacturers for products regulated under SPI measures, in order to facilitate and speed up their review. These data would include how many products of each product model were placed on the EU market by the manufacturers. In addition, the European Commission could request retailers to share sales numbers of products covered or to be covered by SPI measures. These data allow to better estimate market penetration of various product types, linked to sustainability characteristics, at EU level, and would inform the studies for the revision of product specific regulations. Access to data would facilitate and speed up the potential review of existing product specific regulations not relying on the good will of manufacturers and retailers[64]. The advantages of this measure will be effective in the medium term, when the time comes to review an SPI measure. The possibility to collect market data from manufacturers and retailers should not add much burden since these data are readily available. In addition, market data are already used under the current Directive in preparatory and review studies and consultants usually buy them. This would therefore add no complexity or additional delays; it would rather save time and facilitate the studies. Concerning third countries producers, the requirement to introduce data in the digital product passport will be mandatory. Already existing similar international standards (e.g. ISO/IEC 15459-6:2020 or ISO/IEC 16022:2006) foresees internal control checks, supported through IT systems, that impede the possibility of moving a product along the supply chain if certain information is not provided, or it is not provided in the correct way. Similar controls could also be performed by custom and market surveillance authorities.

Measure 7a.3 Expand provisions related to third party conformity assessment

Conformity with some of the requirements considered under Option 3 and 4 cannot be verified on the final product (e.g. the life-cycle carbon footprint of product cannot be assessed the same way as its energy efficiency). This means that enforcement needs to rely mostly on the relevant (technical) documentation. The involvement of independent third parties in the relevant pre-market conformity assessment procedure could provide an extra safeguard for the correct application of those requirements (if retained), thereby increasing compliance and ensuring the availability of complete and verified documentation.

The current framework does not provide for the structural involvement of independent third parties in conformity assessment procedures. The default procedures for ecodesign implementing measures do not provide for third party involvement, and measures can refer to procedures involving third parties only where 'duly justified and proportionate to the risk.' This possibility has not yet been taken up in existing measures.

This measure would ensure that the SPI allows for the structural use of conformity assessment procedures involving third parties. It would lay down the relevant conformity assessment module(s), as well as the requirements and process for selecting the third parties considered independent and capable to assess conformity with the relevant requirements[65]. The SPI measures would specify which

[64] While preserving confidentiality when required, such mandatory data collection would allow to build anonymised datasets of a number of product key indicators (e.g. energy consumption, direct emissions, life cycle data). The availability of such anonymised datasets is key to enable an evidence-based transparent technical discussion with Member States and Stakeholders to define environmental (Ecodesign/SPI) criteria. The European Commission hosts for decades several of such very technical consensus-seeking processes to coin secondary legislation, one example being the 'Sevilla Process' run by DG Environment and DG JRC, which develops mandatory emission limit values and Best available Technique Documents (BREFS) under the Industrial Emissions Directive, including bespoke software hosted by the Commission (JRC) for confidential data and input storage, anonymization and sharing. https://en.wikipedia.org/wiki/Best_available_technology

[65] The Commission's JRC could have a role in ensuring the long-term storage and methodological coherence of datasets

module(s) apply, allowing for the application of third party conformity assessment where feasible and appropriate for the relevant products and requirements.

Sub-option 7b: Strengthen market surveillance by Member States

This option includes all the measures provided for under option 7a.

As outlined in *Annex 15*, market surveillance is critical to ensure the effectiveness of the entire Ecodesign framework. As shown in the annex, the current level of enforcement of the Ecodesign measures is insufficient and market surveillance needs to be strengthened. This is all the more true in the context of the SPI. Effective enforcement of product sustainability requirements is essential to ensure the functioning of the internal market, provide a level playing field for economic operators, and to realise the environmental gains envisaged by SPI. It is therefore essential that the level of resources, both for the European Commission and the Member States is brought to an appropriate level and that adequate legislative and non-legislative measures are taken.

Strengthening enforcement, while not increasing the burden on economic operators, should involve increasing the frequency, effectiveness, and coordination of market surveillance activities. This requires the full commitment and involvement of national authorities, but also support from the European Commission. Whereas part of this will be achieved through the EU Product Compliance Network established by the Market Surveillance Regulation (EU) 2019/1020 and other horizontal measures, specific complementary measures can be undertaken through the Sustainable Products Initiative. The measures proposed under sub-option 7b and 7c focus on the requirements proposed under policy options 3 and 4 for the products under the extended scope of the revised Ecodesign Directive (see option 2). The measures intend to enhance the enforcement of the implementation of SPI requirements and do not aim at directly strengthening the overall enforcement of product legislation because the relevant internal market legislation has been just revised. The specific options foreseen in 7b and 7c also intend to take into account the specific challenges related to enforcing requirements on sustainability performance. Therefore sub-option 7b and 7c focus on SPI-related aspects coherent with the new market surveillance regulation.

Measure 7b.1 – Make relevant product information digitally available to market surveillance authorities

Access to technical documentation of products is key for market surveillance authorities (MSAs) to verify compliance of products, for example to compare it with test results. The Energy Labelling regulation[66] has spearheaded this by requiring the availability and centralised storage of such information for products under its scope in a digital format. However, the Ecodesign Directive does not provide for the publication of digital information.

Based on the lessons learned in the setting up of the energy labelling database (EPREL) and linked to the concept of the European Digital Product Passport (sub-option 4b and Annex 18), this measure will guarantee that the revised framework enables product specific rules to require suppliers (manufacturers, importers, authorised representatives) to make available relevant product information in a digital format, easily retrievable by Market Surveillance Authorities. This measure will allow for market surveillance authorities to access information without having to request it from suppliers. Specific implementation will be defined linked to the choices made under policy option 4. For example, in the absence of a European Digital Product Passport the way this information could be made available to Market Surveillance authorities through the EPREL database.

[66] 2017/1369

Experience shows that market surveillance will be further facilitated if digital information includes the tests and calculations made by the manufacturers to demonstrate conformity in line with the applicable conformity assessment procedure, where relevant also including information from third party conformity assessment bodies. This shall be part of the information provided.

Measure 7b.2 – Structural technical support to improve cooperation between MSAs and ensure sufficient capacities

Market Surveillance Regulation (EU) 2019/1020 foresees a role for the European Commission in helping improve coordination and cooperation between MSAs, as well as in ensuring they have sufficient capacity to carry out their tasks. This measure would build on this and give shape to this role in the specific context of the SPI.

Based on the priorities identified together with MSAs, the European Commission would – among other things:

- organise and fund joint market surveillance and testing projects in relation to specific products or requirements, to contribute to the sharing of capacities and knowledge and to increase enforcement;
- organise/provide support and funding for Member States' (joint) investment in market surveillance capacities, including equipment, IT tools and trainings, especially in relation to new kind of requirements;
- designate Union testing facilities in line with Article 21 of the Market Surveillance Regulation to ensure sufficient laboratory capacity, as well as to ensure the reliability and consistency of testing.

If needed, the European Commission would provide increased support to allow the relevant Administrative Cooperation Group[67] (ADCO) to meet more often, including by digital means. In addition to facilitating the harmonised application of SPI rules, increased ADCO coordination would serve to identify priorities for cooperation or Union support.

In line with Article 36 of the Market Surveillance Regulation, the Union may provide financial support for the realisation of these support actions. This measure would go beyond by committing the Union to provide financing for market surveillance support measures specifically in relation to the SPI, possibly using funds foreseen under the internal marker pillar of the Single Market Programme.[68]

These actions would, to the extent possible, be developed in the framework of the Union Product Compliance Network. They would further facilitate the correct understanding and harmonised implementation of SPI rules. Lastly, these actions can contribute to improving cooperation between MSAs and customs authorities.

Measure 7b.3 - Organise common trainings for staff of notified bodies, notifying authorities and MSAs

Option 7a.3 would enlarge the group of entities involved in implementing and applying SPI rules, adding notified bodies and notifying authorities. Incomplete knowledge or lack of understanding of

[67] European cooperation on market surveillance takes place through informal groups of market surveillance authorities, called Administrative Cooperation Groups. https://ec.europa.eu/growth/single-market/goods/building-blocks/market-surveillance/organisation/administrative-cooperation-groups_en.

[68] https://eismea.ec.europa.eu/programmes/single-market-programme/internal-market_en

applicable rules on the part of these entities can hinder the proper application of product regulations. In addition, divergent interpretation and application of the rules creates market distortions and interfered with the functioning of the internal market.

The Market Surveillance Regulation ((EU) 2019/1020) mandates the European Commission to, in the context of the EU Product Compliance Network (EUPCN)[69], to organise common training programmes and personnel exchanges for MSAs. This measure would make use of that mandate by organising periodic trainings (at least once a year) with regard to the SPI framework, on for example:

- the correct interpretation and application SPI rules, including in the context of common simulated cases;
- methods and techniques relevant for applying or verifying compliance with SPI rules.

The trainings would be planned in close cooperation with Member States and the ADCO. They would be based on Member States' market surveillance planning and where relevant focus on products with higher compliance risks.

This measure would also complement the Market Surveillance Regulation by including in the common trainings also the staff of notified bodies and notifying authorities involved in pre-market conformity assessment procedure related to SPI requirements. This will further facilitate the development and maintenance of a harmonised approach to the implementation and enforcement of the SPI. In addition, the SPI could add minimum requirements for participation in relevant trainings, e.g. representatives of the relevant authorities would be required to take part in at least 1 relevant training annually.

Measure 7b.4 – Publish MSA penalties decisions

The Ecodesign Directives provides that the Member States shall lay down the rules applicable to infringements, and communicate them to the European Commission. The penalties shall be effective, proportionate and dissuasive. As a further deterrent of non-compliance, under this measure the European Commission will publish the penalties and enforcement decisions that are taken in the framework of the application of the SPI framework and which are communicated by national authorities by existing tools such as the Information and Communication System for Market Surveillance[70] (ICSMS), in agreement with them.

Measure 7b.5 – Create a benchmark and a reporting obligation for Member States

The SPI framework will require Member States to report, in addition to the reporting under ICSMS and on the basis of what they indicated in their National Market surveillance programme, on their activities related to sustainable products. The statistical data that MSAs would provide to the European Commission following their activities as laid down in Regulation 2019/1020 should allow the separation of the data on actions they have taken related to SPI. The European Commission could then, possibly in the context of the annual report published on the ICSMS, create a benchmark and publish the performance of the MSAs in relation to SPI-related activities.

[69] https://ec.europa.eu/growth/single-market/goods/building-blocks/market-surveillance/organisation_en/eu-product-compliance-network_en

[70] ICSMS (Information and Communication System for Market Surveillance) is the comprehensive communication platform for market surveillance on non-food products and for mutual recognition for goods. https://webgate.ec.europa.eu/icsms/?locale=en.

Measure 7b.6 – Establish requirements for market surveillance checks

It is essential for the effectiveness of the SPI that MSAs carry out compliance checks on an adequate scale. The level playing field can only be safeguarded and the potential environmental improvements can only be realised if compliance with sustainability requirements is checked systematically, thereby removing non-compliant products from the market and creating effective deterrence.

Under this option the SPI would provide for the setting of requirements on the frequency of checks to be performed in relation to specific products and/or requirements. These requirements could take the form of:

- common criteria to be used by MSAs to establish the frequency of check in relation to specific products (making use Article 11(4) of the Market Surveillance Regulation);
- minimum amounts of checks to be performed in relation to specific products, for example based on the amount of products made available on national markets (based on Article 8 of Regulation (EU) 2018/858).

In addition, the SPI would allow to prescribe the kind of checks to be performed and the methods to be used for those checks, where feasible and appropriate in relation to specific product.

To support MSAs in realising the potential additional efforts (and to ensure they do not come at the expense of other efforts) the SPI would foresee targeted financial support, possibly using funds foreseen under the internal marker pillar of the Single Market Programme.[71]

Sub-option 7c: Reinforce EU level implementation and complement Member States' market surveillance

While options 7a and 7b rely on the strengthening and reinforcement of existing capacities, Option 7c provides for the creation of complementary EU level capacities to, where needed and appropriate, support or reinforce the implementation and enforcement of the SPI. The envisaged capacities are described in the measures below. This option complements options 7a and 7b.

Measure 7c.1 – Complement national market surveillance where needed

With this measure, would be allowed, at its own expense, to organise and carry out market surveillance actions that are independent of those carried out by Member States under their national market surveillance obligations, in close coordination with them.

This capacity would be used where necessary and appropriate to complement Member States' actions while respecting the principle of subsidiarity. In planning potential supporting activities, the European Commission would take account of available data on the compliance of specific products and in relation to specific requirements, as well as of the national market surveillance strategies drawn up pursuant to Article 13 of the Market Surveillance Regulation ((EU) 2019/1020). Activities would be closely coordinated with Member States in the SPI ADCO and, where relevant, the EU Product Compliance Network. Before the European Commission carries out market surveillance activities, it would notify the Member State where the relevant products were made available on the market. The SPI would include a general obligation for Member States to cooperate with the European Commission when it carries out market surveillance activities.

If during these activities the European Commission establishes non-compliance, it should be entitled to initiate Union-wide remedial actions to restore the conformity of the products concerned. To this

[71] https://eismea.ec.europa.eu/programmes/single-market-programme/internal-market_en

end, the SPI would provide for the adoption of implementing measures containing harmonised corrective or restrictive measures to be implemented by Member States, analogous to decisions to widen national market surveillance measures to the whole EU taken in the context of the Union safeguard procedure that is a standard part of EU product legislation.[72]

This measures would be based on provisions similar to those included in Regulation (EU) 2018/858 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles - in particular Articles 9 and 53 thereof.

Measure 7c.2 – Product monitoring and EU testing capacity

This measure provides for the creation, where relevant and in complementarity with Member States needs and capacities, of product monitoring and testing facilities at European level, to assist with both upstream definition of product requirements and downstream market surveillance.

In the context of ecodesign preparatory and review studies, the European Commission currently often relies on external consultants for determining product characteristics (including by conducting product testing in some cases). Increasing the European Commission's capacity to test products and verify measurement methodologies will allow for faster development of product regulations, and faster adaptation capacity to new market developments, improving the appropriateness of the requirements, and in particular the verification tolerances, relying, where necessary, on external laboratories, and acting in a coordinated manner with national market surveillance actors.

These new facilities could also be used in the framework of measure 7c.1, entrusting the European Commission with a market surveillance mandate. They could be designated as Union testing facilities, within the meaning of Article 21 of Regulation (EU) 2019/1020 of the European Parliament and of the Council of 20 June 2019 on market surveillance and compliance of products, with the objective to "contribute to enhancing laboratory capacity, as well as to ensuring the reliability and consistency of testing, for the purposes of market surveillance within the Union".

Measure 7c.3 – Assistance to implementation for suppliers and MSAs

The process of verifying the correct implementation of ecodesign rules can be long and complicated. For manufacturers or importers, questions frequently arise on specificities of the implementing regulations, trying to make sure that their understanding of the rules is accurate. Although this can be addressed partly by making the implementing rules as straightforward as possible, the important number of rules applying can make it complex for stakeholders that will seek confirmation of their interpretations. Similarly MSAs may lack capacity or specific knowledge to perform their tasks and verify the compliance of relevant products covered under SPI.

Assistance would be provided to suppliers and MSAs by a dedicated EU level service, answering specific queries through non-binding advice, but also in the form of trainings and presentation for stakeholders, to facilitate the correct understanding and implementation of rules. This measure would go further than measures 7b.2 and 7b.3 in that it would also include assistance also to manufacturers (in addition to MSAs). It would provide a dedicated and permanent channel for assistance.

[72] See for example Article 39 of the Fertilising Products Regulation (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2019:170:FULL&from=NL).

Measure 7c.4 – Third party channel for market surveillance

Citizens and compliant suppliers are the first affected by the placing on the market of non-compliant products, as this affects their choices and creates market distortions. These stakeholders can also be the first to discover that a product they have acquired or the product of a competitor is not compliant. Creating a reporting channel for third parties to report suspected cases of non-compliance will support the work of Market Surveillance authorities by allowing them to focus on likely cases of non-compliance. This reporting channel will be open to all stakeholders, centralised, and allocate the verification of reported cases to the most relevant Market Surveillance actors.

Options discarded at an early stage

1. *Discarded measure under option 6 in the form of an obligation for companies to take back, or donate for use, unsold products*

This measure sets an obligation for companies to take back or donate unsold products, and to declare their amount, to foster greater transparency. It has been discarded at an early stage due to the costs and the administrative burden associated to it, which are deemed not proportionate to the environmental and social benefits it could generate. Furthermore, it has significant overlap with the ban, but would be a less efficient means of contributing to its objectives.

Description of the measure

This measure would include creating dedicated registries in Member States for specific product groups to monitor the amounts of unsold products. It would also set obligations on relevant actors in the value chain (e.g. producers, importers, retailers) to take back or donate for use unsold products and to monitor and report their amount to national relevant authorities. To preserve commercial confidentiality, only aggregated figures per type of products could be made publicly available. The diffusion of the figures could force a whole value chain to prevent destruction of the unsold goods and eventually improving its stock management processes.

For some product groups, registries already exist in Member States (e.g. in the context of EPR for WEEE) where the producers declare the products placed on the market every year. In the implementation of the measure, it would be explored if an additional field could be added in such registries where the unsold products could be declared. There are several possible ways of Registries could be set up at national or EU level, including through the refinement of existing databases. The obligation on stakeholders to report on unsold goods could be considered as part of the revision of the Ecodesign Directive, or through a new legislative measure.

Administrative burden

Administrative burden for economic operators

Companies will be impacted by the registry as well as the obligatory takeback scheme. The cost of the registry will be similar to the one incurred by businesses concerned by the WEEE registry for instance. A harmonised format for the registration of EEE producers was introduced with European Commission Implementing Regulation (EU) 2019/290, reducing the previous administrative burden associated with determining what unique information a Member State or EPR compliance system

requires to register and where to find this information[73]. A harmonised format would be needed immediately to avoid such administrative burdens.

Cost estimation

No estimates of complying with a comparable registry (e.g.: the WEE registry) from a cost perspective have been made. Estimates, based on input from industry associations, quantified a cost increase of 5% for businesses overall for this policy option. The strongest cost increases are associated to administrative costs (3.88%), operation and maintenance (2.75%) and other costs (3.50%).

As shown in Annex 10, costs estimates for industry have been provided by nine industry associations representing the battery, home appliances, packaging and textile industries. It emerged that the higher cost increase is related to the obligation for companies to take back unsold products.

Administrative burden for the European Commission

The administrative burden would come primarily from the development and monitoring of the registry on unsold goods.

Administrative burden for Member States

The administrative burden will be focused primarily on the development and monitoring of the registry on unsold goods. It will require a close cooperation with the European Commission.

According to estimates from the Impact Assessment, at the MS level more than 2 FTEs are needed to collect and treat data provided by manufacturers and importers on the number of unsold products. The take back obligation for firms might not impact MS equally since it might already be implemented (for example Belgium). The donation schemes are also widely practised at the municipal level according to the interviewees.

Direct economic impact for businesses

CNBC reports that the average return represents 30 percent of the purchase price (clothing returns can be closer to 40%[74]). Returns represent up to 10% of the annual sales of online retailers. It has been further estimated that retailers need to sell at least three units of the same product just to recover the cost of one return. Managing returns has already become a priority for retailers, by increasingly turning to third parties to optimise the efficiency for returned products and finding the best new route for them.

Although a relatively new business model, the benefit reverse logistics brings to companies ranges from three to 15 percent of the overall bottom line, according to the Reverse Logistics Association (RLA) estimates[75]. Companies active in electronics have turned the logistics function from a cost centre to a profit source as well as decreasing their processing costs by up to 50%, reducing the returned goods inventory.

Environmental and social benefits

A take back scheme with an obligatory declaration of unsold goods should yield similar environmental effects as the ban, although to a lesser scale as businesses will not be forbidden to destroy the final product. The impact of reverse logistics on the environmental is considered green as the process includes remanufacturing, refurbishment, recycling, reuse, or asset recovery. Though

[73] European Commission. Study on harmonisation of the format for registration and reporting of producers of Electrical and Electronic Equipment (EEE) to the national register and on the frequency of reporting (2016)

[74] CNBC. A $260 billion 'ticking time bomb': The costly business of retail returns. https://www.cnbc.com/2016/12/16/a-260-billion-ticking-time-bomb-the-costly-business-of-retail-returns.html 2016

[75] Full Circle: Reverse Logistics Keeps Products Green to the End https://www.inboundlogistics.com/cms/article/full-circle-reverse-logistics-keeps-products-green-to-the-end/

effective reverse logistics operations, companies are able to cut out inefficient return processes that result in unnecessary transportation moves, helping to reduce carbon emissions and improve air quality.

The social impact is expected to be similar to the ban under sub-option 6b. Companies will increase their donations or second-hand sales as a result of the take back scheme. However, estimations regarding the percentage of donated goods are usually company specific and not available per sector, so it is impossible to quantify the magnitude. The working conditions of workers employed in reverse logistics and in the handling of stock management and returns are generally poor. In Europe, several unions have gone on strike to protest against poor working conditions. The implications of this sub-option on the working conditions of those handling returned items and stock management can be negative.

2. Discarded measure under option 3 to put in place a Sustainable Products Framework

This measure would take a longer-term view by establishing a new framework legislation with a legally-binding, long-term plan, including sustainability principles and targets. The measures under sub-option 3a and 3b would feed into and help to implement and achieve the targets and sustainability principles set out in the framework legislation. The difference with sub-option 3a and 3b is that this measure would integrate the Ecodesign directive into a larger framework, together with directly applicable principles and targets, as a new approach to achieve the general objective.

The new framework legislation would contain:

- A set of overarching and directly applicable **Sustainability Principles**, intended to apply to all products in SPI scope, in order to steer product design and foster sustainability and circularity of value chains. The application of these principles would take the following forms:

  - At the level of Member States: Member States national and local governments would be required by SPI to follow these principles as a priority when setting up and implementing policies in relevant policy fields (explicitly mentioned in SPI), in particular incentive schemes, public procurement policies, national regulations on products and consumption compatible with EU Internal Market rules. By comparison with the application of the 'waste hierarchy' in the Waste Framework Directive, Member States would have the possibility to adapt the application of Sustainability Principles to the national context and administrative framework. National instruments could implement one Principle in particular, as long as their implementation does not conflict with the other Principles.

  - At EU level, the principles would be implemented through Ecodesign measures and would guide the preparation of other EU legislation and instruments. In the former case of Ecodesign, the principles would be integrated in SPI methodology and guide the preparation, implementation and monitoring of measures. In the latter case of other EU legislation and instruments, as there is no hierarchy between EU pieces of secondary legislation, the Sustainability principles would be applied as non-binding policy guidance and could inspire, for example, the setting of priorities in financial instruments and the implementation of product-related legislation outside of SPI (for construction products for example).

  The following principles would be included in the proposed framework legislation, with the necessary provisions to further codify them and their application:

  - **Principle of design for sustainability**: i.e. the design of a product has to be conducted with a view to optimise product lifetime, minimise environmental and social footprint along their life cycle and to use safe, sustainable, recyclable and to the extent possible

recycled materials; production lines, value chains and distribution networks should also be conceived and managed with a view to maximise their sustainability.

- **Principle of sustainable sourcing of materials**: i.e. the purchaser of materials to be included in a product is required to take steps to minimise the negative environmental and social impacts associated with the material extraction and transformation, taking account of the availability or not of recycled materials and of the objective of strategic autonomy of EU economy.
- **Principle of sustainable production**: i.e. the manufacturer of a product is required to take steps to minimise the negative environmental and social impacts of the manufacturing processes and to maximise the well-being of the workers and communities involved in the process.
- **Principle of management for circularity**: i.e. relevant supply chain actors (manufacturers, waste managers etc.) are required to take steps to ensure that the maximum usage value of a product is retained; whenever technical and economic conditions allow, and without creating negative environmental and social impacts, repair, upgrade and reuse should be preferred to remanufacturing, itself preferable to material recycling and other forms of disposal.
- **Principle of responsibility for information**: i.e. each party in the value chain of a product is required to take steps to keep track of and share along the value chain the information necessary for other parties to evaluate the sustainability of the product concerned and to perform value-retaining operations on it.
- **Principle of avoidance of destruction**: i.e. the usage value of products must not be deliberately destroyed as long as a technically and economically viable solution exists without creating negative and social impacts**.**

– Long-term targets on the achievement of quantified indicators related to the objectives of this legislation, including:

  – Reduction of the impacts of EU production and consumption to respect planetary boundaries;

  – Resource productivity and/or material footprint, as an indicator for decoupling of resource use from economic prosperity;

  – Percentage of recycled materials in production – CEAP includes the objective of doubling EU circular material use rate in the coming decade;

  – taking into account the EU's legal obligation to reach net-zero GHG emissions by 2050).

  These targets would not be legally binding but they would allow to clearly set the objectives for SPI stakeholders' community and monitor the contribution of SPI implementation to their achievement (or distance to achievement) in evaluation and reporting. They would be monitored through a SPI 'accounting tool' similar to the current 'Ecodesign accounting' on GHG reduction and energy efficiency.

Economic impacts

It is expected that the economic impacts on businesses and public authorities would be significant, with potential new costs for compliance and enforcement of requirements. From the estimates provided by industry representatives in targeted interviews (see Table 72 in Annex 11), it can be inferred that the increase in costs associated with this measure is likely to exceed 5% of current compliance costs. The impact on consumers will depend on the manner in which life-cycle costing is

integrated in the framework[76]. However, these impacts could stabilise or reduce over time once the new framework is in place for a few years, and starts delivering its benefits.

Furthermore, there could be issues of coherence with potential overlaps and incoherence if Member States develop national legislation based on SPI Sustainability Principles, additional to the EU requirements applicable to potentially the same products. The measures taken by Member States would weaken the Internal Market for sustainable products.

Environmental impact

Though the legal provisions for the application of Sustainability Principles and the level of ambition of long-term targets are not elaborated in detail, additional environmental benefits would presumably be achieved in comparison with 3b.

[76] In the current Ecodesign Directive, Least Life Cycle Cost (LLCC) ensures that the consumer does not pay a significantly high cost. However, the application of the method to impacts other than energy consumption raises some methodological challenges. See Annex 16.

Annex 10: Impacts of the policy options

1. INTRODUCTION

This Annex presents the analysis of the policy options described in the preceding section, and assesses how they contribute to reaching the specific objectives. Each policy option has two or three sub-options. Overall, approximately 60 specific measures are analysed across all the sub-options.

For each of these policy options this section includes a proportionate analysis of:

- economic impacts (positive and negative), covering opportunity costs, compliance costs and administrative burden (for businesses and for public authorities),
- environmental impacts,
- social impacts,
- stakeholders' views.

The analysis considers the sub-options in a given policy option in isolation (i.e. 2a compared to 2b, and to 2c) and does not at this stage consider the interaction between sub-options across options. This is considered reasonable as the options have been constructed to be largely independent, but an analysis of the synergies between them and hence of the **overall preferred option** is presented later.

As is currently the case with the Ecodesign Directive, the actual impacts, both positive and negative, on the economy and the environment, and in terms of administrative burden for all stakeholders, depend to a large extent on the number of products regulated and the stringency of requirements to be set in subsequent measures, that will themselves be subject to more detailed impact assessments

The below analysis is therefore focused on the **potential** that would bring a revision of the Ecodesign Directive, without prejudice to the actual impacts, that will need to be identified individually, for each product specific regulation, through their own impact assessments.

2. OPTION 1 - BUSINESS AS USUAL – GENERAL ASSUMPTIONS IN IMPACT ANALYSIS

The Business As Usual scenario is based on the absence of SPI with a 2030 horizon. The scenario assumes the existing current and forward looking trends and problems, and a policy framework that will influence these trends and therefore could have economic, environmental, social and other implications. Ecodesign legislation will continue targeting energy-related products (including ICT products) and focus on delivering improvements on energy efficiency and some other environmental performance aspects of target products, in line with the requirements adopted in the latest regulations. Due to current dynamic evolution of the EU policy landscape towards CEAP and Green Deal, a number of other product related legislations are expecting revisions, which are likely to address circular economy goals. In addition, new EU initiatives e.g., on empowering consumers for the green transition, substantiating green claims are expected to facilitate transparency around sustainability of various products. The EU will maintain its voluntary instruments (e.g., Ecolabel, GPP) and funding and investment programmes for innovation, research, development, and market uptake are expected to continue supporting sustainable products development and uptake.

Within the horizon of 2030 in the ‘no SPI’ scenario, social, economic, environmental benefits to be delivered by the EU product policy instruments will be tangible but are difficult to quantify. However, an uneven approach in support, less inclusive product scope, as well as missed synergies with SPI will prevent further maximising the cumulative impact of the EU product policy portfolio.

Further analysis of the baseline specific to the different policy options is provided below.

3. OPTION 2: EXTENSION OF THE PRODUCT SCOPE OF ECODESIGN LEGISLATION

3.1. Overview

Overview of policy option 2

Sub-option 2a: **Extension to CEAP priority products (not addressed through separate legislation**), and energy-related products, including means of transports, textiles, furniture, high-impact intermediary products and chemicals.

Sub-option 2b: **Extension beyond sub-option 2a to all physical goods.**

Sub-option 2c: **Extension beyond sub-option 2b to all services.**

Overview of Policy Option 2

Sub-option 2a: Extension to Circular Economy Action Plan priority products (not addressed through separate legislation). Energy Related products, including means of transports, +

- Textiles,
- Furniture,
- High impact intermediary products,
- Chemicals

Sub-option 2b: Extension beyond sub-option 2a to all physical goods

Sub-option 2c: Extension beyond sub-option 2b to all services

3.1.1. Assumptions used in the analysis

- The main levers for environmental and economic effects are the number and types of products regulated under the scope extension, and the corresponding improvement potentials.
- It is assumed that the requirements of an extended Ecodesign Directive can be brought about by several means (lifetime extension through availability of spare parts, recyclability through design, etc.), depending on the product under consideration. Not all of these measures can be explicitly portrayed within the sub-options, so more general improvement potentials have to be assumed based on experience with such measures (e.g., under the headline of circular economy actions).
- The improvement potentials for some product groups are extracted from the literature. For product groups for which no information is available, assumptions of maximum improvement potentials are made (see Annex 4).

3.1.2. What problem and specific objective does this option address

The extension of the product scope of the Ecodesign legislation addresses the problem that product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects. By bringing more products into the scope of Ecodesign, this policy option thus addresses specific objective 1: improve product sustainability. The sustainability improvement spans beyond use-phase energy consumption to also tackle impacts at other stages of the product life cycle.

Stakeholders' views on PO2

Stakeholders showed some different views: while quite broad support for extension of the ecodesign instrument emerged from a number of stakeholder categories some asked for the (initial) focus of the SPI to be on the priority sectors of the CEAP, while others called for a broad extension to all products and for the future framework to retain flexibility so that updates to rules remain possible where needed. No particular support for

extension to services emerged. Industry representatives tended to cautiously support the extension of Ecodesign Directive, but many underlined the need to retain a product-specific approach if the needs and complexities of different sectors are to be taken into account. They called for individual assessments to be carried out before laying down concrete rules for each new product added to the scope. Other stakeholders – in particular Ecodesign practitioners from the public authorities – tended to be conservative regarding the scope of Ecodesign: energy-related products and the other products are considered to have different features deserving different legislative tools. Stakeholders across the categories underlined the need to ensure synergies with existing EU legislation and avoid overlap on sustainability or design aspects, for the purpose of avoiding extra administrative burden. SMEs[77], in particular, considered that products sold in the EU are not sustainable because there is no harmonised set of requirements to foster sustainable design of products, nor to foster sustainable services, indicating an inclination to expand the scope to other products as well as services.

Enforcement and market surveillance activities (e.g., inspections or audits) are seen as necessary to accompany the implementation of the SPI and their robustness has an impact on how far to go when extending the scope.

The targeted survey provided a list of value chains which, according to the CEAP, should be included in the new scope of the Ecodesign Directive, beyond energy-related products. The respondents indicated that the following five sectors provide the highest circularity potential: packaging (71% of respondents), plastics (65%), textiles (63%), electronics and ICT (62%), and waste collection, treatment and disposal services; materials recovery services (60%).

One of the workshops gathered 73 MS representatives where all policy options were discussed. Concerning PO2, participants expressed support for a scope of the SPI that would be open, and agreed with the list of products suggested for priority action (see list in sub-option 2a). They felt the inclusion of services at this point in time might be premature. Another workshop was organised with 180 stakeholders from various sectors. Here, some stakeholders argued that the European Commission needs to be careful in expanding Ecodesign to other non-energy related product sectors, such as construction materials, for which comparable legislation, that addresses many sustainability aspects, already exists. Instead, there should be a recognition and coherence with sectoral legislation. A package approach should be dropped to facilitate adoption of specific production measures.

3.2. Baseline for PO2

In the absence of the SPI, the product scope of the Directive will remain on energy-related products, including ICT products. New products will be regulated subject to the resources available at the Commission to launch new implementing measures, but the Commission's efforts will be mainly focused on the revision of existing product legislation.

The current Ecodesign legislation covers energy-related products. While not all energy-related products are currently regulated under Ecodesign, the regulated products still make up a considerable fraction of energy consumption by energy-related products used in the EU, more specifically of energy-using products.

With this scope, the current Ecodesign legislation covers about 4% of the European domestic final demand, 3% of employment, 49% of GHG emissions, 59% of acidification, 50% of resource depletion (raw materials) and 51% of primary energy consumption (see Table 26).

[77] SMEs participating in the OPC are defined as participants representing a company/business organisation with less than 250 employees

Table 26 Coverage of current Ecodesign products scope with respect to economic and environmental indicators; percentages represent shares of EU totals; source: own calculations based on EXIOBASE v.3.8.1 (see Annex 4 for details)

Economic importance		Environmental impacts										
Final demand [bn€]	Employment [1000 Persons]	GHG emissions [Mt CO2e emissions]	Human toxicity [kt emissions]	Particulate matter [kt emissions]	Photochemical ozone formation [kt emissions]	Acidification [mt emissions]	Eutrophication [kt emissions]	Ecotoxicity [kt emissions]	Land use [km2]	Resource depletion, water [Mm3 consumption]	Resource depletion, raw materials [Mt extraction]	Primary energy consumption [PJ]
483	7,009	2,366	37	2,201	6,951	2,083	4,902	49	302,038	35,803	7,375	32,381
4%	3%	49%	22%	25%	27%	59%	16%	21%	5%	4%	50%	51%

3.2.1. Economic impacts

3.2.1.1. Administrative burden

Administrative burden for economic operators

The BAU administrative burden on economic actors will depend on the products effectively regulated, and the types and stringency of product requirements. The 2015 Impact assessment on Review of the Energy Labelling Directive and the Ecodesign Directive, estimated the combined administrative costs for manufacturers and dealers to be between €10 and 16m per year. While costs for businesses do not necessarily correlate with the number of products under regulation, an increase in the latter can be used as a rough indicator of the potential increase in BAU administrative costs for businesses.

Administrative costs for the European Commission

Currently, about €0.4m per product are used for preparatory studies and impact assessment support studies. The simplification of the process is expected to lead to a €50k reduction in these costs. Under BAU, the number of studies needed will depend on the available resources. These are considered to be insufficient and would need to increase by about 13 FTE to manage the existing product groups regulated. It will vary between 3 per year based on current resources or higher in the case with reinforcement,

- Administrative burden for Member States

BAU will not lead to a significant change in the market surveillance needs for EU Member States. Any change will arise form additional products being regulated. It is estimated that the increase in costs is proportional to any increase in the number of products covered by implementing acts.

3.2.1.2. Direct economic impact for businesses

The impacts of Ecodesign for Energy Related products have been assessed through impact accounting. While the effect will depend on the specific product, it is assumed that any new product requirements for energy-related products will have broadly comparable economic effects.

3.2.1.3. Indirect economic impact for businesses

No additional indirect economic impacts for businesses are expected.

3.2.1.4. Economic impact for citizens

The EIA Status Report 2020 savings on consumer expenditures of €60 billion per year induced by the current Ecodesign legislation (in combination with the EU Energy Labelling legislation). These savings comprise €75 bn energy savings and €8 bn reduced expenditures for consumables (including paper and toner for imaging equipment, water and detergents for washing machines and dishwashers, bags for vacuum cleaners, shielding gas, filler wire and electrodes for welding equipment), minus €23 billion per year increased acquisition costs for regulated, and thus more expensive, products. Further changes under BAU are assumed to have comparable economic impacts.

3.2.2. Environmental impacts

The actual progress under BAU will depend on the rate at which existing product regulations can be reviewed and new products addressed.

Under the assumption of maximum improvement potentials (see Annex 4), BAU would theoretically be able to provide considerable benefits in all environmental impact categories, ranging between 0.4 and 8.8%, depending on the impact category. However, it should be noted that the products covered in this analysis are not all those currently in scope of Ecodesign. Based on the estimated primary energy coverage these figures should be multiplied by 1.1. In reality the achievable savings will be lower since it will not make sense to regulate all products in scope.

Table 27 Maximum improvement for BAU as a % of EU totals

GHG emissions	**Human toxicity**	**Particulate matter**	**Photochemical ozone formation**	**Acidification**	**Eutrophication**	**Ecotoxicity**	**Land use**	**Resource depletion, water**	**Resource depletion, raw materials**	**Primary energy consumption**
7.4%	3.3%	3.8%	4.1%	8.8%	2.4%	3.2%	0.7%	0.4%	7.5%	7.7%

3.3. Sub-option 2a: Extension to Circular Economy Action Plan priority products

Ecodesign currently covers "energy-related products". Under this sub-option, the Ecodesign scope will be extended to a limited list of priority products showing the highest environmental impacts and best improvement potential from a sustainability and circularity point of view. This sub-option builds notably on the results of a Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains[78], the European Commission Staff Working Document titled "Sustainable Products in a Circular Economy - Towards an EU Product Policy"[79] and an Environmentally Extended Multi-Regional Input-Output (EE-MRIO) Analysis[80].

Accordingly, under **sub-option 2a**, the new SPI legislation[81] would cover:

- energy-related products (including means of transport)[82],
- textiles,
- chemicals[83],

[78] Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains, IVM et al. for the European Commission, 2014
[79] SWD(2019)91 final
[80] Using Exobiase (https://www.exiobase.eu/index.php), for further details refer to annex 4.
[81] Please see Annex 14 for explanation of articulation with existing legislation
[82] This corresponds to the product coverage of the Ecodesign Directive, with the exemption of means of transport, currently excluded.
[83] Understood as intermediate products (e.g. industrial solvents) or final products e.g. such as detergents or cosmetics. Where chemicals are destined/used for food related purposes and are not considered as food or feed, they will be subject to the relevant sectoral legislation, including the future sustainable food systems framework legislation, as announced in the Farm to Fork Strategy

- high-impact intermediary products, and
- furniture.

This extension of scope would encompass products responsible for 19% of EU domestic demand, 19% of employment, 14% of EU GHG emissions, 12% of acidification, 18% of resource depletion and 15% of primary energy consumption. Including the baseline the total scope of SPI would cover products representing 23% of European domestic final demand, 22% of employment, 63% of GHG emissions, 71% of acidification, 68% of resource depletion (raw materials) and 66% of primary energy consumption. Table 28 provides an overview of the economic importance and environmental impacts.

Table 28 Potential coverage of baseline and sub-option 2a products scope with respect to economic and environmental indicators; percentages represent shares of EU totals; source: own calculations based on EXIOBASE v.3.8.1 (see Annex 4 for details)

Economic importance		Environmental impacts										
Final demand [bn€]	Employment [1000 Persons]	GHG emissions [Mt CO2e emissions]	Human toxicity [kt emissions]	Particulate matter [kt emissions]	Photochemical ozone formation [kt emissions]	Acidification [mt emissions]	Eutrophication [kt emissions]	Ecotoxicity [kt emissions]	Land use [thousands km2]	Resource depletion, water [Mm3 consumption]	Resource depletion, raw materials [Mt extraction]	Primary energy consumption [PJ]
3,079	47,004	3,030	103	5,230	11,650	2,531	9,524	134	1,381	136,196	10,014	41,698
23%	22%	63%	60%	60%	46%	71%	31%	58%	23%	14%	68%	66%

3.3.1. Economic impacts

3.3.1.1. Administrative burden

Administrative burden for economic operators

The administrative burden on economic actors will depend on the products effectively regulated, and the types and stringency of product requirements. It is broadly analysed in the following sections, and will be further looked at in individual, product-specific or group of products impact assessments. In the 2015 Impact assessment on Review of the Energy Labelling Directive and the Ecodesign Directive, the administrative costs for manufacturers and dealers combined were estimated to be between 10 and 16 million EUR per year. While the costs for businesses do not necessarily correlate with the number of products under regulation, the increase in the latter within the scope extension can in any case be used as a rough indicator of the potential increase in administrative costs for businesses. The scope extension under sub-option 2a would roughly imply a doubling of the number of products effectively regulated, which would imply an increase in administrative costs for businesses between 10 and 16 million EUR per year.

Administrative cost for the European Commission

Currently, about EUR 400 000 per product are used for preparatory studies and impact assessment support studies. The simplification of the process is expected to lead to a reduction in these costs of about EUR 50 000. The scope extension under sub-option 2a would roughly imply a doubling of the

number of products effectively regulated. In contrast to the administrative costs for businesses, the personnel requirements and expenses for preparatory studies can be assumed to be more directly tied to the number of products under regulation. Assuming similar personnel requirements of approximately 0.75 FTE of Commission staff per product group, plus management and support staff, and the reduced expenses for preparatory studies linked to the streamlining of the process, the coverage of 27 product groups would require around 25 FTEs, which equate to about EUR 4 million in personnel costs per year once all products are regulated, plus an additional EUR 10 million for preparatory studies The latter would be spread across several years, depending on the implementation schedule.

Administrative burden for Member States

The extension of the scope of the Ecodesign Directive will increase the market surveillance needs for EU Member States by increasing the number of products to be looked at. Considering that EU Member States are required to guarantee that Market Surveillance Authorities have the necessary resources and knowledge to perform their functions, the scope extension under sub-option 2a will likely increase administrative costs for EU Member States. It can be estimated that the increase in costs is proportional to the increase in the number of products that will be effectively covered through SPI acts. For example, in the Netherlands these costs are in the order of 700-800 000 EUR/year.

3.3.1.2. Direct economic impact for businesses

The Ecodesign provisions which are more important for non-energy-using products, relating to e.g., recycled content and extended product lifetimes, will likely lead to a reduction in the demand for primary materials and new products, while at the same time the demand for spare parts and repair services is expected to increase. This will likely lead to a reduction in revenues for some industries, such as raw material processors, while others will benefit, such as repair and maintenance services. The sum of these impacts is difficult to estimate, since a multitude of effects happen concurrently. A few studies attempt to quantify these overall economic effects, coming to partly diverging conclusions.

A recent study by Cambridge Econometrics, Trinomics and ICF[84] attempts to quantify the macroeconomic impacts of circular economy measures in the EU for the five product groups of food products and beverages, motor vehicles, construction, electronics and electrical equipment, and waste collection and treatment. For each product group, several assumptions are made regarding changes in production processes (e.g., from primary to recycled input), consumption (e.g., more demand for repair services, less demand for new products) and investment expenditures (e.g., for recycling infrastructure), ranging from 2.5 to 50% compared to the baseline values. The scenarios constructed in this way do not, however, consider administrative costs, while essentially assuming a fully elastic money supply. In combination, the scenarios are estimated to lead to an increase of EU GDP between 0.3 and 0.5%. In contrast, Donati et al. (2020)[85] estimate a considerable GDP reduction of approximately 7% for the EU, based on a combination of measures including delayed replacement, use intensification, design improvements of products, sharing models and scrap diversion. However, this figure can be considered an upper bound of the potential negative effects and is a result of partially restrictive modeling assumptions. Finally, Wiebe et al. (2019)[86] analyse a circular economy scenario at the global level, including broad measures such as recycling, reducing, and repair, reuse

[84] Cambridge Econometrics, Trinomics and ICF (2018): Impacts of circular economy policies on the labour market. https://op.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en

[85] Donati, F.; Aguilar-Hernandez, G. A.; Sigüenza-Sánchez, C. P.; Koning, A.; Rodrigues, J. F.D.; Tukker, A. (2020): Modeling the circular economy in environmentally extended input-output tables: Methods, software and case study. In Resources, Conservation and Recycling 152, p. 104508.

[86] Wiebe, K. S.; Harsdorff, M.; Montt, G.; Simas, M. S.; Wood, R. (2019): Global Circular Economy Scenario in a Multiregional Input-Output Framework. In Environmental Science & Technology 53 (11), pp. 6362–6373.

and service. While they do not provide GDP results for the EU, largely positive employment effects of up to 6% also indicate positive effects on the European GDP.

Potential increases in costs for SME need to be closely monitored and correlated with potential improvement of their market positioning. Among the product groups to be included in the scope, this is especially the case for the construction sector, which has the highest share of SMEs among the added product groups.[87]

3.3.1.3. Indirect economic impact for businesses

Structural shifts are expected in the economy, resulting from less demand for traditional manufacturing and more for repair and related services, etc. The literature is inconclusive on the overall effect. As a result, these effects are difficult to quantify.

3.3.1.4. Economic impact for citizens

Unlike energy-using products, in the case of non-energy-using products, consumers will not experience savings through energy demand reductions. Instead, savings may materialise in the form of fewer purchases of new products (because products can be kept longer in use due to Ecodesign provisions). This demand reduction may be countered by increased demand for spare parts and repair services. As with the economic impacts for businesses, however, the net effect is difficult to quantify.

3.3.2. Environmental impacts

While the EIA Status Reports use product-level calculations to arrive at the aggregate improvement potential of Ecodesign, this is unfeasible for the scope extension beyond energy-related products, since a multitude of measures are possible to reduce the environmental impacts beyond the use phase (such as increased lifetimes and recycled contents in products). For a small number of product groups regulated under Ecodesign (welding equipment, servers and data storage products, and electronic displays), impact assessments have estimated specific environmental effects of Ecodesign provisions not related to use-phase energy consumption (see Polverini 2021). However, these results are too specific to be used in the much broader assessment of a general Ecodesign scope extension. Therefore, more general information on the potential environmental effects of measures not related to use-phase energy consumption was collected and is reported in Annex 4.

Under the assumption of maximum improvement potentials (see Annex 4), sub-option 2a would be able to provide considerable benefits in all environmental impact categories, ranging between 4 and 16%, depending on the impact category. Specifically, it would effectively double the reduction of GHG emissions in comparison with the current Ecodesign legislation. Due to the inclusion of the priority product groups of the Circular Economy Action Plan, considerable reductions are also possible in the case of other environmental impact categories.

Table 29 Maximum Improvement potential relative to BAU for scope 2a as a % of total EU impacts

GHG emissions	Human toxicity	Particulate matter	Photochemical ozone formation	Acidification	Eutrophication	Ecotoxicity	Land use	Resource depletion, water	Resource depletion, raw materials	Primary energy consumption
6,8%	15,8%	16,5%	9,3%	6,4%	6,8%	15,1%	8,5%	4,2%	10,0%	6,8%

[87] German Federal Statistical Office (2018). Statistics on small and medium-sized enterprises. https://www.destatis.de/EN/Themes/Economic-Sectors-Enterprises/Enterprises/Small-Sized-Enterprises-Medium-Sized-Enterprises/_node.html

3.3.3. Social impacts

The EIA Status Report 2019 reports one category of social impacts, i.e. the number of additional jobs in the industry, wholesale, retail and installation sectors which are directly linked to the estimated additional revenues of these sectors resulting from the Ecodesign legislation (see section on economic impacts). Similarly to above, the assumed mechanism leading to additional jobs holds for the regulation of energy-using products, but not necessarily for the products covered under the scope extension.

The studies cited above for economic effects also report social effects in the form of employment changes. The study by Cambridge Econometrics, Trinomics and ICF estimates employment effects of circular economy measures of approximately 0.3% additional demand for jobs in the EU, mainly driven by additional labour demand in the recycling sectors. Wiebe et al. (2019) find more pronounced positive employment effects for the EU, which average at about 4%. In contrast, Donati et al. (2020) estimate an employment reduction of approximately 8% for the EU as a whole.

3.4. Sub-option 2b: Extension beyond sub-option 2a to all physical goods

Under **sub-option 2b**, all physical products (except for agricultural and food products) would be included. This extension of scope would encompass products responsible for 22% of EU domestic demand, 21% of employment, 16% of EU GHG emissions, 42% of human toxicity and 18% of primary energy consumption. Including the baseline the total scope of 26% of European domestic final demand, 24% of employment, 65% of current GHG emissions, 64% of human toxicity emissions and 69% of primary energy consumption.

Table 30 Potential coverage of baseline and sub-option 2b product scope with respect to economic and environmental indicators; percentages represent shares of EU totals; source: own calculations based on EXIOBASE v.3.8.1 (see Annex 4 for details)

Economic importance		Environmental impacts										
Final demand [bn€]	Employment [1000 Persons]	GHG emissions [Mt CO2e emissions]	Human toxicity [kt emissions]	Particulate matters [kt emissions]	Photochemical ozone formation [kt emissions]	Acidification [mt emissions]	Eutrophication [kt emissions]	Ecotoxicity [kt emissions]	Land use [thousands km2]	Resource depletion, water [Mm3 consumption]	Resource depletion, raw materials [Mt extraction]	Primary energy consumption [PJ]
3,441	51,754	3,145	109	5,608	12,501	2,609	10,332	142	1,736	159,255	10,436	43,830
26%	24%	65%	64%	64%	49%	74%	34%	61%	29%	17%	70%	69%

3.4.1. Economic impacts

3.4.1.1. Administrative burden

Administrative burden for economic operators

The administrative burden on economic actors will depend on the products effectively regulated and the stringency of product requirements. As outlined above, a rough estimate can be based on the number of products effectively regulated under the scope extension. For sub-option 2b, the extension to the remaining physical products would imply a little more than a doubling of the number of products groups covered in the baseline. The additional burden would thus sum to EUR 11 to 18 million per year compared to the baseline.

Administrative costs for the European Commission

The scope extension from 2a to 2b only involves a limited number of products that would presumably lead to horizontal regulations, rather than product-specific. It is fair to assume that an additional 2-3 regulations would be useful to cover the scope extension. Based on the assumed doubling of potential regulations under sub-option 2a, the additional number of regulations would therefore be around 30. Under the same assumptions of personnel requirements of approximately 0.75 FTE per product group, the additional FTEs compared to the baseline would then be roughly 28 FTEs.

At the same time, compared to the baseline, a total of EUR 11 million would be required for initial preparatory studies at a cost of EUR 350 000, which could be spread over a number of years, depending on the prioritization of needs. However, compared to sub-option 2a, this sub-option would present the added value of not having to revise the overarching legislative framework should action need to be taken for new or future product categories.

Administrative burden for Member States

The extension of the scope will increase the market surveillance needs for EU Member States by increasing the number of products to be looked at. Considering that EU Member States are required to guarantee that Market Surveillance Authorities have the necessary resources and knowledge to perform their functions, the scope extension under sub-option 2b will likely increase administrative costs for EU Member States. It can be estimated that the increase in costs is proportional to the increase in the number of products that will be effectively covered through SPI acts. However, some scale effects may be realised, leading to lower specific costs and thus a less than proportional increase.

3.4.1.2. Direct economic impact for businesses

The economic effects described above for sub-option 2a apply to a small range of high-impact product groups, which mostly overlap with the priority product groups in the CEAP. The addition of the remaining physical products in sub-option 2b would increase the market share of covered products by 13%. However, the overall economic effects likely remain in the same broad range cited above.

3.4.1.3. Indirect economic impact for businesses

Structural shifts are expected in the economy, resulting from less demand for traditional manufacturing and more for repair and related services, etc. The literature is inconclusive on the overall effect and these effects are difficult to quantify.

3.4.1.4. Economic impact for citizens

Similar to sub-option 2a, the net effects for citizens are difficult to quantify, since in the case of non-energy-using products, consumers will not experience savings through energy demand reductions. Instead, savings may materialise in the form of fewer purchases of new products (because products can be kept longer in use due to Ecodesign provisions). These demand reductions may be countered by increased demand for spare parts and repair services provided their prices are affordable.

3.4.2. Environmental impacts

The environmental impacts of sub-option 2b are very similar to those of sub-option 2a in all impact categories, ranging from 5 to 18%, depending on the impact category (see Table 31). However, the wide scope of sub-option 2b – which may in the future include novel products whose impacts remain as yet unknown – makes it impossible to accurately calculate its full coverage potential, which could be far higher than the above-mentioned figures. In terms of readying the EU to address possible future (as yet unknown) product sustainability challenges, and lessening the likelihood of problematic regulatory gaps occurring (as is now the case), this sub-option scores better in terms of efficiency and

it is more suitable than sub-option 2a due to being more future proof. There would also be additional positive impacts from developing horizontal measures applying to the products groups not covered in 2a. In practice, under this sub-option, following a prioritisation exercise, the first product groups tackled would likely be those identified under sub-option 2a (as not all products will be tackled at once, rather turned into a workplan over a number of years).

Table 31 Maximum improvement potential compared to BAU for scope 2b as a % of total EU impacts

GHG emissions	**Human toxicity**	**Particulate matter**	**Photochemical ozone formation**	**Acidification**	**Eutrophication**	**Ecotoxicity**	**Land use**	**Resource depletion, water**	**Resource depletion, raw materials**	**Primary energy consumption**
7,4%	16,8%	17,6%	10,1%	6,9%	7,4%	16,0%	9,8%	4,8%	10,6%	7,6%

3.4.3. Social impacts

The EIA Status Reports detail one category of social impacts, i.e. the number of additional jobs in the industry, wholesale, retail and installation sectors which are directly linked to the estimated additional revenues of these sectors resulting from the Ecodesign legislation (see section on economic impacts). Similarly to above, the assumed mechanism leading to additional jobs holds for the regulation of energy-using products, but not necessarily for the products covered under the scope extension.

The studies cited above for economic effects also report social effects in the form of employment changes. The study by Cambridge Econometrics, Trinomics and ICF estimates employment effects of circular economy measures of approximately 0.3% additional demand for jobs in the EU, mainly driven by additional labour demand in the recycling sectors. Wiebe et al. (2019) find more pronounced positive employment effects for the EU, which average at about 4%. In contrast, Donati et al. (2020) estimate an employment reduction of approximately 8% for the EU as a whole.

The scope extension beyond the priority product groups of the CEAP would increase the potential reach of Ecodesign to about 24% of European employment. However, the magnitude and direction of potential changes in employment are difficult to estimate. The studies cited above provide a possible range of the changes.

3.5. Sub-option 2c: Extension beyond sub-option 2b to all services

Under **sub-option 2c**, services would be added to the scope, which would lead to an additional 52% of European domestic final demand, 53% of employment and 10 to 32% of environmental impacts covered under Ecodesign.

Table 32 Potential coverage of sub-option 2c product/service scope including baseline with respect to economic and environmental indicators; percentages represent shares of EU totals; source: own calculations based on EXIOBASE v.3.8.1 (see Annex 4 for details)

Economic importance		Environmental impacts										
Final demand [bn€]	Employment [1000 Persons]	GHG emissions [Mt CO2e emission	Human toxicity [kt emissions]	Particulate matter [kt emissions]	Photochemical ozone formation [kt	Acidification [mt emissions]	Eutrophication [kt emissions]	Ecotoxicity [kt emissions]	Land use [thousand skm2]	Resource depletion, water [Mm3 consumpt	Resource depletion, raw materials [Mt	Primary energy consumption [PJ]

		s]			emissions]					ion]	extraction]	
10,257	163,800	3,999	150	7,595	20,531	3,173	17,410	203	2,546	265,032	11,871	55,681
78%	77%	83%	88%	87%	81%	90%	57%	88%	42%	28%	80%	88%

3.5.1. Economic impacts

3.5.1.1. Administrative burden

Administrative burden for economic operators

The administrative burden for businesses of the scope extension to all services is difficult to estimate, as no precedents exist for estimating the cost of the regulation of services under Ecodesign legislation. It will have to be assessed when looking at service-specific measures.

Administrative costs for the European Commission

The administrative burden for the European Commission of the scope extension to all services is equally difficult to estimate, as no precedents exist for estimating the cost of the regulation of services under Ecodesign legislation in this regard either. In addition, due to the heterogeneity of services the total administrative effort cannot be estimated by scaling up product level estimates.

Administrative burden for Member States

The same conclusions as for the administrative costs for the European Commission apply.

3.5.1.2. Direct economic impact for businesses

The addition of all services under sub-option 2c would increase the share of European final demand covered by a factor of 2.3 relative to the baseline. However, similarly to sub-option 2b, the potential GDP effects are unlikely to increase by such a factor. The heterogeneity of services additionally complicates the quantification of potential effects.

SMEs may be disproportionally affected by the scope extension to services since the service sectors generally display relatively high shares of SMEs.[88]

3.5.1.3. Indirect economic impact for businesses

Structural shifts are expected in the economy, involving less demand for traditional manufacturing and more for repair and related services, etc. The literature is inconclusive on the overall effect. As a result, these effects are difficult to quantify.

3.5.1.4. Economic impact for citizens

Similar to sub-options 2a and 2b, the net effects for citizens are difficult to quantify.

[88] German Federal Statistical Office (2018). Statistics on small and medium-sized enterprises. https://www.destatis.de/EN/Themes/Economic-Sectors-Enterprises/Enterprises/Small-Sized-Enterprises-Medium-Sized-Enterprises/_node.html

3.5.2. Environmental impacts

The marginal environmental improvement potential of sub-option 2c is higher than that of sub-option 2b, ranging from 7 to 22%, depending on the impact category. The inclusion of all services creates a large reduction potential since they partially display high environmental impacts through their supply chains.

Table 33 Maximum improvement potential compared to BAU for scope 2c as a % of total EU impacts

GHG emissions	Human toxicity	Particulate matter	Photochemical ozone formation	Acidification	Eutrophication	Ecotoxicity	Land use	Resource depletion, water	Resource depletion, raw materials	Primary energy consumption
10,9%	21,5%	22,1%	16,4%	10,1%	12,0%	21,3%	12,5%	7,0%	12,5%	11,3%

3.5.3. Social impacts

The scope extension to all services would dramatically increase employment potentially addressed by the measures as the majority of economic sectors would be included in the scope. However, the employment effects are unlikely to increase by such a factor and will probably remain in the range of -8% to +4%.

3.6. Impacts on third countries:

The expansion of the product scope of the Ecodesign legislation will have a direct impact on importers of the affected product groups, since the latter will have to comply with the provisions of the Ecodesign legislation, involving administrative costs for compliance. For the products coming into the scope under sub-option 2a (textiles, furniture, high-impact intermediates and chemicals), the average share of imported goods is 19% of European final demand and 15% of intermediate demand. These shares are lower than for energy-related products under the current Ecodesign regulation (24% of final demand and 21% of intermediate demand). The relative effect on third countries is therefore more limited for the additionally regulated product groups than for those currently under regulation. For the remaining physical products to be included under sub-option 2b, 14% of both intermediate and final demand is sourced from international suppliers. Finally, for services to be included under sub-option 2c only 9% of intermediate demand and 8% of final demand is supplied from outside Europe.[89]

Third countries will also be impacted by the reductions in environmental burdens induced by a wider product scope. Of the currently regulated products, approximately 45% of the environmental impacts are embodied in imported goods. While for the additional products covered under sub-option 2a the share of environmental impacts embodied in imports drops somewhat, it still amounts to 33%. For the remaining physical products covered under sub-option 2b, about 28% of the environmental impacts are embodied in imports; for services covered under sub-option 2c, this value drops to 12%. Therefore, though this effect is reduced in relative terms moving from sub-option 2a to sub-option 2c, considerable reductions in environmental impacts can be achieved outside the European Union through the scope extension.

[89] Own calculations with EXIOBASE v.3.8.1.

3.7. Summary of impacts

Table 34 Administrative burden of PO2

Administrative burden Option 2					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Sub-option 2a	Direct costs	none	EUR 10 to 16 million per year	Preparatory studies: 10M€	25 FTEs
	Indirect costs	none	n.a.	none	n.a.
Sub-option 2b	Direct costs	none	EUR 11 to 18 million per year	Preparatory studies: 11M€	28 FTEs
	Indirect costs	none	n.a.	none	n.a.
Sub-option 2c	Direct costs	none	Additional expenses for ensuring compliance of services.	additional expenses for preparatory studies on top of 2b	Additional expenses for regulation of services.
	Indirect costs	none	n.a.	none	n.a.

Table 35 Economic impacts of PO2

Economic impacts				
Description	***Amount/qualitative***			***Comments***
	Option 2a	***Option 2b***	***Option 2c***	
Direct impacts				
Additional costs for the EU and MS administrations as well as businesses	-	-	--	Scope extension to more products leads to cost increases for all involved stakeholders.

Impacts on businesses	+/-	+/-	+/-	Businesses may be negatively affected by demand reductions (e.g., due to longer lasting products or price increases) and positively affected by increased demand for repair and related services or higher demand for EU products, which would more easily comply with requirements. The literature is inconclusive on the overall effect.
Impacts on consumers	+/-	+/-	+/-	Consumers may benefit from prolonged functionality of products and reduced demand for new products, while they may be burdened by additional expenses for products, and repair and related services. The literature is inconclusive on the overall effect.
Indirect impacts				
Indirect effects on overall economy	+/-	+/-	+/-	Structural shifts are expected in the economy, involving less demand for traditional manufacturing and more for repair and related services, etc. The literature is inconclusive on the overall effect.

Table 36 Environmental impacts of PO2

Environmental impacts				
Description	***Amount/qualitative***			***Comments***
	Option 2a	***Option 2b***	***Option 2c***	
Direct impacts				
Overall environmental effects	++	++	+++	Overall, considerable positive environmental impacts are expected from the sub-options in comparison with BAU (exemplary reduction potentials listed below).
Reduction potential of GHG emissions	7%	7%	11%	Increased scope leads to an increasing GHG reduction potential for sub-options 2a to 2c, though difference between 2a and 2b is negligible.

Reduction potential of human toxicity	16%	17%	22%	Increased scope leads to an increasing human toxicity reduction potential for sub-options 2a to 2c, though difference between 2a and 2b is negligible.
Reduction potential of resource depletion (raw materials)	10%	11%	13%	Increased scope leads to an increasing resource depletion reduction potential for sub-options 2a to 2c, though difference between 2a and 2b is negligible.

Table 37 Social impacts of PO2

(1) Social impacts				
Description	***Amount/qualitative***			***Comments***
	Option 2a	***Option 2b***	***Option 2c***	
Direct impacts				
Overall effect on EU employment	+/-	+/-	+/-	Effects on employment are expected to follow overall economic effects. While manufacturing industries may experience slight employment decreases due to reduced product demand, repair and related services may experience slight increases. The literature is inconclusive on the net effects on employment.
Indirect impacts				
n.a.				

4. OPTION 3: EXTENSION OF SUSTAINABILITY REQUIREMENTS FOR PRODUCTS

4.1. Overview

Overview of Policy Option 3

Sub-option 3a: Enhanced sustainability requirements

- Measure 3a.1 – Minimum requirement on the durability or reliability of the product or its components
- Measure 3a.2 – Minimum requirements on reparability and upgradability
- Measure 3a.3 – Restricting the presence of substances hindering circularity
- Measure 3a.4 – Minimum requirements on recycled content on the product or components
- Measure 3a.5 – Minimum requirements to reduce carbon and environmental footprints set at process and/or life cycle environmental impact(s) level
- Measure 3a.6 – Requirements enabling high-quality recycling

Sub-option 3b: Far-reaching sustainability requirements

- Measure 3b.1 – Adoption of SPI measures setting out requirements covering large groups of products
- Measure 3b.2 – Minimum requirements on re-manufacturability
- Measure 3b.3 – Requirements of due diligence on the supply chain of products

Sub-option 3c: Bans on some products

4.1.1. Assumptions used in the analysis

- The main levers for the environmental, social and economic effects are the scope of the requirements and their stringency.
- It is assumed that the requirements of these sub-options will vary across sectors and specific adaptation will be required in implementing measures to integrate the different SPI measures.

4.1.2. What problems and specific objective(s) does this option address

This option addresses sub-problems 1 and 2, i.e. the fact that (i) product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects; and (ii) it is too difficult for economic operators and consumers to make sustainable choices in relation to products. By imposing requirements on the sustainability of products, this option will influence the design of products and eliminate the less sustainable ones from the EU market, hence facilitating the choice of economic operators and consumers.

The option will target specific objective 1 on improving product sustainability. While sub-option 3a will introduce minimum requirements for specific product groups, sub-option 3b will create the possibility to set requirements for large groups of products sharing common characteristics as well as requirements on social aspects. Both sub-options 3a and 3b will introduce or revise product requirements through SPI measures, following the preparation and adoption process provided in the legislation. Sub-option 3c establishes the possibility to ban certain products or materials in products.

Stakeholders' views on PO3

Several questions were asked in the OPC inviting stakeholders to provide an indication of their views on aspects relating to some of the measures under PO3. The most significant part of respondents were industry representatives (56%), while EU citizens represented 16% of total respondents, and NGO's and environmental organisations together 10%. Therefore, the share of stakeholder groups representability needs to be taken into account.

About 55% of the respondents agreed or strongly agreed that voluntary approaches such as labelling do not provide sufficient incentives for businesses to provide more sustainable products – even though the views of sectors diverged somewhat (84% of EU citizens, 38% of industry[90] representatives, 58% of NGOs and 91% of environmental organisations). SME views on voluntary approaches align with the average. There was **overall support (59%) for establishing binding rules on actions to be taken by producers to improve durability, re-usability, upgradability and reparability** to improve the situation compared to the baseline, though some sectors' views diverged (40% of the industry ranked this measure as important or very important, while 87% of EU citizens, 88% of NGOs and 91% of environmental organisations did so). SMEs

[90] Business associations and companies

are slightly less supportive of binding rules (56%, n=59), though still a majority of this group is in favour. In addition, overall 58% of respondents agreed or strongly agreed that economic actors do not have adequate and reliable information on the sustainability of products (56% of EU citizens, 54% of industry representatives, 78% of NGOs and 81% of environmental organisations). This view is slightly higher amongst SMEs (69%, n=59).

On the question on product design rules and general product requirements to foster overall sustainability of products in the EU as set out in the CEAP, the following four options received the highest scores, i.e. between 32% and 35% of the highest score and 18% to 24% of the second highest (4 out of 5): setting binding rules for durability, usability, etc.; prioritising modular designs to facilitate easy repair, upgrade, remanufacture, etc.; producers ensuring information on reparability; and ban on substances inhibiting circularity - even though within certain sectors views diverged on these issues. Out of these, the option which received the highest percentage of the highest preference score was 'Set*[ting]* binding rules detailing, at product group level, what actions producers are obliged to take to improve their products' durability, reusability, upgradability and reparability'. The views of certain sectors diverged with 88% of EU citizens, 88% of NGOs and 91% of governmental organisations showing very high or high preference, while only 40% of industry representatives shared this preference.

In targeted interviews (see Annex 2), minimum sustainability requirements on products (e.g., included in a revision of current Ecodesign rules) were considered by some interviewees – in particular NGOs and consumer associations – as the most effective means of reducing products' environmental impact, because not enough consumers are ready to pay more for sustainability. Nonetheless, some industry representatives expressed concerns about the costs involved in testing certain requirements (e.g., product lifespan requirements and product environmental footprint requirements – in particular if the SPI measure specifies that PEF studies should be used) and how difficult it might be to comply with certain requirements (e.g., on recycled content). Part of the industry was also concerned about potential increases in the administrative burden (e.g., because of due diligence requirements). In general, however, **corporate interviewees supported a product-specific approach to the requirements placed by the SPI and expressed readiness to comply with additional requirements**, provided these are grounded in a robust Impact Assessment and the verification of compliance relies on high quality testing standards. SMEs, however, said they may find it challenging to test the durability of products. Requirements already foreseen in the existing Ecodesign directive are expected to elicit the most effort from manufacturers, though these are expected to provide the highest benefit (via NGOs) and have a large impact on reducing the environmental/social impact of products (via academic/research institutions).

At a workshop with 73 MS representatives in relation to sustainability requirements for products (PO 3), general support was expressed for requirements on durability and reparability, and a number of participants underlined the importance of requirements on recycled content as well as high-quality recycling. In addition, general support was expressed for the use of the PEF method, even though some advised that setting minimum requirements on the carbon/environmental footprint for products might be complex and require additional time. Participants were supportive of the idea of having a set of sustainability principles applicable to all products, but advised that a product-specific approach will also be needed to complement and implement these in concrete terms. In general, participants were also supportive of including due diligence requirements within the SPI, underlining that coherence with other initiatives in this area (such as the upcoming Sustainable Corporate Governance initiative) should be ensured.

The qualitative feedback from interviews with representatives of some industrial sectors on the potential impact of some measures under PO3 is presented below:

Home Appliances

- **Minimum requirement on durability**: durability is already tested. Additional requirements on "less relevant" parts would mean a significant increase in the costs for testing and will lead to investments for testing equipment, adaptation of production technology and an increase in the number of staff for testing.
- **Minimum requirements on reparability and upgradability**: requirements based on current provisions for white goods will lead to (i) an increase in the costs, as testing capacities will have to be increased; (ii) investments in test equipment and space; (iii) adaptation of production technology; and (iv) an increase in the number of staff for design, testing, quality management, etc.
- **Minimum requirements on recycled content**: similar requirements will lead to an increase in costs. The workload to manage the paperwork relating to the supply chain, and check and audit

suppliers will increase significantly. In addition, using a substantial amount of recyclates in manufacturing will require adaptation of the manufacturing processes and potentially new machines. The administrative burden will increase as well as personnel costs. Moreover, a significant increase is expected in the costs to check recyclates for substances. A management system will need to be set up and additional investments will be needed to adapt the composition of the material used (mixed vs. virgin). Finally, an increased quality and verification management market for high quality recycled plastics is not yet developed and additional verification costs for incoming secondary raw materials are expected.

- **Minimum requirements to reduce the carbon and environmental footprints**: having requirements on footprints in addition to the existing Ecodesign requirements will lead to an increase in costs. PEF is (currently) not robust enough to assess product footprints adequately. As a result, a huge effort will need to be made by companies to calculate the PEF of their products, let alone reduce it. Extensive LCAs will have to be performed for each type of product, requiring testing staff, designers, supply chain experts, etc. Finally, IT systems will need to be modified, (LCA) software purchased, etc.
- **Requirements of due diligence on the supply chain of products**: documentation and reporting will increase the administrative burden. Company-wide implementation requires significant initial investments in training, tools and consultancy, as a chain of custody will have to be installed, requiring in turn a management system, extensive quality management and testing, and modification of IT systems. In the long-term, small- and medium-sized suppliers face significant costs to "co-comply" with due diligence laws by documenting and reporting the information needed by their clients. This kind of "paperwork" burdens long-lasting and trusted customer-supplier relationships.
- **Minimum requirements on re-manufacturability**: a new approval of each remanufactured model will be required.
- **Measures banning some products or some materials in specific products**: in order to ensure business continuity investments will be required and more staff will be needed for testing, quality management, warehouse management, marketing, variant management, communication efforts, warehouse management, etc.

Textiles

- **Minimum requirements to reduce the carbon and environmental footprints**: if a specific reduction is introduced, e.g. 5%, then the measure would work, but if a target like zero carbon in 10 years is set, then the costs will be huge.
- If the threshold for product quality is too high, then cheaper products will have their price increased.
- **Minimum requirements on reparability and upgradability**: a flat cost per product would entail a marginal increase; for larger reparability programmes the increase would be negligible.
- **Minimum requirements on recycled content**: for the textile industry, the price of, e.g., polyester could be high in the short term, but in the long term prices will stabilise (as the supply of recycling material adapts).
- **Minimum requirement on durability**: a trade-off exists between durability and recyclability.
- **Minimum requirements on re-manufacturability**: re-manufacturing is not applicable to the textile industry.
- **Requirements enabling high-quality recycling** depend on the components (fibres, chemicals) and how far you can go, for example a ski jacket.
- **Requirements of due diligence on the supply chain of products**: obtaining reliable data (where does the cotton/wool come from) is very difficult. The tracing system does not exist and would entail very high costs.

4.2. Baseline for PO3

Currently, sustainability requirements for products are only partially addressed at EU level, via several product or sector-specific EU legislative instruments (such as the Ecodesign Directive, the Packaging and Packaging Waste Directive, the Single Use Plastics Directive, the End of Life of

Vehicles Directive, the Waste from Electrical and Electronic Equipment Directive, the Construction Products Regulation, and the Batteries and Waste Batteries Regulation) – some of which are currently undergoing revisions[91]. While it is expected that most of the instruments due for revision will increase the requirements in relation to product sustainability, given that no firm decisions on the preferred options for some initiatives have been made yet, forecasting with accuracy the changes to the baseline that these may give rise to is not possible. Taking this into account, **the baseline for the assessment of this PO will rely on existing legislative provisions** (whether already in force or proposed by the Commission).

In relation to the Ecodesign Directive, in the baseline scenario the current status quo is maintained and no additional, more ambitious sustainability requirements are expected to be integrated. Marginal progress and a positive impact might still come from the extension of the circularity requirements that the Directive establishes for limited product groups to other product groups, including those still to be added in the 2030 horizon (see baseline for PO2).

While, as mentioned above, predicting the impact of the evolution of other legislative acts is difficult, some forecasts can be made with regard to the Single Use Plastics (SUP) Directive, the Batteries Regulation, and the upcoming initiatives on empowering consumers and on green claims:

- The **SUP Directive[92]**, based on its provisions and the 2021 guidance, will promote *reusability, recyclability, uptake of recycled material and design for circularity* for single use plastic products, and will limit the *presence of hazardous chemical substances* in single use plastics. It will also progress in delivering *targets for recycled content in beverage bottles*: 25% by 2025 for PET bottles and 30% for all beverage bottles by 2030. A collection target for beverage bottles of 90% by 2029 was also established. Finally, the Directive will ensure that at least a quarter of the fishing gears (or 2700 tons/year) will not be abandoned by fishermen[93].
- The new **Batteries and Waste Batteries Regulation** is expected to address the *hazardous aspects* of batteries and waste batteries, and promote targets for *recycled content* in industrial, EV and automotive batteries (in 2030: 12% cobalt, 85% lead, 4% lithium and 4% nickel; and in 2035: 20% cobalt, 85% lead, 10% lithium and 12% nickel). As it will also introduce *progressive requirements to minimise the carbon footprint* over the life cycle of batteries, efforts to decrease the carbon footprint in the manufacturing process will indirectly lead to the promotion of renewable energy generation as well. Finally, EU aims to get at least 30 million zero-emission vehicles on EU roads by 2030[94]stimulating the market for 2nd life batteries with a 25% uptake would annually save 400 000 tons of CO2 in 2035, generate around EUR 200 million in added-value in 2030 and create around 2 000 FTE jobs[95].
- The upcoming **initiatives on empowering consumers and on green claims** will reduce the amount of false claims and support the market for products that proved their sustainability in accordance with the environmental footprint methods. The benefits associated with transparency will help create the right market signals for products. In addition, the Circular Electronics Initiative, and the Right to Repair Initiative, is expected to promote reparability of products in the group of electronics, which will help to reduce waste.

[91] See Annex 14 for further details

[92] Directive (EU) 2019/904

[93] SWD/2018/254 final. IMPACT ASSESSMENT Reducing Marine Litter: action on single use plastics and fishing gear EUR-Lex - 52018SC0254 - EN - EUR-Lex (europa.eu)

[94]https://ec.europa.eu/commission/commissioners/2019-2024/valean/announcements/keynote-speech-eurelectrics-electro-mobility-summit_en.

[95] SWD/2020/335 final. IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) 2019/1020

Finally, responsible sourcing and due diligence are growing in importance throughout the raw materials value chain and have the potential to drive positive changes in local communities that extract raw materials, for example in the case of cobalt in the Democratic Republic of the Congo (DRC)[96]. The EU Regulation on Conflict Minerals[97], covering tin, gold and a couple of CRMs such as tantalum and tungsten, applies to EU importers as of 1 January 2021 and addresses such concerns. The European Partnership on Responsible Minerals[98] helps mines to comply with the EU Regulation and OECD due diligence guidance[99]. Article 39 of the proposal for a Batteries Regulation[100] intends addressing actual and potential social and environmental risks linked to the sourcing, processing and trading of the raw materials required for battery manufacturing. To that end, the proposal for a Batteries Regulation prescribes that battery manufacturers shall comply with supply chain due diligence obligations (including adopting and clearly communicating to suppliers and the public a company policy for the supply chain of raw materials; establishing and operating a system of controls and transparency over the supply chain, including a chain of custody or traceability; and identifying and assessing potential adverse impacts associated with the identified list of social and environmental risk categories). Responsible sourcing aspects could in principle be analysed in the Ecodesign preparatory studies, after adjustments of the Methodology for Ecodesign of Energy-related Products (MEErP)[101].

However, existing or anticipated sustainability requirements under the above-mentioned legislative instruments remain product or sector-specific, meaning that, in the absence of SPI, **no overarching framework to address product sustainability requirements will be in place by 2030**. The various product or sector-specific legislations may in addition adopt different approaches and/or methodologies, or be more or less ambitious in their requirements. As a result, the overall criteria and sustainability levels targeted by the SPI are unlikely to be evenly achieved across products or sectors.

In addition, gaps in the product coverage are likely to be inevitable: for example, some products, such as textiles, furniture and chemicals, are not covered by the current or anticipated product legislation and, in the absence of SPI, are unlikely to be subject to product-level sustainability requirements over the coming years.

All in all, a "no SPI" scenario is likely to result in **missed opportunities** in terms of product-level sustainability requirements for various groups of products, for example:

- In Europe alone, around 5.8 million tons of **textiles** are thrown away every year. In addition, less than 1% of the material used to produce clothing is recycled into new clothing, representing a loss of more than EUR 92 billion worth of materials each year[102]. Finally, the textile consumption is responsible for about 10% of world CO_2 emissions and 20% of global water consumption, and in a 'no action scenario' by 2050 it will use up to a quarter of the world's carbon budget.[103]
- 10.8 million tonnes of furniture are discarded by businesses and consumers in the EU each year and 80-90% goes to landfill, with 10% recycled[104].

[96] Mancini,L., Eslava, N., Traverso, M., Mathieux, F., Assessing impacts of responsible sourcing initiatives for cobalt: Insights from a case study, Resources Policy 71 (2021) 102015, https://doi.org/10.1016/j.resourpol.2021.102015
[97] Regulation (EU) 2017/821
[98] https://europeanpartnership-responsibleminerals.eu/
[99] https://www.oecd.org/daf/inv/mne/OECD-Due-Diligence-Guidance-Minerals-Edition3.pdf
[100] https://ec.europa.eu/environment/topics/waste-and-recycling/batteries-and-accumulators_en
[101] Mancini, L., Blengini, G.A., Ardente, F., Mathieux, F. JRC notes on Responsible Sourcing in MEErP. (2021). (draft – unpublished)
[102] EEA (2019) Textiles and the environment in a circular economy, Eionet Report - ETC/WMGE 2019/6
[103] UNEP: Putting the brakes on fast fashion (unep.org)
[104] Eunomia and EEB (2019) Circular Economy opportunities in the furniture sector Report-on-the-Circular-Economy-in-the-Furniture-Sector.pdf (kinstacdn.com)

- Some 60% (by weight) of the chemicals that are circulating on the European market, including basic chemicals like oxygen or hydrogen, and are needed to produce other chemicals and household products, from detergents and disinfectants to vinegar, have been identified as hazardous for human health and the environment[105].

4.3. Sub-option 3a: Enhanced sustainability requirements

4.3.1. Economic impacts

The first stakeholders to be affected are economic actors across the value chain (including in third countries), as obligations will be introduced for them to fulfil minimum requirements for the products they wish to place on the market, including obligations such as due diligence processes. Several economic operators downstream, such as repairers, re-furbishers, re-manufacturers, recyclers and sellers of second-hand products, will benefit from the reinforced circularity requirements included in this sub-option. Workers along the supply chains will also be affected, as they will have to adapt to the changes in product design and may need to become acquainted with new skills. On the other hand, they will benefit from a reinforced attention to social aspects along the supply chain. Product users (consumers as well as professional purchasers and users) will benefit from better quality products, and ease of reparability and upgradability. Finally, market surveillance and customs authorities will be affected too, as they are the main stakeholders responsible for enforcing the change in the EU internal market.

4.3.1.1. Administrative burden

Administrative burden for economic operators

Additional administrative burdens can be expected from this sub-option, for example for the provision of information for market surveillance. Companies will be also required to collect more information from their upstream suppliers, e.g. on the presence of substances of concern in the components or mixtures they are supplied with. Assessing the exact administrative burden on economic operators is difficult, but it can be expected to increase from sub-option 3a (the lowest) to sub-option 3b (the highest). However, the possible introduction of a Digital Product Passport – if chosen under PO 4 – is likely to ease this burden.

Administrative costs for the European Commission

Under sub-option 3a, the European Commission will have to conduct a significant amount of work for developing minimum requirements for different measures (e.g., via SPI measures). The average duration from an Ecodesign preparatory study to the implementing measure is 42 months and extensive resources are required[106].

Administrative burden for Member States

The administrative burden on public authorities will be related to the compliance with and enforcement of these measures. In particular, for MSs the new requirements under this sub-option will require additional costs for market surveillance, e.g. for training about the new measures and specifications the product, components and material will have to comply with, as well as for the additional human resources needed to conduct market surveillance activities effectively. As mentioned above, however, the possible introduction of a Digital Product Passport – if chosen under Option 4 – is likely to facilitate these tasks.

[105] Packaging Europe: Into the crucible: Will the European chemicals industry rise to the circularity challenge? - Packaging Europe

[106] Hinchliffe (2018) Assessing the Review Process of EU Ecodesign Regulations. Presentation made at the seminar "The role of the Ecodesign Directive in reaching climate and resource efficiency objectives in Europe"

Importantly, if the implementation of a measure on minimum requirements to reduce the carbon and environmental footprints requires the provision of an Ecological Profile in the form of a PEF study, this will likely be accompanied by third party compliance assessment requirements, which would facilitate the work of verification and enforcement of this measure by Market Surveillance Authorities.

4.3.1.2. Direct economic impact for businesses

Compliance costs for manufacturers and their suppliers:

Most of the measures will put in place new constraints resulting in an increase in compliance costs, e.g. for secondary raw material, product design, and post first-use (ease of repair or reuse) and end of life (improved recycling, remanufacturing) procedures. Companies would need to adapt their product design and even production line with possible negative economic impacts. From the estimates provided by industry representatives in targeted interviews (see Table 71 in Annex 11), it can be inferred that, in most cases, the increase in costs is likely to remain below 5% of current compliance costs.

Depending on the business model, the risk is that businesses pass on the increased price component to consumers, with the initial purchase price of products increasing. The presence on the market of more durable and reliable products, however, is expected to result in a reduction in the overall number of products to be manufactured per year (in particular, probably, for products for which consumers show a strong willingness to pay for improved reparability and durability). In some cases, an initial price increase may be followed by price stabilisation, e.g. as the supply of recycled/secondary material grows to meet demand and the new requirements become the norm in the value chain. The requirements under sub-option 3a are also likely to support businesses in developing new revenue streams and avenues of business, such as repair, refurbishing and remanufacturing[107]. Finally, the sub-options on incentives (PO5) are also likely to support the demand for sustainable products.

Functioning of the internal market: Most of the measures under this sub-option will help in establishing level playing fields, given that some MSs have such requirements in place already (e.g., France[108], Germany[109] and Sweden[110]), resulting in uneven requirements for businesses to comply with for the same products.

Competitiveness, trade and investment flows: The proposed measures could improve the competitiveness of all companies placing products on the EU market, as all businesses will be subjected to the same minimum requirements. The same benefits have already been provided by the Ecodesign Directive[111]. Increased reuse, longer lifetimes, reparability, availability of high-quality recycled material, etc. will help to increase the stock life and the availability of secondary raw material of high quality, also reducing the import dependency of the EU. In the long run, businesses will benefit from eco-designed products[112].

[107] For instance, some retailers in France (Darty and FNAC) have started investing in the repair sector to generate additional revenue

[108] French law against waste and for a circular economy https://www.ecologie.gouv.fr/loi-anti-gaspillage

[109] Circular Economy Act 2020 https://www.bmu.de/en/law/circular-economy-and-safeguard-the-environmentally-compatible-management-of-waste/

[110] Swedish strategy for circular economy accelerates the transition to sustainability 2020 https://www.government.se/4ad42c/contentassets/d5ab250cf59a47b38feb8239eca1f6ab/circular-economy--strategy-for-the-transition-in-sweden

[111] *"The circular economy requirements embodied in the Ecodesign Regulations are typically identified as the most effective solutions – in regulatory terms – to 'market failures', i.e., observed deviations from perfectly competitive market behaviour"* in Bukarica and Tomši´c (2017) Energy efficiency policy evaluation by moving from techno-economic towards whole society perspective on energy efficiency market. Ren. and Sust. Energy Rev.

[112] ADEME (2017) Analyse des bénéfices économiques et financiers de l'éco-conception pour les entreprises. This study, covering 10 companies from five different sectors (food, IT, sport, building, pharmaceutical and hitech), estimated several economic and financial returns generated by the implementation of eco-design approaches in companies: (i) a significant increase in turnover (up to a factor of 5

Impact on SMEs:

For some sectors (for example electrical and electronic products), companies placing products on the EU market have the opportunity to further develop and capture the repair and refurbishment market, where significant growth has been seen recently[113]. As most of the companies in these markets are SMEs, this could produce a significant positive economic impact for the sector.

Importantly, if the implementation of a measure on minimum requirements to reduce the carbon and environmental footprints requires the provision of an Ecological Profile in the form of a PEF study, this will imply an additional administrative burden for the preparation and verification of the PEF study. As noted by some industry and MS representatives, the additional cost may be significant for SMEs. Under the Green Claims initiative, however, the Commission is considering possible measures to facilitate the preparation of PEF studies by SMEs, such as the availability of simplified calculation tools, access to low-cost expertise and support through existing funding and financing tools.

4.3.1.3. Indirect economic impact for businesses

As with Ecodesign and Energy Labelling legislation[114], the measures under this sub-option are expected to have a positive impact on the deployment and diffusion of innovations. For Ecodesign, the level of ambition of the requirements plays an important role in stimulating innovation, and a positive impact on innovation and research can therefore be expected.

4.3.1.4. Economic impact for citizens

Consumers will benefit from the lower price of refurbished products and easy reparability options, but the initial cost of new products could become higher – even though in some cases the increase may be followed by price stabilisation, for the reasons explained above (see 'Direct economic impact for businesses') and because of the likely increased competition to provide more sustainable products. A study by the Parliament on the longer lifetime of products[115] concluded that an increase of 1% of the use of the maintenance, repair and rental services, and other related sectors has an aggregated economic effect of EUR 6.3 billion.

4.3.2. Environmental impacts

The introduction and deployment of the measures under sub-option 3a would effectively reduce environmental impacts compared to the baseline scenario. The product groups recently regulated under the Ecodesign Directive (welding equipment, servers and data storage products, and electronic displays) already show the real environmental benefits deriving from material savings[116]. Therefore, net environmental benefits could be expected from both 3a1 and 3a2.

In the case of 3a1, products with a longer lifespan are[117,118] expected to contribute to a reduction of resource depletion, waste, emissions, and other environmental impacts associated with the production,

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for the most marked case, with median values ranging between +7 and 18%); a tangible reduction in production costs (up to -20% in the most pronounced case); and the strengthening of the commitment of employees and the improvement of the internal functioning of the company. https://www.ademe.fr/analyse-benefices-economiques-financiers-leco-conception-entreprises

[113] In the case of smartphones, for instance, while the market for new phones is saturated, the market for refurbished phones is showing strong growth https://www.lemonde.fr/economie/article/2019/02/24/smartphones-le-boom-de-l-occasion_5427668_3234.html

[114] https://ec.europa.eu/energy/sites/ener/files/documents/201405_ieel_product_innovation.pdf

[115] European Parliament (2016) A Longer Lifetime for Products: Benefits for Consumers and Companies. https://www.europarl.europa.eu/RegData/etudes/STUD/2016/579000/IPOL_STU(2016)579000_EN.pdf.

[116] Polverini (2021)

[117] Iraldo et al. (2017) Is product durability better for environment and for economic efficiency? A comparative assessment applying LCA and LCC to two energy-intensive products. Journal of Cleaner Production; Ardente and Mathieux (2014) Environmental assessment of the durability of energy-using products: method and application. Journal of cleaner production; and Reale et al. (2019) Consumer Footprint-Basket of Products indicator on Household appliances. Technical report. European Commission, Joint Research Centre. 2019.

[118] The results of a JRC study showed that "*for the global warming potential, prolonging the lifetime of a washing machine and dishwasher is environmentally beneficial when the potential replacement product has up to 15 % less energy consumption during the use. For the*

distribution and disposal life-cycle stages[119,120,121,122,123]. For example, a German Environment Agency study[124] concluded that, for all product groups examined, long-life products do better than short-life variants in all environmental categories. Similarly, the PROMPT project showed that, among all the appliances analysed, those with shorter lives always perform worse for all environmental indicators[125]. Moreover, according to Defra[126] there is an argument in particular for optimised lifetime extension strategies, especially for products in which manufacturing, supply chain and waste management impacts dominate over the life cycle. Finally, according to a European Environmental Bureau (EEB) study (2019), extending the lifespan of all washing machines, smartphones, laptops and vacuum cleaners in the EU by one year would lead to annual savings of around 4 million tonnes of CO_2 by 2030. In addition, this can promote the reuse of goods by providing more certainty regarding the remaining lifespan after first use (see below).

Generally, other indirect positive environmental impacts will materialise because products, having a longer lifetime, will be less frequently replaced; avoiding early failure of products prevents their early replacement, and therefore reduces environmental impacts related to the production, transport and disposal of products. The potential for circularity (i.e., re-sale and reuse)[127] is also increased by measures under this sub-option.

While assessing environmental impacts, a distinction needs to be made between B2B and B2C products, as the range of benefits will vary. For B2B products, foreseeing implementation is much easier, as an economic argument exists (having durable and reliable components/products reduces manufacturing and operational risks). Differently, in the case of B2C products consumer behaviour is a significant factor: the minimum requirements will bring in environmental benefits by gradually reducing the possibility for a consumer to choose an unsustainable product. Combined with incentives (PO5), this would further help to move towards more sustainable consumption models.

More in detail with regard to the other measures, measure 3a3 will support PO6 by facilitating circularity and thus contribute to environmental benefits; 3a4 will increase the demand for secondary raw material and thus environmental benefits associated with the reduction in primary resource consumption; 3a6 will foster recycling, thereby feeding the supply required under 3a4; and 3a5 and 3a6 will by design explicitly result in the reduction of negative environmental impacts. Overall, thus, the environmental benefits of sub-option 3a would be significant.[128]

4.3.3. Social impacts

With more sustainable products and lower production needs, a shift in employment can be expected from the manufacturing sectors to the repair and refurbishing sectors. An increase in jobs in the

abiotic depletion potential impact, mainly influenced by the use of materials during the production phase, prolonging the lifetime of both machines was shown always to be beneficial, regardless of the energy efficiency of newer products. Freshwater eutrophication showed a great influence by the impact of the detergent used during the use phase; thus, prolonging the device's lifetime is still beneficial for this impact category, although the benefits are negligible compared to the life cycle impacts of the products.". See https://op.europa.eu/en/publication-detail/-/publication/72cd56e4-bab7-11e6-9e3c-01aa75ed71a1/language-en/format-PDF/source-126402524

[119] Estevan et al.(2017) Life Cycle Costing State of the art report. Local Governments for Sustainability, European Secretariat

[120] Bakker et al. (2014) Products that go round: Exploring product life extension through design. J Clean Prod

[121] Bakker et al. (2019) Products that Last 2.0: Product Design for Circular Business Models. BIS Publishers

[122] Cooper (2016) Longer lasting products: Alternatives to the throwaway society. CRC Press

[123] Ruth et al. (2005) Design Strategies to Postpone Consumers' Product Replacement: The Value of a Strong Person-Product Relationship, The Design Journal

[124] Prakash et al. (2016) Einfluss der Nutzungsdauer von Produkten auf ihre Umweltwirkung: Schaffung einer Informationsgrundlage und Entwicklung von Strategien gegen „Obsoleszenz ". Dessau-Roßlau: UBA Texte

[125] Berwald et al.(2020) Environmental evaluation of current and future design rules. PROMPT

[126] Defra (2011) Longer Product Lifetimes – Summary Report

[127] EEA(2017) Circular by design – Products in the circular economy

[128] Donati et al. (2020) indicate some of these circular economy measures result in reduction of several environmental indicators: −10.1% Global Warming Potential,−12.5% Raw Material Extraction (RME),−4.3% Land Use (LU) and−14.6% Blue Water Withdrawal (BWW).

second-hand sector (repair, refurbishment, remanufacturing) can also be expected with the introduction of measures 3a1 and 3a2. As a result, the workforce will be required to learn new skills.

Several organisations from the social and solidarity economy sector are active in the repair and refurbishing fields. As these organisations often recruit people from vulnerable social groups, a positive social impact can be expected in this regard too.

As discussed earlier, consumers may face an increase in purchase prices. This, however, is likely to be compensated by an equal or lower life-cycle cost because of the increased durability, resulting in a longer lifetime of products and improved efficiency. All the same, vulnerable sections of the society with limited purchasing power could face difficulties in purchasing more expensive products, especially those of daily use. Nonetheless, some of the negative impacts in this regard could be reduced through the incentive measures under PO5.

4.4. Sub-option 3b: Far-reaching sustainability requirements

4.4.1. Economic impacts

The economic impacts of sub-option 3b will be similar to those of sub-option 3a. Depending on the measure, however, differences will emerge.

With regard to the specific measures, whether measure 3b1 will entail any additional costs is unclear, as it intends to set horizontal requirements by wide groups of products. For measure 3b2, the impact will be limited to specific sectors (i.e. those for which remanufacturing is relevant), possibly including SMEs, given that these are often active in manufacturing product components. In the case of measure 3b3, the impact will concentrate in the upstream of the supply chain, in particular in third countries. Also, requirements on due diligence are likely to be accompanied by a requirement for third-party conformity assessment, which will increase the cost for businesses and facilitate the verification by Market Surveillance Authorities. From the estimates provided by industry representatives in targeted interviews (see Table 71 in Annex 11), it can be inferred that, in most cases, the increase in costs related to the measures of sub-option 3b is likely to remain below 5% of the current compliance costs.

4.4.2. Environmental impacts

Measures under sub-option 3b will bring additional environmental benefits because of more ambitious sustainability requirements. In particular, measure 3b1, covering a group of products, will contribute to reducing environmental impacts thanks to the economies of scale generated. The minimum requirements on remanufacturing[129] will close an important loop in the sectors concerned, by facilitating the re-use of product components and therefore reducing the environmental impacts associated with their production. Regarding measure 3b3, the requirements on due diligence will bring benefits along the supply chain, including in the third countries where the production facilities may be located, thus helping to improve global environmental standards.

4.4.3. Social impacts

The additional social impacts compared to sub-option 3a come from the introduction of requirements on due diligence (3b3) and will translate into an improvement of working conditions and human rights along the value chains, both within and outside the EU. Differently, the minimum requirements on re-manufacturability will create additional jobs.

[129] Reuse and remanufacturing, while less meaningful than delayed replacement, may still deliver significant environmental benefits (−1.36% GWP;−1.40% RME;−0.33% LU;−2.33% (source Donate et al.)

4.5. Sub-option 3c: Bans on some products

4.5.1. Economic impacts

Bans on specific materials or products can create problems in specific sectors where the banned materials/products serve as inputs, as in the case of the specialised lamps with mercury, which are used for drying in other industries where LED lamps do not deliver the same performance. However, because of its product-specific nature, the economic impact on businesses and public authorities is expected to be limited.

4.5.2. Environmental impact

Additional environmental benefits will be achieved in comparison with sub-option 3b. It will certainly bring positive environmental impacts, as the removal of products/materials with significant environmental impacts, e.g., single use products or products including materials which make their reuse/recycling difficult, have a direct effect on reducing a source of impacts.

4.5.3. Social impacts

The social impacts of this sub-option are similar in nature to those of sub-options 3a and 3b, but certainly of higher magnitude in comparison with sub-option 3b.

Banning some products could affect some citizen groups, as in the case of incandescent lamps, with older generations not feeling comfortable using LED and CFL lamps[130], at least for the first generations of products.

4.5.4. Impact on third countries

The impact on third countries of suboption- 3c would be similar to the previous two sub-options. Since the value chain of most products are spread across the globe, this sub-option will put in place new constraints resulting in an increase in compliance costs due to the minimum requirements under suboptions- 3a and 3b. The requirements in relation to due diligence (measure 3b3), however, have the potential to be bring added value across the supply chain, including in third countries. Finally, this sub-option will impact businesses in third countries producing or supplying the banned products, or their components or materials.

[130] Incandescent lamps were not banned per se, but led to a de facto ban because of minimum energy performance requirements. Measure 3c2, however, intends to ban specific products/materials, and its legal formulation will also influence the way it is implemented and the alternatives available.

4.6. Summary of impacts

Table 38 Administrative burden of PO3

Administrative burden Option 3					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Measures 3a1, 3a2, 3a4, 3a5, 3a6, 3b2	Direct costs	- - Production and supply chain changes to fulfil minimum requirements (including testing facilities and training) Durability testing equipment in product design departments Capital expenditures to adapt manufacturing processes, logistics and supply chains Capital expenditures to process secondary raw materials	- Personnel to design new, compliant products (depending on timing – if the implementation of the policy is aligned with the design cycle, no additional cost as the new product would have been designed anyway) Personnel with Ecodesign competencies, including life-cycle assessment competencies where relevant Training for re-skilling, from the manufacturing of primary raw materials to that of secondary raw materials Higher personnel activity in the design phase of industrial products, in industrial engineering (design of production processes), in buying departments and in logistics. Higher personnel activity dedicated to the support of professional transitions from activities reduced by these requirements towards those favoured by them (i.e., maintenance, repair/upgrade, refurbishing, remanufacturing)	- Setting up of the enforcement process (including training) (MS) Government expenditures for conformity review (circularity aspects of a larger panel of products, increased recycling contents in products, premature obsolescence, etc.) Third party conformity assessment (assuming that MS might not be able to conduct the conformity review for all aspects)	+/- Monitoring compliance with the requirements (MS)

			Higher activity in after-sales, maintenance, repair, refurbishing and re-manufacturing services Personnel cost to carry out testing and verification		
	Indirect costs	- - Higher up-front cost of products due to, inter alia higher-quality materials, more accurate assembly, better qualified manufacturing work force, more thorough design, and reversible assembly methods (possibly compensated by longer service times)	- Increased cost of products due to the higher costs due to minimum requirement obligations	- Changes required in other policies (EC and MS)	n.a.
Measure 3a3	Direct costs	- - Identification of alternative substances and possible changes in production processes Identification of suppliers of alternative substances Training of personnel	+/- Monitoring of product performance (reliability, durability, impacts) in consideration of the new substances	- Setting up of the enforcement process (including training) (MS) Government expenditures for conformity review (circularity aspects of a larger panel of products, increased recycling contents in products, premature obsolescence, etc.) Third party conformity assessment (assuming that MSs might not be able to conduct the conformity review for all aspects)	+/- Monitoring compliance with the requirements (MS)

	Indirect costs	n.a.	- Increased cost of products due to higher costs of alternatives Lower cost and better circularity for downstream businesses as circularity hindering substances removed	+/- Changes required in other policies (EC and MS)	n.a.
Measure 3b1	Direct costs	- Establishment of production and supply chain changes for the group of products (including testing facilities and training)	- Personnel cost to carry out testing and verification	+/- Development of SPI measures (EC) Setting up the enforcement process (including training) (MS)	+/- Monitoring of compliance with the SPI measures (MS)
	Indirect costs	n.a.	- Increased cost of products due to the new SPI measures Reduced cost because of simplification, thanks to SPI measures targeting product groups instead of individual products	+/- No additional costs as systems are already in place for SPI measures	+/- No additional costs
Measure 3b3	Direct costs	- - Setting up of systems for due diligence	- - Personnel cost to carry our due diligence	- - Establishment of due diligence requirements (EC) Setting up of the reporting process for due diligence (including training) (MS)	- - Monitoring compliance with due diligence requirements (MS)

	Indirect costs	n.a.	- Increased cost of products due to higher costs resulting from due diligence Reduced regulatory risks	- Changes required in other policies and negotiations in international fora like WTO, FTAs etc. (EC and MS)	n.a.
Sub-option 3c	Direct costs	- - Adaptation of the supply chain because of banned products and substances Changes in production and information systems	- Personnel cost to carry out testing and verification	- Identification and rationale of the ban (EC) Setting up of the enforcement process (including training) (MS)	- Monitoring compliance with the requirements (MS)
	Indirect costs	n.a.	- - Increased cost of products due to the higher costs of replacing substances or products	- Changes required in other policies (EC and MS)	n.a.

Table 39 Economic impacts of PO3

Economic impacts				
Description	***Amount/qualitative***			***Comments***
	Option 3a	***Option 3b***	***Option 3c***	
Direct impacts				
Cost of products increases	-	--	---	The cost increase due to the minimum requirements could be passed on to consumers by manufacturers. POs 5 and 6 could help in reducing this impact through incentives and/or Circular Business Models. Consumers (B2C products) or intermediate users (B2B products) will be affected by increased prices. Businesses may or may not benefit in terms of turnover increase, depending on the sales remaining constant/increasing or decreasing.
Growth in after-sales, maintenance, repair, refurbishing, re-manufacturing activities.	++	++	++	3a and 3b explicitly target minimum requirements on the relevant aspects and a growth in markets dealing with post first-use of products can be expected. Companies in these specific repair/second-hand market will benefit, most of them being SMEs.
Indirect impacts				
Increased activity related to the design of circular products and production processes, increased research and innovation	+	++	++	Researchers and research departments in companies will be impacted.

Increased market share for EU companies, in particular SMEs	++	++	++	As most companies in the repair, refurbish, and recycling sector are EU SMEs, a policy push as planned under 3a, 3b and 3c will be beneficial for them.
Fewer new products are sold on the EU market	-	-	-	Fewer new products could mean a loss of turnover for manufacturers in the short term. However, better quality products could bring a premium and in the long run this negative economic impact will be compensated.
Decreasing activity for companies producing single-use, low-cost products	-	-	--	This possible indirect negative impact (direct impact in case of 3c) for the economy but will bring significant environmental benefits.
Decreasing activity for the mining and quarrying sector	-	-	-	The decrease in activity is due to a longer lifetime and availability of high-quality recycled materials. Companies involved in mining will be affected, and potentially companies using virgin materials as well.

Table 40 Environmental impacts of PO3

Environmental impacts				
Description	***Amount/qualitative***			***Comments***
	Option 3a	***Option 3b***	***Option 3c***	
Direct impacts				
Buyers choose more durable, reliable, and repairable products	++	+++	+++	By delivering sustainable products, sub-options 3a and 3b will show positive environmental effects. 3c could also deliver additional benefits by banning unreliable products.
Less sustainable options are driven out of the market	++	++	++	All sub-options will be effective in influencing consumer behaviour through choice editing.
Substances of concern are gradually replaced by safer alternative	++	++	+++	All sub-options provide for measures removing products/materials and will have similar impacts.
Better management of products life cycle	+	++	+++	Sub-options 3b and 3c ensures a better management of product life cycles.
More secondary materials are used in production	++	++	++	To enable more secondary materials availability, high quality recycling is needed. This aspect is target by 3a and to certain extent by 3b too.
Indirect impacts				
Reduction of the indirect environmental impacts associated with the production of new products are diminished as demand decreases	++	+++	+++	
Diminished release of harmful chemicals in the environment	+	++	+++	

Decreasing environmental impact of material extraction	+	++	++	Minimum requirements under 3a and 3b will enable a reduction in the need of virgin material. Citizens will be impacted including in third countries where mines are located.

Table 41 Social impacts of PO3

Social impacts				
Description	***Amount/qualitative***			***Comments***
	Option 3a	***Option 3b***	***Option 3c***	
Direct impacts				
Increased incentive for manufacturers to improve working conditions	+	++	++	Workers involved in the value chain of products will be impacted.
Higher upfront costs for new products, or lower prices for refurbished products or easy repair faced by consumers	+/-	+/-	+/-	Consumers will be impacted, in particular those from lower income groups.
Indirect impacts				
Friction on the labour market as some sectors see an increasing demand, while others a declining one	-	-	-	Workers in specific sectors will be impacted (possibly also in third countries), which in turn will impact their families.
Companies invest in training and reskilling activities to address new demand	++	++	++	Workers in specific sectors will be impacted.

5. OPTION 4: SUSTAINABILITY INFORMATION FOR CONSUMERS AND B2B

5.1. Overview

Sub-option 4a: Enhanced information requirements

- Measure 4a.1 – Information requirements on the durability (technical lifetime) or reliability (mean time between failures) of the product or its components
- Measure 4a.2 – Information requirements on reparability and upgradability, including a reparability scoring
- Measure 4a.3 – Requirement to inform on the presence of substances of concern and to trace them
- Measure 4a.4 – Information requirements on the recycled content on the product or components (e.g., plastic parts)
- Measure 4a.5 – Information requirements on the environmental impacts along the life cycle of the product, for example in the form of an Ecological Profile
- Measure 4a.6 – Information requirements in the form of sustainability performance classes
- Measure 4a.7 – Information requirements on a set of social indicators

Sub-option 4b: European Digital Product Passport

- Measure 4b.1 – Information requirements in the form of a European Digital Product Passport through SPI acts
- Measure 4b.2 – Integration or close coordination of the SCIP Database (Article 9(1)(i) and 9(2) of the Waste Framework Directive) with SPI requirements

Sub-option 4c: Generalised European Digital Product Passport

- Measure 4c.1 – Direct implementation of a European Digital Product Passport to some "cross-sectoral" information requirements and possibility to add product-specific requirements through SPI measures

5.1.1. Assumptions used in the analysis

- Most data needed for information requirements already exists at some stage of the life cycle of the item and companies are able to retrieve it.
- The cost assessments are based on previous legislative acts which are considered to be comparable.

5.1.2. What problem(s) and specific objective(s) does this option address

PO4 tackles the following problems: (i) the lack of incentives to produce more sustainable products and retain value; and (ii) an imperfect information whereby economic actors and citizens lack reliable information on product sustainability. Therefore, it will address problems 1.a. (Product design does not sufficiently take into account environmental and social impacts over the life cycle, including circularity aspects) and 1.b. (Too difficult for economic operators and citizens to make sustainable choices in relation to products).

As for specific objectives, it will support the attainment of the following:

- Improve product sustainability;
- Improve access to sustainability information along value chain; and
- Incentivise more sustainable products and business models to improve value retention.

In all sub-options, PO4 essentially supports the implementation of the environmental sustainability requirements placed on products, as defined in PO3. In particular, the obligation to provide information is expected to improve compliance: should sustainability requirements under PO3 not be made compulsory, the information requirement would offer the opportunity to encourage economic operators to follow these requirements on a voluntary basis. The scope of products is defined in PO2 and all stages of the life cycle are affected by measures under PO4, as information needs to be collected along the life cycle and can be used at different stages (design, use phase, end of life, etc.).

Stakeholders' views on PO4

Stakeholders had several opportunities to provide input to the discussion on PO4, focussing on **the modalities of implementing a European Digital Product Passport**. The main topics included:

- What information exactly is to be shared under each measure;
- Who should have access to specific information and how it should be displayed; and
- When should requirements be set at the product, product category or value chain level.

Importantly, the discussion offered insights on how information requirements will help reach the specific objectives, and what costs and difficulties this might entail, but did not provide specific observations on the differences between the sub-options.

The introduction of information requirements to improve the situation compared to the baseline **gained overall support**: 58% of respondents to the OPC agreed or strongly agreed that economic actors do not have adequate and reliable information on the sustainability of products. .

As barriers to making products sustainable, the lack of awareness of sustainable production practices and methods was mentioned on the producers' side, while consumers cited the lack of education among citizens on issues related to sustainability. Further, the lack of adequate information on, for instance, the embedded carbon footprint in materials was also considered a challenge. Also, information on, for example, the sustainability of products along the entire value chain or the product impact across its life cycle is not available on the consumers' side.When asked about what measures would support the overall sustainability of products in the EU, information requirements were favoured by up to 55% of respondents to the OPC.

In the OPC, stakeholders were also invited to identify **the biggest challenges to a successful establishment and implementation of a European Digital Product Passport**. The results provide an insight into what aspects they consider to be of critical importance. Interestingly, the cost and the (negative) environmental impact of a European Digital Product Passport, which are currently hard to quantify, came last (with 147 respondents choosing this challenge corresponding to 25%). On the contrary, the two biggest challenges were: "Managing the complexity of products and value chains, and the quantity of data that is required to make such a passport effective" (469 respondents corresponding to 79%) and "Ensuring the relevance and reliability of the information included in the passport" (440 respondents corresponding to 74%). Similar views were shared by all groups of stakeholders including EU citizens.

- *Stakeholders' views on sub-option 4a*

The introduction of information requirements to improve the situation compared to the baseline gained overall support: 58% of respondents to the OPC agreed or strongly agreed that economic actors do not have adequate and reliable information on the sustainability of products. At least 75% of NGOs, consumer and environmental organisations, public authorities and academic institutions strongly agreed or agreed compared to 46% of business associations.

Information requirements, as measures in support of product sustainability, were favoured by 55% of respondents. More than half of respondents gave scores of at least 4 out of 5 to the measures related to providing information on product's average lifespan, material sources, repairability and access to repair services. However, there was less support for providing such information from business associations (receiving between up to 37% of the score at least 4 out of 5).

The magnitude of the impact will obviously depend on the quality of the information provided. In the targeted survey, respondents displayed a lack of consensus over the reliability of current social and environmental auditing (31% were neutral, 27% thought it is unreliable, 32% found it is reliable).

- Stakeholders' view on sub-option 4b

There was **overall support for the introduction of a European Digital Product Passport** (therefore going beyond 4a): when asked which information should be included in a European Digital Product Passport, each of the 17 propositions received a positive answer from between 46 to 90% of respondents to the OPC. Support from different stakeholders varied depending on the information proposition: there was strong support for providing the information on the product recyclability and safe use across all stakeholders (at least 75% of all groups of stakeholders agreed or strongly agreed with these measure). On the other hand, requirements to disclose information relevant to remanufacturing or spare parts were not so well supported by business associations, with only 20% agreeing or strongly agreeing. Similarly, on the need to include information on the quantities of materials and substances contained in the product, 25% of business associations agreed or strongly agreed, compared to more than 88% of NGOs, environmental organisations, public authorities, consumer organisations and academic institutions. EU citizens shared similar views as non-business stakeholders.

As part of the SME survey, companies were invited to rank the most likely environmental impacts of introducing a European Digital Product Passport (sub-options 4b and 4c). 62% of respondents ranked as very probable or probable the impact "Contribute to increasing the amount of products with low climate impact"; 60% ranked as very probable or probable the impact "Contribute to lower pollution in air, land and water"; 57% ranked as very probable or probable the impact "Gradually phase out the use of environmentally harmful materials in products on the EU market"; and 47% ranked as very probable or probable the impact "Contribute to the mitigation of biodiversity loss". For all statements, the share of "very improbable" responses was between 7% and 10%.

As part of the same survey, companies were also invited to rank the most likely economic impacts of introducing a European Digital Product Passport. 56% of respondents ranked as very probable or probable the impact "Increase the administrative burden due to higher monitoring and reporting obligations"; 42% ranked as very probable or probable the impact "Contribute to higher economic returns for EU companies"; and 42% ranked as very probable or probable the impact "Contribute to the decoupling of economic growth from environmental impact in the EU". For all statements, the "very improbable" response received 6% of the votes.

Finally, companies were also invited to rank the most likely social impacts of introducing a European Digital Product Passport. 53% of respondents ranked as very probable or probable the impact "Contribute to consumer empowerment due to greater availability of product information"; 44% ranked as very probable or probable the impact "Contribute to decent conditions of work"; and 41% ranked as very probable or probable the impact "Contribute to the reduction of environmental crime at a global level". For each statement, the "improbable" and "very improbable" responses were chosen by, respectively, 15%, 22% and 21% of respondents.

MS representatives who attended the different stakeholder workshops related to this topic expressed the general view that increased product information will be crucial for advancing the objectives of the SPI and that consumers should also be a key target here. The idea of a European Digital Product Passport was well received by participants, but some cautioned that such a passport should not be overloaded with too much information and should remain simple to understand, also for consumers.

- Stakeholders' view on sub-option 4c

According to stakeholders' statements in the dedicated workshop, the European Digital Product Passport is likely to come at a higher cost for the industry and might result in a lower quality of the information provided. Respondents to the OPC and participants to the workshop expressed concerns about horizontal requirements and preferred a gradual implementation, with product-specific requirements, to ensure the relevance of the information demanded. A progressive implementation, with product-specific guidelines, was indicated as the preferred option, therefore leaning towards sub-option 4b. Also, some stakeholders (MSs and

businesses) raised the point that maybe not all information requirements should be part of a European Digital Product Passport, as the cost might outweigh benefits, depending on the specific products, again favouring sub-option 4b over 4c. This, however, presumes that granularity allows to identify what information needs to be part of the passport and what other can be provided by other means. Particularly, stakeholders raised the concern that there should be a distinction between SMEs and large companies, since SMEs may lack capacity to comply with the European Digital Product Passport requirements.

In the OPC, SMEs considered that the following information should be collected in a European Digital Product Passport (>50% agree or strongly agree, in order of agreement): how product should be recycled/handled at end of life (81%, n=59); instructions and safe use (75%, n=57); product environmental and/or carbon footprint (75%, n=60); presence of hazardous chemicals (75%, n=59); relevant information for testing, disassembly, maintenance, repair or reassembly (72%, n=57); economic actors at the origin of information (71%, n=58); list of present materials/substances in product (68%, n=60); expected lifespan of product (67%, n=58); list of legislation and standards complied with by product (67%, n=60); any possession of sustainability labels (66%, n=58); recycled content of each material present in product (63%, n=60); quantities of materials and substances present in product (63%, n=60); information on origin of product components (61%, n=59); results of compliance tests against legislation/standard/technical specifications (60%, n=60); information on material sources (59%, n=58); information relevant to re-manufacturing and spare parts (56%, n=57); and social conditions along the value chain (56%, n=59).

5.2. Baseline for PO4

Several existing EU regulatory instruments address, to various extents, the issue of access to information on products, and on their sustainability, safety and content. In the specific product regulations, some sustainability dimensions (e.g., energy efficiency, hazardous components) are covered better than others (e.g., circularity, footprint). In the context of the SPI, importance is put on information about the circularity of the product (as promoted by PO3 measures). Therefore, the baseline for PO4 is similar to the one of PO3.

In general, legislative acts with more ambitious requirements for products also offer more information about these features. Indirectly, such communication schemes support the environmental, economic and social benefits of the products, too. The relevant examples of such schemes are listed below:

- The **Ecodesign Directive**, in complementarity with the Energy Labelling Regulation, will continue applying ***energy efficiency labelling*** for products falling within its scope. For selected products, labels also include information on water use, storing capacities and noise emissions. The Energy Labelling ***product databases*** will also offer information on products. Differently, the ***product Ecological Profile*** has not been applied yet and whether it would be used in a 'no SPI' scenario remains unclear. Better and clearer communication on circularity performance is not likely to be ensured without a dedicated arrangement for integrating this information in the labelling system. In this respect, the European Commission's Joint Research Centre is preparing a ***reparability scoring*** to be introduced under the Ecodesign legislation[131].
- The newly proposed **Batteries and Waste Batteries Regulation** includes several provisions to improve the supply of information on batteries performance. A printed and online ***labelling system*** will provide basic and more tailored information to consumers and end users (e.g., ***duration, carbon footprint, some chemicals***). An ***electronic exchange system*** and a ***battery passport*** are also envisaged and should be accepted by several global organisations. More in detail, the ***battery passport*** will enable second-life operators to make informed business

[131] JRC (2019). Analysis and development of a scoring system for repair and upgrade of products. JRC Technical Report. Seville.

decisions, and recyclers to better plan their operations and improve their recycling efficiencies. It shall allow access to information about the values for the ***performance and durability parameter***, while whether it will show information on hazardous chemicals, recycled content and environmental impact is less clear. Under the baseline scenario, the new Batteries Regulation provisions on labelling, electronic exchange system and battery passport are expected to be implemented until 2030.

- The **End of Life of Vehicles Directive** also ensures access to comprehensive information on the reparability and safety of cars, while the **SUP Directive** secures access to information on recycled content and other features.
- The **Initiative on Empowering Green Consumers** (prepared by DG JUST) will ensure that the ***consumers will have better information on sustainability/environment characteristics of products***, and will be better protected from misleading practices that lead consumers away from sustainable purchases, by amending existing consumer protection. The proposed changes, e.g. better information for consumers, are expected to be introduced even in the absence of the SPI.
- The **legislative proposal on substantiating green claims** (currently assessed by DG ENV) is highly relevant for PO4, as it aims to establish a ***voluntary EU legal framework enabling companies to substantiate green claims in accordance with the European Commission Environmental Footprint methods***. These methods cover 16 categories of environmental impacts[132] offering a comprehensive coverage and relies on internationally developed scientific methods, extensively road-tested by more than 20 industrial sectors during a pilot phase that took place between 2013 and 2018. This initiative is likely to progress until 2030 (e.g., becoming a basis for the EU Ecolabel[133]).

The last two initiatives address the problem of the reliability of information about products' performance and impact, an issue, which is of increasing importance for consumers, businesses and public procurers. Arguably, existing instruments do not sufficiently ensure the reliability of claims. In addition, the high number of products, and the variety of labels and schemes hinder correct choices. Under the baseline scenario, in the absence of the SPI, the potential benefits of the two new initiatives are not likely to be fully reaped, missing the support of the SPI (which could extend the provisions of the new tools to specific product groups). In particular, a smaller group of products covered by the Ecodesign Directive in the 'no SPI' scenario will result in a more limited scope for the new initiatives too. At the same time, synergies between the Empowering Consumers for the Green Transition and Green Claims initiatives can also contribute to extending the impacts of both.

Important communication instruments deployed by both the European Commission and many MSs are **green or ecolabels for products**. The EU Ecolabel is currently the only pan-European environmental label and a scheme for communication of environmental excellence. The last fitness check of the Ecolabel[134] confirmed its relevance and positive role in reducing the environmental impact of consumption and production. However, it noted that the contribution is limited compared to the overall breadth of the challenges to be addressed with regard to total consumption and production. At the same time, four out of five of the EU Ecolabel stakeholders found that the EU Ecolabel is a valuable tool to facilitate higher uptake and free circulation of green products across Europe (see also the baseline for PO5).

The information flow about the presence of hazardous substances on their own or in mixtures in products is regulated by the **Classification, Labelling and Packaging (CLP) and REACH**

[132] https://ec.europa.eu/environment/eussd/smgp/communication/impact.htm
[133] Strategic Work plan for Ecolabel for 2020-2024 EU Ecolabel Work plan 2020-2024 Dec 2020.pdf (europa.eu)
[134] EC (2017) EMAS and Ecolabel Fitness Check, more information available at: https://ec.europa.eu/environment/emas/emas_publications/policy/fitness_check_en.htm

Regulations, and more recently also by the **Waste Framework Directive**. However, the provision of information in this regard is not always ensured and its availability in the supply chain is reduced when substances or mixtures are incorporated into articles. Even less information is available when products become waste and are subject to recovery operations. The absence of this information hinders the transition of materials from waste to the "recovered" or "secondary raw material" status and, further downstream, makes it difficult to apply product, chemical and other legislation where such knowledge is needed. Some legislative acts do contain provisions requiring information exchange concerning mixtures and products (e.g., the legislation on food contact materials) but, to date, it has proven difficult to apply these requirements due to issues of confidentiality and complexity[135].

To conclude, the baseline scenario shows that, in the absence of the SPI, the existing policy instruments will be able to contribute to or mobilise the positive impacts of such products as selected energy goods, batteries and vehicles, not closing, however, the gap on other products (for further details, see PO3). The biggest impact is expected from the new legislation on substantiating green claims, as it is likely to promote more trustworthy and (PEF) methodologically proven environmental performance, while ensuring consumers access to more detailed information and more trust in green products. In addition, the current application of the Ecolabel may push producers of labelled products to revalidate the environmental performance of their products based on the sounder PEF method. This will help to ensure the reliability of information on products and remove products with insufficient environmental performance from the priority green list of the market.

5.3. Sub-option 4a: Enhanced information requirements

5.3.1. Economic impacts

Manufacturers and importers would be the first stakeholders to be affected, as an obligation is introduced for them to disclose and make available the information required. However, a longer list of economic operators' would benefit from the information made accessible, i.e. maintainers, repairers, re-furbishers, re-manufacturers, recyclers, logistics companies, retailers, including on-line sellers, and second-hand retailers. Workers along the supply chains would also be affected. In addition, customers (consumers, companies and public authorities) stand to benefit as well, as the literature shows that, if presented with product sustainability information, they are two to three times more likely to choose the most sustainable option (ceteris paribus, but also in case of a moderate price increase; for further details on willingness-to-pay, see below)[136]. Finally, Market Surveillance and Customs Authorities would be affected as the authorities in charge of ensuring the enforcement of the measures.

5.3.1.1. Administrative burden

- Administrative burden for economic operators

Sub-option 4a will require product manufacturers and importers to collect, store and display information. In a well-managed industrial process, all data to be included should be available at some stage of the life cycle of the item (e.g., in the design phase or in the mine where the mineral was extracted), and in one link of its value chain (e.g., in the manufacturing factory of the screen of a smartphone). Also, most of the required information would have been collected already for the

[135] COM(2018)32 Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation https://ec.europa.eu/docsroom/documents/27321

[136] https://ec.europa.eu/info/sites/default/files/ec_circular_economy_final_report_0.pdf

purpose of the measures included in PO3. However, gathering this information under a certain form may require substantial work in data management (specially to ensure an interoperable format)[137].

Some legislations already provide for the collection and reporting of the information items listed in sub-option 4a for specific sectors. For example, the presence of certain groups of substances of concern is regulated in existing legislative acts: the REACH Regulation and the Waste Framework Directive require to communicate the presence of substances of very high concern in all products, if the concentration of those substances is higher than 0.1% (w/w). Also, the CLP Regulation contains information requirements for certain types of products (e.g., hazardous substances in chemical mixtures such as detergents), while other labelling requirements apply across sectors (e.g., for allergens in cosmetic products). In addition, elements of sustainability are covered under various legislations (see the baseline, notably on energy efficiency) and social indicators also exist, sometimes as a voluntary practice, in the textile, wood products (EUTR) and chemicals (REACH) sectors.

Differently, information on technical lifetime and reliability (4a.1), reparability and upgradability (4a.2), and recycled content (4a.4) is overall not covered in the sectors included in PO2, regardless of the final scope. In the textile industry, the cost of the collection of information on durability and reliability was estimated by an industry association at about EUR 10 000 to EUR 20 000 per company (to set-up the collection process, especially in the absence of standards for estimating durability). The deployment of methods such as PEF should support businesses (and especially SMEs) in providing information under 4a.5 (Information requirements on the environmental impacts along the life cycle of the product, for example in the form of an Ecological Profile). This is considered as the second largest cost driver in sub-option 4a, while the information requirements on a set of social indicators were indicated by stakeholders as the main cost driver, resulting in an estimated 3.08% administrative cost increase (see Table 77 in Annex 11).

Once information is collected, companies will have to display it to users, which would imply changes in labelling and possibly making the information available online. Also, different types of information are expected to be made accessible to different actors, i.e. manufacturers, consumers, recyclers, etc.

- Administrative costs for the European Commission

The European Commission is expected to be in charge of defining information requirements. Based on existing legislation and schemes, the development of the specifications of the additional information needs is estimated at around EUR 1 000 000 (see chapter on the administrative set-up).

- Administrative burden for Member States

Compliance costs will be driven by the costs of outsourcing, as the IT staff at the MS level might not be enough to conduct the verification processes. Market surveillance will entail costs related to requesting access to the data and screening it, by product. However, direct access and possibilities to automatically process information are likely to provide efficiencies, which can be translated into cost reductions or re-invested in better market surveillance for higher compliance rates.

5.3.1.2. Direct economic impact for businesses

In addition to the administrative burdens described above, other direct costs are expected due to substantive obligations (IT systems to be set in place, testing staff needed), operation (energy to run the system) and maintenance (staff needed to keep data up-to-date).

Substantive obligations (CAPEX and OPEX) are often identified by the industry as the main cost driver. Some of these costs are shared with PO3 (setting sustainability requirements) and will be borne once only, like:

[137] See the dedicated report produced under Task 6 of this assignment for further details

- one-off investments in durability testing equipment in product design departments;
- costs to set up the information collection process (including access to testing facilities and training); and
- personnel cost

Differently, other costs will be specific to the information requirements placed under PO4, as the connection between the internal design and manufacturing ICT systems, and the standardised system making this information available to the relevant stakeholders under a standard format.

SMEs, like all other businesses, will also have to face the cost of new information collection and reporting. However, some stakeholders reported (for the textile industry) that this will be more challenging for SMEs than for larger companies.

However, companies will potentially benefit from the implementation of PO4, being able to display information to customers (B2B and B2C) and better valorise their investment towards sustainability. Also, the introduction of EU-wide requirements would increase consumers' trust in the information provided (especially if associated with the Green Claim Initiative). The industry indicated support for these measures to the extent that it creates a level playing field in Europe and beyond, providing a common framework for measuring and reporting information. This could provide cost-efficiencies, as at the moment, for some industries (e.g. textiles), a lot of private initiatives are ongoing in a rather uncoordinated way. An EU framework would support the scale up of those initiatives. Nonetheless, companies and associations of different sectors expressed a lack of capacity to properly anticipate direct economic benefits, as these will depend on the exact implementation, enforcement, and market reaction.

In addition, companies acting as purchaser of products and subject to their own information requirements, or active in the sectors of after-sales, maintenance, repair, refurbishing and re-manufacturing, will directly benefit from the better information received. This would apply for the products that they receive from their suppliers, as this information will be directly available for consolidation (e.g., to compute the environmental or social impact of the entire product based on that of its parts) or operational use (increased efficiency, lower cost and higher quality of maintenance, repair and recycling).

5.3.1.3. Indirect economic impact for businesses

Sub-option 4a will encourage manufacturers to invest in more sustainable manufacturing processes, logistics and supply chains (including training), and in the design phase of industrial products, industrial engineering (design of production processes) and buying departments. The same effect has been observed following the introduction of past legislation on energy labelling[138]. As a result, the cost of production will increase for those companies that currently do not invest in sustainable solutions and prioritise lower production costs.

While the unit cost (and use-value) of products is likely to rise as a result of both information requirements and the changes in demand that they are meant to trigger, a lower number of products is expected to be manufactured and sold per year, as consumers do not need to replace them as often. This is likely to be true for products for which consumers show a strong willingness to pay for improved reparability and durability (see below the paragraph relating to the economic impact for citizens).

5.3.1.4. Economic impact for citizens

In sub-option 4a, when purchasing products citizens will have access to a wider set of information than is currently the case. While the cost of providing information incurred by companies is likely to

[138] JRC (2017), Boyano A., Moons H., Villanueva A., Graulich K.,Rüdenauer I., Alborzi F., Hook I., Stamminger R., (2017)Eco-design and Energy Label for household dishwashers, EUR 28645 EN

be transferred to the customers, they will be capable of choosing items that increasingly offer better value for money (longer lasting, easily repairable). Depending on their willingness to pay more for more durable products, consumers will benefit to a lower or higher extent from the measure. According to a recent study[139], which measured the willingness-to-pay based on information on reparability and durability, consumers's willingness-to-pay would increase most for large and expensive items (e.g. white goods such as washing machines, dishwashers). For other products, such as clothing, the increase in the willingness-to-pay is lower, but still positive: "Depending on how durability/reparability information was presented, willingness-to-pay for an additional year of durability ranged between EUR 20-36 for vacuum cleaners and dishwashers, EUR 92-148 for TVs, EUR 148-217 for smartphones, and EUR 14-27 for coats. Willingness-to-pay for an improved reparability rating was around EUR 29-54 for vacuum cleaners, EUR 83-105 for dishwashers, EUR 77-171 for TVs, EUR 48-98 for smartphones and EUR 10-30 for coats[140]."

5.3.2. Environmental impact

Measure 4a.1 makes it easier for economic operators and citizens to choose products that have a longer and more stable lifetime (more reliable). As buyers choose more durable and reliable products, less sustainable products are driven out of the market, increasing the overall sustainability of the product stock. In addition, more reliable products with a longer lifetime decrease the need for replacement and lead to a decreased production of new products. As a consequence, the indirect environmental impacts associated with the production of new products are diminished.

Measure 4a.2 makes it easier for economic operators and citizens to choose products that can easily be repaired or upgraded. As a result, its direct and indirect impacts are similar to those of measure 4a.1.

Measure 4a.3 helps economic operators and citizens to choose products that minimise the presence of substances of concerns. As a direct effect, substances of concern are gradually replaced by safer alternatives, if and when they become available. Their impact on the value chain is also mitigated, as tracing enables a better management of products containing substances of concern (notably during recycling and/or preparation for reuse). Indirectly, this measure helps to mitigate the release of harmful chemicals in the environment, at all stages of the life cycle, and decreases its related environmental and human health impact.

Measure 4a.4 informs on recycled content. It can result in higher confidence in the reliability of recycled materials and eventually create an incentive for higher recycled content in products. In other words, this measure supports the replacing of primary raw materials by secondary materials, therefore decreasing the environmental impact of material extraction and of the production of primary basic metals, materials and chemicals.

Measure 4a.5 makes it easier for economic operators and citizens to choose products that minimise their environmental impact. Similarly to measures 4a.1 and 4a.2, it supports the overall improvement of the product stock. Indirectly, this measure will decrease the environmental impact of products, at all stages of their life cycle.

Measure 4a.6 builds on previous successful experience with performance classes such as energy labelling[141], and is expected to further facilitate consumers' understanding of the information provided and promote sustainable consumption. Studies focusing on different designs for energy labelling showed that the vast majority of consumers (above 90%) are aware of energy labelling and capable of

[139] LE Europe, VVA Europe, Ipsos, ConPolicy, Trinomics for the European Commission (2018) Behavioural Study on Consumers' Engagement in the Circular Economy https://ec.europa.eu/info/sites/default/files/ec_circular_economy_final_report_0.pdf

[140] ibid

[141] See Technical report to the Evaluation of the Energy Labelling Directive and specific aspects of the Ecodesign Directive https://ec.europa.eu/energy/sites/ener/files/documents/Final_technical_report-Evaluation_ELD_ED_June_2014.pdf

identifying the most energy-efficient product thanks to labelling scales that sort products in different performance classes[142]. As previous measures encouraging sustainable consumption, measures 4a.6 will help to diminish the negative environmental impacts of production and consumption (see Annex 14 for further details about the articulation between the SPI and the Green Claims Initiative). Moreover, the availability of environmental performance classes will allow a wider use of financial and non-financial supporting schemes both at EU and national level (see PO5).

Measure 4a.7 has no environmental impact.

Overall, based on the consultation conducted with stakeholders throughout this study and the knowledge of the experts involved, environmental gains can be roughly estimated as follows:

- the work of all players intervening in the product life cycle (maintenance, repair and recycling) is facilitated:
    - 5% cost reduction of maintenance and repair[143]
    - 4-25% increase in the maintenance and repair rates[144]
    - reduction in the number of consumer products being sold per year by 0.1 to 0.2%, and hence a proportional reduction of their environmental impacts upon production[145]
    - increase in the quantity of high-purity recycled materials, leading to a potentially significant increase of the contribution rate of recycled materials to raw materials demand from 6% to 78% for plastics, from 13% to 84% for aluminium and from 24% to 81% for steel [146].

For sub-option 4a, the generation, storage, and display of information is not expected to require a significant additional use of material and energy, with the related environmental impacts. This is due to the assumption that most producers will store the information (most of which is assumed to be already available) in existing web pages.

5.3.3. Social impact

As purchasing practices and production processes change towards more sustainability, the workforce will shift from declining to growing sectors and jobs. For example, mining and quarrying is expected to de-grow, while maintenance, repair and recycling services are expected to be boosted by the proposed initiative. This results in an increased need to re-skill the workforce and mitigate the territorial impacts of the economic transition. Initiatives to ensure a just transition (such as the Just Transition Mechanism) will be key in ensuring positive social outcomes.

Also, the introduction of information requirements on social indicators are expected to help to improve working conditions across the value chains, both in and outside the EU.

As mentioned above, due to the administrative burden generated by the PO, consumers will be faced with a higher cost per product. This cost is likely to be compensated by a higher use-value. However, vulnerable customers could face difficulties with a higher upfront cost of products, depending on the actual increase in prices. For reference, the (conservative) estimate included in the businesses' administrative burden points towards a rather limited price increase. In addition, the implementation of Circular Business Models such as rental and leasing (PO6) is susceptible to mitigate the issue of upfront costs for lower-income households and to better reflect the Life-Cycle Cost of the product.

[142] ibid
[143] Deloitte Environment et al. (2016) "Study on socioeconomic impacts of increased reparability"
[144] SPI Impact Assessment supporting study
[145] Deloitte Environment et al. (2016) "Study on socioeconomic impacts of increased reparability"
[146] SPI Impact Assessment supporting study. Based on end-of-life recycling input rates (EOL-RIR), Eurostat

5.4. Sub-option 4b: European Digital Product Passport

5.4.1. Economic impacts

For sub-option 4b, the same stakeholders will be affected as for sub-option 4a.

5.4.1.1. **Administrative burden**

- Administrative burden for economic operators

A European Digital Product Passport (as included in sub-options 4b and 4c) would streamline information sharing compared to the situation which would be created by sub-option 4a, not including a harmonised digital infrastructure. It will reduce the leeway companies have in sharing information, but is expected to simplify the process of setting up the system. According to the SME survey, 56% of respondents anticipate a high to very high increase in the administrative burden compared to the baseline scenario. However, this must be put in perspective with the overwhelming support, across all stakeholders (including SMEs), for a European Digital Product Passport. As indicated with regard to indirect costs, 42% of SME respondents expect a higher economic return for EU businesses. In addition, the results of the consultations show that the expected environmental benefits are worth the cost of the measure.

In addition, measure 4b.2 improves the provision of the information required under measure 4a.3 and ensures that the tracing of substances of very high concern is not duplicated between the chemical and Ecodesign legislations. Therefore, this measure should result in more efficiency for companies, limiting the risk of double reporting and thus reducing their administrative burden.

Cost estimation

The costs related to the implementation of the EU DPP will change depending on the specific system architecture that will be developed in close coordination with the relevant stakeholders. Moreover, a number of companies and sectors are already implementing some sorts of track & tracing and passport-like systems (e.g. automotive sector, batteries, apparel). Where such systems are in place, the costs of the EU DPP will be lower compared to a company/sector that will start from scratch.

The use of a European Digital Product Passport by companies is expected to provide them with efficiencies in implementing the information requirements described under sub-option 4a. Overall, according to stakeholders' comments, this is expected to result in lower costs compared to sub-option 4a, with an average administrative cost increase of 2,31% in sub-option 4b, compared to 2,48% in sub-option 4a.

- Administrative costs for the European Commission

Under sub-option 4b, the European Commission would be in charge of supervising the set-up and governance of the European Digital Product Passport, including the coordination with existing databases (e.g. SCIP and EPREL). In the context of the secondary legislation preparations, the establishment of a central registry, hosting the unique identifiers and the track & tracing information, should be evaluated elements (see Annex 18 for more details).

The existing examples of passport-like systems and product-related databases developed at EU level are all centralised (or include an important "centralisation" component in their design). On the contrary, the EU DPP will be designed as a mostly decentralised system, making a direct cost comparison with similar systems developed at EU level not relevant.

Table 42 Past assessment costs

	EPREL Database[147]	Batteries Centralized Database[148]	Batteries Digital Passport[149]
One-off investment cost	€3 000 000	€5 600 000	€7 800 000
Annual maintenance cost	€300 000	€434 000	€900 000

In the impact assessment for the revision of the Batteries Directive, the Centralized Database covers the whole scope of the Directive, while the Digital Passport only covers individual industrial batteries and batteries for electric vehicles. In the case of the European Digital Product Passport, providing a definitive estimation of costs is difficult at this stage, due to the peculiarities of its proposed structure.

A decentralised/distributed system is expected to have a lower administrative burden for the European Commission compared to a fully centralised one. The only system that includes some common elements to the EU DPP is the tobacco products track & tracing system (as implemented through Commission Implementing Regulation 2018/574). However, even in this case a direct comparison of costs is not possible. The tobacco products track & tracing system has been designed with the main objective of combatting illicit trade of tobacco products, and therefore it includes specific security features that makes the whole cost higher than what would be needed for the EU DPP. Table 43 below reports the main cost element for the tobacco products track and tracing system (all costs have to be covered by the tobacco manufacturers).

Table 43 Estimated costs for tobacco products track & tracing system

Cost item	**Annualised cost (EUR million)**	**Cost per unit pack (EUR)**
Marking packages with a unique identifier	43.0	0.001451
Recording and transmitting data	48.7	0.001642
Processing, storing and accessing data	10.5	0.000353
Compatibility of components of the traceability system	37.6	0.001268
Security feature	14.9	0.000502
TOTAL	***154.6***	***0.005216***

Most of the features listed in Table 43 would not be required for the EU DPP, at least not with the same level of stringency (e.g. there will be no need to send all information to a centralised database, there will be no anti-tampering devices for unique identifiers, there will be no need to have an independent unique identifier issuer, etc.).

[147] European Commission (2015) Impact assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council setting a framework for energy efficiency labelling and repealing Directive 2010/30/EU, SWD(2015)139 final https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_impact_assessment_part1_v7.pdf

[148] European Commission (2019) IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) 2019/1020, SWD/2020/335 Final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=SWD:2020:335:FIN

[149] ibid

The setting-up and management of the central registry would be comparable to the tobacco registry, which cost[150] is estimated in the order of **1.4 € per ten thousand unique identifiers**. This cost is additional to the ones included in Table 43.

The exact costs will depend, among other things, by the number of identifiers processed on a yearly basis, the amount of data to be included in the track & tracing system, the availability of statistical analysis tools.

Based on the information collected and the extrapolation of the costs for other decentralised systems currently under development, a very preliminary estimation of the costs for the Commission of setting up and maintaining the European Digital Product Passport would total around EUR 8 million as one-off investment and at least EUR 1 million as annual maintenance cost.

However, though coming at a cost for the European Commission, the infrastructure is also expected to provide access to a wealth of structured information, which can then be used to derive market intelligence and improve policy making in the future, by both the European Commission and Member States. The economic benefits deriving from the availability of this data are difficult to estimate at this stage, but are expected to be at least in the same order of magnitude of the European Digital Product Passport deployment and maintenance costs.

- Administrative burden for Member States

Under sub-option 4b, MSs will benefit from the same improvements as under sub-option 4a. In addition, a European Digital Product Passport is expected to be a powerful tool to easily access all necessary information and identify gaps in reporting.

One component of the economic burden on public authorities is determined by the cost of the equipment required to conduct inspection and control operations properly (scanners and verification equipment). According to the previously done impact assessment (e.g. for the tobacco products track and tracing system), there are many kinds of scanners that allow the reading of a range of various forms of data carriers depending on their nature. As a result, the effect is proportional to the quantity and kind of data carriers to be used for the European digital product passport.

5.4.1.2. Direct economic impact for businesses

The direct economic costs of sub-option 4b relate to the set up the IT infrastructure for the European digital product passport. According to a textile association, this will have a differentiated impact depending on existing systems within companies. Large companies with existing IT infrastructures used for different purposes will have to restructure their IT system to allow for better information exchanges across their internal infrastructure, to finally provide all necessary information within the European digital product passport. For SMEs that do not yet have such complex systems, the cost will be less as they will be able to start from a clean slate. The installation and operation of the IT system will result in increased CAPEX and OPEX, as already described in sub-option 4a.

A European Digital Product Passport will allow consumers to access information more easily, further improving the benefits highlighted with regard to sub-option 4a. On the other hand, all companies, including SMEs, will benefit from the data on the parts they use as input to their process being delivered to them in a digital, standard format. This will increase the efficiency of their manufacturing processes and their reporting obligations, including under sub-option 4b. However, companies and associations consulted expressed a lack of capacity to properly anticipate direct economic benefits, as these will depend on the exact implementation, enforcement, and market reaction.

An important element for SMEs will be the language. Many SMEs prefer to work in their own language and are required to work in the language of their customers. The impact on SMEs

[150] DG SANTE, confidential information

may vary based on the language choices that will ultimately be made for the European Digital Product Passport system.

5.4.1.3. Indirect economic impact for businesses

The indirect economic impacts for businesses are the same as under sub-option 4a.

5.4.1.4.

The economic impact for citizens is the same as under sub-option 4a: they will access a wider set of information than is currently the case. However, the cost of products is likely to increase: depending on their willingness to pay more for more durable products, consumers will benefit to a lower or higher extent from the measure. The precise **Economic impact for citizens** magnitude of impact will therefore vary by type of products.

Additionally, the economic impact on citizens will vary depending on the ease of accessing and using information: if the cost of products increases but information is hard to access, citizens will be worse off. Sub-option 4b offers an improvement in this regard compare to sub-option 4a, as a European Digital Product Passport streamlines how information is stored and shared. These improvements will be further strengthened provided that information is available in citizen's preferred language. The final impact on citizens of sub-option 4b will therefore **vary based on the language choices that will ultimately be made for the European Digital Product Passport system.**

5.4.2. Environmental impact

Sub-option 4b includes all the measures of sub-option 4a and will therefore have the same kind of environmental impacts compared to the baseline.

More in detail, measure 4b.1 is expected to increase accessibility of information through the development of a European Digital Product Passport. Manufacturers will have to make available the required information through a unique identifier that users will employ to access information upon demand. In general, this is expected to reinforce the impact of the overall option. Along the value chains, operators will be able to access this information more easily, which is expected to help them improve their own production processes and procurements, and facilitate, for example, the work of businesses involved in maintenance, repair, re-manufacturing and recycling activities. Besides, consumers will also be able to find all the relevant information through a single entry point (e.g., a QR code), which should improve both their purchasing practices and their use of the product. The European Digital Product Passport is expected to operate as a decentralised dataspace, as opposed to a database hosted on centralised servers, as is the case for example for the EPREL Database. Concretely, for each individual item (or package of items sold collectively, such as a box of colour pencils) or for each batch of products placed on the EU internal market, a digital passport will be available as a data structure containing a unique identifier of the item (or package of items or batch) and a set of data relevant to that item (or package of items or batch). The nature of the data present on the European Digital Product Passport and the structure of this data is common to all items of the same product group. They may vary from one product group to the other, but the general intention is to maximise the elements of the structure that are common to all product groups[151]. In some products, such as electronics, dynamical data could be added, for instance, if the product has been maintained or repaired.

[151] For further details, see the dedicated report prepared under Task 6 of this assignment

Measure 4b.2 will allow the information previously submitted to the SCIP Database to selectively become available through the European Digital Product Passport. That way, it will help achieve the objectives of improved information supply of the Waste Framework Directive and, indirectly, the REACH Regulation (Article 33), as well as increase the impact of the SPI requirements. Also, it increases the incentive to phase out substances of concerns, where possible, and mitigate the effect of those that cannot be replaced, thereby facilitating the work of recycling facilities, which will have access to information on the end-of-life management of the various products that contain substances of concerns. Both aspects of 4b.2 are instrumental in reinforcing the environmental effects of information requirements.

5.4.3. Social impact

The social impacts of sub-option 4b are of the same nature as those under sub-option 4a. However, the introduction of a European Digital Product Passport will intensify them. For instance, changes in the workforce are expected to be more considerable. Besides, the European Digital Product Passport will generate more significant benefits compared to sub-option 4a also with regard to social indicators, thanks to the increased salience of the information provided. As a result, the social impact in terms of workforce transition and working conditions will be higher.

Differently, sub-option 4b is expected to provide the highest efficiency to companies and to best mitigate the administrative burden; this should somewhat limit the impact on consumers in terms of increase in the product price.

5.5. Sub-option 4c: Generalised European Digital Product Passport

5.5.1. Economic impact

For sub-option 4c, the same stakeholders will be affected as for sub-option 4a and 4b.

5.5.1.1. **Administrative burden**

- Administrative burden for economic operators

Sub-option 4c intends to speed up the implementation of the PO by introducing horizontal requirements. To avoid a multiplication of existing information requirements (i.e. the requirements provided for by the REACH Regulation and Waste Framework Directive for all products containing substances of very high concern), the generalised European Digital Product Passport would progressively take over these existing information requirements, offering also an opportunity to improve the efficiency of the current REACH Regulation and Waste Framework Directive provisions. Nonetheless, the administrative burden for businesses is expected to be slightly higher than for sub-option 4b as companies will not be provided with product specific requirements.

Cost estimation

The use of a European Digital Product Passport by companies is expected to provide them with efficiencies in implementing the information requirements described under sub-option 4a. In addition, companies and industry associations were asked to estimate the cost of horizontal requirements. Based on their reply, sub-option 4c would result in an average administrative cost increase of 2.33%, compared to a 2.48% increase in 4a and 2.31% in 4b.

- Administrative costs for the European Commission

The definition of horizontal requirements is expected to be less work-intensive and therefore less costly compared to sub-options 4a and 4b. As for sub-option 4b, the European Commission will bear

the cost of setting up the European Digital Product Passport and will benefit from the same market intelligence to improve decision making in the future.

- Administrative burden for Member States

The administrative burden for Member States is the same as under sub-option 4b: not only will MSs benefit from the improvements expected under sub-option 4a, but they will also benefit from a European Digital Product Passport, as a powerful tool to easily access all necessary information and identify gaps in reporting.

5.5.1.2. Direct economic impact for businesses

The direct economic impacts for businesses are the same as under sub-option 4b. One the one hand direct costs will grow as a result of new requirements demanding new equipment and staff. The display of information will be facilitated by digital product passports, which will increase the benefits of showcasing companies' efforts in better products, providing sales arguments to sustainable companies. Easy access to manufacturing information will support the work of companies in the circular economy. However, companies and associations consulted expressed a lack of capacity to properly anticipate direct economic benefits, as these will depend on the exact implementation, enforcement, and market reaction. The impact on SMEs is rather similar to sub-option 4b.

5.5.1.3. Indirect economic impact for businesses

The indirect economic impacts for businesses are the same as under sub-option 4a and 4b. Sub-option 4c will encourage manufacturers to invest in more sustainable practices along the value chain, as observed following the introduction of past legislation on energy labelling[152].

5.5.1.4. Economic impact for citizens

The economic impact for citizens is the same as under sub-options 4a and 4b: they will access a wider set of information than is currently the case. However, the cost of products is likely to increase: depending on their willingness to pay more for more durable products, consumers will benefit to a lower or higher extent from the measure. The precise magnitude of impact will therefore vary by type of products.

Additionally, the economic impact on citizens will vary depending on the ease of accessing and using information: if the cost of product increases but information is hard to access, citizens will be worse off. Sub-option 4b offers an improvement in this regard compared to 4a, as a European Digital Product Passport streamlines how information is stored and shared. These improvements will be further strengthened provided that information is available in citizen's preferred language. The final impact on citizens of sub-option 4c will therefore **vary based on the language choices that will ultimately be made for the European Digital Product Passport system.**

Horizontal requirements are not expected to lead to any additional change of impact for citizens compared to sub-option 4b.

5.5.2. Environmental impact

Sub-option 4c, similarly to 4b, includes all the measures of sub-option 4a and will therefore have the same kind of environmental impacts compared to the baseline.

[152] JRC (2017), Boyano A., Moons H., Villanueva A., Graulich K.,Rüdenauer I., Alborzi F., Hook I., Stamminger R., (2017)Eco-design and Energy Label for household dishwashers, EUR 28645 EN

More in detail, measure 4c.1 will introduce some "cross-sectoral" information obligations via horizontal requirements, leaving open the possibility to develop product-specific information requirements through secondary legislation. Similarly to sub-option 4b, this information will need to be displayed in the European Digital Product Passport. Those horizontal requirements can be introduced earlier and faster than product-specific or product-category specific requirements, as the guidelines relating to the information requirements will be prepared at a higher level and a lower number of requirements will need to be produced.

While the effects of information requirements on the value chains are incremental (one company improving its processes after having accessed the information of its suppliers, thereby updating its own information, etc.), horizontal requirements might provide positive environmental impacts earlier, thanks to a faster roll-out. However, many stakeholders (MSs and businesses alike) indicated the importance of the granularity of the requirements to ensure the overall quality of the legislation. They also emphasised that a progressive roll-out of the passport, starting from products with existing information requirements and then extending the scope, will ensure a better implementation. In that sense, the expected environmental gains of sub-option 4c might not materialise due to poorer implementation, and sub-option 4b seems fitter for purpose than sub-option 4c.

5.5.3. Social impact

The social impact of sub-option 4c is the same as that of sub-option 4b: the social impacts of sub-option 4c are of the same nature as those under sub-option 4a. However, the introduction of the European Digital Product Passport will intensify them. For instance, changes in the workforce are expected to be more considerable. Besides, the European Digital Product Passport will generate more significant benefits compared to sub-option 4a also with regard to social indicators, thanks to the increased salience of the information provided. As a result, the social impact in terms of workforce transition and working conditions will be higher. No specific impact resulting from horizontal requirements was identified either through consultation or desk research.

5.6. Impact on third countries

PO4 will impact the businesses of third countries, as they will need to provide the same information as EU businesses on the products they export to the EU. In the case of sub-option 4a, companies from countries that already have well-developed information systems (i.e., mature markets) might be advantaged. Similarly, under sub-option 4b and 4c companies from countries with more advanced digital markets might be advantaged.

5.7.Summary of impacts

Table 44 Administrative burden of PO4

Administrative burden Option 4					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Sub-option 4a	Direct costs	-- Durability testing equipment in product design departments (shared with PO3) Connection between internal design and manufacturing ICT systems, and the standardised system making this information available to the relevant stakeholders under a standard format Setting-up of IT systems (home appliances)	-- Consolidation of the ecological profile based on inputs by suppliers Social impact auditing Personnel cost to comply with information obligations Personnel needed to keep data up-to-date Energy to run the system	-- Defining information requirements	- Compliance cost
	Indirect costs	n.a.	+/- Increased cost of products due to higher costs from suppliers' own reporting obligations Reduced cost of identifying suppliers thanks to better information Increased competition thanks to better information	n.a.	n.a.

-Sub-option 4b	Direct costs	-- Setting-up of ICT systems compatible with the European Digital Product Passport	--- Provision of information required in a digital format Consolidation of information based on inputs of suppliers	--- Supervising the set-up of the European Digital Product Passport	--- Guarantee of the functioning of the European Digital Product Passport Enable, as possible, the integration or coordination with the SCIP Database
	Indirect costs	n.a.	No new requirements compared to 4a	n.a.	n.a.
Sub-option 4c	Direct costs	No new requirements compared to 4a and 4b	+++ Provision of information required based on horizontal requirements	+ (not cumulative with 4a) Definition of horizontal information requirements	No new requirements compared to 4a and 4b
	Indirect costs	n.a.	No new requirements compared to 4a and 4b	n.a.	n.a.

Table 45 Economic impacts for PO4

Economic impacts				
Description	***Amount/qualitative***			***Comments***
	Option 4a	***Option 4b***	***Option 4c***	
Direct impacts				
Setting-up information sharing processes and regularly updating them augment costs	---	--	---	Companies see an increase in administrative burden and substantive obligations European Commission see an added regulatory cost, especially in setting up digital product passport
The level and quality of information augment. Access becomes easier and less costly	++	+++	++	Companies can better showcase their sustainable practices Public authorities access better information to improve policy making Market surveillance becomes easier and the overall quality of products improves.
Indirect impacts				
Companies will benefit from lower cost of accessing information from suppliers	++	+++	++	Sectors in the circular economy (maintenance, repair, re-manufacturing, recycling) will particularly benefit from increased efficiency, lower costs and better quality of output. Manufacturers in general will benefit from cost decrease of performing LCAs and identifying suppliers. As cost decreases, pressure on products' price decreases as well, benefiting customers.

Companies invest in sustainable manufacturing processes (including design, logistics, supply chains, training, after-sale)	+	++	++	Costs of companies already engaged in the sustainable transition particularly benefit, as their current cost decrease. Companies that do not already engage in the sustainable transition receive a new incentive to do so, with added means through access to information. Overall, sustainable products become more mainstream.
Unit cost of products increases	-	--	--	In the short term, the added regulatory cost will drive a products' price increase. Consumers will face a higher up-front cost. In the short term, this might put vulnerable consumers at risk, which can be mitigated by the implementation of Circular Business Models (PO6). In the medium term, price increase associated with higher quality will drive a change in consumer behaviour. As companies access information that can lead to more efficient processes, the pressure on prices is also expected to diminish.

Use value of products increase	+	++	++	Procuring companies will benefit from better supplies, increasing the quality of their end products, and eventually save on production costs. Consumers will be able to compensate higher up-front prices with better value-for-money, lower Life-Cycle Costs and will engage in consumption practices that ensure long-lasting products.

Table 46 Environmental impacts for PO4

Environmental impacts				
Description	***Amount/qualitative***			***Comments***
	Option 4a	***Option 4b***	***Option 4c***	
Direct impacts				
The set-up of a digital infrastructure and the constant feeding and sharing of data generates negative environmental impacts	-	-	-	4a could allow for a more case by case approach of what needs to be stored digitally, and how it is stored. However, 4b and 4c might allow for better efficiency and harmonised improvement of the overall structure
Buyers choose more durable, reliable, and repairable products	+	++	+	This concerns both companies as purchasers, public procurement and consumers. Access to information help buyers make more informed choices.

				Price increase related to regulatory burden provides an added incentive to buy the most reliable option. 4b improves the accessibility of information provided under 4a. 4c results in a faster implementation and higher ambition.
Less sustainable options are driven out of the market	+	++	++	Firstly, as buyers can better identify the most sustainable alternative, the demand for least sustainable options is expected to decrease. Secondly, as manufacturers can gradually improve their processes thanks to access to information, a number of products see their quality improving. The ambition increases thanks to both easier access (4b) or faster implementation (4c)

Substances of concern are gradually replaced by safer alternative	+	++	++	Access to information will help highlighting the use that can be made of safer alternatives, helping in mainstreaming them. As consumers have a better access to information on substances of concern, demand for products with unnecessary use of these substances is expected to decrease.
Better management of products containing substances of concern	+	++	++	Integration of the SCIP directive (4b) is expected to make this process more efficient. Companies will have a direct access to SCIP information, supporting better management at the end-of-life. Other stages will also benefit from better access to information on what substances are present in a product.

More secondary materials are used in production	+	++	++	Access to accurate data on the materials being recycled enables higher-purity sorting, and hence the production of higher-quality secondary metals, materials or plastics, at a lower cost. This improves the market position of secondary metals, materials or plastics vs. primary. Access to information will improve the visibility of the use of secondary materials, and provide useful information for manufacturers using them.
Indirect impacts				
Indirect environmental impacts associated with the production of new products are diminished as demand decreases	+	++	++	Overall demand is expected to decrease due to longer lasting products and, to some extent, price pressure. Consumer behaviours are expected to become more sustainable. 4b and 4c aim at a higher overall impact.

Diminished release of harmful chemicals in the environment	+	++	++	Improved management of substance of concerns at all stages of the life-cycle thanks to better access to information is expected to reduce the release of these chemicals. This will especially help companies in avoiding those substances at production stage, and better managing their end-of-life.
Decreasing environmental impact of production of primary basic metals, materials and chemicals	+	++	++	As less products are produced, as more secondary raw materials are used, the production of primary basic metals, materials and chemicals is expected to decrease.
Decreasing environmental impact of material extraction	+	++	++	As less products are produced, as more secondary raw materials are used, material extraction is expected to decrease.

Table 47 PO4 Social impacts

(2) Social impacts				
Description	***Amount/qualitative***			***Comments***
	Option 4a	***Option 4b***	***Option 4c***	
Direct impacts				
Increased incentive to improve working conditions by manufacturers	+	++	++	All options support this impact, and the digital product passport should result in higher impact. This will especially benefit workers in those value chains were scrutiny is not yet widespread, but it will also aim at improving the quality of reporting in sectors where this is already happening.
Vulnerable consumers face higher upfront cost of products	-	--	--	The increased cost of production will impact vulnerable consumers. However, the option is intended to also change consumption modes, and increase the use-value of products and reduce the Life-Cycle Cost of products. In the long term, this impact is expected to be moderate, specifically if Circular Business Models (PO6) are implemented.
Indirect impacts				
Friction on the labour market as some sectors see increasing demand, while other decline	-	--	--	While this indirect effect is somewhat negative, it should be compensated by needs of new markets, as described below.
Companies invest in training and reskilling activities to address new demand	+	++	++	

6. OPTION 5: REWARD MORE SUSTAINABLE PRODUCTS THROUGH INCENTIVES

6.1. Overview

Overview of Policy Option 5

Sub-option 5a: Enhanced incentives measures

- Measure 5a.1 – Member States are encouraged to introduce reputational and economic incentives, supported by the provision of guidelines
- Measure 5a.2 – Mandatory Green Public Procurement requirements in SPI product-specific rules

Sub-option 5b: Linking incentives to performance

This sub-option includes all measures in 5a, plus the following:

- Measure 5b.1 – Member States are obliged to use performance classes to introduce reputational and economic incentives
- Measure 5b.2 – Modulation of EPR fee according to the performance class

Sub-option 5c: Consumption-oriented incentives

This sub-option includes all measures in 5b, plus the following:

- Measure 5c.1 – Bonus for EU citizens to reduce their carbon footprint
- Measure 5c.2 – Introduction of an excise proportional to the life cycle environmental performance of the products placed on the EU market

6.1.1. Assumptions used in the analysis

- Sub-options have an aggregated effect in terms of the environmental, economic and social impact associated to sustainable products. This means that, although evidence is provided for specific reputational and economic incentives (e.g., eco-voucher, or green public procurement) or for a limited scope (e.g., MS, single product), there is a positive relation between the implementation of said policy measure and a positive effect on product sustainability.
- The information provided via the above measures is available to consumers and economic operators for a rational decision-making that makes sustainable products the preferred choice *ceteris paribus*. The hampering effects of asymmetric and/or imperfect information, although relevant, is considered not to be sufficiently significant to offset the positive effects of policy support to sustainable products. This is in line with the positive effect of existing measures such as Ecolabel and Energy Labelling[153].
- The improvement potentials for some product groups are consistent with the assumptions made for PO2. For product groups for which no information is available, assumptions of maximum improvement potentials are made. In general, an improvement potential of 5-10% was assumed conservatively across the different environmental impact categories for all product groups within the scope of the SPI. The notable exception is the energy savings potential, for which available evidence suggest an average improvement potential between 3 and 33% for ten different product groups attributable to the EU Energy Labelling.[154] Hence, the estimations have assumed an average improvement potential of 20%, which has been used for the product categories within the scope of the SPI.

[153] SWD(2017) 253 final, EMAS and Ecolabel Fitness Check

[154] Ecofys (2014) Evaluation of the Energy Labelling Directive and specific aspects of the Ecodesing Directive. ENER/C3/2012-523. Ecofys, OKO Institutut, Seven, Waite, SoWatt, Univrsity of Coimbra by order of the European Commission.

6.1.2. What problem and specific objective does this option address?

This policy option is intended to primarily address sub-problem 2 ('too difficult for economic operators and citizens to make sustainable choices in relation to products') by contributing – together with option 6 – to achieving the specific objectives 3 ('incentivise more sustainable products and business models to improve value retention'). It can also support the specific objective 1 ('improve product sustainability').

Stakeholders' views on PO5

As concerns sub-option 5a, economic and reputational incentives are perceived by SMEs as key tools to support the achievement of greater product sustainability: 70% of the respondents to the SME survey agree or strongly agree that regulations and incentives incentivise innovation in sustainable products. However, workshops results show a need to focus on improving incentives for circular design[155]. Similarly, when asked how to increase compliance and enforcement, respondents to the consultation underline the need for accompanying measures from the European Commission to MSs, showing the need for guidance and harmonisation at the EU level.

Respondents to the targeted survey welcome the consideration of fiscal measures to incentivise circularity, including the removal of harmful subsidies; lower VAT for sustainable / circular goods / services (including repair services) / use of secondary raw materials / use of sustainable materials; tax on virgin / fossil materials; environmental impact tax; and tax shift from labour to resources.

Interviewed stakeholders indicate that they expect an administrative burden related to incentives to be limited. Similar messages are obtained from National Authorities responding to the open public consultation[156]. A stakeholder survey with 80 responses from individual companies discloses that the yearly cost of their participation to initiatives[157] or of using specific methods[158] range between EUR 5,000 and EUR 2 million[159]. This cost however represents an opportunity for companies, as:

- Close monitoring enables them to know precisely the strengths and weaknesses of their products[160];
- Obtaining a label is expected to be beneficial to their revenue as, beyond the reputational gain and competitive advantage[161], it would qualify their products for other incentives (eco-voucher) and initiatives Green Public Procurement (GPP).

Respondents to the OPC rank 'improving access to finance', 'making better use of standardisation' and 'developing and implementing mandatory Green Public Procurement criteria and targets' as the three most important measures to encourage more sustainable production and consumption patterns. All main stakeholder groups (EU citizens, industry, NGOs and environmental groups) provided similar rankings, showing they jointly placed very high or high importance on the impacts of these measures. For SMEs,

[155] Workshop on Policy support for circular business models, May 2021
[156] Position papers (the Netherlands, Finland, and Denmark) within the OPC
[157] Initiatives based on commitments (e.g., UN Global Compact), reporting initiatives (e.g., Carbon Disclosure Project), indices (Dow Jones Sustainability Index), labelling initiatives (e.g., EU Ecolabel), initiatives by partnerships or platforms that are cross-sectoral (e.g., CE 100 network of the Ellen Macarthur Foundation) or sectoral (e.g., Sustainable Apparel Coalition)
[158] Standards (e.g., ISO 14040-44), other similar methods (e.g., Environmental footprint), methods underlying labelling (e.g., Swiss Ecolabel), certifications (e.g., Rainforest Alliance), reporting methods / organisation-level tools (e.g., UN Global Compact Indicators), rankings (e.g., SJSI Robecosam) and indicators internal to the company
[159] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods
[160] Ministère de l'Écologie, du Développement durable et de l'Énergie (2013), Bilan au parlement de l'expérimentation nationale, Affichage environnemental des produits de grande consommation
[161] SWD(2017) 253 final, EMAS and Ecolabel Fitness Check

mandatory GPP criteria and targets are of relatively less importance. The lowest priority was given to 'better use and promotion of voluntary sustainability labels such as the EU Ecolabel', which is already widespread. A stakeholder survey shows that 97% of the individual businesses[162].

A number of stakeholders are of the opinion that the main barrier for further uptake of circular products is not technical, but rather it is based on the fact that today the linear model is financially more attractive than manufacturing circular and sustainable products. According to SMEs, the main barriers to circular business models are the lack of a clear regulatory framework (65% score at least 4 out of 5, n=54) and the lack of consumer awareness and responsiveness to circular business models (62%, n=55). The main economic incentive to support sustainable products mentioned by stakeholders is green public procurement. The SME survey results indicate however that a majority would be unaffected (29%), not concerned (19%) or negatively affected (4%) if public authorities were required to purchase a minimum proportion of sustainable products in the total public procurement. The respondents to the consultation also wish that mandatory GPP standards would include sustainability, recycling, and social criteria.

Regarding the social impact of sub-option 5a, the respondents to the consultation underline the need for the legislator to take measures in support EU citizens to increase the level of awareness relating to the environmental, sanitary and social consequences of consumption patterns. Empowering consumers to make more sustainable choices and supporting communities though e.g., repair programs is highlighted by some stakeholders as important to achieve a more sustainable society.

As regards sub-option 5b, the respondents to the consultation indicate that it is paramount for certification to be affordable for SMEs, possibly through one-stop-shop solutions. They also underline the need for market and administrative barriers removal, as well as the need to align directives and regulations to remove the existing legal hurdles.

A large furniture manufacturer reported the complexity of communication about recycled content, and the needs of a case-by-case approach. Figures presented to the customer need to be reliable, but the intricacy of supply chains, the lack of material traceability and the recyclability variation from a material to another according to technological maturity and raw material costs hinder this accuracy. Rather than a precise figure, their preferred approach is to present a minimum level of recycled content. The same stakeholder recognises the interest to develop harmonised systems to monitor and communicate on environmental performances by product group, to assess the effect of this information on consumer behaviours, and to differ the mandatory implementation until the methodology is fully ready.

A furniture business organisation raised concerns about the costs and administrative burden that could be incurred by sub-option 5b, especially if a life-cycle analysis is required of each product placed on the market. Instead of having this burden on companies, it should be put on the sector, as a way to have accurate data to define appropriate and simple criteria. The same stakeholder indicated a strong support towards the harmonisation of EPR eco-modulation which would limit the burden associated to a diversity of approaches on modulation of EPR fees across MSs.

A textile business organisation recommended imposing eco-vouchers for consumers to purchase textile items that are second-hand, certified, repaired or rental.

The modulation of fees is ranked the fourth most important measure to encourage more sustainable production and consumption patterns in the OPC, again across all main stakeholders. Though, for SMEs, modulation of fees is considered the most effective. The majority of respondents are in favour of establishing a punitive scheme (such as the eco-modulation of fees) when rules / measures are not followed, though some stakeholders are in favour of positive incentives only. Some industry stakeholders

[162] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods

are in support of setting-up an ambitious eco-modulation of fees in the EPR scheme, like the representatives of the French textile industry stated in a recent opinion paper published in Le Monde[163].

As for the social impact of sub-option 5a, the respondents to the consultation underline consumer education as a requirement in relation with mandatory label requirements, including an easy non-compliance reporting system.

As regards sub-option 5c, policy support for circular economy by a dedicated tax regime (e.g., introducing a tax on virgin material) is identified as the second most important barrier for the further uptake of circular products by the respondents to the consultation. This issue is also challenged by stakeholders. In the targeted stakeholder survey, the introduction of an excise duty proportional to the product life cycle environmental footprint receives 40% of positive opinions for achieving greater sustainability, while 27% of respondents expressed negative opinions.

6.2. Baseline for PO5

In the absence of SPI, the EU and MSs will continue promoting sustainable products, services and businesses through EU instruments such as the EU Ecolabel, the Energy Label and the application of EU Green Public Procurement criteria. MSs will also continue to introduce measures on the national level. This would include the introduction of fee modulation in extended producer responsibility (EPR) schemes (as required under Article 8a of the Waste Framework Directive), tax incentives (e.g., reduced VAT on small repairs in accordance with the VAT Directive) and the introduction of national labelling schemes (e.g., the Nordic Ecolabel). The Baseline assessment will consider all these policy instruments and assume that the provisions will not change before 2030. It will also assume that the existing success and challenges associated with the efficiency of these instruments might persist if no additional measures are taken. It will also be assumed that overall trends with regards to the market uptake of sustainable products seen until now will sustain a future "No-SPI" scenario.

In the absence of SPI, the existing instruments will continue to deliver certain positive impacts in terms of providing a market push towards more sustainable and circular products.

The EU Ecolabel is a voluntary labelling scheme which was established in 1992 by the European Commission. Its application has been expanding product coverage and generating visible impact on consumer choices. The EU Ecolabel has helped to streamline national initiatives on ecolabelling, and many MSs have integrated their labels with the EU Ecolabel[164]. The CEAP recognizes the valuable role of EU Ecolabel criteria to inspire mandatory legislation and prescribes the systematic inclusion of circular economy aspects in the EU Ecolabel criteria. It has also supported *green procurement* in many countries. The EU Ecolabel will continue being active irrespectively of SPI. However, in the last few years its uptake has been hindered by significant obstacles such as competition with other green labels and the administrative burden associated with its application[165].

[163] « Nous, marques textiles, demandons à être plus régulées », 7th July 2021, https://www.lemonde.fr/idees/article/2021/07/07/nous-marques-textiles-demandons-a-etre-plus-regulees_6087296_3232.html

[164] Lange P. (2014) The coexistence of two Ecolabels: – The Nordic Ecolabel and the EU Ecolabel, Nordic Council of Ministers, 5 may 2014

[165] Prieto-Sandoval, V., Mejía-Villa, A., Ormazabal, M. et al. Challenges for ecolabeling growth: lessons from the EU Ecolabel in Spain. Int J Life Cycle Assess 25, 856–867 (2020). https://doi.org/10.1007/s11367-019-01611-z

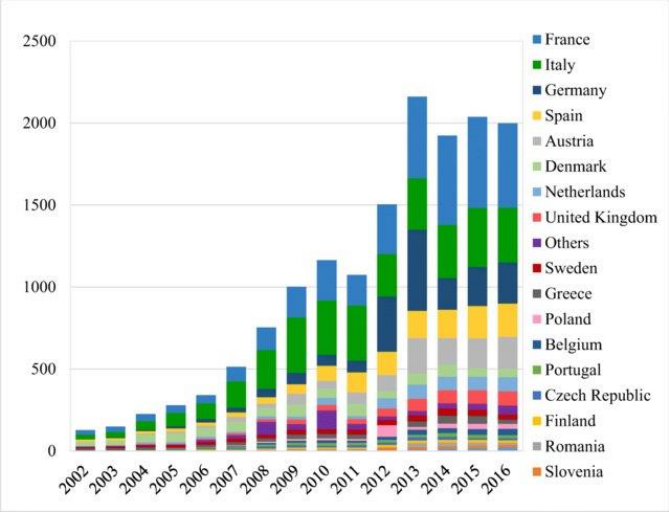


Figure 1 Evolution in EU Ecolabel licenses since 2002

Source: Prieto-Sandoval et al (2020) based on data from the EC

The latest Ecolabel Fitness check[166] has confirmed the relevance and positive role of the instrument in reducing the environmental impact of consumption and production. However, it highlighted that the contribution is limited compared to the overall breadth of the challenges to be addressed with total consumption and production. Under the EU Ecolabel a number of product groups have no or marginal uptake indicating that the market is immature and/or that the administrative burden or verification cost for compliance with certain set of criteria may be too high and act as a barrier for participation. At the same time, the EU Ecolabel operates in a context of general public support for sustainable production and consumption: 77% of the EU population surveyed through the Eurobarometer indicated that they are willing to pay more for environmentally-friendly products if they feel that the claims can be trusted[167]. According to the 2020-2024 EU Ecolabel Work Plan, the Ecolabel product portfolio will continue to expand. The further refinement of circularity aspects might be taking place as well. As discussed in the baseline for PO4, the integration of the PEF approach in the Ecolabel methodology will further extend the latter's positive impact and increase the endorsement from consumers and procurers.

The positive impacts of the **Energy label** introduced through the Energy Labelling regulation can be associated with the impact of the respective products to which the label is applied (see also environmental, social and economic impacts presented in the baseline for PO2). As a communication tool, it incentivizes sustainable consumer behaviour by making energy efficient products more attractive. It can also incentivise the green procurement of products in public procurement tenders.

Green Public Procurement (GPP): under the Baseline, it will remain a voluntary instrument meaning that it is up to the MSs and their contracting authorities to implement it. In this context, the EU GPP criteria sets developed by the European Commission for 20+ priority products are non-binding and not formally adopted as a legal act. At the same time, the European Commission

[166] SWD (2017) 252 final. FITNESS CHECK REPORT on the review of implementation of Regulation (EC)No 122/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS) and the Regulation (EC) No 66/2010 of the parliament and of the Council of 25 November 2009 on the EU Ecolabel

[167] Special Eurobarometer 468: Attitudes of European citizens towards the environment - Data Europa EU

encourages MSs to take further steps to apply green procurement criteria to at least 50 % of public tenders. In addition, with the promotion of Just Transition actions the Commission encourages to increase the uptake of socially-responsible criteria in public procurement to support social inclusion via public investments. While comprehensive monitoring on GPP in MSs is missing, selected countries report on their GPP performance. For example, the Swedish Competition Authority found that more than 90% of procurement in Sweden has sustainability criteria included in the contracts, while the percentage reported for the Netherlands is 91%[168]. In Germany and the Netherlands, several cities are promoting the leasing of services and product-as-a service models (e.g., computer equipment and furniture).[169] The French procurement law establishes a target of 20% of refurbished products in public purchases. France also includes environmental performance targets for large-scale renewable energy installations (e.g., performance targets based on the embodied carbon content of solar photovoltaic panels used in large-scale installations).[170] The latter has been leading to the purchase of the best environmentally-performing product in the market by installers, and fostered competition between original product manufacturers to improve the environmental performance of solar PV modules. At the international level, the European Commission can use the ongoing dialogue in the Committee implementing the WTO's revised Government Procurement Agreement (GPA) to encourage strategic partners and third countries to strengthen sustainable products procurement.

Although a considerable adoption of GPP criteria is observed as described above, its current overall uptake demonstrates a clear potential for improvement due to significant variations in the adoption of GPP criteria across Member States and product groups[171]. Improved clarity on relevant legislative provisions on GPP and the introduction of mandatory elements (as opposed to the current voluntary nature of the instrument) could increase its uptake[172]. There are many potential benefits to harmonising green public procurement for products. Harmonising criteria used by MSs ensures the functioning of the internal market, improves EU-wide competition, and reduces the administrative burden for economic operators and authorities.

As regards circular procurement, the OECD in their 2014 survey studied MSs practices and challenges associated with this approach[173]. As seen in the table below, the awareness of procurement and its potential to contribute to a more circular economy is the key challenge for many MSs (yellow). Capacity building, evidence, and practical guidance on how to implement more circular procurement are the main challenges for countries already familiar with circular economy principles (turquoise). The biggest challenge for those few countries (lavender) that have launched pilot projects to implement circular procurement is how to scale them up at a mainstream level.

[168] Ministry of Economic Affairs and Climate Policy (2021) Public Procurement Monitoring Report of the Netherlands

[169] Norden (2021) Sustainable procurement for the SDGs; Dalhammar et al (2016) Sustainable Procurement of PSS – the case of furniture. Journal of Cleaner Production.

[170] Republique Francaise (2021). Cahier des charges de l'appel d'offres portant sur la réalisation et l'exploitation d'Installations de production d'électricité à partir de l'énergie solaire « Centrales au sol ».

[171] Centre for European Policy Studies and College of Europe (2012), the Uptake of Green Public Procurement in the EU27.

[172] Poukli K. (2020) Towards mandatory Green Public Procurement (GPP) requirements under the EU Green Deal: reconsidering the role of public procurement as an environmental policy tool. ERA Forum (2021) 21:699–721. https://doi.org/10.1007/s12027-020-00635-5

[173] EP (2017). Green Public Procurement and the EU Action Plan for the Circular Economy. Study prepared by Policy Department Economic and Scientific Policy European Parliament for ENVI Committee. Available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2017/602065/IPOL_STU(2017)602065_EN.pd

Table 48 Summary of respondents' views on Member States and circular procurement

	Lavender	Turquoise	Yellow
Definition	*Actively embedding (circular) procurement practice in policies for delivering the Circular Economy*	*Aware of possible alternatives, some evidence of individual examples but no systematic approach to linking procurement and the Circular Economy*	*Not aware beyond the barriers to the Circular Economy*
Countries	Finland, Netherlands, Belgium (Flanders specifically), France, UK (Scotland specifically)	Sweden, Denmark, Italy, Spain, Germany, Austria; UK (England); Belgium; Latvia; Malta	Romania, Lithuania, Slovak Republic, Poland, Bulgaria, Czech Republic, Portugal, Hungary
Major challenges	Legal; financial; inertia	Linking procurement to CE; lack of training in alternative approaches; verification (e.g. of LCC)	Lack of awareness/ evidence; low recognition of BPQR; active legal challenges to BPQR

Extended producer responsibility (EPR) schemes have long been implemented across all MSs. Some MSs have included aspects of fee modulation and Ecodesign aspects of waste prevention in their EPR legislation. EPR schemes are implemented by MSs following the principles included in Article 8 and 8a of the Waste Framework Directive (2008/98/EC). The same is also mandated by the ELV Directive, the WEEE Directive, the Batteries Directive, and the Packaging and Packaging Waste Directive[174]. A number of new EPR schemes for additional product categories have been or are to be implemented at the national level.

For example, Ireland has established EPR schemes for agricultural plastics and tyres and has plans to implement EPR for textiles. France has already adopted an EPR scheme for textile waste, as well as for pleasure boats, furniture and mobile homes. Similarly, Sweden and the Netherlands assessed the possibility for implementation of mandatory EPR system for textile products.

EPR for packaging has contributed to significant increases in recycling rates in the EU. This applies also to plastic packaging, where recycling reached on average 40% in 2015, which is well above the required 22.5% of the EU Packaging and Packaging Waste Directive.

[174] Note for instance art 7(2) of the PPWD: *Member States shall ensure that, by 31 December of 2024, extended producer responsibility schemes are established for all packaging in accordance with Articles 8 and 8a of Directive 2008/98/EC.* Also SUPD Article 8 is dedicated to EPR and the SUP items in question are to a large extent packaging.

Country	Packaging	WEEE	ELV	Agricultural plastic	Other
Austria	✓	✓	✓		*Plastic foils and bulky plastics*
Belgium	✓	✓	✓	✓	*Disposable plastic kitchenware*
Bulgaria	✓	✓	✓		
Croatia	✓	✓	✓		
Cyprus	✓	✓	✓		
Czech Republic	✓	✓	✓		
Denmark	*ρ*	✓	✓		
Estonia	✓	✓	*tb*		
Finland	✓	✓	✓	✓	
France	✓	✓	✓	✓	*Textile, pesticide, fertilizer, seed and plant packaging, furniture and office equipment, ink cartridges*
Germany	✓	✓	*tb*	✓	
Greece	✓	✓	✓		
Hungary	✓	✓	✓		
Ireland	✓	✓	✓	✓	
Italy	✓	✓	✓	✓	
Latvia	✓	✓	✓		
Lithuania	✓	✓	✓		
Luxemburg	✓	✓	✓		
Malta	✓	✓	*N/A*		
Netherlands	✓	✓	✓		*Window panes*
Poland	✓	✓	✓		
Portugal	✓	✓	✓		*Medical and pharmaceutical packaging*
Romania	✓	✓	*tb*		
Slovakia	✓	✓	✓		
Slovenia	✓	✓	✓		
Spain	✓	✓	✓	✓	
Sweden	✓	✓	✓	✓	
United Kingdom	✓	✓	✓		

√ - EPR scheme; tb - takeback obligation, no PRO; ρ-product fee obligation/governmental fund. Source: European Commission, 2014.

Figure 2 EPR schemes in EU Member States

The EPR instrument is aimed at shifting the responsibility of waste management to producers and to give an incentive to invest in sustainable product design. Although EPR schemes have proven to be successful in achieving the first objective by organising separate collection and treatment of end-of-life products, the extent to which it incentivises sustainable product design has proven to be limited. In particular when uniform (rather than modulated) financial contributions are applied in the case of collective EPR schemes, these incentives are weak[175].

VAT differentiation can be an effective mechanism to stimulate sustainable products markets in Europe. [176] The use of pricing mechanisms promoting reparability and product life extension are increasing among MSs in terms of scope and level of ambition. For instance, differentiated taxation for the purchase of more sustainable alternatives is used to support sustainably sourced materials, efficient and cleaner production, repair, high-quality recycling, etc. Tax breaks are in place for the repair of a large number of products in Sweden, whereas France provides financial aid in the form of vouchers for the repair of bicycles or the purchase of electric bicycles (see also additional examples in measure 5b.2).[177] While these instruments can provide incentives for the sustainable consumption and repair of products, they are not introduced consistently across the internal market. In addition, the possibilities to further extend the introduction of financial incentives through VAT reductions or exemptions is limited within the scope of the VAT Directive (2006/112/EC), which for instance only allows tax reductions in services offering minor repairs of certain products.[178]

In the business-as-usual scenario, it can be expected that the impact of the EU Ecolabel will continue to expand with the extension of the product portfolio and the integration of the PEF

[175] see e.g. OECD 2016, Incentives for eco-design in extended producer responsibility
[176] Oosterhuis, F. et. al. (2008)
[177] With the "Coup de pouce réparation", the French government provided a EUR 50 bonus per bike to cover the cost of repairs until March 31, 2021. It also provides a bonus, of a maximum of EUR 200, for the purchase of a new electric bicycle.
[178] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006L0112&from=EN

approach. The positive trends observed in the application of GPP in MSs are expected to continue, although variations in the adoption of GPP criteria across MSs will limit the impact of the instrument. No further significant changes are expected in the adoption and implementation of other EU instruments promoting reputational and economic incentives. The challenges discussed above are likely to persist, while some progress could be expected in selected MSs. The benefits associated with these instruments is difficult to quantify, but a certain demand for greener products and market uptake will be facilitated.

6.3. Sub-option 5a: Enhanced incentives measures

6.3.1. Economic impacts

Measure 5a.1 will not directly result in additional economic impacts, as it will be limited to the provision of guidelines to support public authorities in MSs with the introduction of reputational and economic incentives at the national level. The economic incentives themselves may result in additional economic impacts, however it is not possible at this stage to estimate their overall impact as this depends on the actual incentives on which guidance will be provided and the product categories to which these incentives apply.

Measure 5a.2 will allow the Commission to develop mandatory GPP criteria. Underpinning work is to be undertaken on a product-by-product basis in the context of SPI measures. Product-specific GPP criteria will be subject to an Impact Assessment process. As such the economic impact of the instrument overall is difficult to assess, although this is likely to increase and be positive as the instrument departs from the current voluntary nature of GPP. Existing GPP schemes have been found to be often associated with economic savings over the entire life cycle of the purchase of a product for public authorities, and society more broadly, through reduced use and improved efficiency of resources[179]. By sustaining demand for "greener" products, public procurement creates markets for environmentally friendly products and services. Depending on the product group, GPP can provide a competitive advantage to suppliers of sustainable products.

6.3.1.1. Administrative burden

Administrative burden for economic operators

Measure 5a.1 will not directly result in an additional administrative burden for economic operators as it will be limited to the provision of guidelines to support public authorities in MSs with the introduction of reputational and economic incentives at the national level. The actual impact on economic operators depends on if and how guidance provided by the European Commission is put into practice by public authorities in MSs, as well as the specificities of the guidance in terms of types of incentives and product categories to which these apply.

GPP typically requires manufacturers to produce the information necessary to certify that their products meet the necessary requirements, as well as all operators along the value chain to keep the associated records and documents. Furthermore, such a measure could lead to additional burdens for companies, such as:

- Monitoring process and costs related to the collection and tracking of information on a large scale[180]; and
- Third-party verification of the product (NB: third-party verification costs linked to EU requirements are assessed under Option 7).

[179] Economic and reputational incentives and support measures for sustainable products - Task 4 report of this Impact assessment

[180] Ministère de l'Écologie, du Développement durable et de l'Énergie (2013), Bilan au parlement de l'expérimentation nationale, Affichage environnemental des produits de grande consommation

Administrative costs for the European Commission

Measure 5a.1 will generate costs for the EC associated with the development of guidelines. These costs are expected to remain limited.

As concerns measure 5a.2, the administrative costs for the European Commission will be linked to drafting the legislative measure, its supporting guidelines and tools for the implementation of GPP in MSs. A dedicated GPP helpdesk has already been set up by the European Commission in 2010[181]. Consequently, the costs for measure 5a.2 are also expected to remain limited, though higher than for measure 5a.1[182].

Administrative burden for Member States

The implementation of sub-option 5a.1 will generate an administrative burden for public authorities, in particular because of the need to monitor and enforce compliance with the new incentives, although this does depend on if and how MSs choose to put EU guidelines into practice. Certain savings could also be expected. For instance, incentivizing economic operators to use standardisation and labelling will ease the work of civil servants as the use of enforceable criteria for consumer information on environmental characteristics will be easier to control than the fairness of general business orientations[183].

As concerns measure 5a.2, experiences show that GPP implementation costs can benefit from reputational incentives. For instance, in Korea, GPP benefited from the existing green criteria of the Korea Eco-label and Green Recycled Mark and from the implementation of an online platform, the Green Products Information System (GPIS), to ease the monitoring and reporting process. Similar lessons were drawn in China, the Netherlands[184], Sweden[185] or the city of Vienna[186], where the use of common monitoring and impact measurement tools and standards have supported GPP uptake from contracting authorities. Furthermore, the use of a common EU approach can reduce fragmentation and misalignments in estimating the impact of GPP in each country. Nevertheless, the implementation of GPP requires training in evaluating life cycle cost for public officers[187].

6.3.1.2. Other economic impacts for Member States

Although voluntary at this stage, MSs will be encouraged to set up incentives, which can have impacts on public finances. Environmental taxation is a behavioural transformation tool, with a potential to transform the economy, thus leading to imbalances[188]. It could lead to an immediate increase of the public budget (with a decrease over time as behaviours are modified), or on the contrary, to fiscal revenue decrease (e.g., reduced VAT). For instance, by introducing a reduced VAT rate, Austria reduced the amount of repair-related tax collected, although it will partially be

[181] Helpdesk for GPP, https://ec.europa.eu/environment/gpp/helpdesk.htm
[182] In addition, the European Commission suggested setting up a compulsory reporting to monitor the uptake of Green Public Procurement (GPP), without further defining the resources required. Cf. COM(2020) 98 A new Circular Economy Action Plan for a cleaner and more competitive Europe
[183] Ex ante impact assessment of the French AGEC Law (2019). https://www.senat.fr/leg/etudes-impact/pjl18-660-ei/pjl18-660-ei.html
[184] OECD 2015, Going Green: Best Practices for Sustainable Procurement
[185] Konkrrensverket 2018, The Swedish procurement monitoring report
[186] ConPlusUltra 2014, Green Public Procurement in the City of Vienna Impact Analysis
[187] Hasanbeigi, A., Becque, R., Springer, C. 2019. Curbing Carbon from Consumption: The role of Green Public Procurement.
[188] European Parliament EPRS 2020, Comprendre la fiscalité environnementale

compensated by an increase in demand[189]. Another example is the Belgian eco-voucher that has been found to support the domestic consumption and job market, as it must be used within the country[190]. If the eco-vouchers were replaced by an equivalent net amount, Belgium would lose EUR 50 millions of direct and indirect domestic consumptions and 1,300 jobs. Yet, both of them are beneficial to the government as they generate revenue, and employment reduces the need for unemployment allowance. One last example is the implementation of the bonus/malus scheme in France, which resulted in budget imbalance in the first years due to the stronger than expected interest from both consumers and producers. In 2009, the deficit reached EUR 625 million. Corrections were applied, which led to a tax benefit of EUR 45.8 million in 2012[191]. With the shift of the bonus/malus scheme in 2019 to target more specifically low-income households and those that depend on their vehicle for their livelihood, it was found that it generates indirect benefits, in particular social benefits, that could offset the opportunity cost of public funds associated with the use of public money[192]. Even without the quantification of those indirect benefits, the direct benefits associated to this incentive (lesser environmental impact, economic savings of citizens) surpass the associated economic burden (amount of bonuses distributed): in 2019, there was an overall gain of EUR 610 million for the community.

The procurement of green products may result in economic advantages. Studies show that green products can have a lower purchasing price, due to a smaller amount of resources and/or waste generated, which can lead to lower associated production costs. In the European Union, the purchasing cost of green copying paper was found to be similar to non-green copying paper and even cheaper in some MSs (-23% in Germany)[193]. The use of an (environmental) life cycle costing approach could even decrease the costs associated with the purchased solution. Another study concluded that the average financial impact of GPP was -1.2%, thus leading to cost reductions for public authorities using GPP. In Austria, results show that the implementation of the ÖkoKauf (EcoBuy) programme in the city of Vienna resulted in savings of EUR 17 million annually[194], resulting from the purchase of various products groups, ranging from organic food to cleaning products, vehicles or lighting bulbs. It should be pointed out that this number varies from a product group to another[195]. For instance, procurement of green textiles or 100% electricity supplied from Renewable Energy Sources (RES-E) can lead to non-negligible increases in costs.

6.3.1.3. Direct economic impact for businesses

Many different incentives are possible, and target various types of stakeholders, from consumers to producers through retailers. Incentives create opportunities to strengthen the market for sustainable products, as companies are encouraged to develop and sell new and less environmentally-impacting products. The measures under sub-option 5a should be designed as non-discriminatory.

Guidelines introduced under measure 5a.1 are not expected to have direct impacts on companies and will not directly affect their competitiveness. Indirectly, however, the introduction of

[189] Austrian Institute for Economic Research (2019), " Effekte eines ermäßigten Mehrwertsteuersatzes für Reparaturdienstleistungen
[190] Roland Berger 2017, « Les avantages du système des éco-chèques par rapport à un montant net équivalent – Analyse d'impact pour les pouvoirs publics »
[191] Commissariat général au développement durable 2013, Évaluation économique du dispositif d'écopastille sur la période 2008-2012
[192] French Ministry of Ecological Transition (2021), "Prime à la conversion des véhicules particuliers en 2019: bilan socio-économique"
[193] Öko-Institut, ICLEI 2007 for DG ENV, Costs and Benefits of Green Public Procurement in Europe
[194] OECD 2015, Going Green: Best Practices for Sustainable Procurement
[195] Collection of statistical information on Green Public Procurement in the EU 2009

incentives by Member States, such as environmental taxes, may affect the relative competitive position of companies. For instance:

- **Revenue increase due to higher demand**. Differentiated taxation, GPP and eco-vouchers are all instruments that contribute to increasing the demand for sustainable products and services, which positively impacts the revenues of companies providing them (associated with reputational gain)[196];
- **Impacts on profits.** Changing the sustainability of products or new / higher environmental taxes may increase production costs. This may result in lower profits if prices do not keep up, e.g., in case a full pass-through of environmental taxes to the consumer is not possible. The empirical evidence indeed shows that, although situations are highly variable across industries, a 100% pass-through of costs to prices is unlikely[197];
- **Investments**. To produce more sustainable alternatives and, for instance, reduce the amount of environmental taxes paid, the measures will also encourage manufacturers to invest in more sustainable manufacturing processes, logistics and supply chains (including training), in the design phase of industrial products, in industrial engineering (design of production processes), purchasing departments and logistics[198]; and
- **Business models**. Incentives can also foster the development of circular business models (policy option 6): differentiated taxation, for instance, is an instrument that can support repair and reuse, and the shift towards recycled material[199].

Measure 5a.2 is expected to have positive direct economic impacts on companies offering sustainable products and on contracting public authorities. By sustaining demand for "greener" products, public procurement creates markets for environmentally-friendly products and services. It also provides incentives for companies to develop innovative solutions with lower environmental impacts[200], creating markets and jobs[201], notably for SMEs[202]. Depending on the product group, green public procurement can provide a competitive advantage to environmentally-aware suppliers[203].

Capital expenditures are expected to increase significantly because of the efforts required to produce products eligible for Green Public Procurement[204]. Operational expenditures are also expected to rise, less so than capital expenditures, as specific staff would be needed to ensure the fulfillment of the requirements (research, product and production technology development,

[196] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods

[197] RBB Economics (2014), Cost pass-through: theory, measurement, and potential policy implications

[198] JRC (2017), Boyano A., Moons H., Villanueva A., Graulich K.,Rüdenauer I., Alborzi F., Hook I., Stamminger R., (2017) Ecodesign and Energy Label for household dishwashers, EUR 28645 EN

[199] European Topic Centre on Waste and Materials in a Green Economy 2021, Business models in a circular economy

[200] COM(2008) 400 final

[201] Umweltbundesamt, Green public procurement, https://www.umweltbundesamt.de/en/topics/economics-consumption/green-public-procurement#strap-14572

[202] Irish Department of the Environment, Climate and Communications 2021, Green Tenders - an Action Plan on Green Public Procurement

[203] For example, the City of Lille procured in 2003/2004 the management and the maintenance of a new energy-efficient lighting system (300 control boxes and 22 000 lighting units). The selected tenderer managed to win several similar contracts in neighbouring municipalities, and competitors soon replicated its strategy to focus on energy efficiency and environmental performance. It allowed to save 32 to 35% of its energy, and financial gains were reinvested primarily in the development of new environmental technologies, products and services, to achieve a 40% decrease. It also allowed to lower the public budget for public lightning by 5%. The old lighting system was made more energy efficient and transferred to a twining town in Senegal, alongside skills transfer.

[204] Stakeholder consultation, October 2021

testing and quality assurance, after sales service and after sales service support, management system operators, purchasing departments, etc.).However, those increased expenditures could also benefit the other policy options of the SPI, which would limit their overall magnitude.

6.3.1.4. Indirect economic impact for businesses

Measures 5a.1 and 5a.2 are expected to have positive indirect economic impacts. The introduction of incentives will indeed support higher activities in product testing, repair or recycling activities. Reputational incentives, which could foster GPP[205], have the potential to generate knowledge spill-overs, to bring strong positive network effects (e.g., services based on information and communication technologies through an increase of interoperability), and to contribute to generate trust, especially among early adopters of risky innovative products[206].

6.3.1.5. Economic impact for citizens

The guidelines developed under measure 5a.1 will not lead to direct impacts for citizens. Depending on if and how MSs choose to implement the EU guidelines on incentives, there could be an indirect impact. For some products, evidence shows that the introduction of incentive schemes can lead not only to immediate reduction of operational costs (for instance due to reduced energy consumption as a result of the energy label), but also to the decrease of investment costs in the medium term, with prices lower than forecast[207]. For instance, with the shift of the French bonus/malus scheme in 2019 to target more specifically low-income households and those that depend on their vehicle for their livelihood, 341,000 bonuses were provided in 2019[208]. In that same year, the scheme led to savings in terms of gas (EUR 117 million) and car maintenance (EUR 81 million) and benefits in terms of improved efficiency, that surpassed the associated costs of purchasing a new vehicle.

The change in demand fosters the number of sustainable options available and sold every year on the markets, resulting in a need for less products. For eco-vouchers, although it is difficult to quantify, literature acknowledged effects on environmental awareness[209], which can have a multiplying effect on consumption choices.

However, some incentives are likely to increase prices if manufacturers transfer, partially or fully, the cost to the consumers (e.g., taxation, third-party verification and registration costs for labels, EPR fees). In the literature, the breadth of this transfer varies widely from one instrument to another and depends on contextual elements[210].

GPP has the potential to generate procurement savings from public authorities, either through lower purchasing costs, operating costs or increased product life-expectancy[211]. These savings could contribute to reduce public spending and positively impact citizens.

6.3.2. Environmental impacts

The possible introduction and deployment of economic and reputational incentives following EU guidelines and the mandatory requirements to implement GPP will generate positive

[205] Environmental impact for option 5a
[206] Sant'Anna School of Advanced Studies and Öko-Institut on behalf of DG ENV 2020, Identification of elements for a future Strategy for the EU Ecolabel
[207] Ellis M and al. 2007, Do energy efficient appliances cost more?
[208] French Ministry of Ecological Transition (2021), "Prime à la conversion des véhicules particuliers en 2019: bilan socio-économique"
[209] CO2logic 2019, Evaluation de l'impact climatique associé à l'utilisation d'éco-chèques en Belgique
[210] European Parliament EPRS 2020, Comprendre la fiscalité environnementale
[211] Interview with stakeholder, April 2021.

environmental impacts compared to the baseline scenario. In some cases, for instance with eco-vouchers[212], the deployment of incentives could however generate unintended environmental consequences, e.g., a rebound effect, with the increase of sustainable product consumption instead of the unique direct replacement of unsustainable products. However, the overall balance is expected to be positive.

The guidelines under measure 5a.1 can lead to positive environmental effects due to the introduction of incentives by MSs that incentivise a greater selection of more sustainable products by consumers and the development of more sustainable offers by producers (e.g., increased product recyclability linked to eco-modulation according to SPI product performance classes).

The examples below show the potential environmental benefits of certain reputational and economic incentives:

- The updated EU Waste Framework Directive recommends MSs to use "fiscal measures or other means to promote the uptake of products and materials that are prepared for re-use or recycled"[213]. In Austria, following some regional initiatives, the implementation in January 2021 of a tax relief for *"small repair services and the sale of repaired products"* is the first Austrian national legislation to address reparability, with a VAT reduction from 10% to 20% for certain repair services. The measure will incentivise repairs, reducing the overall number of products on the market and strengthening repair companies[214].
- The Belgian eco-voucher scheme generated average CO_2 emission savings of 1 kgCO_2eq per EUR spent[215]. Overall, the use of eco-vouchers has saved the equivalent of 0.23% of Belgium's total annual CO_2 emissions in 2017 and 2018 (216,665 tCO_2eq and 229,797 tCO_2eq respectively), with a societal cost of EUR 21 to 42 million. The incentive to purchase products with a longer lifespan and use generally resulted in a greater reduction in terms of environmental impact than consumer goods: electro / multimedia and renovation / construction categories enabled for 31% and 24% of CO_2 reductions respectively, while they accounted for 38% and 4% of the amounts spent through eco-vouchers. The study also acknowledged the potential positive impacts on biodiversity and on water and soil quality.

Still, economic incentives such as the eco-voucher may cause a rebound effect[216]. For instance, following the implementation of the French bonus-malus system that provided a financial incentive to replace old and polluting vehicles with fuel-efficient ones, an increase of the vehicle fleet has been observed, with sales boosted by 13% compared to baseline[217]. While environmental performances of new vehicles improved, the voucher led to an increase of the production of vehicles, a polluting process, and to an increased use frequency and duration of journeys for energy-efficient cars. In the short term, the scheme resulted in a 1.2% increase in CO_2 emissions. In the longer term, estimates on CO_2 emissions evolution were variable, from -0.4% to +13.4%[218]. With the shift of the French bonus/malus scheme in 2019 to target more specifically low-income households and those that depend on their vehicle for their livelihood,

[212] Interview with stakeholder, April 2021
[213] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
[214] Austrian Institute for Economic Research 2019, Effekte eines ermäßigten Mehrwertsteuersatzes für Reparaturdienstleistungen
[215] CO2logic 2019, Évaluation de l'impact climatique associé à l'utilisation d'éco-chèques en Belgique
[216] INSEE 2012, Le bonus/malus écologique : éléments d'évaluation, Stakeholder interview
[217] Commissariat général au développement durable 2013, Évaluation économique du dispositif d'écopastille sur la période 2008-2012
[218] INSEE 2012, Le bonus/malus écologique : éléments d'évaluation

the environmental impact was found to be positive, with a reduction in atmospheric pollution and savings of CO_2 emissions (taking into account production and distribution of gas, construction of new vehicles, production of electricity, usage of new vehicles, destruction of old vehicles) [219]. Still, depending on the product, a targeted approach may be necessary to mitigate the rebound effect.

Measure 5a.2 is expected to have positive environmental effects compared to baseline. In the literature, GPP is often identified as a tool that can address environmental problems such as deforestation, greenhouse gas emissions, water use, energy efficiency, waste, etc.[220]. It was shown that, for almost ten product groups frequently procured by public institutions in the European Union, the use of GPP produced a reduction of CO_2 emissions. The table below presents the difference between the CO_2 emissions of a core and comprehensive green product compared to a non-green product[221]. It shows large variability according to the products groups.

Table 49 CO_2 impact of GPP per functional unit (negative numbers imply reductions in CO_2 emissions)

Product group	unit	core	compre-hensive
Cleaning services	m^2 cleaned	0%	-100%
Construction	building	-69%	-70%
Electricity	kWh	-26%	-100%
Catering & food	lunch prepared	0%	
Gardening	m^2 garden	-100%	-100%
Office IT equipment	computer	-24%	-24%
Paper	kg paper	-97%	-89%
Textiles	kg textile	-76%	-76%
Transport	vehicle	-12%	

Source: Collection of statistical information on Green Public Procurement in the EU, 2009

In Austria, the city of Vienna set up the ÖkoKauf (EcoBuy) programme in 1998 to procure green products and services, for an amount of about EUR 5 billion annually. It is estimated that the programme reduced CO_2 emissions by about 15,000 to 30,000 tonnes per year[222] [223].

Furthermore, pre-tender market consultations with market suppliers allowed in GPP within the framework of the EU public procurement directives can enable them to explore circular business models[224], which have a potential to reduce the environmental impact (Option 6).

[219] French Ministry of Ecological Transition (2021), "Prime à la conversion des véhicules particuliers en 2019: bilan socio-économique"
[220] For instance, European Commission 2017, Public procurement for a circular economy or OECD 2015, Going Green: Best Practices for Sustainable Procurement
[221] PwC, Significant and Ecofys 2009, Collection of statistical information on Green Public Procurement in the EU
[222] ConPlusUltra 2014, Green Public Procurement in the City of Vienna Impact Analysis
[223] OECD 2015, Going Green: Best Practices for Sustainable Procurement
[224] European Commission 2017, Public procurement for a circular economy

6.3.3. Social impacts

Measures 5a.1 and 5a.2 are expected to have positive effects in terms of job creation. Incentives aiming at supporting local companies, such as eco-vouchers, taxation or, to a certain extent, GPP or EPR, support the creation of non-offshorable jobs, whether for the design of more sustainable products or for low-skill work (e.g., distribution channel, waste collection, recycling). For instance, the Belgian eco-vouchers have led to the creation of 1,300 jobs[225]. The creation of non-offshorable jobs can give opportunities for low-skilled workers to subsequently improve their skills and develop their career through practical training[226]: according to the non-profit network organisation RREUSE, social enterprises active in the circular economy provide "green skills development and lifelong opportunities for vulnerable groups"[227]. RREUSE estimated that a social enterprise can create 20 to 140 jobs per 1,000 tonnes, depending on the product that is collected with a view of being re-used (20-25 jobs for textile, 35-70 for multi household products, and 60-140 jobs for electronic and electrical equipment). The Circular Economy Action Plan estimates that the overall job creation linked to the circular economy increased by 5% between 2012 and 2018 in the EU[228].

Measure 5a.1 would contribute to issue guidelines to advice on taxation, that comes under the jurisdiction of MSs. A socio-economic assessment of a global switch of taxes from labour to pollution and resource use to incentivise sustainable production found that this could provide additional employment to 6.6 million people[229] over a five-year period compared to business as usual. In turn, labels can increase the workers and consumers' safety as they often include requirements regarding chemicals and other hazardous products. In sub-option 5a, the adoption of labels is voluntary, although a catalyser for GPP. To enhance comparability and trust for consumers, it is key to support the readability of reputational incentives[230]. As only guidelines are issued, MSs might adopt various schemes, thus affecting information access for consumers.

Furthermore, economic and reputational incentives and GPP aim at influencing consumption habits and can assist consumers in drawing attention towards environmental impacts of products and services.

The introduction of incentives may lead to price increases in the short term, which will raise the question of social fairness and require a case-by-case analysis and possibly the introduction of support measures[231]. However, in the medium and long terms prices are expected to decrease due to the effect of the incentives and even reach lower values than 'traditional' products thanks to economies of scale[232]. Therefore, the issue of affordability of more sustainable products should be only temporary.

[225] Roland Berger 2017, « Les avantages du système des éco-chèques par rapport à un montant net équivalent – Analyse d'impact pour les pouvoirs publics »
[226] Cambridge Econometrics, Trinomics, and ICF 2018 for DG ENV, Impacts of circular economy policies on the labour market
[227] RREUSE 2021, Briefing – Job creation in the re-use sector: data insights from social enterprises
[228] European Commission 2020, Circular economy action plan
[229] ACCA 2018, Tax as a force for good - Rebalancing our tax systems to support a global economy fit for the future
[230] Ministère de l'Écologie, du Développement durable et de l'Énergie (2013), Bilan au parlement de l'expérimentation nationale, Affichage environnemental des produits de grande consommation
[231] European Parliament EPRS 2020, Comprendre la fiscalité environnementale
[232] Ecorys 2012 for DG ENV, Study on Incentives Driving Improvement of Environmental Performance of Companies

6.4. Sub-option 5b: Linking incentives to performance

6.4.1. Economic impacts

6.4.1.1. Administrative burden

By shifting the linkage of performances for incentive implementation from voluntary to mandatory, measure 5b.1 would incur higher administrative burden for companies (e.g., setting up information collection process, including access to testing facilities and training). Direct economic gains are however expected to exceed spending, as numerous companies have established that qualifying for reputational incentives proves beneficial despite its cost[233].

Administrative burden for economic operators

As concerns measure 5b.1, it is expected that mandatory requirements would result in an increased number of incentives being introduced to reach the agreed goals. It would thus result in increased administrative burden for companies, as illustrated for 5a.1.

Measure 5b.2 will also generate an administrative burden for companies, for instance to monitor material flows and verify product content. The textile examples show that product content certification costs in terms of secondary raw material decrease according to the number of certified items, and range from EUR 2,232 for a single item to EUR 575 for 50 items (leading to costs between EUR 0.01 and EUR 0.70 per product)[234].

These additional burdens would however be limited, as they would comply to a harmonised bundle of measures across the EU.

Administrative costs for the European Commission

Measure 5b.1 will incur costs as the EC would have to support MSs in introducing incentives based on performance classes. Additional administrative burdens would result from ensuring that they are properly linked to performance classes. These costs may vary from one incentive to another but are expected to remain limited compared to the already existing flow of products and waste statistics reported by the MSs to EUROSTAT.

As for measure 5b.2, the administrative costs for the EC will be linked to drafting the legislative acts and ensuing supporting guidelines and tools for the implementation of eco-modulation in MSs. An additional burden would be linked to monitoring the measure uptake. But costs are expected to remain limited.

By implementing common rules across Europe for sub-option 5b, market fragmentation can be reduced.

Administrative burden for Member States

In addition to sub-option 5a, the administrative burden for MSs depends to the linkages to be established between performance classes and incentives (option 4). Costs will also be incurred to monitor the uptake for the different products groups. Costs are however expected to remain limited in comparison to the current monitoring of product groups and waste statistics.

[233] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods

[234] RDC Environnement for ADEME 2020, Définition des critères d'éco-modulation applicables à la filière REP TLC

6.4.1.2. **Direct economic impact for businesses**

The measures under sub-option 5b are non-discriminatory: all economic operators would be granted the same rights related to the performance classes of their products.

Given the mandatory requirement, measure 5b.1 would enhance the positive economic impacts identified for sub-option 5a, especially the increase of companies' revenues, but would also entail further costs for businesses (e.g., setting up information collection and monitoring processes, including access to testing facilities and training, research and development). The benefits would likely be higher than the costs, considering that companies already comply with higher-than-mandated sustainability standards based on their own cost and benefit consideration[235].

As regards measure 5b.2, the introduction of eco-modulation in EPR schemes is an incentive for companies to introduce more sustainable products in the market and a mean to generate savings in EPR fees that will increase revenues for companies already marketing such sustainable products[236]. Such a modulation has a real potential to steer the market: while a new eco-modulation is under discussion, the share of eco-modulated products for the French EPR scheme on textiles has increased, from 0.64% in 2018 to 2.16% in 2019, after the number of eco-modulated items on the market had already doubled between 2017 and 2018[237].

While it can foster the usage of material that is easier to recycle on the market, the introduction of additional eco-modulation in existing or new EPR schemes could however have detrimental effects on companies' production costs, that can only be partially passed on to the customer. For instance, a study showed that the replacement of non-recyclable plastic containers by recyclable plastic or paper would result respectively in a 109% or 34% increase of the producer's EPR contribution due to weight increase[238].

Although it is expected that the cost of secondary raw material will decrease in the medium-term and become competitive and even lower than virgin material, the introduction or increased usage of recycled material in products can incur immediate costs increases. Depending on the location of recycling facilities, the introduction of a criteria to include recycled content could indeed trigger higher raw material prices due to labour cost and sorting automation. In the textile industry, compared to virgin material, it is estimated that the cost of recycled material could be 40% higher if recycled in France but 70% lower if recycled in Bangladesh. In the medium-term, after 2025, the cost of the recycled material in France could decrease thanks to technological developments and be 55% lower than virgin material[239].

As for sub-option 5a, sub-option 5b would result in cost increases to invest in sustainable production, but also cost reductions for producers of sustainable products to which economic incentives are applied. These effects depend on types of economic incentives introduced by MS and on whether an EPR scheme is in place for specific product groups .. Sub-option 5b would however provide opportunities for innovative companies, some of which could be SMEs, albeit

[235] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods

[236] For instance, for the textile sector in France, the share of products available on the market linked to eco-modulation according to three non-cumulative criteria (eco-design, integration of recycled material from used textiles and shoes, integration of recycled material from by-products) represented 0.64% of the total in 2018, with a doubling in volume from 2017, and increased to 2.16% in 2019. RDC Environnement for ADEME 2020, Définition des critères d'éco-modulation applicables à la filière REP TLC

[237] RDC Environnement for ADEME 2020, Définition des critères d'éco-modulation applicables à la filière REP TLC

[238] E3 Conseil 2021, Quand l'éco-modulation des contributions décourage l'éco-conception, http://www.e3conseil.com/fr/blog/quand-l-eco-modulation-des-contributions-decourage-l-eco-conception

[239] RDC Environnement for ADEME 2020, Définition des critères d'éco-modulation applicables à la filière REP TLC

they are generally less innovative than large companies[240]. Despite that, the implementation of sub-option 5b is expected to have higher impacts on SMEs compared to large companies. SMEs are more reactive to higher administrative burden[241], and are thus more likely to adapt their production to develop more environment-friendly products. As for sub-option 5a, they are less likely to benefit from economies of scale due to a limited range of products.

From a fiscal point of view, a potential side-effect would be the decrease of revenues for manufacturers. If, once proper incentives for repair are in place (e.g., reduced VAT), new purchases should decline because of the increase in repaired products, the value-added linked to these purchases would be lost[242].

6.4.1.3. Indirect economic impact for businesses

Within measure 5b.1, reputational incentives, such as labels and 'name and shame' strategies, can further enhance the indirect positive economic effect by improving the information consumers have access to. As a consequence, companies are encouraged to improve their production processes and the working conditions in order to benefit from the reputational incentives and the positive image they convey. This can lead to investment in research and innovation in order to gain a competitive advantage by producing the most sustainable product[243].

Evaluation and management instruments, such as the European Eco-Management and Audit Scheme, have been found to reduce the cost for resource, energy and waste management, and to potentially lead to organisational and process innovations, as the primary goal of the instrument is to improve the performance of companies[244]. Furthermore, it has been shown that cost savings as a benefit of participating in these schemes can outweigh the associated registration costs, although cost efficiency can be different according to sectors or types of organisations.

The mandatory nature of measure 5b.1 and measure 5b.2, with the use of performance classes, could also potentially harmonise the European market compared to sub-option 5a, that would rely on the voluntary implementation of incentives by MSs. This harmonisation would ensure coherence and alignment with product requirements under the SPI and heighten the impacts of the EPR schemes[245].

6.4.1.4. Economic impact for citizens

For citizens, sub-option 5b will likely lead to price increases in the short term, as a pass-through of the costs for companies is expected to occur[246]. The magnitude of this pass-through depends on many variables and on the specific products. As per the impact on SMEs, this element will be analysed in a specific impact assessment carried out for the target product when SPI measures should be developed. In the medium to longer term, prices of more sustainable alternatives are

[240] OECD 2018, Promoting innovation in established SMEs
[241] Ecorys 2012, Study on Incentives Driving Improvement of Environmental Performance of Companies.
[242] Austrian Institute for Economic Research (2019), Effekte eines ermäßigten Mehrwertsteuersatzes für Reparaturdienstleistungen
[243] Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU
[244] SWD(2017) 253 final, EMAS and Ecolabel Fitness Check
[245] Textile industry companies and business organisation's input in the stakeholder survey, October 2021
[246] RBB Economics (2014), Cost pass-through: theory, measurement, and potential policy implications

expected to decrease due to the effect of the incentives. For certain products groups, prices could even reach lower values than 'traditional' products thanks to the economy of scale.

6.4.2. Environmental impacts

The implementation of measure 5b.1 will significantly enhance the environmental effects identified for measure 5a.1. Indeed, rather than relying on a voluntary participation, measure 5b.1 will require MSs to introduce incentives to achieve their objectives and will thus result in a faster implementation compared to sub-option 5a. The literature has indeed shown that the environmental performance of businesses improves with mandatory measures, while voluntary ones are "unlikely to bring about significant improvement in environmental outcomes"[247] [248].

Mandatory reputational incentives are expected to better enable consumers to choose sustainable products, by facilitating the understanding of the information provided. They will assist in diminishing the negative environmental impacts of production and consumption. Indeed, the effectiveness of a voluntary measure depends in large part on the size of the organisation. Large companies are more likely to implement voluntary measures due to higher investment and capital needs, and therefore reputation[249]. Engagement in voluntary incentives is thus a major limitation to the policy's effectiveness and take-up.

Measure 5b.2 is also expected to have positive environmental impacts. The literature recognises the effectiveness of EPR schemes to address environmental goals (e.g., reduced waste, increase recycling) but underlines the need for empirical assessments to better understand their effects[250]. The current implementation of EPR schemes provides limited incentives to modify product design[251] [252] and – considering the example of the widespread EPR scheme on plastic packaging – only few schemes have gone further than basic fee modulation[253]. More advanced eco-modulation would, in this case, enhance scheme effectiveness by charging higher fees to producers introducing non-sortable, non-recyclable or difficult-to-recycle packaging (e.g., additives), while rewarding reusable packaging producers. A recent study on the introduction of eco-modulation for the textile EPR scheme in France notes the impossibility to generalise environmental results to the whole sector, due to product variability. It however estimates that the introduction of a criteria on recycled material for a t-shirt (30 or 60%) could lead to a reduction of GHG emissions by 10 to 20% and eutrophication reduction by 20 to 40%[254].

6.4.3. Social impacts

The implementation of sub-option 5b will significantly enhance the social effects identified for measure 5a.1. Incentives and eco-modulation in EPR schemes will be introduced at a faster pace, thus enhancing the job creation potential on the EU market in related fields, such as recycling or

[247] Aragon-Correa J., Marcus A. & Vogel D. 2020, The effects of mandatory and voluntary regulatory pressures on firms' environmental strategies: a review and recommendations for future research
[248] « Nous, marques textiles, demandons à être plus régulées », 7th July 2021, https://www.lemonde.fr/idees/article/2021/07/07/nous-marques-textiles-demandons-a-etre-plus-regulees_6087296_3232.html
[249] Ecorys (2012), Study on Incentives Driving Improvement of Environmental Performance of Companies
[250] OECD 2015, What have we learned about extended producer responsibility in the past decade? A survey of recent EPR economic literature
[251] Material Economics 2018, The Circular Economy a Powerful Force for Climate Mitigation
[252] OECD 2017, La responsabilité élargie du producteur, mise à jour des lignes directrices pour une gestion efficace des déchets
[253] IEEP 2017, EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging
[254] RDC Environnement for ADEME 2020, Définition des critères d'éco-modulation applicables à la filière REP TLC

eco-design. The sub-option aims at further developing and strengthening the market for sustainable products, while at the same time contributing to bring their costs down, making them affordable and reliable[255].

The use of performance classes will reduce market fragmentation, as MSs will use the same basis to inform customers on the environmental performances of products within the scope of SPI; as a consequence, the above benefits are more likely to be experienced across all MSs. The sub-option will also increase the safety of workers and consumers, as labelling often includes requirements regarding chemicals and other hazardous products.

Similarly to option 5a, the introduction of incentives leading to price increases in the short term will have an impact in terms of social fairness and require a case-by-case analysis and possibly the introduction of support measures[256]. However, in the medium and long terms prices are expected to decrease due to the effect of the incentives and even reach lower values than 'traditional' products thanks to economy of scale. Therefore, the issue of affordability of more sustainable products should be only temporary.

6.5. Sub-option 5c: Consumption-oriented incentives

6.5.1. Economic impacts

6.5.1.1. Administrative burden

Administrative burden for economic operators

Similarly to sub-options 5a and 5b, measure 5c.1 would imply an increased burden for companies: they would have to gather and report data to third-party verification bodies to qualify for reputational incentives (labels), and thus economic incentives (GPP, eco-vouchers, differentiated taxation, carbon bonus, etc.) that would be implemented by MSs to reach their circularity targets. Besides, they would have to absorb the cost of the excise duty if they do not comply.

The additional administrative burden required under sub-option 5c might be more difficult to absorb for SMEs, given their quasi-fixed costs nature resulting in a higher share of their revenues and profits being absorbed for such measures.

Administrative costs for the European Commission

For all measure, the European Commission would bear costs for the development of guidelines.

Measure 5c.2 would require additional efforts, as the European Commission is expected to determine a minimum amount of excise duty payable for each product.

Administrative burden for Member States

For all measures MSs are expected to bear most of the administrative burden as they would be in charge of the implementation.

[255] OECD (2016) *Creating market incentives for greener products*. OECD Publishing. Paris.
[256] European Parliament EPRS 2020, Comprendre la fiscalité environnementale

Measure 5c.1 would require "significant changes for stakeholders in levels of activity, behaviour or technology"[257], which could imply consequential implementation efforts for MSs. The cost linked with monitoring the carbon bonus could however be limited, as it would represent an additional process within the annual monitoring of tax returns. The compensation of household carbon savings could also represent a financial burden for MSs, although it could be offset with revenues from the excise duty.

Measure 5c.2 would entail costs for MSs due to the implementation, compliance monitoring and penalty processes that would be required. The implementation cost can be kept low if the duty is collected in the same way as other taxes applicable to the product. In Sweden, it was effectively the case: only 0.1% of the total revenues from energy and carbon taxes equated to administrative costs for the tax authority[258].

6.5.1.2. Direct economic impact for businesses

The measures under sub-option 5c are expected to have a positive impact on companies supplying sustainable products and services. This effect would be enhanced with the implementation of measure 5c.1, as purchases would be explicitly encouraged because of the consumer bonus. In addition, sustainable companies might benefit from the competitive advantage over those who have to pay higher excise duty due to the low environmental performance of their products[259].

Measure 5c.1 would in line with the Polluter Pays Principe internalise externalities and so shift consumption towards more sustainable products. As such, the bonus would be a win-win solution. The manufacturer would have an incentive to place on the market products with lower carbon footprint, as this would lead to higher market uptake from the consumers. The consumers would be incentivised to buy products with lower carbon footprint, as they would receive a direct economic benefit through a tax rebate calculated as difference between the carbon footprint of the average product sold in the market and the carbon footprint of the specific product bought.

Still, companies' competitiveness could be affected as they would have to evaluate the product performance against the proposed excise duty[260], and invest in sustainable production (e.g., by changing manufacturing processes) in order to be exempt of the excise duty and / or to benefit from the consumer bonus[261] [262]. This investment cost might not be fully passed on to the consumer, and thus temporarily reduce profits for parts of the market. These effects could be heightened for SMEs, as their financial situation is more sensitive to revenue and expense variations. However, certain SMEs tend to be more innovative than large companies and could benefit from these opportunities.

Measure 5c.2 has the potential to generate the highest negative impact on companies as the additional tax burden would unlikely be fully passed on consumers[263]. The level of pass-through would depend on the consumers' price sensitivity, or on price regulation for some products[264].

[257] BIO Intelligence Service, Cambridge Econometrics, LEI and the Institute of Social Ecology for DG ENV 2013, Modelling of Milestones for achieving resource efficiency – Task 1: Turning milestones into quantified objectives
[258] UN Committee of Experts on International Cooperation in Tax Matters 2019, Environmental tax issues
[259] European Parliament EPRS 2020, Comprendre la fiscalité environnementale
[260] Stakeholder consultation, October 2021
[261] European Parliament EPRS 2020, Comprendre la fiscalité environnementale
[262] OECD 2021, Towards a national Strategic Framework for the circular economy in Czech Republic
[263] RBB Economics 2014, Cost pass-through: theory, measurement, and potential policy implications
[264] UN Committee of Experts on International Cooperation in Tax Matters 2019, Environmental tax issues

6.5.1.3. Indirect economic impact for businesses

Sub-option 5c is expected to have positive indirect impacts: measure 5c.1 would support the development of product testing, repairing and recycling activities. The reputational incentives that would be implemented by MSs could further enhance the indirect impacts identified for measures 5a.1 and 5b.1, namely the support of GPP, knowledge spill-overs, positive network effects and stronger trust, especially among early adopters of risky innovative products[265].

As for PO4, sub-option 5c might lead to changes in demand as consumers would be explicitly encouraged to choose sustainable products with the carbon bonus and the excise duty. This could lead to a lower number of products being manufactured and sold per year, as their replacement rate would fall. This would be especially the case for products for which consumers show a strong willingness to pay for improved reparability and durability.

6.5.1.4. Economic impact for citizens

Measure 5c.1 is expected to have a positive economic impact for citizens, especially the most vulnerable. Better-off consumers would be less incentivised to participate, even though their carbon footprint is the most significant[266]: it was demonstrated that consumers with high carbon footprints would be less inclined to take carbon-conserving decisions than those with smaller footprints, when provided with a Personal Carbon Allowance (PCA) without any further incentive[267]. As concerns the poorer brackets, the carbon bonus could represent a financial opportunity. However, depending on the economic operators' costs pass-through to the consumers, the price increase might limit their ability to choose sustainable products and to benefit from the carbon bonus scheme.

The implementation of a carbon bonus would have to be a long-term measure to be fully integrated in consumption habits: in Denmark, free one-month travel cards for public transports were distributed to 500 car drivers. During the experiment, an increase in the use public transport was observed. However, this increase dissipated as soon as the experiment was over[268].

Measure 5c.2 can have a counter-productive effect on citizens and lead to economic imbalances[269]. Instead of turning to more sustainable products, consumers might find other solutions to access less sustainable but cheaper products: a study found that high excise duty rates, such as the ones in Nordic countries on beer, led to an increase of cross-border shopping, which was facilitated with the free movement of goods with or within the European Union[270]. A similar situation might be observed, although there could be duties applied on products coming from non-EU countries.

6.5.2. Environmental impacts

The implementation of sub-option 5c is expected to enhance the environmental impact reduction more than under sub-option 5b, with the implementation of a carbon bonus for citizen and an excise proportional to the life cycle. However, the literature is scarce on the effects of these

[265] Sant'Anna School of Advanced Studies and Öko-Institut on behalf of DG ENV 2020, Identification of elements for a future Strategy for the EU Ecolabel
[266] UNEP 2020, Emissions Gap Report 2020
[267] Capstick S. & Lewis A. n.d., Personal carbon allowances: a pilot simulation and questionnaire
[268] Roy, S. & Woerdman, E. 2012, End-user emissions trading: what, why, how and when?
[269] European Parliament EPRS 2020, Comprendre la fiscalité environnementale
[270] EY & Regioplan 2014, Economic effects on high excise duties on beer

instruments on circularity. Therefore, the potential environmental impacts of the measures specific to sub-option 5c have been determined in comparison with akin instruments, such as carbon offsetting programmes and carbon taxation.

As for Measure 5c.1, voluntary carbon offset programmes are similar to carbon bonuses, as consumers purchase offsets from domestic or international providers to compensate for their emissions. Carbon offsets however present the risk of a rebound effect, as they can alleviate consumers' guilt and encourage them to continue or to even increase their unsustainable practices[271]. Carbon bonuses present a similar risk as wealthier consumers would be less incentivised to participate, even though their carbon footprint is the most significant[272].

Carbon bonuses can also be compared to the Personal Carbon Goals that were experimented in Norfolk Island (Australia) in 2011. The local government implemented a 15-month trial, named the Norfolk Island Carbon Health Evaluation (NICHE) Project[273]. In total, 27% of all households of the island volunteered to participate and received a unique carbon goal that was 10% below baseline level. They were assigned a carbon card account to use at petrol stations, with a fuel discount, and had an incentive to go under the assigned goal to save money on utility bills and / or fuel for the vehicle. At the end of the experimentation, it was found that carbon emissions fell by 25.1% with the reduction of fuel consumption, and by 12.3% with the reduction of electricity usage. However, petrol / diesel consumption and active mobility (public transport, cycling) did not appear to have changed.

Measure 5c.2 may potentially have a positive environmental impact as, according to the literature, it could "help enable a systemic transition towards the circular economy"[274]. Replacing labour taxes with taxes on finite resources (or less sustainable products) could indeed promote less resource-intensive and more labour-intensive practices (e.g., remanufacturing)[275]. The occurrence of such impact, and its magnitude, would depend, however, on each MS, as national governments have competence over labour taxation.

An excise duty proportional to the life cycle environmental performance, encouraging consumers to switch to more sustainable products, can be compared to measure 5b.1. By using performance classes and raising the costs of products difficult to collect and recycle, this measure will assist in shifting consumer demand and promoting more sustainable alternatives. An articulation with EPR schemes needs to be identified.

Similarly, an excise duty encouraging companies to improve their product's environmental performance over its life cycle could also have effects similar to carbon taxation. When comparing MSs that have implemented a carbon tax[276] with those that have not[277], it has been found that this mechanism has a "positive and significant impact (…) on stimulating the

[271] a study finds that "a promise to fully offset customers' carbon emissions resulting from electricity usage increases their energy use post-adoption by 1-3%"Cf. Harding M. & Rapson D. 2013, Do Voluntary Carbon Offsets Induce Energy Rebound? A Conservationist's Dilemma
[272] UNEP 2020, Emissions Gap Report 2020
[273] Hadley, L. 2020. Removing barriers to environmental action: the impact of personal cap-and-trade systems of individuals' sense of efficacy and personal responsibility for climate change
[274] Ellen Macartur Foundation 2015, Towards a circular economy: business rationale for an accelerated transition
[275] ACCA 2018, Tax as a force for good - Rebalancing our tax systems to support a global economy fit for the future
[276] Finland, Latvia, Denmark, Slovenia, Sweden, Ireland, France and the United Kingdom
[277] Belgium, Germany, Malta, Bulgaria, Estonia, Netherlands, Luxembourg, Austria, Portugal, Hungary, Romania, Lithuania, Croatia, Slovakia, Italy, Poland, Cyprus, Greece, Spain and Czech

reduction of carbon emissions"[278]. The study determined that the reduction ranged from 2.61% to 3.04% from 1990 to 2017, which is significant at country-scale.

6.5.3. Social impacts

Measure 5c.1 is expected to have a positive social impact as it would encourage a behavioural change leading to the selection of products having greater sustainability. Most of the households (68.1% of those that took part to the NICHE Project) declared that Personal Carbon Trading would be "an acceptable mandatory tool to improve the environment"[279]. Compared to baseline results, the positive replies increased by 19.2%. This growth was attributed, in part, to the improved awareness and understanding of carbon emissions linked to consumption. Households that did not participate did not change their opinion or behaviours.

A survey that was conducted with a representative sample of the British population and a study that conducted an online simulation found that participants would be more willing to reduce their energy use under a Personal Carbon Trading (PCT) scheme compared to an energy tax system[280]. Besides, they also indicated that they would be more willing to reduce daily consumption with PCT, a product that was outside the scope of the system that was proposed. In the simulation, participants made more energy-conserving choices as the carbon allowance diminished. However, these results are only hypothetical, and decisions could be different in a real-life situation. This illustrates the potential for behavioural change, which could in turn be beneficial for the environment. A simulation undertaken for personal carbon allowances found comparable results[281].

Measure 5c.2, if accompanied by a shift of taxation on labour, has the potential to support the uptake of more labour-intensive and less resource-intensive activities, which would trigger job creation. A socio-economic assessment of globally switching taxes from labour to pollution and resource use to incentivise sustainable production found that such a solution could provide employment to 6.6 million people[282] over a five-year period compared to business as usual. This condition would depend, however, on each MS, as national governments have jurisdiction over labour taxation. There is however the risk of job being lost in companies that produce the less sustainable products, as their turnover would decrease.

The excise duty is also at risk of creating social unrest across Europe, as taxation has a differentiated effect on different categories of consumers, due for instance to the availability and cost of alternatives or household incomes[283]. Such an instrument could lead to social events, as the Gilets Jaunes (Yellow Vest) movement has shown in France after October 2018. This campaign started after the French government announced an increase of the internal consumption tax on energy products that would in turn increase the price of car fuel prices. Although the environmental benefit of such increase was widely accepted by the participants of the movement, it was perceived that the economic inequality would deepen between urban territories with good

[278] Ghazouani, A., Xia W., Ben Jebli M. & Shahzad U. 2020, Exploring the role of carbon taxation policies on CO2 emissions: contextual evidence from tax implementation and non-implementation European countries
[279] Hadley, L. 2020. Removing barriers to environmental action: the impact of personal cap-and-trade systems of individuals' sense of efficacy and personal responsibility for climate change
[280] Hadley, L. 2020. Removing barriers to environmental action: the impact of personal cap-and-trade systems of individuals' sense of efficacy and personal responsibility for climate change
[281] Capstick S. & Lewis A. n.d., Personal carbon allowances: a pilot simulation and questionnaire
[282] ACCA 2018, Tax as a force for good - Rebalancing our tax systems to support a global economy fit for the future
[283] European Parliament EPRS 2020, Comprendre la fiscalité environnementale

public transport links, and rural ones with inadequate or inexistent public transport, where car travel is inevitable. Furthermore, the revenues would have fed the State general budget, rather than improving environmental performances. This event underlined the need to identify the use of the revenue generated by the tax to enhance social acceptability: for instance, redistributing the proceeds of the tax to households, using them to support investment and innovation in environmental performance, or reducing social security contributions in order to promote employment[284].

6.6. Impacts on third countries

It is a known fact that a transition towards a circular economy will have implications at a global scale and will result in the evolution of primary and secondary resources flows[285], as shown with the recent bans on waste imports for recycling in several Asian countries. There is limited literature available on the interlinkages between international trade and circular economy[286], and current EU trade agreements barely mention circular economy. Using macro-economic modelling (E3ME model), a recent study on the impact of a circular economy transition in Africa has estimated negligible trade effects derived from the European transition to circularity[287].

While the encouragement to develop and market more sustainable options can lead to recyclable waste flows towards countries with less stringent regulations (e.g., developing countries), the literature also recognises the role of the EU in setting the course and fostering the adoption of similar standards in third-countries to access the EU market[288].

The introduction of reputational and price incentives and GPP requirements in measures 5a.1, 5a.2 and 5b.1 is done in a non-discriminatory way. Efforts will be made to mitigate possible adverse effects to developing countries in the context of the EU development cooperation programs (*via* technology transfer and capacity building).

While both measures will generate the benefit of improving standard-setting in third countries to address local environmental and social impacts, the development of incentives such as EPR and its eco-modulation could negatively impact the competitiveness of EU firms in world markets but also the environment with greater affordability for less circular products[289].

There is sound evidence that stricter environmental regulations in the EU have had a positive impact on eco-innovation (and circularity) in developing countries, particularly for export-oriented companies with presence in the European market[290]. For instance, the excise duty would

[284] Commissariat général au développement durable 2017, La fiscalité matière – une opportunité pour une économie circulaire

[285] Kettunen, M., Gionfra, S. and Monteville, M. (2019) EU circular economy and trade: Improving policy coherence for sustainable development, IEEP Brussels / London

[286] OECD 2018, International Trade and the Transition to a Circular Economy

[287] Rademaekers, K.; Smit, T.A.B; Artola, I.; Koehler, J.; Hemkhaus, M.; Ahlers, J.; Van Hummelen, S.; Chewpreecha, U.; Smith, A. & McGovern, M. (2020) Circular economy in the Africa-EU cooperation – Continental report. Continental report under EC Contract ENV.F.2./ETU/2018/004 Project: "Circular Economy in Africa-Eu cooperation", Trinomics B.V., Tomorrow Matters Now Ltd., adelphi Consult GmbH and Cambridge Econometrics Ltd.

[288] Kettunen, M., Gionfra, S. and Monteville, M. (2019) EU circular economy and trade: Improving policy coherence for sustainable development, IEEP Brussels / London

[289] Kettunen, M., Gionfra, S. and Monteville, M. (2019) EU circular economy and trade: Improving policy coherence for sustainable development, IEEP Brussels / London

[290] For example, in: Lustosa, M. (2001). Innovation and Environment under and Evolutionary Perspective: Evidence from Brazilian Firms. Nelson and Winter Conference. Aalborg, Danish Research Unit for Industrial Dynamics (DRUID). 140: 18; DIAZ LOPEZ, F.J (2009) Environment, technological change and innovation. The case of the Mexican chemical industry. Faculty of Social Sciences. School of Development Studies. Norwich, University of East Anglia. Unpublished PhD thesis. 302 p.;

be levied on the products placed on the EU market, irrespective of where they are produced. Therefore, it will be a non-discriminatory measure. An on-going study of UN environment has assessed the degree of progress in the implementation of product policies across all world regions. Preliminary findings suggest that most attention is given to end-of-life aspects of products, with waste management and recycling having top priority in developing countries. In contrast, very few policies focus on key aspects of SPI linked to product eco-design, circular business models and consumption patterns. The same study highlights an important barrier for sustainable products due to higher prices and reduced markets. Technical cooperation, access to business support networks, and knowledge exchange on sustainable products and eco-design are considered key elements needed for bridging the gap in global product policy frameworks[291]. Therefore, it is possible to assume a potential positive, cooperation-based and non-discriminatory impact in global value chains due to the implementation in the EU of the measures envisaged in sub-option 5c and the consolidation of an internal market for sustainable products.

Fernández, S., Torrecillas, C., & Labra, R. E. (2021). Drivers of eco-innovation in developing countries: the case of Chilean firms. Technological Forecasting and Social Change, 170, 120902.

[291] UN Environment (2021) Mainstreaming sustainable consumption and production policies and circular economy models: best practices and recommendations. https://www.oneplanetnetwork.org/Mainstreaming-SCP-policies-best-practices-recommendations

6.7. Summary of impacts

Table 50 Administrative burden of PO5

Administrative burden Option 5					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Sub-option 5a	Direct costs	- Costs associated to certification and verification (product performance)	- Reporting on products sustainability performance Costs associated to fulfilling additional performance-requirements in GPP / public tendering Costs associated to fulfilling EMAS, ETV, etc. requirements Differentiated taxation of sustainable alternatives	- Implementation cost (for the "Level" reporting tool assessing and reporting on the sustainability performance of buildings) in terms of time to get used to the new reporting instrument	- Implementation costs of incentive schemes (for example: 0.1€ per 1€ funded with the eco-voucher scheme) Costs linked to the set-up, monitoring and reporting on reputational and economic incentives Assessment and verification procedure for performance-based eligibility criteria in public procurement Cost of verifying compliance with the performance class set up in a given incentive (e.g., EU Ecolabel. ETV, etc.) Training, tools and skills development (e.g., inventories for sustainability criteria of additional product groups) linked to the purchase of more sustainable products

					Training of new/current staff, development of guides, exchange of best practices
	Indirect costs	n.a.	- Loss of reputation and market access for low-sustainability products due to MS purchasing more sustainable products and the introduction of incentive	n.a.	- Potential fiscal losses (e.g., reduced VAT)
Sub-option 5b	Direct costs	- - Costs associated to certification and verification (product performance) Costs of removal of environmentally harmful subsidies (legally binding)	- Reporting on products sustainability performance Operation and maintenance of additional EPOs (for new EPR systems in place at national level)	- - Implementation cost Costs derived from the process with stakeholders to establish new EPR schemes (e.g., for consultations, studies, etc.)	- - Implementation costs of incentive schemes (for example: 0.1€ per 1€ funded with the eco-voucher scheme) Costs linked to the set-up, monitoring and reporting on reputational and economic incentives Assessment and verification procedure of the performance-based eligibility criteria in public procurement Cost of verifying compliance with the performance class set up in a given incentive (e.g., EU Ecolabel. ETV, etc.)

					Training, tools and skills development (e.g., inventories for sustainability criteria of additional product groups) linked to the purchase of more sustainable products Training of new/current staff, development of guides, exchanges of best practices Enforcement costs for legally binding targets
	Indirect costs	n.a.	- - Loss of reputation and market access for low-sustainability products	n.a.	- Potential fiscal losses (e.g., reduced VAT)
Sub-option 5c	Direct costs	- - Costs associated to certification and verification (product performance)	- - Reporting on products sustainability performance EU-level excise proportional to the environmental performance of products	- - - Costs associated incurred with the transposition to set up the environmental excise Set up and implementation of a (pilot) carbon bonus incentive for EU citizens at MS-level	- - - Costs associated to monitoring and vigilance of different categories of environmental excise. Costs of monitoring the implementation of a (pilot) carbon bonus incentive for EU citizens at MS-level Training of new/current staff, development of guides, exchanges of best practices

	Indirect costs	n.a.	- - - Carbon footprint score incentives (penalises low-sustainability products) Revenue loss from higher taxes on products using virgin materials and unsuitable products for circular economy	n.a.	n.a.

Table 51 Economic impacts of PO5

Economic impacts				
Description	***Amount/qualitative***			***Comments***
	Option 5a	***Option 5b***	***Option 5c***	
Direct impacts				
Increased revenues for sustainable products and services providers	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Product manufacturers will be impacted.
Profits	-	--	--	Depending on the pass-through level of additional costs (e.g., investment in design and manufacturing processes, taxes, third party verification), all actors in the product value chain will be impacted. For sustainable products and services providers, there is a potential to increase sales and associated profits.
Increased activity related to the design of products and production processes	+	++	++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Product manufacturers and service providers for support activities will be impacted.
Changes in purchasing aptitudes of public authorities and savings	++	+++	+++	The mandatory green product procurement under measure 5a.2 will result in financial and environmental savings. Public authorities will be impacted.

Increased product testing, repairing or recycling activities and growth in the repair services sector	+	++	++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions, but also the uptake of circular business models. All actors in the product value chain will be impacted.
Greater affordability of sustainable products in the medium term	+	++	++	Citizens and products users will be impacted.
Competitive advantage for companies providing sustainable products and services	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Manufacturers and retailers will be impacted.
Indirect impacts				
Less products sold on the EU market	-	--	--	The introduction of performance criteria should lead to a decrease in the number of products being bought. Evidence however shows a potential for rebound effects. All actors in the product value chain will be impacted.
Decreasing activity for companies producing single-use, low-cost products	-	--	--	There is a progressing ruling-out of less sustainable products. Product manufacturers will be impacted.
Decreasing activity for the mining and quarrying sector	-	--	--	Raw material producers will be impacted.
Development of circular business models	+	+	+	The increased level of stringency for the different sub-options supports the uptake of circular business models. All actors in the product value chain will be impacted.

Competitive advantage through operational performance improvement and better reputation	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Manufacturers and retailers will be impacted.
Potential fiscal revenue	n.a.	n.a.	+	Sub-option 5c introduces the excise duty.
Reduced market fragmentation	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions.
Improvement of the level playing field between companies in Europe	+	++	++	Sub-option 5b introduces performance classes.

Table 52 Environmental impacts of PO5

Environmental impacts				
Description	***Amount/qualitative***			***Comments***
	Option 5a	***Option 5b***	***Option 5c***	
Direct impacts				
Reduction of waste	+	++	++	Measures are expected to incentivize the production and consumption of more durable and reparable products, which extends product lifetime before being discarded.
More secondary materials are available and used in production	+	++	++	
Buyers choose more durable, reliable, and repairable products	+	++	+++	The measures are cumulative with an increasing level of stringency for the different sub-options, leading to an increased number of incentives being introduced. Citizens and product users will be impacted.

Less sustainable options are driven out of the market	+	++	+++	There is an increased level of stringency for the different sub-options, leading to an increased number of incentives being introduced. All actors in the product value chain will be impacted.
Indirect impacts				
Indirect environmental impacts associated with the production of new products decrease as demand decreases	+	+++	++	The introduction of performance criteria should lead to a decrease in the number of products being bought. Evidence however shows a potential for rebound effects. All actors in the product value chain will be impacted.
Decreasing environmental impact of material extraction	+	++	++	Raw material producers will be impacted.

Table 53 Social impacts of PO5

Social impacts				
Description	***Amount/qualitative***			***Comments***
	Option 5a	***Option 5b***	***Option 5c***	
Direct impacts				
Better access to information for consumers	n.a.	++	++	From sub-option 5b, incentives are linked to performances classes. Citizens and products users will be impacted.
Increased incentive to improve the safety of workers and consumers	+	++	++	Reputational incentives have a potential to improve safety. Workers, citizens and products users will be impacted.

Job creation	+	++	++	There is an increased level of stringency for the different sub-options. Incentives have the potential to create jobs in various sectors, including design and recycling. Measure 5b.2 introduces eco-modulation for the EPR scheme. Labour in specific sectors will be impacted.
Vulnerable consumers face higher upfront cost of products	-	--	---	There is usually a premium on more sustainable products, although the amount of pass-through from producer to consumer is highly variable. Citizens and products users will be impacted.
Increased efficiency of Market Surveillance and customs authorities	+	++	++	Product manufacturers, service providers for support activities, and public authorities will be impacted.
Indirect impacts				
Friction on the labour market as some sectors see increasing demand, while others decline	-	--	--	Labour in specific sectors will be impacted, which would further impact families. These impacts could also occur in third countries.
Social unrest	n.a.	n.a.	--	Measure 5c.2 will introduce an excise duty. Recent events showed that particular care need to be put in the design of such measures. All actors in the product value chain will be impacted.
Companies invest in training and reskilling activities to address new demand	+	++	++	Product manufacturers will be impacted.
Skills development in relation to product life cycle analysis	+	++	+++	Public authorities and citizens will be impacted.

7. OPTION 6: MEASURES FOR CIRCULAR ECONOMY AND VALUE RETENTION

7.1. Overview

Overview of Policy Option 6

Sub-option 6a: Promotion of value retention and value maximisation

- Measure 6a.1. – Providing guidelines on supporting circular business models.
- Measure 6a.2. – EU-wide hub supporting the uptake of circular business models.

Sub-option 6b: Enhanced value retention

This option includes all measures included in option 6a plus the following:

- Measure 6b.1. – Introducing a transparency obligation and a ban on the destruction of unsold consumer products via SPI acts

7.1.1. Assumptions used in the analysis

- A circular business model is "a business model in which the conceptual logic for value creation is based on utilising the economic value retained in products after use in the production of a new offering". As such, all circular business models are part of a sub-set of sustainable business models, generally resulting in positive environmental, economic and social impacts.
- Circular business models also generate unintended negative impacts and rebound effects (i.e., consumers tend to buy more goods / services than under traditional models because of higher perceived sustainability, or product life extension can be equally implemented to products of lesser environmental performance, resulting in increased net emissions). However, such negative effects are not considered to be so significant to offset the positive impacts obtained from the implementation of a particular business model.
- The impacts generated by sustainable business models result from a combination of policy factors as well as market decisions made by private operators and consumers. However, the assessment of environmental impacts using the Exiobase model cannot quantify the relative impact of a specific policy measure (i.e., the attribution measure). Instead, it is assumed that any improvement potential exists because of the influence of policy support of the sub-options in this study.
- In assessing environmental impacts of all policy sub-options using the Exiobase model, a 5% environmental improvement potential has been assumed for those product groups and circular business models within the scope of SPI where no improvement factor has been identified in the literature.

7.1.2. What problem and specific objectives does this option address

Policy option 6 is intended to primarily address sub-problem 1 (Product design does not sufficiently consider environmental impacts over the life cycle, including circularity aspects) by contributing – together with option 5 – to achieving specific objective 3 (Incentivise more sustainable products and business models to improve value retention). It also supports specific objective 1 (Improve product sustainability) by addressing the market failure 'Markets for

circular business models not fully developed'. This policy option also relates to a number of drivers arising from market, regulatory, and behavioural failures. Such drivers are related to insufficiently developed markets for circular business models and the behavioural failure associated to the persistence of linear production and consumption patterns as the most critical default option.

Stakeholders' views on PO6

There is overall support for all four business models proposed, receiving similar scores. More than half of respondents found that business models based on reverse logistics (60%), product-service systems (54%) and collaborative and sharing economy (50%) would be effective or very effective in encouraging more sustainable production and consumption (getting the score at least 4 out of 5). This number is slightly lower (46%) for on-demand production. Support for any proposed business models was lower from business associations and company organisations (ranging from only 32% for the business model based on collaborative and sharing economy to 47% for the business model based on reverse logistics). A clear regulatory framework to support circular business models, profitability, and insufficient consumer awareness and responsiveness were considered as the main barriers to successful deployment of more circular business models in the EU (receiving scores at least 4 out of 5 by more than 50% of respondents). However, profitability, and insufficient consumer awareness and responsiveness were not seen as barriers by NGOs and environmental organisations (less than a third of respondents gave score at least 4 out of 5). Interestingly, as many as 47% of the respondents indicated that they either do not know or have no opinion on the extent to which the fact that 'banks and investors are often unwilling to provide the credit and funding necessary to initially establish these business models' constitutes a barrier'.

From the industry point of view, the most preferred measures enabling all four business models related to GPP and the decrease of administrative burden for new circular business models. Increase of collaboration amongst the circular business community was also supported for all business models except for the "producer-service systems" business model. For EU citizens and non-business stakeholders, the most preferred measures enabling the "product-service system", "collaborative and sharing economy" and "reverse logistics" business models related to GPP, and obligations to producers for take-back and repair/maintenance. With regards to the "on-demand production" business model there was also a support to develop tools to measure the benefits and financial viability of Circular Business Models, and guidelines on the various EU funding instruments and support mechanisms. Across all stakeholder groups, improving access to finance for the production and consumption of sustainable products, better use of standardisation and mandatory GPP were considered as most important incentives for circularity (receiving scores at least 4 out of 5 from more than 70% respondents). Voluntary schemes such as the Ecolabel were the least supported measure. Other incentives were suggested by the open answers, such as a tax on virgin / fossil materials or a tax on environmental impact.

Evidence from the SME survey suggests that it is necessary to provide technical support and resources for the transition to a more sustainable production and consumption system. An EU wide platform for information and cooperation could be

helpful to bring together different stakeholders and act as a key transition lever292. This supports sub-option 6a with the development of guidelines for circular business models and an EU-wide hub for circular businesses.

It was highlighted that the European Commission should play more of a supportive than regulatory role for circular business models. There should be a promotion of producer ownership models with policy mixes of regulation and tax schemes, as they encourage sustainable products. It was also said that there should be safeguards that this model favours durable goods, which when broken or damaged, are eventually repaired. Additionally, the collaboration between suppliers, manufacturers and researchers should be promoted to stimulate circular solutions. The EC should fund research on consumer acceptance of new business models, their benefits and challenges, as the sustainable option should be more attractive and efficient for the consumer. There should also be minimum recycled content requirements. A logic of hierarchy should be applied to circular initiatives. Additionally, collection schemes should be improved to avoid reparable products being recycled.

SMEs also emphasised the importance of supporting democratic business models, such as worker cooperatives. It was noted that the democratization of businesses, by allowing workers to have a voice and vote in company boards or creating worker-owned cooperatives, can steer companies to more sustainable and equitable business conducts. Co-creation models where different actors in the value chain work together to design sustainable products were also mentioned.

An emphasis was also placed on empowering consumers to participate in do-it-yourself repair resources and providing them with the needed resources to do so, for example, open-source patents. Furthermore, building communities (e.g., digital) where consumers can be empowered to fix or re-purpose their products was mentioned several times.

The category of products for which most respondents considered that a potential ban on the destruction of unsold consumer products should not apply were those that pose a health or safety risk (460 respondents accounting for 92% of respondents). This view was shared across all groups of stakeholders. It was followed by the goods not complying with relevant legislation (54% of respondents) and counterfeit products (44% of respondents).

The introduction of a ban on destruction of unsold goods was also discussed with the SMEs as part of the survey. Stakeholders were asked to decide which circular business models would be most effective to decrease the amount of unsold goods in the EU. The majority of respondents thought that fostering reconditioning and remanufacturing schemes would be an effective measure to decrease the amount of unsold goods in the EU. In contrast, fostering a producer 'duty of care' received only about one-third of the number of responses of the most voted measure. 19% of respondents thought that 'boosting more sustainable business models such as on-demand production' would be a good way to decrease the amount of unsold goods. 16% of stakeholders thought that 'selling damaged products at a discounted price' should be an additional measure taken to decrease the amount of unsold durable

[292] IA SME Survey (2021)

products. ‘Fostering donation schemes’ and ‘Fostering greater transparency by producers regarding their product return rates and unsold goods policies’ received 14% of votes. According to SMEs participating in the OPC, products which pose a health or safety risk should be excluded from any introduced ban.

Moreover, to avoid the destruction of goods, stakeholders argued that there should be mandatory multi-criteria and labelling of products on resource efficiency. There should be repair requirements, including requiring producers/importers to allow repairs of their products to be done by independent repairers and guaranteeing supply of spare parts at a reasonable price for +10 years. There should also be mandatory minimum requirements on durability, reparability and recyclability of certain product categories (such as electronics/ICT equipment). Repair information should be readily available for customers online, with non-destructive disassembly required.

According to stakeholders’ statements in the workshop dedicated to the MS experts, the idea of additional EU-level guidance for MS on how to foster circular business models was deemed useful, as was the establishment of an information service on the subject. In general, there was support for the suggestion of an EU-wide prohibition on the destruction of unsold goods, but one participant underlined that this should be accompanied by the collection of more data on this issue at the European level.

7.2. Baseline for PO6

The baseline scenario for this policy option will assess the current state of play regarding business models for value retention and the relevant policy support measures, while looking into their further evolvement in case of a ‘no SPI’ scenario.

Circular Business Models have experienced rapid growth in recent years, largely in response to the emergence of new technologies and supportive consumer preferences. While several Circular Business Models involve large firms, entrepreneurship emerges as a key driver of circular business models. Their environmental benefits are largely sector-specific but are expected to be significant. Overall, the market penetration of new circular business models remains limited, and there remains considerable potential for the scale up of models in many sectors[293]. Based on the registry of Eutopia Green database[294], in the EU there are close to 2,500 companies implementing Circular Business Models. In general, the vast majority of Circular Business Models in the sample correspond to sustainable business models (SBM) based on upgrading / recycling, product-service-systems (PSS), collaborative and sharing economy and reverse logistic.

[293] Support to new and existing circular business models - Task 5 report of this Impact assessment

[294] The Eutopia Green database is a brand-new AI-powered platform to access information about over 11,000 European organizations developing sustainable and climate-friendly innovations. The platform includes information such as sector, technology, climate impact, SDGs, financials, development stage, date of establishment, number of employees, and more. Eutopia collects data from public online sources as well as from its strategic partners and the green start-up community. See: https://www.eutopiagreen.com

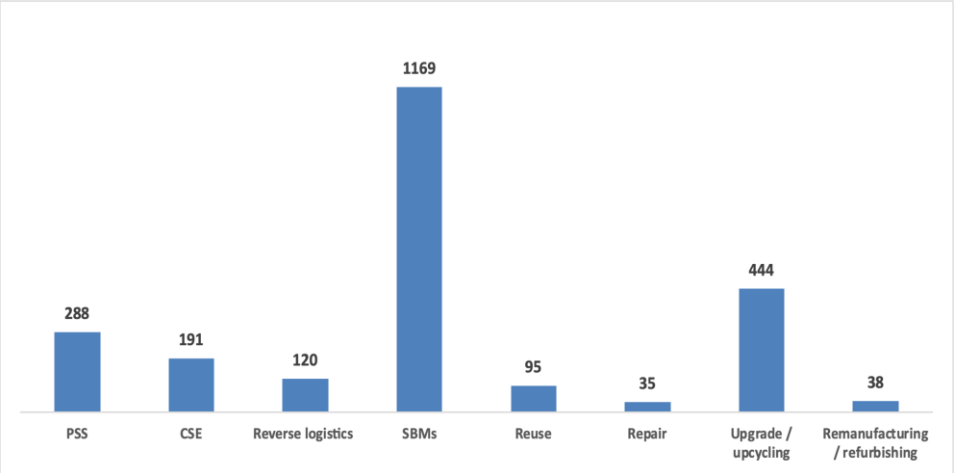


Figure 3 Distribution of Circular Business Models patterns in a sample of 2,380 European companies in the study

The sectoral distribution of the Circular Business Models sample across the target sectors and value chains of the Circular Economy Action plan is portrayed in the figure above. The energy sector reports having the largest amount of Circular Business Models, followed by construction material and works, and means of transport (with an aggregated value of 66% of the total). Plastics, textiles, other sectors (e.g., services) and electronics and ICT report an additional 21% of companies in the sample.

As most new types of Circular Business Models have emerged in recent years, measuring the effect of policy on developing business models is still relatively limited. PSS encompass a wide variety of possible business models and have so far attracted little policy attention, except for measures related more broadly to the servitisation of companies. In the case of collaborative economy, policy interventions have so far tried to keep a careful balance in the promotion of sustainable and social collaborative models, while regulating larger capitalist digital businesses restructuring established markets and creating new ones. At the European Union level, there is a lack of specific policies focusing on supporting servicising solutions. Policy interventions at local/municipal level are more effective in targeting and stimulating the implementation of PSS solutions. Traditional policy instruments targeting product environmental performances (e.g., ecolabelling) have not been sufficient to support PSS innovation.

In the context of circular economy, circular business models based on value retention (via maintenance, repairing, re-furbishing, re-manufacturing, component harvesting, upgrading and reverse logistics), value maximisation (via products-as-a-service, collaborative consumption), and recycling and upcycling are of especial interest. Support for such models requires incentives and further development of markets for circular business models (see Markets for Circular Business Models are not fully developed).

In a ‘no SPI’ scenario, EU policy support will be limited to traditional innovation funding and financing instruments. The **EU funding landscape** for the coming years has several instruments aiming to promote innovation, entrepreneurship, research, development, and market penetration in the area of the circular economy, sustainable products, circular and sustainable business models, and improving relevant capacities and frameworks. The EU's next research and innovation programme *Horizon Europe* will help to speed up the transformation to a circular economy and deliver on the EU's new circular economy action plan. In addition to supporting

large-scale systemic solutions and regional demonstration projects (such as the circular cities and regions initiative) Horizon Europe will focus on important material streams and sectors highlighted in the Circular Economy action plan, including plastics, construction, electronics, and textiles.[295] 40% of the EUR 95.5 billion Horizon Europe budget for 2021-2021 will be devoted to green and digital transition, and sustainable recovery from the pandemic and resilience. Sustainable and circular innovations and business models, sustainable product consumption and production, as well as policy innovations will get support under this programme. Furthermore, financial support for circular innovation will be available in *the InvestEU*[296]*, European Structural and Investment Funds*[297] *and the Recovery and Resilience Facility*[298]*. The circular bioeconomy investment fund (ECBF)* [299] and green finance instruments of the *European Investment Bank (EIB)* will help in de-risking investment into market applications. The ECBF is the first venture fund exclusively focused on bioeconomy and circular bioeconomy in Europe. Its target is EUR 250 million, to which the EIB has committed EUR 100 million. Furthermore, the EIB also has its own range of financing products to support circular economy that amounted close to EUR 2.5 billion over 2015-2019[300]. Between 2015 and 2019, the EIB financed circular economy investments in a large number of projects in many sectors, as outlined in the following table.

Table 54 The EIB's circular economy approved operations, 2015-2019

Sector	Lending (€ millions)	Share
Industry and services	747	30%
Waste management	594	24%
Agriculture and bioeconomy	438	18%
Water management	426	17%
Mobility	95	4%
Urban development	80	3%
Energy	71	3%
Total	**2,452**	**100%**

Today the EIB allocates 25% of its financing to climate and other sustainability-oriented investment projects. In the coming years, the EIB will continue focusing on circular economy and its intentions were proven by introducing a financing and advisory package to facilitate projects in circular businesses (see box below). By committing to an official target for 2025, the EIB will increase up to 50% its investment in climate action and environmental sustainability projects. The Climate Bank Roadmap details the EIB's role in supporting the European Green Deal through a wide spectrum of financial products and advisory services[301].

[295] https://ec.europa.eu/info/research-and-innovation/research-area/environment/circular-economy/circular-economy-strategy_en
[296] One third of the 1.8 trillion-euro investments from the NextGenerationEU Recovery Plan, and the EU's seven-year budget will finance the European Green Deal.
[297] https://ec.europa.eu/info/funding-tenders/funding-opportunities/funding-programmes/overview-funding-programmes/european-structural-and-investment-funds_en . The ESIF mainly focus on 5 areas: research and innovation; digital technologies; supporting the low-carbon economy; sustainable management of natural resources; small businesses;
[298] https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en
[299] https://www.ecbf.vc/
[300] https://www.eib.org/
[301] European Investment Bank Group Sustainability Report 2020 (eib.org)

Box 1: The EIB's circular economy financing and advisory

In combination with direct financing programmes, the EIB has developed a Circular Economy Guide supporting the circular transition to promote a common understanding of the circular economy concept, its different business models and related challenges and opportunities among the EIB's financial and project partners (reuse, repair, refurbish, re-purpose and remanufacture). With this approach, the EIB raises awareness about and promotes circular business models among its business clients and stakeholders; facilitates and harmonises due diligence and reporting on circular economy projects by the EIB's financial and project partners. The EIB has developed specific guidelines on project eligibility and screening in a wide number of sub-options or categories of circular business models. Besides providing operational guidelines, the EIB also offers other services aimed at informing and raising awareness, providing advisory services for project development, etc.[302] The criteria for project eligibility includes a categorisation system along the three dimensions of circular economy (circular design and production, use, value recovery and support), guiding and removing bias in decision making investment projects in specific type of circular business models. This is an example of how a guideline could be used for guiding other financial programmes and schemes Europe-wide and at the MS-level, both for public and private financial institutions[303].

To understand the possible impact of future funding programmes one can look at the lessons from previous EU programmes. An evaluation of the Horizon 2020 programme based on macroeconomic models estimates a significant socio-economic impact from the programme (over EUR 400 billion gained by 2030). However, it was found that commercialisation was still a challenge, that is, only 25% of H2020 project coordinators considered that they would achieve the target full commercialisation three years after the start of the project. [304] Private investment in projects were expected to lead to a leverage factor of 2 in one third of H2020 projects. Another 29 % also indicated that there had been no external investment in their innovation and did not expect any in the future. One can envisage similar impacts and challenges linked to the new funding programmes. At the same time, the increased focus on circular and sustainable finance instruments by the EIB could offer a complementary approach and promote the commercialisation of new ideas, including the ones that focus on value retention.

Another policy development that is considered in this baseline scenario is related to the **national initiatives on the ban of destructions of unsold products**. Limited data is available on the number of unsold products being destroyed in the EU and possible trends without EU-action. Ökopol roughly estimated that between 10% and 20% of returned clothing and between 4% and 10% of returned electronics are destroyed with an increasing trend due to growth in e-commerce[305], but this is a very rough estimate based on a small dataset related to the German market. At the EU level there is no instrument to address the destruction of unsold products or to increase transparency by economic operators regarding the fate of unsold goods. However, selected MS have been launching some initiatives. The French "law against waste and for a Circular Economy" includes a provision that producers, importers and distributors of new non-food products intended for sale are required to reuse in particular by donating or recycling their unsold products. It is estimated that the introduction of the ban before the end of 2021 could

[302] https://circulareconomy.europa.eu/platform/sites/default/files/categorisation_system_for_the_ce.pdf
[303] https://www.eib.org/attachments/thematic/circular_economy_guide_en.pdf
[304] EC 2017, Interim evaluation of Horizon 2020, https://ec.europa.eu/info/publications/interim-evaluation-horizon-2020-book_en

[305] Policy Brief on Prohibiting the Destruction of Unsold Goods Prepared by Ökopol for the EEB

annually avoid the e.g. destruction of 10,000-20,000 tonnes of new textile products, EUR 180 million worth of hygiene and beauty products in France.[306]. The Spanish preliminary draft law on contaminated soil and waste includes a ban on the destruction of unsold surpluses of non-perishable products such as textiles, toys and electrical devices, unless another regulation requires their destruction[307]. The German the Recycling Management Act introduces a general 'duty of care' to ensure, when distributing products, also in connection with their return, that their fitness for use is maintained and that they do not become waste. More specific ordinances will follow determining the functioning of the duty of care for specific products. The German act also includes the possibility to introduce a transparency obligation requiring manufacturer to clearly document how unsold products are handled[308]. The Spanish preliminary draft law on contaminated soil and waste includes a ban on the destruction of unsold surpluses of non-perishable products such as textiles, toys and electrical devices, unless another regulation requires their destruction[309]. Considering that the public pressure to support bans on destruction of unsold products is growing along with the sharpening political discussion, one can expect that new national initiatives will be introduced in the coming years. This can potentially cause fragmentation of the internal market in the absence of uniform measure restricting the destruction of unsold products at the EU-level. .

7.2.1. Assumptions used in the analysis

- It is assumed that all circular business models are part of a sub-set of sustainable business models, generally resulting in positive environmental, economic and social impacts.
- Circular business models also generate unintended negative impacts and rebound effect (i.e., consumers tend to buy more goods / services than under traditional models because of their higher perceived sustainability, or product life extension can be equally implemented to products of lesser environmental performance, resulting in increased net emissions). However, such negative effects are not considered to be so significant to offset the positive impacts obtained from the implementation of a particular business model.
- The impacts generated by sustainable business models result from a combination of policy factors as well as market decisions taken by private operators and consumers. However, the assessment of environmental impacts using the Exiobase model cannot quantify the relative impact of a specific policy measure (i.e., the attribution measure). Instead, it is assumed that any improvement potential exists because of the influence of policy support of the sub-options in this study.
- In the assessment of environmental impacts using the Exiobase model of all policy sub-options, a 5% environmental improvement potential has been assumed for those product groups and circular business models within the scope of SPI where no improvement factor has been identified in the literature.

[306] https://circulareconomy.europa.eu/platform/sites/default/files/anti-waste_law_in_the_daily_lives_of_french_people.pdf

[307] Search the database - European Commission (europa.eu)

[308] The 'duty of care' obligations has been introduced under its 'Waste Management and Product Recycling Act' (Kreislaufwirtschaftsgesetz – KrWG), which has recently entered into force https://www.bmu.de/themen/wasser-abfall-boden/abfallwirtschaft/abfallpolitik/kreislaufwirtschaft/die-obhutspflicht-im-kreislaufwirtschaftsgesetz/

7.2.2. What problem(s) and specific objective(s) does this option address

Policy option 6 is intended to primarily address sub-problem 1 (Product design does not sufficiently consider environmental impacts over the life cycle, including circularity aspects) by contributing – together with option 5 – to achieving the specific objectives 3 (Incentivise more sustainable products and business models to improve value retention). It also supports the specific objective 1 (Improve product sustainability) by addressing the market failure of 'Markets for circular business models not fully developed'. This policy option is also related to a number of drivers arising from market, regulatory, and behavioural failures. Such drivers are related to insufficiently developed markets for circular business models and the behavioural failure associated to the persistence of linear production and consumption patterns are the default option being the most critical.

Stakeholders' views on PO6

Evidence from the SME survey suggests that it is necessary to provide technical support and resources for the transition to a more sustainable production and consumption system. An EU wide platform for information and cooperation could be helpful to bring together different stakeholders and act as a key transition lever[310]. This supports sub-option 6a with the development of guidelines for circular business models and an EU-wide hub for circular businesses.

It was highlighted that the European Commission should play more of a supportive than regulatory role for circular business models. There should be a promotion of producer ownership models with policy mixes of regulation and tax schemes, as they encourage sustainable products. It was also said that there should be safeguards that this model favours durable goods, which when broken or damaged, are eventually repaired. Additionally, the collaboration between suppliers, manufacturers and researchers should be promoted to stimulate circular solutions. The EC should fund research on consumer acceptance of new business models, their benefits and challenges, as the sustainable option should be more attractive and efficient for the consumer. There should also be minimum recycled content requirements. A logic of hierarchy should be applied to circular initiatives. Additionally, collection schemes should be improved to avoid reparable products being recycled.

SMEs also emphasised the importance of supporting democratic business models, such as worker cooperatives. It was noted that the democratization of businesses, by allowing workers to have a voice and vote in company boards or creating worker-owned cooperatives, can steer companies to more sustainable and equitable business conducts. Co-creation models where different actors in the value chain work together to design sustainable products were also mentioned.

An emphasis was also placed on empowering consumers to participate in do-it-yourself repair resources and providing them with the needed resources to do so, for example, open-source patents. Furthermore, building communities (e.g. digital) where consumers can be empowered to fix or re-purpose their products was mentioned several times. The need for democratic business models such as worker cooperatives was also highlighted.

The introduction of a ban on destruction of unsold products was also discussed with the SMEs as part of the survey. Stakeholders were asked to decide which circular business models would be most effective to decrease the amount of unsold goods in the EU. The majority of respondents think that fostering reconditioning and remanufacturing schemes would be an effective measure to decrease the amount of unsold products in the EU. In contrast, fostering a producer 'duty of care' received only about one-third of the number of responses of the most voted measure. 19% of respondents think that 'boosting more

[310] IA SME Survey (2021)

sustainable business model such as on-demand production' would be a good way to decrease the amount of unsold goods. 16% of stakeholders think that 'selling damaged products at a discounted price' should be an additional measure taken to decrease the amount of unsold durable products. 'Fostering donation schemes' and 'Fostering greater transparency by producers regarding their product return rates and unsold products policies' received 14% and 14% votes respectively.

Moreover, to avoid the destruction of goods, stakeholders argue that there should be mandatory multi-criteria and labelling of products on resource efficiency. There should be repair requirements, including requiring producers/importers to allow repairs of their products to be done by independent repairers and guaranteeing supply of spare parts at a reasonable price for +10 years. There should also be mandatory minimum requirements on durability, reparability and recyclability of certain product categories (such as electronics/ICT equipment). Repair information should be readily available for customers online, with non-destructive disassembly required.

According to stakeholders' statements in the workshop dedicated to the Member State experts, the idea of additional EU-level guidance for MS on how to foster circular business models was deemed useful, as was the establishment of an information service on the subject. In general, there was support for the suggestion of an EU-wide prohibition on the destruction of unsold goods, but one participant underlined that this should be accompanied by the collection of more data on this issue at the European level.

7.3. Sub-option 6a: Promotion of value retention and value maximisation

7.3.1. Economic impacts

7.3.1.1. Administrative burden

Administrative burden for economic operators

The provision of guidelines and the creation of an EU wide hub would incur no administrative burden for economic operators. Economic operators as well as citizens would benefit from sub-options 6a measures to increase their knowledge on circular business models and develop circular initiatives, and they are expected to use them this knowledge to more frequently for their economic interactions deepen their economic interactions.

Businesses active in furniture, home appliances and packaging surveyed in the SPI stakeholder consultation (2) reported that the administrative impact would be no different in comparison to the baseline.

Administrative costs for the European Commission

The provision of guidelines on supporting circular business models can be managed internally or externalised to an agency or a contractor.

The costs associated to the set-up of a hub (**6a2**) depends very much on the final scenario selected. If the hub is to act as an online platform, managed as part of a wider dissemination activity on the SPI (e.g. following the Ecodesign website model), it is likely that the administrative cost will be limited to the cost of Commission personnel.

Management costs can also be shared with another existing platform, such as the Circular Economy Stakeholder platform for instance. The management can also be externalised, as if the

case for the European Cluster Collaboration Platform. The overall cost for this would have to be assessed on a more specific basis but can range annually between 80,000[311], 200,000[312] or five million Euros[313]. Costs related to a real infrastructure development for this hub could be higher, in the order of several million Euros.

Administrative burden for Member States

No administrative burden is expected to be borne by MSs, unless the European Commission decides to delegate certain aspects of the guidelines on circular business models to existing agencies (e.g., the Enterprise European Network). In this case, a specific, specialized officer may be hired to manage the implementation of support measures for the development of circular business models. It is most likely that the measures will be enforced by an existing officer in the scope of his/her work on business development.

7.3.1.2. Direct economic impact for businesses

Impact on SMEs

The economic impact of this policy option is expected to be overall positive as the market for circular business is growing. Again, different circular business models have varied growth estimations. According to a recent study, the adoption of explicit policies to promote the circular economy will contribute to higher growth and employment levels in Europe by 2030. Compared to a baseline scenario, GDP will grow by almost 0,5% and there will be additional 700.000 jobs due to higher demand in waste management (in particular from recycling plants), repairs, product-as-a-service and rebounds in consumer demand from savings through collaborative actions (e.g., car and ridesharing).[314]

The policy options will aim to further sponsor and raise awareness of those circular models with the most potential for growth. Indeed, research from the IA shows that while 9% of SMEs have already adopted Circular Business Models, on average 20% of businesses are already familiar with Circular Business Models[315]. With the support from the public sector, there are good reasons to believe that circular economy business models will continue to increase.

Recent trends suggest that demand for Circular Business Models will continue to grow in future years, pushed by significant policy measures at EU and MS level, as well as generational trends and a growing appetite for sustainable products. Generation Z and Millennials are notably boosting demand for refurbished products and easy reparability options.

In the **textiles sector**, the second-hand apparel market is expected to double in 5 years with resale platforms driving the main growth. Between 2017 and 2019, global growth in Millennials' purchase of second-hand clothes and footwear grew by 36%[316]. Adidas's used items are now planned to be taken back from the consumers, for which consumers receive vouchers that can be

[311] Cost of personnel according to data transmitted by the European Commission for a contractual agent.
[312] This was the total budget planned for the maintenance of the Circular Economy Stakeholder Platform.
[313] This was the total budget for the set up and maintenance of the European Cluster Collaboration Platform. The budget also foresees the payment of experts and matchmaking events.
[314] European Commission. Impacts of circular economy policies on the labour market https://op.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en
[315] IA. SME survey. 2021
[316] McKinsey. The state of fashion 2019. https://www.mckinsey.com/~/media/mckinsey/industries/retail/our%20insights/the%20state%20of%20fashion%202019%20a%20year%20of%20awakening/the-state-of-fashion-2019-final.ashx

used over 3 years[317]. In June 2021, a French start up, Faune, raised EUR two million for its platform allowing major retail brands to commercialise second-hand products, including those products they were unable to sell[318]. More recently, online retailer Zalando announced the creation of a second-hand apparel platform. Zalando aims to extend the life of 50 million items by 2023[319].

In the **ICT sector**, the global market for refurbished phones and laptops in 2017 was EUR 50 billion, expected to double to EUR 100 billion by 2022, as only ca. 15% of all privately-owned phones are recycled or refurbished. The global refurbished IT market growth reached 18% between 2017 and2018[320]. In Europe, a decline in the demand for new smartphones runs parallel to an increase of the market of refurbished ones, which explains how second-hand electronics online retailer BackMarket recently raised EUR 276m to expand the global footprint of its marketplace for refurbished consumer electronics[321], currently comprised of 1,500 refurbishers and repairers (90% of them European).

Consolidated data on the economic impact of Circular Business Models at the EU level is scarce, but sectoral evidence as well as some information in MSs is available. According to an EU-level study, **servitisation** (see description of some innovative Circular Business Models) has the potential to increase annual turnover and number of clients[322]. Although still in its early stages, the market for **circular reverse logistics** is expected to generate a strong economic impact with the surge of online sales, where 30% of products bough online are returned. One report demonstrated that the implementation of efficient and effective reverse logistics processes can reduce costs and help companies to recover significant shares of revenue[323]. The report argues that companies whose products are subject to regeneration can save up to 60 % of the estimated cost of a completely new product.

As for concerns SMEs, they are key to how change will materialise. Facilitating the incorporation of new and innovative circular business models, as well as offering more funding, tailor-made guidance and opportunities to collaborate within and across borders and while reducing red tape, will ensure that SMEs can reap the benefits of the circular economy and that no one is left behind in the transition[324]. Regulators should nevertheless be aware of some of the important barriers to entry in some circular markets for SMEs, particularly in the collaborative economy (e.g., car sharing and accommodation rentals). This should not stop SMEs from competing in the market. According to an EU-level study, servitisation brings a 1-10% increase in annual turnover to

[317] BOF. How Adidas Plans to Cash In on Old Clothes. https://www.businessoffashion.com/articles/sustainability/how-adidas-plans-to-cash-in-on-old-clothes

[318] Usine Digitale. Faume lève 2 millions d'euros pour aider les marques à créer leur site de seconde main. https://www.usine-digitale.fr/article/faume-leve-2-millions-d-euros-pour-aider-les-marques-a-creer-leur-site-de-seconde-main.N1114254

[319] Corporate Zalando. https://corporate.zalando.com/en/newsroom/news-stories/zalando-sets-out-revolutionize-pre-owned-fashion-europe

[320] European Economic and Social Committee. Identifying the impact of the circular economy on the Fast-Moving Consumer Goods Industry: opportunities and challenges for businesses, workers and consumers – mobile phones as an example https://circulareconomy.europa.eu/platform/sites/default/files/impact_of_ce_on_fmcg_-_mobile_phones_case_study.pdf

[321] Back Market Raises EUR 276 million to build a circular economy giant https://sifted.eu/articles/back-market-raise-276m/

[322] Technopolis, Dialogic and University of Cambridge for the European Commission. Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018)

[323] The Benefits of Reverse Logistics, International Letters of Social and Humanistic Sciences, 26:138-147 DOI:10.18052/www.scipress.com/ILSHS.26.138. April 2014 https://www.researchgate.net/publication/279742868_The_Benefits_of_Reverse_Logistics

[324] Chambers for a Circular Economy, Actions to support SMEs' transition to a Circular Economy, 2020 https://euagenda.eu/upload/publications/chambers-for-a-circular-economy-2020-2020-00016-01.pdf

servitised SMEs in Europe[325]. Manufacturing SMEs report an increase of revenues as a result of introducing services, as well as the generation of new clients[326].

Several businesses active in furniture, home appliances and packaging surveyed in the stakeholder consultation (2) reported that overall, there would be very low or no economic benefits for them at all. Costs are expected to be moderately lower than benefits. Operation and maintenance costs are expected to be no different compared to the baseline, as are capital expenditures and personal costs. No indirect costs were reported. One organization reported fully supporting the policy option, arguing that the EU can further support circular transformation through technology and innovation programmes where there is a need for industrial innovation. Building competences needed for the future EU generation was also considered necessary.

7.3.1.3. Indirect economic impact for businesses

Circular business models benefit from an improved brand image as a number of international businesses have already embraced closed-loop models. Businesses are using circular models to develop new, differentiated products and engage with their customers, particularly in textiles and electronics. Brands in high-street fashion (e.g., North Face, Patagonia, and H&M) and sportswear (e.g., Adidas and Puma) have developed new lines with reused materials. A study[327] found that revenues from sustainable products and services grew at six times the rate of overall company revenues between 2010 and 2013, among the 12 members of the S&P Global 100 sampled.

Another less discussed indirect economic impact relates to issues of conformity and guarantee of reused/refurbished/repaired products and their performance, particularly in the construction and ICT sectors. Possible additional costs related to the reuse of secondary raw materials for example could be generated for the producers. Producers could have to present a new label or proof of performance for their products to ensure that regulatory requirements are met, and that there are no health, life or insurance risks. Several studies argue that the average construction cost of a green building certification is between 1-9% higher than normal construction costs depending on the grade level required[328]. Nevertheless, green buildings on average are less costly to operate than traditional buildings (on average 10% less).

7.3.1.4. Economic impact for citizens

The promotion of circular business models would benefit citizens in several ways. Firstly, citizens would increase their awareness and knowledge of the variety of different ways to do business and to consider the value of products. This should inspire citizens to adopt sustainable consumption habits and behaviour patterns, as well as promote new sustainable services such as the sharing economy and lengthen product life cycles through reuse and repair. For example, repair cafés have become increasingly common globally, with close implications for citizens. In Germany alone, 860 repair initiatives were active in March 2021, proving that citizens see real

[325] Technopolis, Dialogic and University of Cambridge for the European Commission. Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018)
[326] Technopolis, Dialogic and University of Cambridge for the European Commission. Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018)
[327] Harvard Business Review, The Comprehensive Business Case for Sustainability. https://hbr.org/2016/10/the-comprehensive-business-case-for-sustainability
[328] Construction Cost of Green Building Certified Residence: A Case Study in Taiwan, Chen-Yi Sun, Sustainability MDPI, February 2019.

value in the generalisation of circular modes of business[329]. Secondly, such initiatives may encourage citizens to adopt different attitudes to products, and to consider circular business as a potential career path. As demonstrated in the social impact section, there is growing demand for workers in the circular economy.

7.3.2. Environmental impacts

Sub-option 6a is expected to have a positive environmental impact, however the exact magnitude of such positive environmental improvements attributable directly to the policy sub-option and for all product groups within the scope of SPI may vary, as explained with several examples cited in the literature.[330] The environmental potential of circular business models is found to be broadly positive, as value retention activities extend product lifetimes, hence reducing material and energy requirements (and related impacts) from production of replacement products, whereas product-as-a-service and sharing models increase the optimisation and intensity of product use.

As far as the environmental impact of some well-known circular business models (see Markets for Circular Business Models are not fully developed) are concerned:

- **Remanufacturing:** some of the benefits typically associated to remanufacturing include a reduction of material consumption up to 80%, as well as product dematerialisation and decarbonisation. A study of the sector estimated 2.3 million tonnes of annual savings for landfilling avoidance and emission savings in the region of 8.3 million tonnes of CO_2eq for the EU-27.[331] In addition, several studies have identified a very large potential in terms of reduction of greenhouse gases, energy consumption, resource extraction and waste disposal.
    - For instance, remanufactured photocopiers are cited to generate a reduction between 19 to 25% in resource extraction, 27% in energy consumption, 23% in GHG emissions, and 35% in waste disposal reduction.[332]
    - As regards remanufactured turbochargers, energy (82%) and GHG emissions (73%) saving potentials have also been identified with LCA methods.[333]
    - In the case of remanufactured medical catheters, the impact in terms of global warming reduced by 50.4% and abiotic resource use is lowered by 28.8%.[334]
- **Reuse and repair** models: a study by the company CWS[335] about the circularity and environmental impacts of its own yearly operations have been recently assessed including 555,000 protective garments products used in the manufacturing and hospitality sectors. This study identified environmental benefits equal to a 76% reduction in GHG emissions related to a service cycle of 555,000 pieces of blue wear, industrial

[329] See the following website for an overview of all available repair measures in Germany: https://www.reparatur-initiativen.de/orte
[330] SPI supporting study report
[331] ERN (2015), Remanufacturing Market Study, European Remanufacturing Network, http://www.remanufacturing.eu/assets/pdfs/remanufacturing-market-study.pdf
[332] Kerr, W. and C. Ryan (2001), Eco-efficiency gains from remanufacturing, Journal of Cleaner Production, Vol. 9/1, pp. 75-81, http://dx.doi.org/10.1016/S0959-6526(00)00032-9.
[333] Gao, W. et al. (2017), Investigation on the Comparative Life Cycle Assessment between Newly Manufacturing and Remanufacturing Turbochargers, Procedia CIRP, Vol. 61, pp. 750-755, http://dx.doi.org/10.1016/j.procir.2016.11.214.
[334] Schulte, A., Maga, D., & Thonemann, N. (2021). Combining Life Cycle Assessment and Circularity Assessment to Analyze Environmental Impacts of the Medical Remanufacturing of Electrophysiology Catheters. Sustainability, 13(2), 898. https://doi.org/10.3390/su13020898
[335] According to the study, with headquarters in Germany, CWS is active in 15 countries in Europe, employs around 11,000 people worldwide and has an annual turnover of more than EUR 1.1b. In Germany alone, CWS repaired more than 2.3 million workwear products and more than 600,000 already used items were returned to their service cycle in 2019.

clothes, catering & service and personal protective equipment. Assuming that each garment is subject to 46 cycles of washing during its service lifetime, the same study found that repairs reduce the environmental impact by 49.11 kilograms of greenhouse gas emissions per person per year, whereas the reuse of used garments reduces greenhouse gas emissions by 5.99 kilograms per person per year. [336]

- Some negative impacts have also been identified for reuse. Many examples are found in the literature of the beneficial reuse of standardised, unpowered products and components, and repairing an item is always found to be less energy intensive than new production. However, reusing a product does not guarantee an environmental benefit. Attention must be paid to restoring and upgrading old product efficiencies, minimising over-specification in the new application, and considering whether more efficient, new products exist that would be more suitable.[337]
- **Collaborative economy**: its environmental impacts can differ strongly per business model. In general, though, by increasing the utilisation of existing assets in the economy, the environmental impact of collaborative consumption is often lower than traditional alternatives. For instance, an LCA analysis of a collaborative platform for ski-related services in Hammarby Sjöstad (Sweden) has been recently conducted. The sharing model of skis, electric tools, cars, bicycles and cooking equipment, and the online platform have resulted in a reduction of 18-ton of CO_2eq compared to the baseline (20 tons of CO_2eq).[338] As regards car sharing, global warming potential (GWP) savings between 4 to 20% were estimated as resulting from the replacement of 10 and 50% in the use of private cars, respectively.[339] There are however growing concerns over side-effects of collaborative business models, which could have a negative environmental impact and offset the potential advantages[340].
- Different **PSS** models will contribute differently to the environment.
    - The environmental impacts of Mobility-as-a-Service using electric scooters is estimated to reduce GHG emissions by 202 g CO_2eq / passenger-mile, caused by the resource extraction and manufacturing of scooters (50%) and daily collection for charging (43% of the impact).[341] An important source of the environmental impacts is caused by the very short life span of electronic scooters (e.g., they can last one month in use[342]). Moreover, not all models are designed for reparability and durability,[343] and manufacturing occurring in overseas countries does not necessarily guarantee meeting strict environmental standards nor compliance with the avoidance of conflict minerals sourcing.

[336] Jakob Tobias Steffen (2021): Circular Advantage Studie. CWS International GmbH. Duibsburg.
[337] Cooper, D. R., & Gutowski, T. G. (2017). The environmental impacts of reuse: a review. Journal of Industrial Ecology, 21(1), 38-56. https://onlinelibrary.wiley.com/doi/abs/10.1111/jiec.12388
[338] Martin, M., Lazarevic, D., & Gullström, C. (2019). Assessing the environmental potential of collaborative consumption: peer-to-peer product sharing in Hammarby Sjöstad, Sweden. Sustainability, 11(1), 190. https://doi.org/10.3390/su11010190
[339] Ding, N., Pan, J., Zhang, Z., & Yang, J. (2019). Life cycle assessment of car sharing models and the effect on GWP of urban transportation: A case study of Beijing. *Science of the total environment*, 688, 1137-1144. https://www.sciencedirect.com/science/article/abs/pii/S0048969719326798
[340] European Commission. Environmental potential of the collaborative economy (2019)
[341] Hollingsworth, J., Copeland, B., & Johnson, J. X. (2019). Are e-scooters polluters? The environmental impacts of shared dockless electric scooters. Environmental Research Letters, 14(8), 084031. https://iopscience.iop.org/article/10.1088/1748-9326/ab2da8
[342] Shared scooters don't last long https://oversharing.substack.com/p/shared-scooters-dont-last-long?utm_medium=email&utm_campaign=cta
[343] LIME (2020) Lime for a Sustainable Paris. A study on Lime's environmental impact in Paris 2018-2019. Lime. https://www.li.me/hubfs/Assets/LIME_ENG_Paris%20Sustainability%20Report_11OCT2019_RGB.pdf

- A study of the impact of pay-per-use washing machines in the Netherlands identified positive changes in consumer behaviour leading to a 2º Celsius (C) decrease in washing temperature (from 40 to 38ºC), resulting in additional benefits in terms of energy savings and lesser frequency of washing per week (from 13 to 10 times a week on average). [344] As a point of reference, it has been estimated that a reduction of the average wash temperature by 3ºC in five European countries (France, Italy, Belgium, Denmark, and the UK) reduced the yearly energy consumption for laundry washing by 11.7% in 2013.[345]

7.3.3. Social impacts

The social impact of the policy measure is expected to be largely positive. Providing support for training in circular economy can open several employment opportunities in the market, particularly as some sectors lack skills and staff. For instance, the repair sector in France is understaffed, struggling to attract qualified people. As well as there being a lack of technical knowledge for repair, the sector is not considered very attractive (low wages)[346]. In the PSS sector, European SMEs undertaking servitisation are also limited by the number of people they can hire, listing the skill set of current staff and the difficulties in hiring staff with the right skills as a key barrier to their development[347]. 73% of SMEs however indicated to have hired additional employees after the introduction of product-service bundles[348]. Estimates for the UK show that a circular economy could create up to 50,000 new jobs in dismantling, recycling, organic treatment and in energy from waste facilities[349].

Servitisation CBMs increase the affordability of more durable high-quality products as an alternative to low-cost, but less durable and less efficient products. For example, the Papillon project[350] aims to combat energy poverty in Flanders by providing efficient household appliances on a leasing basis for €7 per month. An estimation of cost savings, based on the (average) energy consumption of the replaced old appliances and on the energy consumption (energy label) of the newly installed ones (over 10 years and based on the average Belgian electricity rate of 0,30 €/kWh) indicates savings of €804 for a fridge, €573 for a freezer, €321 for a washing machine, €564 for a tumble drier and €432 for a dishwasher.

Many circular economy enterprises are also engaging the socially excluded or vulnerable. This is true particularly in collection, sorting, repair, resale and upcycling operations, for example in textiles and food. Rreuse, the international network representing social enterprises active in re-

[344] Bocken, N. M., Mugge, R., Bom, C. A., & Lemstra, H. J. (2018). Pay-per-use business models as a driver for sustainable consumption: Evidence from the case of HOMIE. Journal of Cleaner Production, 198, 498-510. https://www.sciencedirect.com/science/article/abs/pii/S0959652618320109;

[345] AISE (2013) I prefer 30º. The case for the AISE low temperature washing initiative. Substantiation Dossier. International Association for Soaps, Detergents and Maintenance Products.

[346] ADEME. Panorama de l'offre de réparation en France. (2018) https://librairie.ademe.fr/dechets-economie-circulaire/1014-panorama-de-l-offre-de-reparation-en-france-actualisation-2018.html

[347] European Commission. Study on the potential of servitisation and other forms of product-service provision for EU small and medium-sized enterprises (2018) https://ec.europa.eu/growth/content/study-potential-servitisation-and-other-forms-product-service-provision-eu-small-and-medium_en

[348] Technopolis, Dialogic and University of Cambridge for the European Commission. Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018)

[349] The Circular Economy: Barriers and Opportunities for SMEs Vasileios Rizos, Arno Behrens, Terri Kafyeke, Martin Hirschnitz-Garbers and Anastasia Ioannou No. 412 / September 2015 https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/GreenEconet_CEPS_SMEs_Circular_Economy.pdf

[350] https://www.bosch.be/news-and-stories/climatemattersatbosch-papillon-project/

use, repair and recycling estimates that its members divert around 1 million tonnes of goods and materials every year from landfill and they extended the lifespan of 214 500 tonnes of products, leading to CO2 savings equivalent to average emissions of approximately 108 000 EU citizens. Boosting such circular business models could present considerable opportunities to build skills and generate employment. Providing support for training in circular business models can open varied employment opportunities in the market, particularly as some sectors lack skills and staff. Proximity is important to a lot of circular activities. Membership-based social enterprise models (such as cooperatives, mutual, and associations) can provide a suitable structure for peer-to-peer initiatives such as sharing schemes, where access to services rather than returns on capital are the primary objective.

Circular business models usually operate under the same labor contracts as in the linear economy. As underlined in a report, unsafe work and a lack of minimum wage and social protection is one risk that can be traced to the logistics sector, particularly in retail and warehouses[351]. While there have been no specific studies on the social impact of reverse logistics business models, there is evidence that road transport has one of the worst records in complying with social and labor law in Europe[352]. Still, this likely results from insufficient enforcement and monitoring resources, which, if deployed, could limit the social drawbacks.

A study on the effects of the circular economy on labor suggests a strong trend in recycling and waste management (due to decreases in the demand of traditional waste management, e.g., landfilling), with the implicit assumption that better wages will be given to workers in the waste sector, linked to higher GDP and higher purchasing capacity[353].

7.4. Sub-option 6b: Enhanced value retention and value maximization

7.4.1. Economic impacts

7.4.1.1. Administrative burden

Administrative burden for economic operators

Economic operators will have to comply with the transparency obligation and a ban on the destruction of unsold products introduced with one or a series of SPI measures for specific products or groups of products. The administrative burden of the transparency obligation is estimated to be limited since economic operators are given flexibility to disclose required information in a manner appropriate to their business environment, and in view of an exemption for SMEs. Economic operators may place the information on a publicly available website or they may disclose it by other means, for instance by including it in a publicly available management report. Reporting obligations to competent authorities, with heavier administrative burden for member states and economic operators are avoided. The requirement may lead to some administrative burden related to inventory management in order to collect the necessary information. However, it is expected that economic operators have most of the required

[351] Fair Trade Advocacy. Avoiding blind spots : promoting circular and fair business models. https://fairtrade-advocacy.org/wp-content/uploads/2020/12/Circular-and-Fair-report.pdf

[352] ETF. Social conditions in logistics in Europe: focus on road transport. https://www.wilke-maack.de/wp-content/uploads/2020/07/report_social_conditions_in_logistics.pdf

[353] European Cmmission https://op.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en

information already available at present. Economic operators are likely to keep account of the number of unsold products they discard for purposes of VAT deduction, to claim the VAT paid for imported products if these products end up being discarded instead of sold. As such, the main administrative burden associated with the measure is expected to relate to the actual act of information disclosure, such as creating and maintaining a dedicated space on a website to place this information.

To further limit administrative burden of the measure, the transparency obligation does not apply to SMEs. It is expected that this instrument is more effective as a disincentive when applied to large enterprises. In addition SMEs seem to cover a smaller market share of consumer products placed on the market. In e-commerce of consumer goods this is an estimated 12.76%[354].

With regards to the ban, economic operators will incur some costs relating to value chain management and stock management (finding alternatives for returned products, for instance through donation or sale at a reduced price). Some administrative burden may also stem from transparency obligations on the fate of unsold products. The administrative burden depends on the product categories to which the ban on the destruction of unsold products will be applied, and under which conditions. This will be determined through a separate impact assessment.

Administrative costs for the European Commission

It is expected that the ban on the destruction of unsold products would incur some administrative burden for the European Commission for instance to develop the SPI measures and to coordinate relevant activities with Member States. A comparable Directive (94/62/EC) on packaging and packaging waste to reduce the consumption of lightweight plastic carrier bags) estimated that the administrative burden would be high for the European Commission[355].

Administrative burden for Member States

It is envisaged to make the ban on destruction of unsold products directly applicable to economic operators. Although transposition in national legislation would thereby not be needed, monitoring and compliance verification by Member States can lead to a considerable administrative burden, depending on the scope of the SPI measure that introduces the ban on destruction of unsold products in practice.

7.4.1.2. Direct economic impact for businesses

The ban will lead to some important changes for businesses in terms of stock management and value chain management. To estimate the cost of the ban on businesses, it is necessary to look at the holding cost (warehouse costs, including insurance), and distribution cost (employee wages associated to moving the product and remarketing). The cost would depend on the product categories to which the ban on the destruction of unsold products will be applied, and under which conditions. This will be determined through a separate impact assessment. Exemptions are considered to ensure proportionality of the measure, for instance to prevent an inability to dispose of products while they are defective.

The economic impacts may in part be attributed to the cost of "dead inventory" or "dead stock", which stands for the inventory that is not sold to the customers and has been stored for a specific period in e.g. warehouses. The bigger the dead inventories, the higher the costs for companies

[354] As estimated based on Euromonitor data for e-commerce for 2021.

[355] COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT Reducing Marine Litter: action on single use plastics and fishing gear Accompanying the document Proposal for a Directive of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment SWD/2018/254 final - 2018/0172 (COD)

(stock, insurance, rent, administrative costs). The cost of dead inventories can represent 25-30% more than the inventories actual cost value[356]. In the US, dead inventory amounts to 50 billion dollars per year.

A ban on destruction of unsold products will require timely investments related to stocks, marketing and Human Resources to prevent dead inventory. The measure would provide a strong incentive to improve and innovate markdown planning, for instance in the fashion industry, to find an optimal balance between ensuring that as little stock as possible remains at the end of a season while minimizing the loss of revenue due to price reductions.

Considering the growing market for circular businesses models as well as the value of unsold products , there is reason to believe that net benefits may to an extent offset negative economic impacts of dead inventory. Companies can consider new business opportunities by creating markets for unsold products by remanufacturing them, or by collecting valuable unsold products and selling them at a reduced price. For instance, a business model found in the textile value chain is second-life retailing. This model, which is applied to both high-value and low-value textiles, is used to sell unsold stock lots and overruns and thus to give textiles a second chance. While the respective products are used instead of discarded, customers benefit from low prices. This model uses reverse logics not to bring back products to their point of origin, i.e., manufacturing, but to other retail channels[357].

In case unsold products are donated instead of destructed, some negative economic impacts may be incurred by businesses due to tax reasons. Donation of unsold products by economic operators (e.g. importers) forfeits the right to deduct VAT paid to tax authorities upon acquiring of these goods. In the case of destruction, economic operators do have a right to deduct VAT. The disposal cost of a product averages at EUR 0.85 per item. In addition, small dealers in particular indicate that it would be too time-consuming to select a suitable donation organisation.

Compliance cost may differ per company depending on the extent to which destruction of unsold products actually occurs. For instance in Germany, online retailers such as Zalando claim to already comply with the German duty of care[358] which requires companies to ensure, when distributing products, that they do not become waste. Zalando has a return rate of around 50% and claims that almost all of its returned articles (97%) are sold again via the shop or outlet stores[359]. Just 0.05% of the items is said to be destroyed due to necessity.

As for SMEs, they generally have more limited financial and human resources available to adapt to important legislative changes. However, the ban on destruction of unsold goods, including transparency requirements will primarily have an impact on those organisations that are known to hold very large quantities of unsold goods. The SPI measure may exclude targeted economic operators, for instance by focusing on large companies and all companies listed on regulated markets (except listed micro-enterprises) holding unsold products in the EU covered by the SPI measure. This could be considered in order to ensure proportionality of the measure.

Businesses active in furniture, home appliances and packaging surveyed in the SPI stakeholder consultation reported that there would be very low or no economic benefits for them with the implementation of a ban on destruction of unsold goods. One requested further clarification with

[356] What Is The Real Cost Of Dead Inventory? https://www.manufacturing.net/home/article/13117104/what-is-the-real-cost-of-dead-inventory

[357] Second-life retailing: a reverse supply chain perspective. March 2016Supply Chain Management 21(2):259-272 https://www.researchgate.net/publication/298429830_Second-life_retailing_a_reverse_supply_chain_perspective

[358] The duty of care in the Circular Economy Act | BMU

[359]Ecommerce News. Germany makes destroying products more difficult. February 12, 2020

respect to the implementation of the ban, regarding the definition of the destruction of unsold goods, the interlinks with product safety and waste legislation. They considered that parallel regulatory amendments would be necessary to support such a policy option in the area of taxation favouring circular business models. Stakeholder views varied with respect to impacts on operation and maintenance costs: one business found there were no changes expected in comparison to the baseline, while another found that personal costs (OPEX) would increase by less than 1%, and operation and maintenance costs between 1-5%. Impacts for businesses in specific product categories will be further assessed in the impact assessment of implementing measures that introduce the ban on destruction of unsold goods, where applicable.

7.4.1.3. Indirect economic impact for businesses

It is foreseen that the indirect impact will overall be positive. Companies choosing to invest in circular models, such as reverse logistics or leasing services which prevent product surpluses, are expected to generate an increase in revenues. Indeed, one report demonstrates that the implementation of efficient and effective reverse logistics processes can reduce costs and help companies to recover significant shares of revenue[360]. Companies transitioning towards circular practices will improve their brand image, particularly if they engage in more regular donations or pledge to reduce the volumes they buy. The indirect impact is foreseen to be positive overall.

7.4.1.4. Economic impact for citizens

The ban on destruction of unsold products will make alternatives to destruction, including sale at reduced prices and donation, more attractive. This could make products economically more accessible for consumers with a lower purchasing power. Such impacts may differ on a product by product basis and will be further assessed in the impact assessment of implementing measures.

7.4.2. Environmental impacts

Increasing evidence is available on the magnitude of waste generated in certain sectors through the destruction of unsold goods. Such unsold products are either recycled, incinerated or sent to landfill. In the German online and mail order business, it is estimated that almost four percent of the returned products are disposed of, which corresponds to around 20 million items per year[361]. In France, government estimates on the yearly destruction of products vary from EUR 630M to EUR 800M[362].Jewellery and watch brands Cartier, Piaget, and Baume & Mercier, admitted that in an effort to keep its products out of the hands of unauthorized sellers, it had destroyed about $563 million worth of watches over the past two years. A ban on the destruction of unsold products will reduce the amount these products being discarded, and thereby reduce CO_2 emissions from waste treatment operations. Positive environmental impacts may also stem from improved stock management with possible reductions in production surpluses as a result.

There are currently no available complete estimations on the total amount of unsold products being destructed in the EU. In some sectors, such as textiles or electronics, estimations have been

[360] The Benefits of Reverse Logistics, International Letters of Social and Humanistic Sciences, 26:138-147 DOI:10.18052/www.scipress.com/ILSHS.26.138. April 2014

[361] Universität Bamberg, Retouren: Warum 20 Millionen Artikel vernichtet warden https://www.uni-bamberg.de/presse/pm/artikel/retourenvernichtung-asdecker-2019/

[362] Impact Assessment of the French circular economy law elaborates on expected benefits of such instrument. Ex ante impact assessment of the French AGEC Law (2019). https://www.senat.fr/leg/etudes-impact/pjl18-660-ei/pjl18-660-ei.html

made on the total amount of unsold products destroyed. One economic operator in the online retail sector reportedly destroys 3 million unsold products per year in France, but it is not possible to say which percentage of that refers to books, perfume, or textiles[363]. Consequently, it is not possible to estimate how many tons of additional CO_2 are emitted in the atmosphere as a result of unsold goods.

In the fashion industry, the production of textiles is responsible for 10% of global carbon emissions. According to the European Environment Agency, textile purchases in the EU in 2017 generated about 654 kg of CO_2 emissions per person. Preventing the destruction of these products could reduce this impact. The reuse or recycling (although recycling also counts as destruction) of unsold textiles alone will save 250,000 t/year of CO_2, equivalent to the emissions of 125,000 cars per year[364]. France estimates that for textiles, on a market of about 600,000 tonnes of textile every year[365], the upcoming ban on destruction of unsold products could avoid the destruction of 10,000 to 20,000 tonnes of textile a year[366] (1.7% to 3.4%).

7.4.3. Social impacts

Foreseen social impacts will be largely positive if companies increase their donations to social enterprises as a result. Estimations regarding the percentage of donated products are usually company specific and not available per sector. It has been estimated in Germany that in almost 40% of the cases, it would be theoretically possible for retailers to donate the goods, provided that a recipient can be found. That affects 7.5 million articles per year. Donation or sale at reduced prices instead of destruction could have a positive social effect, making products more accessible for a segment of the population[367].

The working conditions of workers employed in reverse logistics and in the handling of stock management and returns should be surveyed closely. In Europe, several unions have gone on strike to protest against poor working conditions. The implications of such a ban on the working conditions of those handling returned items and stock management should not be ignored.

7.5. Impacts on third countries

The provision of guidelines to support Circular Business Models, the deployment of a hub and the ban on unsold products (see sub-options 6a.1, 6a.2 and 6b) are done in a non-discriminatory way. No adverse trade effects are expected vis-à-vis trading partners.

The ban on the destruction of unsold consumer products (sub-option 6b) could have a potential negative impact on third countries. Research has pointed to the social and environmental problems caused by donated products in developing countries, particularly electronics. The issues raised refer to corruption, creating dependency on donations and the absence of waste treatment channels available to deal with the end of life of such products. According to the World Bank, in

[363] Huffington Post, *Selon « Capital », Amazon a jeté plus de 3 millions d'invendus en France* (2019). https://www.huffingtonpost.fr/2019/01/12/selon-capital-amazon-a-jete-plus-de-3-millions-dinvendus-en-france_a_23640921/

[364] French Ministry of Environment 2020, Textile usagés, https://www.ecologie.gouv.fr/textiles-usages

[365] French Ministry of Environment 2020, Textile usagés, https://www.ecologie.gouv.fr/textiles-usages

[366] French Ministry of Environment 2020, The anti-waste law in the daily lives of the French people

[367] Universität Bamberg, Retouren: Warum 20 Millionen Artikel vernichtet warden https://www.uni-bamberg.de/presse/pm/artikel/retourenvernichtung-asdecker-2019/

low-income countries, over 90% of waste is often disposed of in unregulated dumps or openly burned.[368].

[368] World Bank. Solid waste management. https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management Last updated September 23rd 2019.

7.6. Summary of impacts

Table 55 Administrative burden of PO6

Administrative burden Option 6					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Sub-option 6a	Direct costs	+/- No direct costs estimated for businesses	+/- No direct costs estimated for businesses	- Hiring of personnel Design and development of a platform or website	- Staff costs Platform or website maintenance
	Indirect costs	n.a.	n.a.	- Possible indirect costs related to public procurement	n.a.

Sub-option 6b	Direct costs	- -- Value chain and stock management adaptation	- - Storage costs (warehouse costs, including insurance) Distribution costs (employee wages associated to moving the product and remarketing)	- Set up of the implementing acts (European Commission) Enforcement of the SPI acts (MSs)	- Enforcement and compliance costs
	Indirect costs	n.a.			

Table 56 Economic impacts of PO6

Economic impacts			
Description	***Amount/ qualitative***		***Comments***
	Option 6a	***Option6b***	
Direct impacts			
Increased revenues for companies developing circular products or services	+	++	According to an EU-level study, servitisation brings a 1-10% increase in annual revenues to servitised SMEs in Europe[369]. Manufacturing SMEs report an increase of revenues as a result of introducing services, as well as the generation of new clients. Almost all circular business models studied in the framework of the IA could benefit from a ban on the destruction of products. A pattern found in the textile value chain is second-life retailing. This model, which is applied to both high-value and low-value textiles, is used to sell imported stock lots and overruns, giving textiles a second chance.
Circular businesses gain larger market shares	+	++	A study[370] found that revenues from sustainable products and services grew at six times the rate of overall company revenues. In the ICT sector, where the global market for refurbished phones and laptops in 2017 was €50 billion, expected to double to €100 billion by 2022, i.e., only ca. 15% of all privately-owned phones are recycled or refurbished[371]. The global IT refurbished market growth accounted for 18% of growth between 2017 and 2018. In Europe, a decline in the demand for new smartphones runs parallel to an increase in the demand for refurbished ones.
Increased stock management and value chain management cost	+/-	--	The ban on destruction of unsold products will lead to cost increases for businesses in terms of stock management and value chain management. Costs include warehouse costs, including insurance, and distribution cost such as employee wages associated to moving the product and remarketing. The adaptation to the ban may incentivize innovation in stock management. This may require initial investments, but could lead to savings in the long run.

[369] European Commission, Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018) https://op.europa.eu/en/publication-detail/-/publication/0d1ed8aa-8649-11e8-ac6a-01aa75ed71a1/language-en

[370] Harvard Business Review, The Comprehensive Business Case for Sustainability. https://hbr.org/2016/10/the-comprehensive-business-case-for-sustainability

[371] European Commission, Actions to scale-up Value Retention Process Business Models for Consumer Products
G7 Alliance on Resource Efficiency Workshop Report
https://ec.europa.eu/environment/international_issues/pdf/G7VRP_Workshop_report.pdf

Indirect impacts			
Improved brand image	++	+++	A number of international businesses having already embraced closed-loop, circular business models have benefited from improved brand image. Businesses are using circular models to develop new, differentiated products and engage with their customers, particularly in textiles and electronics. High-street fashion (e.g., North Face, Patagonia and H&M) and sportswear (e.g., Adidas and Puma) brands have all developed new lines with reused materials.

Table 57 Environmental impacts of PO6

Environmental impacts			
Description	***Amount/qualitative***		***Comments***
	Option 6a	***Option 6b***	
Direct impacts			
Decrease of GHG emissions	+	++	It is not currently possible to estimate how many tons of additional CO_2 are emitted in the atmosphere as a result of destruction of unsold goods. However, it is clear from numerous studies that disposal contributes to climate change due emissions of waste treatment operations. The manufacturing of product surpluses also releases large amounts of CO_2. Direct impacts depend on the product scope of implementing measures and will be further assessed through a dedicated impact assessment.
Less waste being burned or going to landfill	+	+++	According to a study by PRO EcoTLC and RDC Environment, the disposal of 1 kg of textile with household waste generates 1.4 kg of CO_2, whereas its disposal through the recycling sector saves 25 kg. The reuse or recycling of unsold textiles (although recycling would be covered by the ban on destruction of unsold goods) alone will save 250,000 t/year of CO_2, equivalent to the emissions of 125,000 cars per year.
Indirect impacts			
Consumers adapt their modes of consumption	++	+++	Through increased awareness on circular business models it is expected that consumers will adapt their consumption patterns. According to the 2017 Eurobarometer survey, a majority of Europeans think that protecting the environment is very important to them personally. The same survey showed support on the part of citizens for stricter legislation to tackle environmental problems.

Table 58 Social impacts of PO6

Social impacts			
Description	***Amount/qualitative***		***Comments***
	Option 6a	***Option 6b***	
Direct impacts			
Employment opportunities	+	+	Providing support for training in the circular economy can open varied employment opportunities in the market. Estimates for the UK show that a circular economy could create up to 50,000 new jobs in dismantling, recycling, organic treatment and in energy from waste facilities[372]. The repair sector in France is understaffed, struggling to attract qualified people[373]. As well as there being a lack of technical knowledge for repair, the sector is not considered very attractive (low wages). In the PSS sector, European SMEs undertaking servitisation are also limited by the number of people they can hire, listing the skill set of current staff and difficulties in hiring staff with the right skills as key barriers to their development.
Positive effects on training and (re)skilling	++	++	Increasing the circularity in the economy by upskilling both the workforce and society is necessary to enable new social practices. Closing the skills gap can lay the groundwork for unfolding the potential of new economic and technological solutions as well as infrastructures in a better way. Appropriate vocational education and training measures and innovative learning arrangements are needed to bridge the skill gap[374].
Increase in second-hand products and donations	+	++	A growing market for second-hand products could have a positive social effect, making products more accessible for underprivileged segments of the population. Donations and sale of products at reduced prices as a result of the ban on destruction of unsold products should also improve the living conditions of citizens living in precarious environments.

[372] The Circular Economy: Barriers and Opportunities for SMEs. Vasileios Rizos, Arno Behrens, Terri Kafyeke, Martin Hirschnitz-Garbers and Anastasia Ioannou No. 412 / September 2015

[373] ADEME, Panorama de l'offre de réparation en France : actualisation 2018 https://librairie.ademe.fr/dechets-economie-circulaire/1014-panorama-de-l-offre-de-reparation-en-france-actualisation-2018.html

[374] Circle economy. Closing the skills gap :vocational education and training for the circular economy. https://assets.website-files.com/5d26d80e8836af2d12ed1269/608c0aa6fec4df0fa7bd78e4_20210422%20-%20CJI%20VET%20Paper%202%20-%20297x210mm.pdf

Indirect impacts			
Better wages for workers	+	+	A study on the labour effects of the circular economy provides useful data that suggest a strong trend in recycling and waste management (due to a decreasing demand in traditional waste management, e.g., landfilling), with the implicit assumption that better wages will be granted to workers in the waste sector[375], linked to higher GDP and higher purchasing capacity.

8. OPTION 7: STRENGTHENED APPLICATION OF THE ECODESIGN FRAMEWORK

8.1. Overview

Overview of Policy Option 7

Policy Option 7 is built around a strengthened application of the Ecodesign framework. Its three sub-options consist of an improvement of the current framework mainly addressing its efficiency (7a), additional strengthening enforcement, specifically relating to market surveillance (7b), and the creation of complementary EU-level implementation and enforcement support capacities. The sub-options are summarised in the box below.

Sub-option 7a: Improve the current framework to increase efficiency

- Measure 7a1. – Streamline the procedures for the development and adoption of Ecodesign implementing regulations
- Measure 7a.2 – Introduce the possibility to collect data from manufacturers and retailers regarding regulated products sales and usage
- Measure 7a.3 – Add provisions related to third party certification

Sub-option 7b: Strengthen market surveillance of EU Member States

This option includes all the measures provided for under sub-option 7a, plus:

- Measure 7b1 – Make relevant product information digitally available to Market Surveillance Authorities
- Measure 7b2 – Structural technical support to improve cooperation between Market Surveillance Authorities and ensure sufficient capacities
- Measure 7b3 – Organise common trainings for staff of notified bodies, notifying authorities and Market Surveillance Authorities
- Measure 7b4 – Publish penalties decisions issued by Market Surveillance Authorities
- Measure 7b5 – Create a benchmark and a reporting obligation for Member States
- Measure 7b6 – Establish requirements for market surveillance checks

[375] European Cmmission https://op.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en

Sub-option 7c: Reinforce EU level implementation and complement Member States' market surveillance

This option includes all the measures provided for under sub-option 7b, plus:

- Measure 7c1 – Complement national market surveillance where needed
- Measure 7c2 – Products monitoring and testing facilities
- Measure 7c3 – Assistance to implementation for suppliers and Market Surveillance Authorities
- Measure 7c4 – Third party channel for market surveillance

8.1.1. Assumptions used in the analysis

- The environmental improvement potential of the strengthened application of the Ecodesign framework mainly arises from process optimisation and an improved information base, allowing for a faster and more effective setting of requirements. In addition, increased and improved market surveillance is expected to reduce non-compliance and thereby decrease lost benefits.
- The proposed measures generally increase costs on businesses, but an improved level playing field (e.g. through reduced non-compliance) could counteract that to a certain extent. Similarly, administration costs will increase, though efficiency improvements will counteract that to a certain extent.

8.1.2. What problems and specific objectives does this option address

This option addresses the problem of "sub-optimal application of the current Ecodesign legislation", contributing to the specific objectives "improve products sustainability" and "improve application of sustainable product legislative framework".

Sub-option 7a addresses the efficiency and speed of the Ecodesign regulatory process, while sub-option 7b addresses its effectiveness through improved market surveillance, which also contains elements increasing the efficiency of the process. Sub-option 7c introduces the possibility for autonomous market surveillance by the Commission, assistance to suppliers and Market Surveillance Authorities as well as a third-party channel for market surveillance.

Stakeholder views

Overall, the majority of the stakeholders were satisfied with the Ecodesign Directive legislative process (58%). The prioritisation of the most important improvements are as follows:

1. Increase Commission staff resources;
2. Publish measures as they come and not by package;
3. Better align with the Better Regulation Framework;
4. Merge preparatory studies with IA and/or run consultations in parallel (stakeholder meetings, consultation forum, OPC); and
5. Do not halt process when objections are being raised.

The greatest improvement potential in the Ecodesign process is perceived in conducting preparatory/review studies, followed by the impact assessment on draft measures/proposed voluntary agreement, the Consultation forum process and, lastly, the preparation of the working plan. Stakeholders stressed the importance of increasing transparency, setting clearer timelines/deadlines/milestones, providing more clarity on the reasoning behind the selection of products and better responding on the how and why of stakeholder comments are being taken into account. In the preparatory phase (i.e. working plan, prep study and impact assessment), stakeholders still see a potential to be more involved, considered and informed.

A diverse set of stakeholders confirmed the concerns related to market surveillance. There is a general call for market surveillance to be improved, both in terms of clearer and harmonised regulation, and enforcement improvements. Many stakeholders commented on the lack of resources (funding and trained staff) and testing capacity in Member States. Notably, some stakeholders mentioned that surveillance and reporting need to be more open to the public. Digital tools were noted to be potentially useful to create more transparency. Further, SMEs participating in the OPC considered setting verification targets for products that are most likely to be non-compliant, as well as creating a central reporting point/website to enable consumer feedback, important.

There is a significant funding gap at MS level for Market Surveillance Authorities. There is also insufficient competent staff and testing capacity at MS level. Training for authorities is needed to ensure a common understanding of responsibilities. Funding should be increased and verification targets should be improved for Market Surveillance Authorities. There should also be consistent checks across MS. Digital passports are a suggested solution for more efficient checks. Additionally, it was suggested that Civil Society Organisations should be able to initiate non-compliance proceedings with Market Surveillance Authorities. SMEs were in particular in favour of supporting measures from the Commission to MSs, such as guidance and carrying out complementary market surveillance where needed.

8.2. Baseline for PO7

Until now, the implementation of the Ecodesign Directive has shown achievements and impact, but its entire potential has not been harnessed due to a number of factors, such as:

- Delays in adopting Ecodesign measures caused by lack of resources at the Commission level, as well as by the turnover of the staff dealing with the Ecodesign Directive.
- Reduced effectiveness of the framework due to manufacturers' non-compliance;
- Difficulties encountered by Market Surveillance Authorities in performing proper surveillance;
- Insufficiency of EU resources for supporting national Market Surveillance Authorities in improving regulatory enforcement.

It was highlighted that certain structural changes including working methods and interaction with MSs and stakeholders will be necessary to streamline policy development and implementation.

The current problems will persist and might be further exacerbated in case no specific interventions are introduced in the coming years. The problems and challenges observed with the implementation of the Ecodesign Directive will continue to prevent it from reaching its full potential.

In 2019[376] the Commission estimated that inadequate market surveillance had led to between 10 and 25% of products on the market failing to meet the Ecodesign requirements, resulting in a loss of approximately 10% of envisaged environmental benefits. The new general Market Surveillance Regulation could increase effectiveness through e.g., improved general coordination and empowerments for Market Surveillance Authorities. However, the regulation is not specific to the challenges of Ecodesign enforcement (i.e. it covers mainly instruments focused on product safety rather than sustainability) and does not specifically address the lack of resources dedicated to Ecodesign enforcement. The current shortage of administrative capacities to ensure effective deployment of market surveillance mechanisms will likely persist. Therefore, insufficient market surveillance could continue compromising the competitiveness of compliant producers by

[376] European Commission 2019 New energy efficiency labels explained, link: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_19_1596

distorting fairness of competition with non-compliant products. In regards to this, many stakeholders are concerned with the competitiveness of sustainable products suppliers due to the unfair competition from non-compliant products suppliers:

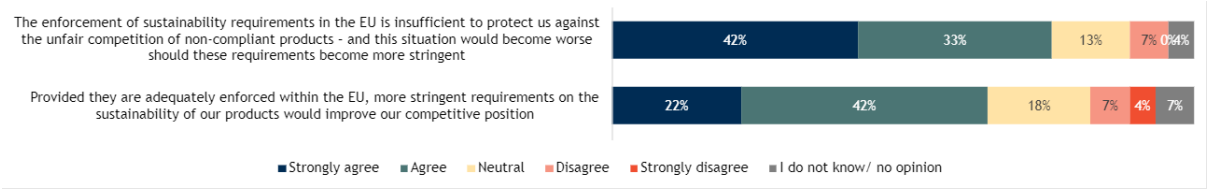


Figure 4 Stakeholder views on competitiveness aspects related to a strengthened application of the Ecodesign framework

In the 'no SPI' scenario, the administrative burden for the Commission, MSs and the industries related to the Ecodesign Directive will in principle remain at the current level (but could increase if new products will be regulated under it). The administrative and compliance costs for manufacturers differs between implementing measure for different products. The current annual administrative cost for each MS in relation to the current Ecodesign measures ranges, according to the interviewed stakeholders, between EUR 200 000 to EUR 1 million[377]. In the 'no SPI' scenario, towards 2030 the administrative and compliance cost should in principle remain constant (but could increase if new products will be regulated under it).

8.3. Sub-option 7a: Improve the current framework to increase efficiency

8.3.1. Economic impacts

8.3.1.1. Administrative burden

Administrative burden for economic operators

Increased data availability will likely measures that are easier to implement, thus decreasing the administrative burden. Additional data provision requirements for manufacturers, on the other hand, will likely slightly increase their cost burden.

The measure related to third-party conformity assessment will, if applied to specific product requirements, likely increase costs for businesses since they will not be able to rely on self-declaration for those requirements and would have to pay for the services of notified bodies.[378] The exact cost estimation will depend on the specific procedure identified in product-specific regulations, which in turn will depend on the nature of the relevant requirements. The impact assessment of the recently adopted Market Surveillance Regulation estimated average costs for conformity assessment procedures and relevant documentation applicable to specific kinds of electric motors to amount to approximately 0.3% of the revenues of companies.[379] The procedure chosen should specifically take into account impacts and proportionality for SMEs.

Administrative costs for the European Commission

The streamlining of the Ecodesign process and the increased availability of data under sub-option 7a is expected to decrease the costs per regulation for the Commission. The Commission will have to invest once in optimising the process, but the resulting savings will likely exceed this investment after several product regulations. Furthermore, additional availability of data from

[377] according to the consultations with MSs conducted under this impact assessment

[378] This was recognised in the 2015 review of the Energy Labelling Directive (2010/30/EU) and the Ecodesign Directive: "The main drivers for the burden for manufacturers are third party certification (options 2 and 3) and the extension of the scope to non-energy related products (option 3).", SWD(2015) 139 final

[379] EUR-Lex - 52017SC0466 - EN - EUR-Lex (europa.eu)

manufacturers will likely reduce administrative effort and further reduce the cost of preparatory studies. At the same level of complexity, therefore, a preparatory study will be less costly (including the cost for consultants).

Administrative burden for Member States

There will be some additional burden for MSs in so far as product-specific regulations prescribe the use of third-party conformity assessment in relation to specific requirements. In that case, costs will be associated with the assessment and surveillance of the competence and independence of notified bodies by notifying authorities. This will, however, could be balanced by possible reduced surveillance costs associated with the physical testing of products.

8.3.1.2. Direct economic impact for businesses

Although businesses will have to bear the costs for third-party conformity assessment, in case it is made compulsory for some products before placing them on the market, this will also likely lead to decreased non-compliance for those products leading to a more level playing field and increased business opportunities for compliant products.

8.3.1.3. Indirect economic impact for businesses

No indirect economic impacts are expected for businesses.

8.3.1.4. Economic impact for citizens

The economic impact for citizens stemming from the efficiency improvement of the Ecodesign framework in sub-option 7a consists of additional savings (in terms of energy demand reductions, but also for example increased durability and reparability of products) associated with the increase in the number of product regulations that can be processed with the same resources. Due to efficiency improvements through shorter lead times and more readily available and reliable market data, consumer savings would increase. The consumer expenditure is the combined expenditure for the purchase of products, the energy costs during usage, and for some products, the water costs during usage and/or installation and maintenance costs. The savings realised will depend on the product groups covered and the exact requirements imposed. Based on the 2015 Impact Assessment on the Review of the Energy Labelling Directive and the Ecodesign Directive[380], we can estimate a minimum of around EUR 3 billion annually.

8.3.2. Environmental impact

The process for the adoption of Ecodesign requirements for a product category is currently long and subject to avoidable delays[381] and this leads to regulations based on data and information that could be outdated. The improvement of the Ecodesign framework envisioned under sub-option 7a is likely to reduce adverse environmental impacts, due to a number of factors. First, it will be possible to process product regulations (including reviews) faster, thus to a certain extent limiting delays that represent missed opportunities. The possibility to collect sales and usage data would speed up, facilitate, and/or improve the quality of preparatory studies, as large parts of them consist of data collection. Second, the new process would also allow more parallel work and

[380] SWD(2015) 139 final, EUR 8.1 billion consumer savings is estimated for measures that include addressing the length of the process and low ambition of measures but also some issues that are tackled by other measures of the current Impact Assessment (i.e., joint market surveillance actions and non-energy environmental impacts), or not at all. By subtracting their estimated contribution we derive the figure quoted in the text.

[381] The process is planned to take roughly 40-42 months. It sometimes takes twice as long as planned (i.e. 84 months). See also 'EU action on Ecodesign and Energy Labelling: important contribution to greater energy efficiency reduced by significant delays and non-compliance', Special Report 01, January 2020, European Court of Auditors

better involve stakeholders. Third, better data and synergies with other regulations will increase the quality of the work and enhance the impact of the regulations accordingly.

The introduction of provisions related to third party certification will – where applied – contribute to a reduction of the risk of non-compliance as can be observed, for example, with the Construction Products Regulation.[382]

The measures under sub-option 7a are estimated to shorten the process by 4-6 months and may prevent further delays. A streamlined process would mean that the requirements for unregulated products (or for reviews of regulated ones) would apply earlier and would force manufacturers to start reducing the environmental impacts of their products earlier, contributing thus to a bigger overall reduction of negative environmental impacts.

8.3.3. Social impacts

The social impacts of this sub-option are more difficult to estimate than the environmental and economic impacts. A strengthened role of third-party conformity assessment may increase employment opportunities in this sector.

8.4. Sub-option 7b: Strengthen market surveillance by Member States

8.4.1. Economic impacts

8.4.1.1. Administrative burden

Administrative burden for economic operators

The digital provision of product data to Market Surveillance Authorities will increase the administrative burden for businesses. In so far as the required information exists (i.e., due to existing Ecodesign requirements or new ones) the administrative burden of registering products to e.g. a database will be minimal and only related to clerical work. The 2015 Impact Assessment on the Review of the Energy Labelling Directive (2010/30/EU) and the Ecodesign Directive has estimated this cost to be EUR 1.5 million per year for the entire industry for products in the current scope (i.e., energy-related products). In so far as the digital provision of information would be realised through the Digital Product Passport presented under Option 4, cost estimates are provided therein.

Administrative costs for the European Commission

Structural technical support to improve cooperation between Market Surveillance Authorities and to ensure sufficient capacities will likely permanently increase costs for the Commission. Common training for staff of notified bodies, notifying authorities and Market Surveillance Authorities will also increase the administrative burden of the Commission. The setup of the benchmark and reporting obligation for MSs and the establishment of requirements for market surveillance checks will likely create a small administrative burden on the Commission during setup.

Costs will derive from the need for additional staff to implement and organise technical support, training, benchmarking, and potential requirements. It is assumed this will require 2 additional FTE.

[382] European Commission (2019). Special review study: Assessment of appropriateness of a third party conformity assessment procedure for solid fuel boilers and solid fuel local space heaters: https://drive.google.com/file/d/1-NcEksnpUIVQbAxkO4JGu6Gn14ZQ_Ihq/view

In addition, funding will be needed to finance joint market surveillance and testing projects and Union testing facilities.

Administrative burden for Member States

Structural technical support to improve cooperation between Market Surveillance Authorities will likely make their operations more efficient and harmonised, and thus reduce their specific administrative burden. Common training for staff of notified bodies, notifying authorities and Market Surveillance Authorities will have a similar effect as the structural technical support and thus will reduce costs for these stakeholders. Publishing Market Surveillance Authorities penalties will likely create an initial burden with respect to system setup (or integration with existing systems, such as the ICSMS) and then involve low running costs for the actual publishing activities.

Setting up the benchmark and reporting obligation for MSs and especially establishing the requirements for market surveillance checks (in so far as introduced) will likely lead to a considerable cost increase of market surveillance. The new Market Surveillance Regulation allows Market Surveillance Authorities to recover the totality of the costs of their activities with respect to instances of non-compliance, which could compensate the cost increase to some extent.

Costs could also be partly covered through the participation of MSs to the Commission's Single Market Programme[383] or other Union funding.

8.4.1.2. Direct economic impact for businesses

Although businesses will have to bear costs related to the digital provision of product data to Market Surveillance Authorities, the actions under this sub-option will also likely lead to decreased non-compliance for those products leading to a more level playing field and increased business opportunities for compliant products.

8.4.1.3. Indirect economic impact for businesses

No indirect economic impacts are expected for businesses.

8.4.1.4. Economic impact for citizens

The main effect of strengthened market surveillance within sub-option 7b is a reduction of non-compliance. The 2020 EIA Status Report estimates the economic benefit for consumers from avoiding non-compliance related to current product regulations to be in the order of EUR 12 billion in 2030.[384] Assuming that non-compliance can only be reduced to a certain extent, thereby achieving only a proportion of the additional benefits (for example, up to 50%) through the measures in sub-option 7b, the economic benefit would still be at around EUR 6 billion. The benefits due to decreased non-compliance would come on top of the benefits deriving from the ability to process additional regulations/reviews connected to the measures under 7a (EUR 9 billion in total compared to baseline).

8.4.2. Environmental impacts

The increased capacities and effectiveness of national Market Surveillance Authorities envisioned under sub-option 7b is likely to increase the positive environmental effects of sub-option 7a.

The digital provision of relevant product information to Market Surveillance Authorities would allow a considerable efficiency increase with the associated environmental benefits. Common

[383] 15 million is foreseen annually in the current budgetary period (105 million total) to support market surveillance of Member States generally, see also https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/single-market-programme_en.
[384] Ecodesign Impact Accounting Status Report 2020.

training for the different parties involved in implementation and enforcement, as well as structural technical support to improve cooperation between Market Surveillance Authorities and ensure sufficient capacities would likely lead to further efficiency improvements and increase the likelihood of non-compliance detection. Publishing Market Surveillance Authorities penalties decisions would provide a further deterrent for non-compliance. These measures would also likely contribute to the harmonised application of the Ecodesign/SPI product regulations. The EEPLIANT project family has shown that increased harmonisation and cooperation between Market Surveillance Authorities can considerably increase the environmental effectiveness of Ecodesign.[385]

The measures related to benchmarking of and requirements for market surveillance activities provide tools to incentivise and, where necessary, ensure that Market Surveillance Authorities perform checks on a sufficient scale.

The 2019 EIA Status Report estimates that approximately 10% of environmental benefits of the current Ecodesign legislation are lost due to non-compliance. Assuming that the measures in sub-option 7b will, by increasing the scale and efficiency of checks and thereby reducing non-compliance, reduce lost benefits by 50%, this would translate into the reduction potential summarised in Table 36. It should be noted that these benefits are additional to the ones described in sub-option 7a.

Table 59 Yearly environmental reduction potential of sub-option 7b relative to baseline as percentages of EU totals; own calculations based on EXIOBASE v.3.8.1

GHG emissions	Human toxicity	Particulate matters	Photochemical ozone formation	Acidification	Eutrophication	Ecotoxicity	Land use	Resource depletion, water	Resource depletion, raw materials	Primary energy consumption
1.6%	0.7%	0.8%	0.9%	1.9%	0.5%	0.7%	0.2%	0.1%	1.6%	1.7%

8.4.3. Social impacts

The social impacts of this sub-option are also more difficult to estimate than the environmental and economic impacts. However, increased market surveillance and increased business opportunities for compliant products could lead to additional jobs.

8.5. Sub-option 7c: Reinforce EU level implementation and complement Member States' market surveillance

8.5.1. Economic impacts

Reinforcing EU level implementation and complementing MSs' market surveillance is likely to entail costs at EU level. The height of the costs will partly depend on the extent to which to which these support capacities need to be used to complement MS enforcement efforts.

As with sub-option 7b, sub-option 7c will contribute to tackling non-compliance, which will bring economic benefits.

[385] https://eepliant.eu/

8.5.1.1. Administrative burden

Administrative burden for economic operators

This sub-option could contribute to lowering the administrative burden for economic operators such as manufacturers and importers through clearer and more adapted requirements, as well as the provision of technical support to answer questions from economic operators related to the implementation of product-specific requirements.

Administrative costs for the European Commission

All measures envisioned under the sub-option would entail a significant administrative burden on the Commission due to the setting up of the necessary capacities for the wide range of products in scope.

The new Market Surveillance Regulation allows Market Surveillance Authorities to recover the totality of the costs of their activities with respect to instances of non-compliance; the same would apply to the European Commission.

The creation of a third-party channel for market surveillance would require initial costs for the setting up of a simple IT reporting system, in addition to running costs. As far as cases would be forwarded to the most relevant Market Surveillance Authorities, only limited additional staff capacity would be needed.

Administrative burden for Member States

The creation of complementary EU-level market surveillance would support Market Surveillance Authorities in their market surveillance, without creating any additional administrative burden.

8.5.1.2. Direct economic impact for businesses

The actions under this sub-option will also likely lead to decreased non-compliance for those products leading to a more level playing field and increased business opportunities for compliant products.

8.5.1.3. Indirect economic impact for businesses

No indirect economic impacts are expected for businesses.

8.5.1.4. Economic impact for citizens

Sub-option 7c would further strengthen market surveillance and thus the reduction of non-compliance. The 2020 EIA Status Report estimates the economic benefit for consumers from avoiding non-compliance related to current product regulations to be in the order of EUR 12 billion in 2020.[386] For sub-option 7b, a lost benefits reduction effectiveness of 50% has been assumed. With the additional creation of complementary EU level implementation and enforcement support capacities, it appears feasible that a reduction of 70% can be realised, leading to additional consumer savings of around EUR 2.5 billion compared to 7b. The benefits due to decreased non-compliance would come on top of the benefits deriving from the ability to process additional regulations/reviews connected to the measures under 7a (EUR 11.5 billion in total compared to baseline.

8.5.2. Environmental impacts

The creation of complementary EU level implementation and enforcement support capacities will likely lead to further environmental improvements beyond the other sub-options. It is assumed

[386] Ecodesign Impact Accounting Status Report 2019 (https://www.vhk.nl/downloads/Reports/EIA/EIA%20Status%20Report%202019%20-%20VHK20201028.pdf)

that the measures in sub-option 7c can further reduce non-compliance and thereby reduce lost benefits by 70%. The results for the individual impact categories are summarised in Table 37, for the energy-related products currently regulated under Ecodesign. It should be noted that these benefits are additional to the ones described in sub-option 7a and 7b. In addition, putting in place EU level support capacities would better allow to tackle new challenges that could emerge with the broadening of products and requirements envisaged.

Overall, sub-option 7c would be associated with reduced GHG emissions of around 22 Mt CO2e, with a monetary value of around EUR 2.2 billion in 2030. This is around 8% of the reduction in greenhouse gas emissions in 2030 due to energy saving.

Table 60 Yearly environmental reduction potential of sub-option 7c relative to baseline as percentages of EU totals; own calculations based on EXIOBASE v.3.8.1

GHG emissions	Human toxicity	Particulate matters	Photochemical ozone formation	Acidification	Eutrophication	Ecotoxicity	Land use]	Resource depletion, water	Resource depletion, raw materials	Primary energy consumption
1.8%	0.8%	0.9%	1.0%	2.1%	0.6%	0.8%	0.2%	0.1%	1.8%	1.8%

8.5.3. Social impacts

The social impacts of this sub-option are more difficult to estimate than the environmental and economic impacts. The EU level implementation and enforcement support capacities may induce additional employment demand.

8.6. Impacts on third countries

Manufacturers in third countries are affected in the same way as European manufacturers by the measures in sub-option 7a related to streamlining and third party conformity assessment. Sub-options 7b and 7c are mostly unlikely to have a direct effect on third countries, as the majority of the measures are aimed at MSs and their cooperation with the Commission. The digital provision of product information may place an additional burden on foreign manufacturers or importers in a similar way to data collection in sub-option 7a. The other measures in sub-options 7b and 7c likely have similar effects on manufacturers in third countries as on domestic manufacturers.

8.7. Summary of impacts

Table 61 Administrative burden of PO7

Administrative burden Option 7					
		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent
Sub-option 7a	Direct costs	- Infrastructure for additional data provision requirements	- Expenses for third party conformity assessment	- Investment in process optimisation	- Assessment and surveillance on the competence and independence of notified bodies
	Indirect costs	n.a.			
Sub-option 7b	Direct costs	- Infrastructure for additional data provision requirements	- Expenses for product data provision	- System setup for provision of product data to MSAs (or integration with existing systems)	-- Expenses Commission staff for training, technical support etc. (~2 FTE, p.a.) MS expenses for reporting obligation and market surveillance checks
	Indirect costs	n.a			
Sub-option 7c	Direct costs	n.a.	n.a.	-	-- Staffing at the Commission and budget to coordinate additional testing with MS. Contracts with external laboratories

	Indirect costs	n.a.

Table 62 Economic impacts of PO7

Economic impacts				
Description	***Amount/qualitative***			***Comments***
	Option 7a	***Option 7b***	***Option 7c***	
Direct impacts				
Consumer savings through increased benchmarks due to shorter lead times of Ecodesign process	+ At least 3 billion Euros	+ At least 3 billion Euros	+ At least 3 billion Euros	Higher savings on energy costs through higher benchmarks in sub-option 7a
Additional consumer savings through reduction of non-compliance	n.a.	++ 6 billion Euros	++ 8.5 billion Euros	Increased effectiveness of successively increased market surveillance in sub-options 7b and 7c
More level playing field and increased business opportunities for compliant products	+	++	++	Decrease in non-compliant product on the market
Indirect impacts				
n.a.				

Table 63 Environmental impacts of PO7

Environmental impacts				
Description	***Amount/qualitative***			***Comments***
	Option 7a	***Option 7b***	***Option 7c***	
Direct impacts				
Improvement potential due to efficiency increase	+	+	+	Due to reduced lead time for implementing actions in sub-option 7a
Additional improvement potential relative to baseline due to increased market surveillance	n.a.	+ 0.1 – 1.9% depending on impact category	+ 0.1 – 2.1% depending on impact category	Increased market surveillance in sub-options 7b and 7c assumed to successively reduce non-compliance
Indirect impacts				
n.a.				

Table 64 Social impacts of PO7

Social impacts				
Description	***Amount/qualitative***			***Comments***
	Option 7a	***Option 7b***	***Option 7c***	
Direct impacts				
Additional employment demand through measures	+	+	++	Some measures may create additional employment demand in the private sector (third party conformity assessment) or public sector (the Commission or Market Surveillance Authorities)
Indirect impacts				
n.a.				

Annex 11: Comparison of the options

OPTION 2: EXTENSION OF THE PRODUCT SCOPE OF ECODESIGN LEGISLATION

Overview of Policy Option 2

Sub-Option 2a: Extension to Circular Economy Action Plan priority products (not addressed through separate legislation), and energy-related products, including means of transports, textiles, furniture, high-impact intermediary products and chemicals.

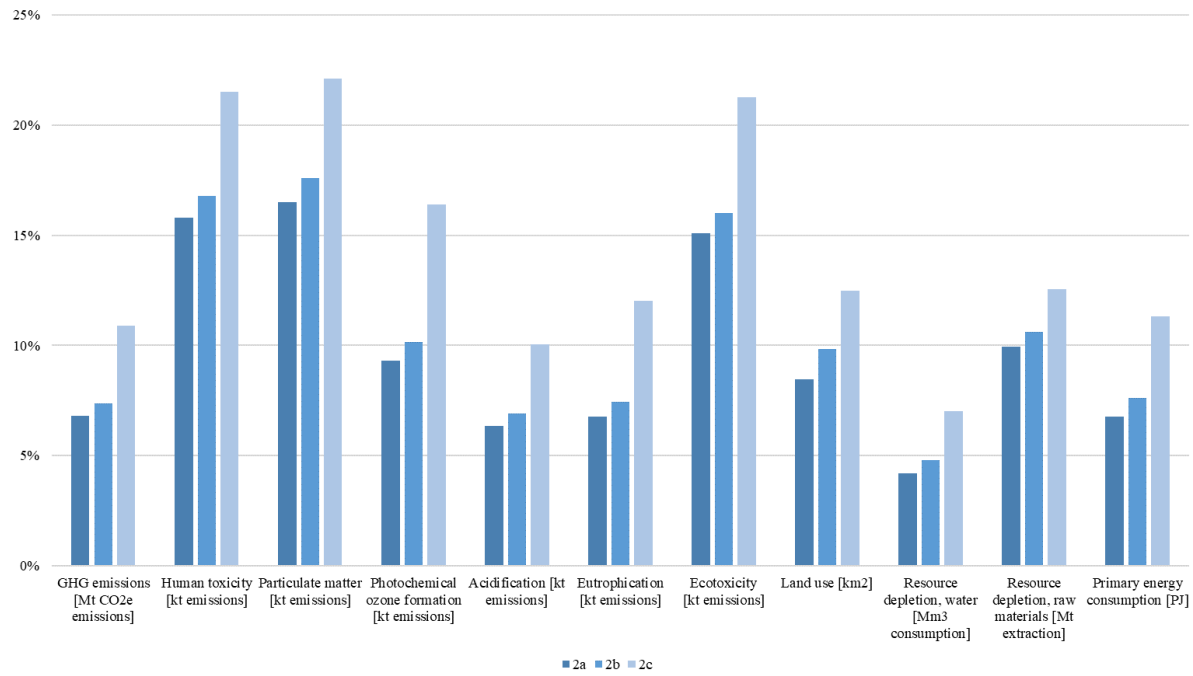
Sub-Option 2b: Extension beyond sub-option 2a to all physical goods.

Sub-Option 2c: Extension beyond sub-option 2b to all services.

The product scope determines the population of products that can be regulated. Their current economic and environmental impacts provide an indication of the scale of what could be regulated. Table 58 provides an overview of this potential coverage using key indicators.

Table 65 Potential coverage of sub-options with respect to economic and environmental indicators; percentages represent shares of EU totals; source: own calculations based on EXIOBASE v.3.8.1 (see Annex 4 for details)

	Economic importance				Environmental impacts										
Policy Option	Final demand [bn€]	Employment [1000 Persons]	Total exports [M€]	Total imports [M€]	GHG emissions [Mt CO2e emissions]	Human toxicity [kt emissions]	Particulate matter [kt emissions]	Photochemical ozone formation [kt emissions]	Acidification [mt emissions]	Eutrophication [kt emissions]	Ecotoxicity [kt emissions]	Land use [thousand km2]	Resource depletion, water [Mm3 consumption]	Resource depletion, raw materials [Mt extraction]	Primary energy consumption [PJ]
BAU	483	7,009	417,444	252,637	2,366	37	2,201	6,951	2,083	4,902	49	302	35,803	7,375	32,381
	4%	3%	15%	11%	49%	22%	25%	27%	59%	16%	21%	5%	4%	50%	51%
2a	3,079	47,004	1,149,432	811,960	3,030	103	5,230	11,650	2,531	9,524	134	1,381	136,196	10,014	41,698
	23%	22%	42%	36%	63%	60%	60%	46%	71%	31%	58%	23%	14%	68%	66%
2b	3,441	51,754	1,350,346	1,005,194	3,145	109	5,608	12,501	2,609	10,332	142	1,736	159,255	10,436	43,830
	26%	24%	49%	44%	65%	64%	64%	49%	74%	34%	61%	29%	17%	70%	69%
2c	10,257	163,800	2,370,454	1,753,787	3,999	150	7,595	20,531	3,173	17,410	203	2,546	265,032	11,871	55,681
	78%	77%	86%	77%	83%	88%	87%	81%	90%	57%	88%	42%	28%	80%	88%



	GHG emissions	Human toxicity	Particulate matter	Photochemical ozone formation	Acidification	Eutrophication	Ecotoxicity	Land use	Resource depletion, water	Resource depletion, raw materials	Primary energy consumption
2a	6,8%	15,8%	16,5%	9,3%	6,4%	6,8%	15,1%	8,5%	4,2%	10,0%	6,8%
2b	7,4%	16,8%	17,6%	10,1%	6,9%	7,4%	16,0%	9,8%	4,8%	10,6%	7,6%
2c	10,9%	21,5%	22,1%	16,4%	10,1%	12,0%	21,3%	12,5%	7,0%	12,5%	11,3%

Figure 1 Environmental reduction potential of the policy options relative to baseline as percentages of EU totals; own calculations based on EXIOBASE v.3.8.1

Table 66 Qualitative comparison of the impact of the options with regard to the specific objectives - the extent to which the different sub-options allow achieving the (specific) objectives

Specific objective	Baseline	Option 2a	Option 2b	Option 2c
Improve product sustainability				
Better access to sustainability information along value chain.				
Incentivise more sustainable products and business models to improve value retention				
Improve application of sustainable product legislative framework				

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

1.1. Sub-option 2a

***Effectiveness in achieving the specific objectives*:** By expanding the scope of Ecodesign to include the priority products of the CEAP, the environmental improvement potential of this sub-option can double that of the current Ecodesign legislation for some impact categories, including GHG emissions. For other impact categories, the effect is more pronounced as Ecodesign currently predominantly has impacts on energy savings / GHG emissions. Relative to EU totals, the reduction potential ranges from 4 to 16%, depending on the impact category.

***Efficiency*:** The above environmental impacts stand against additional administrative costs at the EU level of approximately EUR 4 million per year. In addition, EUR 10 million for preparatory studies would have to be expended in the coming years.

***Coherence*:** Internally, the scope extension is highly coherent with sub-option 3a regarding existing and additional sustainability requirements on a product level. Coherence also exists with sub-option 3b, which would introduce more far-reaching sustainability requirements and refer to entire product groups. A new sustainable product framework regulation in sub-option 3c would at least partially constitute a substitute for the Ecodesign Directive. Coherence is also given with POs 5 and 6, since they complement the requirements on product design with incentives and circular business models mainly addressing later stages of the product life cycle. The sub-option is also highly coherent with PO 7, which constitutes a strengthened application of the Ecodesign framework and thus supports the scope extension.

Regarding external coherence, the scope extension would be well suited to cover life cycle impacts of products that are not systematically covered by existing legislation. However, due to the inclusion of construction and motor vehicles, it may display some overlap with the Construction Products Regulation and the ELV Directive.

1.2. Sub-option 2b

***Effectiveness in achieving the specific objectives*:** The inclusion of the remaining physical product categories only ensures limited additional environmental benefits. As a result, the environmental effects of sub-option 2b are similar to those of sub-option 2a: the reduction potential ranges from 5 to 18% of EU totals (compared to 4 to 16% under sub-option 2a), depending on the impact category.

***Efficiency*:** The above-mentioned improvement potentials stand against additional EU-level administrative costs of approximately EUR 4.2 million. The amount for preparatory studies would increase to approximately EUR 11 million. As environmental benefits, also costs are thus estimated to only increase marginally compared to sub-option 2a.

***Coherence*:** The internal coherence is not influenced by the further scope extension. Externally, the inclusion of the remaining physical products, which includes plastics, may create overlaps with the Packaging and Packaging Waste Directive and the Single Use Plastics Directive.

1.3. Sub-option 2c

Effectiveness in achieving the specific objectives: The additional inclusion of all services would provide a considerable environmental improvement compared to the baseline and would increase the impacts of sub-option 2b by more than 50% in most impact categories. The reduction potential thus ranges from 7 to 22% of EU totals, depending on the impact category.

***Efficiency*:** Since the additional costs of including all services could not be quantified, estimating the effectiveness of this sub-option is difficult. However, as outlined already, costs are likely to increase disproportionately with the inclusion of services, since services are heterogeneous and therefore the administrative requirements high.

***Coherence*:** The inclusion of services would not reduce the scope extension's internal or external coherence.

Table 67 Summary of benefit assessment

Benefits				
Description	***Amount***			***Comments***
	Option 2a	***Option 2b***	***Option 2c***	
Direct benefits				
Reduction of negative environmental impacts through regulation of more products	++	++	+++	Larger share of overall environmental impacts covered
Scope extension implies additional emphasis on environmental impacts beyond use phase energy consumption	++	++	+++	Wider range of environmental impacts covered
Indirect benefits				
Ecodesign framework gets introduced to new communities	+	+	+	Extension of framework to non-energy-related products

1.4. Cost estimates – industry

Inputs on the cost increase were provided by nine industry associations representing the battery, home appliances, packaging and textile industries. Those industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: +) less than 1% cost increase, ++) between 1% and 5% cost increase and +++) more than 5% cost increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (when data is missing or the measure is not deemed detailed enough).

Calculating the shares of the cost increase levels (+, ++ and +++) across the nine industry associations reveals that the top three cost drivers are measures for reusability, upgradability and reparability (a total share 65% of +++), for design for recycling, dismantling and recovery (64% of +++), and for design for repair and reuse (57% of +++).

More specifically, costs would be especially driven by third party verification if needed (and external audits if mandatory) and by the length of the minimum availability period (for spare parts). Also, numerous requirements would require the upgrade of IT systems.

Regarding the requirement on energy and performance efficiency during use phase, stakeholders declared that since many efforts have been already made over the last decades, further improvements will need higher investments as well as more development capacity.

Particularly, SMEs in the sectors covered by the Ecodesign Directive will face an increase in compliance costs, in regards to adapting aspects of operation, such as raw material requirements, product design, post first use and end of life. Any compliance costs which are fixed will weigh more heavily on SMEs.

Table 68 Share of respondents estimating the cost of individual measures to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	Measures (Requirements)	+	++	+++
2a-b-c	for availability of spare parts for repair	56%	11%	33%
2a-b-c	for considering energy efficiency	39%	11%	50%
2a-b-c	for considering recycling as evaluation criteria	39%	11%	50%
2a-b-c	for considering reusability, upgradability and reparability	25%	10%	65%
2a-b-c	for considering use of hazardous substances as evaluation criteria	60%	10%	30%
2a-b-c	for design for recycling, dismantling and recovery	36%	0%	64%
2a-b-c	for design for repair and reuse	43%	0%	57%
2a-b-c	for marking if hazardous substances are used	67%	14%	19%
2a-b-c	for marking plastic components	71%	0%	29%
2a-b-c	for recycling avoiding pollution	55%	9%	36%
2a-b-c	for repair and maintenance	71%	10%	19%

2a-b-c	on energy and performance efficiency during use phase	44%	11%	44%
2a-b-c	on energy efficiency during use phase	64%	9%	27%
2a-b-c	on information relevant for disassembly and recycling	67%	8%	25%

Source: Own calculations based on inputs from Industry associations

1.5. Cost estimates – administration

MS representatives from Sweden, Belgium and the Netherlands were asked during interviews to estimate the additional costs in terms of FTEs generated by the measures of PO2. They underlined the fact that the number of requirements to be reviewed by the Authorities significantly increases conformity costs and outsourcing costs (since MSs may lack the facilities to conduct in-house conformity reviews).

While calculating exact estimates was not possible, some relevant insights shared included: 1) one of the MSs stated that the number of additional FTEs per requirement is equal to 2 FTEs or more, with a small economy of scale (as the marginal costs of conformity review are assumed to slightly decrease conditional on the number of requirements); 2) another MS referred to the current staffing of 20 people working at 80%, and in charge of 40 regulations and 30 product groups, including staffing for internal testing at the agency in charge. In case the scope is expanded to additional product groups, limited economies of scale were expected, namely in relation to the methodological approach applied (which can be horizontal and increase efficiency); and 3) another MS provided an estimate of the current budget, which is between EUR 200 000 and 350 000, compared a approximately EUR 700 000 for Energy Labelling, with the main reason explaining the difference being that the Ecodesign department is part of a larger entity and represents a small activity, as its priority is lower compared to e.g. safety. All MSs highlighted the issue of understaffing, especially in federal countries, that might imply an even higher number of additional FTEs.

Stakeholders' views on the choice of options

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out provide insights into the favoured option.

Several stakeholders asked for the initial focus of the SPI to be on the priority sectors proposed by the CEAP. Other industry representatives would be on board with an extension of the scope to all products. Services were deemed unnecessary to include. They emphasised the need for ensuring that there is no overlap with other regulations and providing robust enforcement and market surveillance.

Member State representatives found it important to add additional products to the Ecodesign Directive scope. However, they believed it would be premature to add services to the scope. Concerning EU citizens, NGOs and environmental groups, the majority want an extension to all products. No significant support for extension to services could be foundSince SMEs indicated a need to have harmonised requirements on products sold in the EU, this would suggest that SMEs would be in favour of extending the scope of the Ecodesign Directive to other products. However, a distinction of which type of products is not elicited from SMEs in the consultation process.

1.6. Assessment of subsidiarity and proportionality

Subsidiarity assessment

The subsidiarity attested to the Ecodesign Directive (2009/125/EC), as set out in whereas 41, holds for all sub-options, since responsibilities between EU and MS authorities do not change in the context of the scope extension.

Proportionality assessment

All sub-options should be considered to comply with the proportionality principle, since the scope extension constitutes a necessary contribution to the achievement of the EU's sustainability goals.

1.7. Preferred sub-option

Based on the above observations, sub-option 2a appears to generate the highest benefit in relation to costs and potential issues regarding coherence with other legislation. In particular, it is capable to double the potential of the current Ecodesign legislation to reduce the environmental impacts of products on the EU market. However, with a view towards future developments in production processes, product distribution, use and disposal, as well as changing evidence on environmental impacts of specific product groups, it appears feasible to define the scope of SPI more broadly to also account for product groups that are not in the CEAP priority list. While the current environmental benefits of sub-option 2b are only marginally bigger than those of sub-option 2a, this may change in the future. At the same time, the additional costs of including the remaining physical products under sub-option 2b are estimated to be on the order of a 10% increase. Against this background, sub-option 2b appears more future proof than sub-option 2a and is therefore the preferred option.

OPTION 3: EXTENSION OF SUSTAINABILITY REQUIREMENTS FOR PRODUCTS

Under PO3, a number of new or reinforced sustainability requirements on products, understood as minimum requirements allowing the placing of these products on the EU market, would be introduced through measures adopted under the revised Ecodesign legislation. Possible dimensions covered by this PO include (i) several circularity aspects (durability, reusability, upgradability, reparability, recyclability, recycled content, remanufacturing and high-quality recycling, restricting certain products or materials in products, countering premature obsolescence, etc.); (ii) improved energy and resource efficiency; (iii) reduced carbon and environmental footprints; and (iv) social aspects along the value chain of products.

Overview of Policy Option 3

Sub-option 3a Enhanced sustainability requirements: Reinforce the circular economy requirements of the Ecodesign Directive whose potential has not been fully exploited yet and add new requirements on the product sustainability of products through existing legislation.

Sub-option 3b Far-reaching sustainability requirements: Develop horizontal requirements for a broad range of products, set minimum requirements on remanufacturing, and introduce the requirements on social aspects along the value chain of products.

Sub-option 3c Ban some products: Allow for the possibility of explicitly prohibiting certain products or materials, based on a clear set of assessment criteria.

Table 69 Qualitative comparison of the impact of the sub-options with regard to the specific objectives - the extent to which the different sub-options allow achieving the (specific) objectives

Specific objective	Baseline	Option 3a	Option 3b	Option 3c
Improve product sustainability				
Improve access to sustainability information along value chains.				
Incentivise more sustainable products and business models to improve value retention				
Improve application of sustainable product legislative framework				

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

Sub-option 3a

Effectiveness in achieving the specific objectives:

As it directly targets the problem 1 and specific objective 1, the effectiveness of sub-option 3a is high. Also, some of the measures under suboption 3a are already being tried out in recent Ecodesign implementing measures (3a1 and 3a2), are provided for in the future Battery Regulation (3a4) and are also at the centre of the review of the ELV Directive. In addition, some of the measures under this sub-option are also considered in the upcoming Ecodesign- and Energy Labelling implementation measures on mobile phones and tablets.

Also, the measure on high-quality recycling is likely to ensure synergies with and make a positive contribution to increasing the supply of high-quality recycled content/secondary material. Demand for the latter will itself be boosted by the minimum requirements on recycled content under this sub-option. Furthermore, extending the coverage to non-energy products, it will be effective covering a wider range of products.

In conclusion, sub-option 3a is likely to be effective, as most of the measures have either already been tried out or show great potential.

Efficiency: Sub-option 3a is expected to be quite efficient, as some of the requirements covered by the measures under this sub-option are already being applied through the Ecodesign Directive (to energy-related products where the implementing measures show high benefit/cost ratio) as well as via relevant policies in some MS. For some sectors, such as repair, refurbishment, etc., the economic impacts will be positive, as the measures will result in a growth of these markets.

Coherence: Sub-option 3a, setting minimum requirements (circularity aspects) on products placed on the market, will be internally coherent with other POs and externally coherent with the existing waste, product and resource policies. Externally, it will support parallel initiatives such as the Green Claims Initiative, the Empowering Consumers for the Green Transition Initiative and Circular Electronics Initiative.

Sub-option 3b

Effectiveness in achieving the specific objectives: Regarding sub-option 3b, and specifically the horizontal requirements covering product groups (3b1), a successful example exists of horizontal standby and network standby provisions under the Ecodesign legislation, targeting electrical and electronic products. As for minimum requirements on remanufacturing (3b2), given that most remanufacturing initiatives are currently pushed by the industry itself, a minimum requirement is expected to bring added value and boost the market possibilities for remanufactured products (with measures under PO6 potentially helping to develop business models to encourage remanufacturing). Regarding the due diligence on the supply chain of products (3b3), as the value chains are spread globally, the effectiveness depends on the clarity of the requirements, their synergies with other related requirements (e.g., under other initiatives) and their ability to be enforced in third countries (e.g., in the textile sector). The Digital Product Passport (PO4) – if chosen – could facilitate fulfilling this due diligence requirement and conveying the related information.

Efficiency: Sub-option 3b further increases the environmental benefits of sub-option 3a thanks to the remanufacturing and due diligence requirements, bringing positive environmental impacts in third countries as well. Also, the cost of development, implementation, compliance and enforcement for requirements covering a group of products is lower than for requirements applying to individual products, which could make this sub-option even more efficient than sub-option 3a.

Coherence: Internally, sub-option 3b ensures the same level of coherence with other POs as sub-option 3a. Externally, it will support parallel initiatives such as the Green Claims Initiative, the

Empowering Consumers for the Green Transition Initiative and the Circular Electronics Initiative.

Sub-option 3c

Effectiveness in achieving the specific objectives: Sub-option 3c would be effective in principle as it will include all eco-design measures defined under 3a and 3b plus targeted bans. The effectiveness of sub-option 3c derives also from the simplicity of the measure of banning some products. However, clear criteria would need to be developed for setting these bans.

Efficiency: Banning the most unsustainable products is a cost-effective way of reducing the impacts of products. However, the cost of replacing banned material/product could have negative economic impact on several stakeholders along the value chain and end users as well.

Coherence: Internally, sub-option 3c ensures the same level of coherence with other POs as sub-option 3a and 3b. Externally, it will support parallel initiatives such as the Green Claims Initiative and the Empowering Consumers for the Green Transition Initiative by simplifying the choice of consumers and removing a potential source of misleading claims.

Table 70 Summary of Benefit assessment

Benefits				
Description	***Amount***			***Comments***
	Option 3a	***Option 3b***	***Option 3c***	
Direct benefits				
Health benefits	+	++	++	Health benefits would be both direct (removal of harmful substances/products) and indirect (through better environment)
Environmental or ecological benefits	++	++	+++	Sub-option 3b will lead to benefits in the third countries as well because of due diligence.
Improved market efficiency	+	++	++	All sub-options will improve market efficiency.
Indirect benefits				
Benefits from third-party compliance	++	+++	+++	Sub-option 3b will also lead to benefits to several actors of the value chain because of due diligence.
Achieving internal market	++	++	++	This option will harmonise the requirements and thus create a level playing field for the internal market.

Enhanced protection of SMEs	++	++	++	Most of the circularity related businesses are SMEs and this PO will bring additional benefit and protection to them.

Cost estimates – industry

Inputs on the cost increase were provided by nine industry associations representing the battery, home appliances, packaging and textile industries. Those industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: +) less than 1% cost increase, ++) between 1% and 5% cost increase and +++) more than 5% cost increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (when data is missing or the measure is not deemed detailed enough).

Calculating the share of the cost increase levels (+, ++ and +++) across the nine industry associations reveals that the top three cost drivers are the measures banning some products or some materials in specific products (53% of +++), imposing minimum requirements on re-manufacturability and minimum requirements to reduce the carbon and environmental footprints (both 38% of +++), and imposing minimum requirements on recycled content on the product or components (37% of +++).
Moreover, costs would be additionally driven by the need to increase testing capacities (investment in test equipment and space), the adaptation of production technology and the (extensive) LCAs to be performed for each type of product (time intensive). The verification costs for incoming raw materials would also significantly increase (according to two industry associations from the home appliances sector), especially if third party verification is needed.
Regarding the requirement on energy and performance efficiency during use phase, stakeholders declared that since many efforts have been already made over the last decades, further improvements will need higher investments as well as more development capacity.
Overall, industry associations estimate that more staff will be needed in the field of testing, quality management, warehouse management and marketing.
At the sub-option level, industry associations' inputs revealed that sub-option 3c is estimated to be costlier (53% of +++) than sub-option 3a (24% of +++) and sub-option 3b (25% of +++).

Any fixed costs related to testing equipment/paid studies on energy performance and verification would impact SMEs more than larger businesses.

Table 71 Share of respondents estimating the cost of individual measures to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	Measures	+	++	+++
3a	Minimum requirement on the durability (technical lifetime) or reliability (mean time between failures) of the product or its components	26%	50%	24%
	Minimum requirements on recycled content on the product or components (e.g. plastic parts)	20%	43%	37%
	Minimum requirements on reparability and upgradability	74%	13%	13%
	Minimum requirements to reduce carbon and environmental footprints through minimum requirements set at process and/or life cycle environmental impact(s) level	41%	22%	38%
	Requirements enabling high-quality recycling	57%	19%	24%
	Restricting the presence of substances hindering circularity	68%	28%	4%
	Restricting the presence of substances of concern	0%	75%	25%
3b	Allow for the adoption of requirements covering groups of products (horizontal sustainability requirements)	86%	9%	5%
	Compliance with international labour conventions	100%	0%	0%
	Minimum requirements on re-manufacturability	54%	8%	38%
	Requirements enabling high-quality recycling	100%	0%	0%
	Requirements of due diligence on the supply chain of products	50%	15%	35%
3c	Measures banning some products or some materials in specific products like in the Single-Use Plastics Directive	47%	0%	53%

Source: Own calculations based on inputs from Industry associations

Notes: PO3b also includes PO3a measures while PO3c is calculated based on the PO3c measures only, independently of the measures contained in PO3a and PO3b.

Table 72 Share of respondents estimating the cost of individual sub-options to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	+	++	+++
PO3a	45%	31%	24%
PO3b (includes PO3a)	50%	25%	25%
PO3c (includes PO3b)	47%	0%	53%

Note: figures correspond to the total share of +, ++ and +++ by sub-options.

Cost estimates – administration

MS representatives from Sweden, Belgium and the Netherlands were asked during interviews to estimate the additional costs in terms of FTEs generated by the measures of PO3. In this context, they underlined the costs related to verification procedures, especially those related to "due diligence", since they might require sending inspectors to countries of production of intermediary goods (within and outside the EU). In any case, the highest additional costs (significantly more than two FTEs) would be implied by the compliance with and enforcement of effective bans of products (Sub-option 3c). One to two additional FTEs would also be required for the legislative part at the MS level related to the enforcement of the bans or single use restrictions.***Stakeholders' views on the choice of options***

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out provide insights into the favoured option.

Support mostly came from NGOs, environmental organisations and consumer organisations. They believe this is the most effective way of reducing the environmental impact of products since consumers are not ready for increased final product prices. For EU citizens, the most impactful measure would be for manufacturers to prove that the design of products is capable of being reused, repaired, shared, upgraded, and recycled. Mainly MS representatives supported the use of the PEF method.

For all proposed measures under the third policy option, industry representatives were less enthusiastic than the other consulted stakeholders. They still showed a preference for establishing a fixed and clear set of far-reaching sustainability requirements. They placed the highest importance (40% of industry respondents) on the provision of binding rules to improve durability, re-usability, upgradability and reparability. Some concerns were mentioned by industry representatives about the potential costs in testing these requirements.

In particular, SMEs indicate a preference for setting requirements to oblige producers to improve product durability, reusability, upgradability and reparability at product level.

Assessment of subsidiarity and proportionality

Subsidiarity assessment

The measures proposed under PO3 comply with the subsidiarity principle, as the following objectives, pursued by said measures, cannot be reached by MSs alone: (i) ensuring a levelplaying field for EU businesses; (ii) guaranteeing a uniform implementation across the single market; and (iii) ensuring the cost efficiency of setting up a single set of measures to avoid different compliance requirements in different -MSs.

Proportionality assessment

Sub-option 3b provides the necessary means to solve the problem/achieve the objective satisfactorily, and ensure effective enforcement. The costs are proportionate to the objectives and the additional costs related to the supply chain due diligence are justified by the positive potential impacts on global supply chains. Finally, thanks to existing policies (Ecodesign and Product Labelling), certain businesses and public authorities are already familiar with the compliance and enforcement procedures, which is expected to ease adaptation.

Preferred sub-option

Sub-option 3b is the preferred option, as it will bring considerable benefits by introducing some changes to existing policies without imposing significant costs.

More in detail, the minimum requirements on re-manufacturability have the potential to drive market possibilities and demand for remanufactured goods. As for due diligence (measure 3b.3), despite the fact that it could entail tangible costs and administrative burdens (for both the industry and public authorities), this measure is expected to have an overall positive influence on suppliers, including those in third countries. Moreover, the due diligence requirement would fit well with sub-option 4b on the Digital Product Passport, which would facilitate its implementation. In any case, its effectiveness depends on the clarity of the requirements to be set as well as on their synergies with other related requirements and their ability to be enforced, including in third countries (e.g., in the textile sector). Nevertheless, elaborating these requirements via SPI measures will allow to set rules with an appropriate level of detail and precision, where necessary on a product-specific basis.

Therefore, sub-option 3b would bring added value, but interactions with other POs need to be carefully considered.

Option 3c seems difficult to justify as it could have disproportionate costs

OPTION 4: SUSTAINABILITY INFORMATION FOR CONSUMERS AND B2B

Sub-option 4a: Enhanced information requirements - Making better use of existing provisions, such as the ecological profile; strengthening the importance of information requirements for circularity (including durability and reparability scoring systems); and making available via digital means on a voluntary basis relevant sustainability-related information.

Sub-option 4b: European Digital Product Passport - Creating a European Digital Product Passport that makes information available to third parties in a digital format (using the same open digital standard).

Sub-option 4c: Generalised European Digital Product Passport - Creating a limited number of "cross-sectoral" requirements in a European Digital Product Passport applicable to any product in the scope of the SPI placed on the market and possibly adding product-specific requirements to the product passport via SPI measures.

Table 73 Qualitative comparison of the impact of the sub-options with regard to the specific objectives - the extent to which the different sub-options allow to achieve the (specific) objectives

Specific objective	Baseline	Option 4a	Option 4b	Option 4c
Improve product sustainability				
Improve access to sustainability information along value chains				
Incentivise more sustainable products and business models to improve value retention				
Improve application of sustainable product legislative framework				

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

The following paragraphs explain the results shown in the table along effectiveness, efficiency and coherence. Summary tables of the benefit, cost and coherence assessment are provided afterwards, as well as stakeholders' views on the choice of the option.

The baseline scenario includes a number of information requirements, which are, however, limited to a few topics and sectors. As a result, its contribution to the specific objectives is reduced.

Sub-option 4a

Effectiveness in achieving the specific objectives: by creating information requirements on a number of topics, sub-option 4a will first of all provide better access to sustainability information along the supply chain. Indirectly, it is expected to incentivize more sustainable products and business models, as customers (businesses, public procuring agencies and final consumers alike) can select sustainable options more easily and be better informed about the environmental impact of their purchases. In the long term, product sustainability should be improved.

Efficiency: sub-option 4a contains all the information requirements measures of PO4, which are the main drivers of the environmental impact and offer a net advantage compared to the baseline in terms of supporting sustainable purchase. However, it does not provide for a harmonised way of collecting, communicating and making accessible the information. While this approach is flexible and allows companies to adapt their investments, it might result in part of the information not being exploited to its fullest potential and could lead to a lack of interoperability between information provided by different actors along the value chain. Notably, it increases MS surveillance needs, as they are not provided with a specific tool to access all the information made available. In terms of social impacts, sub-option 4a will contribute to the evolution of the labour market, as some sectors will grow and other decline, although this is supposed to be a rather indirect effect. Finally, the introduction of social indicators should support better working conditions.

Coherence: Internally, sub-option 4a essentially supports the implementation of the environmental sustainability requirements placed on products, introduced in sub-option 3a, but also included in 3b and 3c. Also, by introducing classes of performance, it enables their use by MSs to support reputational and economic incentives under sub-option 5b. Externally, it will support ongoing initiatives such as the Green Claims Initiative.

Sub-option 4b

Effectiveness in achieving the specific objectives: sub-option 4b integrates the information requirements of sub-option 4a into a coherent and consistent digital system. The introduction of the European Digital Product Passport will greatly increase the ease of sharing and accessing information, and ensure interoperability and consistency of the information reported. That way, it will reach the specific objective of improving access and exchange of sustainability-related information along value chains.

Efficiency: by introducing the European Digital Product Passport, a very powerful tool for all stakeholders affected along the value chain (companies, procurers, consumers and authorities), sub-option 4b will increase the efficiency of the measures already included in sub-option 4a. This is expected to increase the environmental, economic and social impact of the PO, with the cost-benefit ratio expected to be in favour of the European Digital Product Passport.

Coherence: Externally, the European Digital Product Passport, relying on a consistent set of technical and open standards, will ensure a steady flow of consistent and coherent information also between different policies built around environmental and social life cycle information (e.g., Green Claims Initiative, taxonomy, carbon border adjustment mechanism, Batteries Regulation, Construction Products Regulation, EU Ecolabel, etc.). Internally, the introduction of the European Digital Product Passport will also support the efficiency provided by sub-option 7b, which includes a measure to make relevant product information digitally available to Market Surveillance Authorities. In addition, coordination with the SCIP database could help mitigate the administrative burden on companies under this legislation.

Sub-option 4c

Effectiveness in achieving the specific objectives: sub-option 4c implements the European Digital Product Passport according to a different strategic approach, foreseeing two sets of information (called "attributes"): (i) an horizontal limited number of "cross-sectoral" attributes applicable to all products in the scope of the SPI and already identified as part of the main legal text; and (ii) whenever relevant and appropriate, a set of product-specific attributes to be identified when developing SPI measures. Compared to the baseline and other policy sub-options, this sub-option ensures that access to basic information is guaranteed for all products in the scope of the SPI, independently from the availability of product-specific measures. These attributes would be of general nature (e.g., the name of the product, its colour, details about the manufacturer, the presence of substances of very high concern, etc.). However, the quality and relevance of the information that these horizontal attributes would deliver are cause of concern, as this data would lack the accuracy and specificity of sectoral or product requirements. For this reason, the effectiveness is considered lower than under sub-option 4b.

Efficiency: sub-option 4c will most likely come at an additional cost for businesses, which will have to comply with unspecific requirements. The quality of information provided as a result risks being lower, which would decrease the environmental benefit of PO4. While 4c is introduced to allow for a faster and more ambitious roll-out of the initiative, this decrease in quality shows that there might not be real efficiency gains. The social impacts of higher product costs might not be as well compensated by access to higher quality products.

Coherence: sub-option 4c offers the same elements of coherence as sub-option 4b.

Table 74 Summary of benefit assessment

Benefits				
Description	***Amount***			***Comments***
	Option 4a	***Option 4b***	***Option 4c***	
Direct benefits				
More detailed information on products	++	++	+	
Better access to information	+	++	++	
Indirect benefits				
More sustainable products on the market	+	++	++	
Indirect compliance benefit for businesses	+	++	++	Under sub-options 4b and 4c, links with the SCIP database can provide efficiency in complying with reporting obligations

Table 75 Summary of coherence assessment

	Option 4a	*Option 4b*	*Option 4c*
Internal coherence	3a, 5b, (7b) To some extent	3a, 5b, 7b To a large extent	3a, 5b, 7b To a large extent
External coherence	To some extent	To a large extent	To a large extent

Cost estimates – industry

The figures presented below correspond to an average cost increase (by cost category) relative to the baseline (BAU) measured in percent change. As such, these figures can be considered as signals of cost drivers and help identify potential measures which, according to the industry, significantly impact costs.

Industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: (i) less than 1% cost increase; (ii) between 1% and 5% cost increase; and (iii) more than 5% cost increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (because of a compliance level in already subjected sectors which is already high). To quantify the industry associations' inputs, the following figures were retained: 0.5% for (i), 2.5% for (ii) and 5% for (iii) (being unable to assess whether the increase will be significantly above 5% or not).

The three main cost drivers of the PO, according to industry associations, are the costs related to the information requirements for the European Digital Product Passport (>3.11% minimum cost increase), the direct implementation of the Digital Product Passport to whole categories of products (>2.99%) and the information requirements on a set of social indicators (>2.96%).

The cost of new information collection and reporting will weigh more heavily on SMEs as fixed costs are spread over lower sales. For example, in the textile industry, collection of information on durability and reliability has been estimated by an industry association at about €10,000 to €20,000 per company to set-up the collection process, especially in the absence of standards for estimating durability. These costs will be relatively heavier for SMEs.

Table 76 PO4 Cost increase in % by measure and cost category

Sub-PO	**Measures**	**N° of sectors**	**Administrative costs**	**CAPEX**	**OPEX**	**Operation & maintenance**	**Other costs**	**Mean**
4a	Information requirements on the durability (technical lifetime) or reliability (mean time between failures) of the product or its components	6	2.19	2.44	2.44	2.44	2.75	2.45
	Information requirements in the form of sustainability performance classes	5	2.00	2.13	3.10	1.63	1.63	2.10

	Information requirements on a set of social indicators	6	3.08	2.70	3.08	3.20	2.75	2.96
	Information requirements on recycled content on the product or components (e.g.., plastic parts)	6	2.44	2.71	2.69	2.44	2.00	2.46
	Information requirements on reparability and upgradability, including a reparability scoring	6	2.43	2.43	2.43	2.43	2.30	2.40
	Information requirements on the environmental impacts along the life cycle of the product, for example in the form of an Ecological Profile	6	3.00	2.13	3.50	2.69	2.75	2.81
	Requirement to inform on the presence of substances of concern and tracing them	6	2.69	2.44	2.69	2.44	2.30	2.51
4b	Information requirements in the form of a Digital Product Passport	6	3.00	3.42	3.75	3.08	2.30	3.11
	Integrating or closely coordinating the SCIP Database (implementing REACH Art. 33) with SPI requirements	6	1.63	1.00	1.00	1.00	1.00	1.13
4c	Direct implementation of a Digital Product Passport to whole categories of products based on horizontal requirements	6	2.33	3.75	3.10	3.08	2.70	2.99

Source: Own calculations based on inputs from industry associations as follows:

Table 77 Average costs for businesses by PO4 sub-option

PO4	**Admin costs (1)**	**CAPEX (2)**	**OPEX (3)**	**Operation & maintenance (4)**	**Other costs (5)**	**Mean (6)**
PO4a	2.48	2.46	2.83	2.45	2.35	2.51
PO4b	2.31	2.21	2.38	2.04	1.65	2.12
PO4c	2.33	3.75	3.10	3.08	2.70	2.99

Note: the figures correspond to the average cost increase (by cost category) relative to the baseline (BAU). Inputs on the cost increase were provided by industry associations. As for the methodology, the average cost increase by measure is calculated. No distinction is assumed by sub-option, since they refer to different scopes. In red: lowest average minimum cost increase. In blue: highest average minimum cost increase.

Stakeholders' views on the choice of options

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out provide insights into the favoured option.

The introduction of a European Digital Product Passport (therefore going beyond sub-option 4a) **gained overall support**. When asked what information should be included in a European Digital Product Passport, each of the 17 propositions received a positive answer by between 46 to 90% of respondents to the OPC. Support from different stakeholders varied depending on the information proposition: there was strong support for providing the information on the product recyclability and safe use across all stakeholders (at least 75% of all groups of stakeholders agreed or strongly agreed with these measures). On the other hand, requirements to disclose information that could be of use to other operators for repair, remanufacture or recycling, or to market surveillance authorities, and the need to include information on the quantities of materials and substances contained in the product were not so well supported by business associations compared to NGOs, environmental organisations, public authorities, consumer organisations

and academic institutions. EU citizens shared similar views as non-business stakeholders. All in all, respondents to the OPC and participants to the European Digital Product Passport workshop indicated a strong preference for the establishment of the European Digital Product Passport. At the same time, concerns were also expressed about horizontal requirements and a gradual implementation, with product-specific requirements, was preferred to ensure the relevance of information demanded. In light of the above, **sub-option 4b appears to be the preferred option across stakeholders.**

Particularly, SMEs are in favour of a DPP. SMEs expect that the EU DPP would lead to an increase in the amount of low climate impact products and lower pollution levels as well as gradually phase out the use of environmentally harmful materials and increase consumer empowerment. However, there is concern about the additional administrative burden to be put on SMEs and therefore, a distinction between SMEs and large companies should be made if the EU DPP is to be introduced.

Assessment of subsidiarity and proportionality

Subsidiarity assessment

The measures proposed under PO4 comply with the subsidiarity principle, as the following objectives, pursued by said measures, cannot be reached by MSs alone: (i) ensuring a levelplaying field for EU businesses; (ii) guaranteeing a uniform implementation across the single market; and (iii) ensuring the cost efficiency of setting up a single set of measures to avoid different compliance requirements in different -MSs.

Proportionality assessment

The results of the stakeholder consultation point to an overall agreement that the European Digital Product Passport, as defined in sub-option 4b, will deliver overall benefits with regard to the identified problems. Contributions insisted in particular on the need to ensure accessible, reliable and relevant information, which tends to favour sub-option 4b over 4a (accessibility), and 4b over 4c (reliability and relevance). The issue of the cost, and social and environmental impacts of the European Digital Product Passport is considered relevant by respondents (both in the OPC and in position papers), but less importance is attributed to it (as shown in question 2B.2 of the OPC). This is reflected in the study of impacts of PO4 and the sub-option comparison: sub-options 4b and 4c are more ambitious than sub-option 4a, which implies higher costs. As a result, there is a strong indication that sub-option 4b will be the most effective and efficient way to ensure that the costs of the measures will be matched or outweighed by their environmental and social benefits.

Preferred sub-option

Based on the above observations, sub-option 4b is the preferred sub-option, offering the highest potential in reaching the specific objective, and ensuring that cost increases are proportionally matched with clear economic, environmental and social benefits. Also, it is coherent with the other POs in the SPI initiative and with other policies.

OPTION 5: REWARD MORE SUSTAINABLE PRODUCTS THROUGH INCENTIVES

Overview of Policy Option 5

Sub-option 5a: Enhanced incentives measures

- Measure 5a.1 – Member States are encouraged to introduce reputational and economic incentives, supported by the provision of guidelines
- Measure 5a.2 – Mandatory Green Public Procurement requirements in SPI product-specific rules

Sub-option 5b: Linking incentives to performance

This sub-option includes all measures in 5a, plus the following:

- Measure 5b.1 – Member States are obliged to use performance classes to introduce reputational and economic incentives
- Measure 5b.2 – Modulation of EPR fee according to the performance class

Sub-option 5c: Consumption-oriented incentives

This sub-option includes all measures in 5b, plus the following:

- Measure 5c.1 – Bonus for EU citizens to reduce their carbon footprint
- Measure 5c.2 – Introduction of an excise proportional to the life cycle environmental performance of the products placed on the EU market.

Table 78 Qualitative comparison of the impact of the options with regard to the specific objectives – the extent to which the different sub-options allow achieving the (specific) objectives

Specific objective	Baseline	Option 5a	Option 5b	Option 5c
Improve product sustainability				
Improve access to sustainability information along the value chains				
Incentivise more sustainable products and business models to improve value retention				
Improve application of sustainable product legislative framework				

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

The following paragraphs explain the results shown in the table in terms of effectiveness, efficiency and coherence. Summary tables of the benefit, cost and coherence assessment are provided afterwards, as well as stakeholders' views on the choice of option.

The **baseline** scenario includes a number of reputational and economic incentives to encourage the supply and demand of greener products and services, which are different from one Member State to another, and the current market fails at introducing or giving a boost to green products.

Sub-option 5a

Effectiveness in achieving the specific objectives: sub-option 5a will slightly increase the supply and demand for sustainable products. It will provide better access to information for businesses, workers and citizens alike in the European Union on product sustainability. It is also expected to incentivise more sustainable approaches to business and products in general, thus contributing to preserve resources. It will foster research and development activities and non-offshorable job creation. Improvements in production processes and working conditions are also foreseen. Overall, the revenues of companies providing sustainable products and the consumers' awareness towards sustainability are expected to grow. In the long term, product sustainability should improve, although with variations, in Member States.

Efficiency: sub-option 5a is expected to have positive economic impacts on certain businesses, mainly by increasing their revenues. It will also lead to investments in design and production processes. Measure 5a.1 may result in additional administrative burdens for economic operators and Member States, as the implementation of incentives will be on a voluntary basis, while the administrative burden for the European Union will be limited to guidelines and specific provisions for the implementation of GPP. The voluntary aspects could foster discrepancies and market fragmentation. Costs related to the monitoring and enforcement of incentives and GPP costs are expected for Member States, but GPP is also foreseen to lead to financial and resource savings. Introduction of certain types of incentives could impact fiscal revenues.

Coherence: internally, sub-option 5a essentially supports the enhancement of existing incentive measures. Through 5a.1, it notably aims at providing guidelines. It interacts with sub-option 6a, and notably measure 6a.1, which also provides guidelines to support the uptake of circular business models. It also interacts with PO2 and the revision of the Ecodesign directive. Market surveillance activities interact with PO7. Externally, it draws on the Public Procurement Directives, the Ecodesign Directive and existing incentivising tools on reputational incentives (e.g., European Ecolabel, Energy label, European Technology Verification System) and relies on the upcoming revision of the VAT Directive for economic incentives.

Sub-option 5b

Effectiveness in achieving the specific objectives: sub-option 5b is expected to enhance the environmental, economic and social effectiveness of sub-option 5a as Member States would be required, rather than encouraged, to implement incentives. In addition, the introduction of eco-modulation of EPR fees will foster the use of recycled and/or easier-to-recycle material. The use of performance classes will ensure harmonisation at EU level.

Efficiency: while implementing incentives could lead to revenue increase for companies producing sustainable products, it will lead to investments in research and development, design, and productions processes. The eco-modulation of EPR fees could have detrimental effects on companies' production costs. These costs would be passed on, at least partially, to customers although, in the medium to longer term, prices of more sustainable alternatives are expected to decrease and, for some products, move even lower than baseline products. The introduction of certain types of incentives could impact fiscal revenues. In relation to an increased number of incentives implemented, the administrative burden is expected to increase compared to sub-option 5a. However, as the same rules would apply across the EU, it would reduce market fragmentation and limit the magnitude of the additional expenditures required to meet the criteria.

Coherence: internally, sub-option 5b introduces a mandatory use of performance classes for Member States to introduce reputational and economic incentives. These classes are introduced for all sub-options in PO4. As for sub-option 5a, it also interacts with PO2 and PO7. Externally, this sub-option builds on the Energy Label framework and Ecodesign Directive for performance classes, and on the Waste Framework Directive for eco-modulation. It also draws on existing incentivising tools, such as the Ecolabel.

Sub-option 5c

Effectiveness in achieving the specific objectives: sub-option 5c has the potential to level the playing field for less resource-intensive and more labour-intensive practices, which could lead to non-offshorable job creation. The carbon bonus and the excise duty will support change in consumption behaviours towards more sustainable products, but both also present the risk of creating imbalances. The social acceptability of the proposed measures is questionable.

Efficiency: sub-option 5c is expected to increase the revenues of certain businesses as consumers would be explicitly encouraged to turn to sustainable alternatives. Companies would have to invest in research and development, design, and productions processes. Although these would not be fully passed on to the consumer, the market share could dwindle. This sub-option would also significantly increase administrative burden for public stakeholders. Among all actors, Member States are expected to bear most of the administrative burden linked to sub-option 5c as they would have to implement incentives, the carbon bonus and the excise duty on products with low environmental performance. The measure could impact fiscal revenues (positively for 5c.2, negatively for 5c.1).

Coherence: internally, sub-option 5c does not interact with another PO, or introduce a different level of coherence. Externally, sub-option 5c supports a carbon footprint score included in the Digital Product Passport, the use of excise taxes defined in the Energy Taxation Directive, and the revised Ecodesign Directive.

Table 79 Summary of benefit assessment

Benefits				
Description	***Amount***			***Comments***
	Option 5a	***Option 5b***	***Option 5c***	
Direct benefits				
Increased revenues for sustainable product and service providers	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Product manufacturers will be impacted.
Increased activity related to the design of products and production processes	+	++	++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Product manufacturers and service providers for support activities will be impacted.
Changes in purchasing aptitudes of public authorities and savings	++	+++	+++	The mandatory green product procurement under measure 5a.2 will result in financial and environmental savings. Public authorities will be impacted.
Greater accessibility of repair services and growth in the repair services sector	+	++	++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Product manufacturers and service providers for support activities will be impacted.
Greater affordability of sustainable products in the medium term	+	++	++	Citizens and products users will be impacted.
Competitive advantage for companies providing sustainable products and services	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Manufacturers and retailers will be impacted.

Reduction of waste	+	++	++	Measure 5a.1 is expected to increase the number of collection points for specific products, easing the collecting and recycling processes. Measure 5b.2 introduces eco-modulation in EPR scheme. Product manufacturers, service providers for support activities, and public authorities will be impacted.
Increased availability, quality and use of secondary materials	+	++	++	Measure 5a.1 is expected to increase the number of collection points for specific products, easing the collecting and recycling processes. Measure 5b.2 introduces eco-modulation in the EPR scheme. Product manufacturers, service providers for support activities, and public authorities will be impacted.
Buyers choose more durable, reliable, and repairable products	+	++	+++	There is an increased level of stringency for the different sub-options, which encourages (5a.1) the mandatory use of performance classes (5b.1), leading to an increased level of incentives being introduced. GPP is introduced from sub-option 5a. Citizens and product users will be impacted.
Increased incentive to improve the safety of workers and consumers	+	++	++	Reputational incentives have a potential to improve safety. Workers, citizens and products users will be impacted.
Job creation	+	++	++	There is an increased level of stringency for the different sub-options. Incentives have the potential to create jobs in various sectors, including design and recycling. Measure 5b.2 introduces eco-modulation for the EPR scheme. Labour in specific sectors will be impacted.
Increased efficiency of Market Surveillance and customs authorities	+	++	++	Product manufacturers, service providers for support activities, and public authorities will be impacted.

Indirect benefits				
Increased product testing, repairing or recycling activities				The increased level of stringency for the different sub-options supports the development and market of more sustainable solution, but also the uptake of circular business models. All actors in the product value chain will be impacted.
Development of circular business models	+	++	++	The increased level of stringency for the different sub-options supports the uptake of circular business models. All actors in the product value chain will be impacted.
Competitive advantage through operational performance improvement and better reputation	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions. Manufacturers and retailers will be impacted.
Potential fiscal revenue	N.A.	N.A.	+	Sub-option 5c introduces the excise duty.
Reduced market fragmentation	+	++	+++	The increased level of stringency for the different sub-options supports the development and market of more sustainable solutions.
Improvement of the level playing field between companies in Europe	+	++	++	Sub-option 5b introduces performance classes.
Indirect environmental impacts associated with the production of new products decrease as demand decreases	+	+++	++	The introduction of performance criteria should lead to a decrease in the number of products being bought. Evidence however shows a potential for rebound effects. All actors in the product value chain will be impacted.
Decreasing environmental impact of material extraction	+	++	++	Raw material producers will be impacted.

Reduction in packaging entering the market partly resulting from reduced packaging waste	+	++	++	Raw material producers, and packaging producers will be impacted.
Companies invest in training and reskilling activities to address the new demand	+	++	++	Product manufacturers will be impacted.
Skills development in relation to product life cycle analysis	+	++	+++	Public authorities and citizens will be impacted.

Costs estimates – industry

Inputs on the cost increase were provided by nine industry associations representing the battery, home appliances, packaging and textile industries. Those industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: +) less than 1% cost increase, ++) between 1% and 5% cost increase and +++) more than 5% cost increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (when data is missing or the measure is not deemed detailed enough).

Calculating the share of cost increase levels (+, ++ and +++) across all industry associations' inputs reveals that the three top cost drivers relate to energy labels (41% of +++), the introduction of the excise (due to extensive LCA/PEF testing, 35% of +++), and the introduction of a taxation on virgin material and unsustainable use of products less suitable for the circular economy (29% of +++).

Industry associations do not foresee a substantive increase in costs following the implementation/extension of EPR schemes (seeing PRO fees as low).

Increase in staffing will mostly result from the need to document the amount of recycled materials in products.

Taxation on virgin material would imply extensive recycling and production documentation (which increases the administrative burden). Some industry associations (home appliance and battery) also fear that there is not enough high-quality recycled material available at the moment.

At the sub-option level, it turns out that PO5c is estimated by the industry association to be the costliest (22% of +++), compared to PO5a (17% of +++) and PO5b (14% of +++)

It is important to recall that both sub-options PO5b and PO5c include the measures of PO5a.

Table 80 Share of respondents estimating the cost of individual measures to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	**Measures**	+	++	+++
5a	Differentiated taxation for the purchase of more sustainable alternatives	47%	41%	12%
	European Ecolabel	38%	46%	15%
	European energy label (extension of)	47%	12%	41%
	Green public procurement (GPP)	94%	6%	0%
5b* (in addition to 5a)	EPR schemes: fees charged by Producer Responsibility Organisation depending on total of waste that needs to be collected, disassembled, and recycled	87%	13%	0%
	Eco-voucher for sustainable/environmental-friendly products	71%	18%	12%
5c** (in addition to 5b)	Introduce a taxation on virgin material use and unsustainable use of plastics and products less suitable for the circular economy	35%	35%	29%
	The introduction of an excise proportional to the life cycle environmental performance of the products placed on the EU market	35%	29%	35%

Source: Own calculations based on inputs from Industry associations

Notes: PO5b also includes 5a measures. PO5c also includes 5a measures (but do not include PO5b)

Table 81 Share of respondents estimating the cost of individual sub-options to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	+	++	+++
PO5a	*58%*	*25%*	*17%*
PO5b (includes PO5a)	*65%*	*22%*	*14%*
PO5c (includes PO5b)	*50%*	*28%*	*22%*

Note: figures correspond to total share of +, ++ and +++ by sub-options. Inputs on cost increase have been provided by industry associations. PO5b and PO5c include the measures of PO5a.

Cost estimates – administration

Member State representatives from Sweden, Belgium and the Netherlands were asked during interviews to estimate the additional costs in terms of FTEs (full time equivalent staff) generated by the measures of PO5.

According to their inputs, the most important cost driver is the compliance review process with the EU Ecolabel and Energy Label: it implies the recruitment of more than 5 FTEs.

1 to 2 FTEs are needed for MS to adapt purchasing pattern (as well as to enforce it) to more sustainable products. 2 or more FTEs would require the introduction of an excise (proportional to the life cycle environmental performance of products).

Stakeholders' views on the choice of sub-options

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out do provide insights into the favoured option.

Industry representatives acknowledged that close monitoring enables them to know precisely the strengths and weaknesses of their products. Furthermore, obtaining a label is expected to be beneficial to their revenue as, beyond the reputational gain and competitive advantage, it would qualify their products for other incentives (eco-voucher) and initiatives (GPP). Most importantly, they welcomed the consideration of fiscal measures to incentivise circularity, including the removal of harmful subsidies, lower VAT for sustainable / circular goods / services (including repair services), a tax on virgin / fossil materials, an environmental impact tax, and a tax shift from labour to resources. Some industry stakeholders were in support of setting-up an ambitious eco-modulation of fees in the EPR scheme.

All main stakeholders ranked 'improving access to finance', 'making better use of standardisation' and 'developing and implementing mandatory Green Public Procurement criteria and targets' as the three most important measures to encourage more sustainable production and consumption patterns. Besides these, which are part of sub-option 5b, the modulation of fees is ranked the fourth most important measure. The majority of respondents to the consultation were in favour of establishing a punitive scheme when rules / measures are not followed, though some stakeholders are in favour of positive incentives only.

SMEs were in favour of modulation of EPR fees (69% score at least 4 out of 5, n=59). SMEs tended to be unaffected (29%) or moderately positively impacted (23%) by Green Public Procurement requirements. 19% of SMEs found GPP requirements to be not applicable to their enterprise.

Assessment of subsidiarity and proportionality

Subsidiarity assessment

Depending on their nature, incentives can be implemented at various levels. Economic incentives are implemented at Member States level, while reputational incentives can be implemented at local, national, European or international levels. Action taken by the Member States alone is not sufficient to achieve the objectives. Evidence shows that there are benefits to ensure a uniformed implementation of incentives across the single market and to reduce the number of reputational incentives (see problem section). Guidance will be provided to Member States to implement incentives (5a.1), and mandatory requirements will be introduced to avoid differentiated practices across EU Member States on GPP (5a.2) and EPR fees (5b.2). Under sub-option 5b, linkages with classes of performance will support a level-playing field for EU businesses. The negative consequences resulting from non-harmonised practices lead to significant market entry obstacles, such as divergence in the requirements for economic operators across Member States and associated costs (e.g., national labels).

The aim of setting common binding provisions to support the transition to a circular economy cannot be sufficiently achieved by the Member States but can be better achieved at EU level.

Proportionality assessment

Based on the above observations, sub-option 5b appears to generate the highest benefit in relation to costs and enables a level implementation of reputational and economic incentives, of EPR fees and of GPP across Member States. Economic, environmental and social effects have been taken into consideration. As they relate to creating of market opportunities for sustainable options and

ruling out less sustainable ones, associated costs are commensurate with the underlying objectives of the SPI. Compared to sub-option 5c, sub-option 5b is simpler.

Preferred sub-option

Sub-option 5b is the preferred sub-option.

OPTION 6: MEASURES FOR CIRCULAR ECONOMY AND VALUE RETENTION

Overview of Policy Option 6

Sub-option 6a: Promotion of value retention and value maximisation

- Measure 6a.1. – Providing guidelines on supporting circular business models.
- Measure 6a.2. – EU-wide hub supporting the uptake of circular business models.
-

Sub-option 6b: Enhanced value retention and value maximisation

This option includes all measures included in option 6a plus the following:

- Measure 6b.1. – Introducing a ban on the destruction of unsold consumer products via SPI measures

Table 82 Qualitative comparison of the impact of the options with regard to the specific objectives - the extent to which the different sub-options allow achieving the (specific) objectives

Specific objective	Baseline	Option 6a	Option 6b
Improve product sustainability			
Improve access to sustainability information along the value chain			
Incentivise more sustainable products and business models to improve value retention			
Improve application of sustainable product legislative framework			

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

Sub-option 6a

Effectiveness in achieving the specific objectives: Sub-option 6a will provide better access to information for businesses, workers and citizens alike in the European Union on circular business models. Indirectly, it is expected to help companies transition towards circular models or develop their circular models further. It is also expected to incentivise more sustainable approaches to business and products in general.

Efficiency: Measures proposed under sub-option 6a are commonly used for different topics and have proved their cost-effectiveness to spread knowledge.

Coherence: Internally, sub-option 6a provides support to all measures on the implementation of sustainable products by promoting the development of Circular Business Models in different sectors of the economy. It helps to provide new economic solutions for businesses that need to start implementing sustainability requirements on their products or making their products more durable. It is particularly related to PO5. Externally, SPI will complement EU funding and

financing programmes focusing on supporting uptake on sustainable, circular and climate-addressing innovations. It will support ongoing initiatives such as the European Circular Stakeholder Platform.

Option 6b

Effectiveness: Evidence from current business practice has shown the negative impact of the destruction of unsold products for the environment. Policy option 6b will increase the level of ambition of PO6 and will force companies to innovate in their supply chain and stock management practices to ensure that unsold products are no longer destroyed. By encouraging alternatives such as donation to social enterprises or remanufacturing, a ban of the destruction of unsold products could provide employment opportunities for low-skilled workers, who can subsequently improve their skills and develop their career through practical training.

Efficiency: the measure implemented will have significant costs for economic operators, Member States as well as the European Commission. Overall, the economic, environmental and social benefits are expected to outweigh the initial costs of the adaptation to the ban.

Coherence: the sub-policy option will take into account measures at EU Member State level to restrict the destruction of unsold goods, as in France and Germany. It will take into account product categories addressed by national measures as well as exemptions. Internally, the proposed transparency obligation, which aligns with the German transparency ordinance, complements the reputational incentive measures (sub-options 5a and 5b) as is dis-incentivizes destruction of unsold products and circumventing the ban on this practice. Market surveillance activities will be conducted in relation to PO7. Externally, by promoting a coherent EU approach to banning the destruction of unsold goods, policy option 6b will contribute to the achievement of the objectives of the EU policies on waste.

Table 83 Summary of benefit assessment

Benefits			
Description	***Amount***		***Comments***
	Option 6a	***Option 6b***	
Direct benefits			
Decrease of GHG emissions	+	++	Companies, citizens
Increased revenues for companies developing circular products or services	+	++	Companies, consumers
Circular businesses gain larger market shares	+	++	Citizens, consumers
Employment	+	++	Companies, citizens and workers

opportunities			
Indirect benefits			
Improved brand image	+	++	Companies

Costs estimates – industry

Inputs on the cost increase were provided by nine industry associations representing the battery, home appliances, packaging and textile industries. Those industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: +) less than 1% cost increase, ++) between 1% and 5% cost increase and +++) more than 5% cost increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (when data is missing or the measure is not deemed detailed enough).

Calculating the share of cost increase levels (+, ++ and +++) across all industry associations' inputs reveals that the top business cost drivers are the ones related to the obligation for companies to take back unsold products (56% of +++) and costs related to the ban on the destruction of unsold/returned products (43% of ++). This was one of the reasons to discard measure 6c (Set obligation for companies to take back, or donate for use, unsold products and to declare their amount to foster greater transparency, see Annex 9: Policy Options and Measures for more details).

Reverse logistics activities (taking back unsold goods) will require additional staffing. Some "buyback" costs could also be implied (according to one industry association) since retailers might not return products for free.

At the sub-option level, it turns out that 6b is estimated by industry associations to be more costly (43% of ++) than 6a (100% of +).

Table 84 Share of respondents estimating the cost of individual sub-options to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	Measures	+	++	+++
6a	Promotion of value retention and value maximisation	100%	0%	0%
6b	Enhanced value retention and value maximisation	57%	43%	0%

Source: Own calculations based on inputs from industry associations

Notes: It is important to recall that PO6b includes the measures of PO6a.

Cost estimates – administration

Member State representatives from Sweden, Belgium and the Netherlands were asked during interviews to estimate the additional costs in terms of FTEs (full time equivalent staff) generated by the measures of PO6.

At the MS level more than 2 FTEs are needed to collect and treat data provided by manufacturers and importers on the number of unsold products.

The take-back obligation for companies might impact MS equally since it might already be implemented (for example Belgium). The donation schemes are also being applied widely at the municipal level according to the interviewees.

Stakeholders' views on the choice of sub-options 6a and 6b

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out provide insights into the favoured option.

Businesses active in furniture, home appliances and packaging surveyed in the SPI stakeholder consultation (2) reported that the administrative impact of PO6a would be no different in comparison to the baseline. In terms of economic benefits, PO6a could yield very low or no benefits at all. Costs are expected to be overall moderately lower than benefits. Operation and maintenance costs are expected to be no different compared to the baseline, as are capital expenditures and personal costs. No indirect costs are reported. One organization reported fully supporting the policy option, arguing that the EU can further support circular transformation through technology and innovation programmes where there is a need for industrial innovation. Building competences needed for the future EU generation is also considered necessary.

Turning to PO6b, businesses active in furniture, home appliances and packaging surveyed as part of the SPI stakeholder consultation either argued that there would be no difference with the baseline, or that administrative costs would increase by less than 1%. They reported that the economic benefits would be very low or inexistent. Several requested further clarifications with respect to the implementation of the ban, regarding the definition of the destruction of unsold products the interlinks with product safety and waste legislation. Parallel regulatory amendments were considered necessary to support such a policy option, such as considering used products as products and not waste, and taxation favouring circular business models. Stakeholder views varied with respect to possible impacts on operation and maintenance costs: one business found there were no changes expected in comparison to the baseline, while another found that personal costs (OPEX) would increase by less than 1%, and operation and maintenance costs between 1-5%.

A ban on the destruction of unsold consumer products would have a limited impact on SMEs, given that most SMEs either discount unsold consumer products systematically until sold, or recover materials from the unsold products. Nevertheless, SMEs did consider that products which pose a health or safety risk should be excluded from a destruction ban.

Assessment of subsidiarity and proportionality

Subsidiarity assessment for 6a

- Ensuring a level-playing field for EU businesses and equality of opportunity

Subsidiarity assessment for 6b

- Ensuring a level-playing field for EU businesses
- Ensuring a uniformed implementation across the single market dealing with unsold goods
- Cost efficiency of setting up the same model across the single market, to avoid differentiated practice across EU Member States on the returned of unsold goods.

Sub-option 6a will equally support EU businesses across all Member States.

In order to achieve a significant reduction of waste generated by unsold goods, it is necessary to implement an EU-wide ban. Action taken by the Member States alone is not sufficient to achieve the objectives. While some EU Member States are already taking steps to ban the destruction of unsold products (Germany, France), an EU-wide measure is necessary to avoid dissonance in the internal market. The non-harmonised practices lead to significant varying practices across

Member States, with different levels of stringency of measures to address the destruction of unsold goods.

The aims of setting common binding provisions to support the transition to a circular economy cannot be sufficiently achieved by the Member States but can be better achieved at EU.

Proportionality of the sub-options

Based on the above observations, sub-option 6b appears to generate the highest benefit in relation to costs and enables an EU-level of a ban of unsold products across Member States. Economic, environmental and social effects have been taken into consideration. As they could bring significant economic and environmental effects, associated costs are commensurate with the underlying objectives of the SPI.

Preferred sub-option

Based on the above observations, sub-option 6b appears to generate the highest benefit in relation to costs and enables a level implementation of circular business models in Europe. It offers the highest potential in ensuring positive environmental benefits and also developing new circular business models.

OPTION 7: STRENGTHENED APPLICATION OF THE ECODESIGN FRAMEWORK

Policy Option 7 is built around a strengthened application of the Ecodesign framework. Its three sub-options consist of an improvement of the current framework mainly addressing its efficiency (7a), additional strengthening enforcement, specifically relating to market surveillance (7b), and the creation of complementary EU-level implementation and enforcement support capacities. The sub-options are summarised in the box below.

Sub-option 7a: Improve the current framework to increase efficiency

- Measure 7a1. – Streamline the procedures for the development and adoption of Ecodesign implementing regulations
- Measure 7a.2 – Introduce the possibility to collect data from manufacturers and retailers regarding regulated products sales and usage
- Measure 7a.3 – Add provisions related to third party certification

Sub-option 7b: Strengthen market surveillance of EU Member States

This option includes all the measures provided for under sub-option 7a, plus:

- Measure 7b1 – Make relevant product information digitally available to Market Surveillance Authorities
- Measure 7b2 – Structural technical support to improve cooperation between Market Surveillance Authorities and ensure sufficient capacities
- Measure 7b3 – Organise common trainings for staff of notified bodies, notifying authorities and Market Surveillance Authorities
- Measure 7b4 – Publish penalties decisions issued by Market Surveillance Authorities
- Measure 7b5 – Create a benchmark and a reporting obligation for Member States
- Measure 7b6 – Establish requirements for market surveillance checks

Sub-option 7c: Reinforce EU level implementation and complement Member States' market surveillance

This option includes all the measures provided for under sub-option 7b, plus:

- Measure 7c1 – Complement national market surveillance where needed
- Measure 7c2 – Products monitoring and testing facilities
- Measure 7c3 – Assistance to implementation for suppliers and Market Surveillance Authorities
- Measure 7c4 – Third party channel for market surveillance

Policy Option 7 is built around a strengthened application of the Ecodesign framework. The three sub-options consist of an improvement of the current framework mainly addressing its efficiency (7a), additional strengthening of enforcement, specifically relating to market surveillance (7b), and the creation of complementary EU level implementation and enforcement support capacities. The sub-options are summarised in the box below.

Sub-Option 7a: Improve the current framework to increase efficiency

- Measure 7a1 – Streamline the procedures for the development and adoption of Ecodesign implementing regulations
- Measure 7a.2 – Introduce the possibility to collect data from manufacturers and retailers regarding regulated products sales and usage
- Measure 7a.3 – Add provisions related to third party certification

Sub-Option 7b: Strengthen market surveillance of EU Member States

This option includes all the measures provided for under option 7a, plus:

1. Measure 7b1 – Make relevant product information digitally available to Market Surveillance authorities

2. Measure 7b2 – Structural technical support to improve cooperation between MSAs and ensure sufficient capacities
3. Measure 7b3 – Organise common trainings for staff of notified bodies, notifying authorities and MSAs
4. Measure 7b4 – Publish MSA penalties decisions
5. Measure 7b5 – Create a benchmark and a reporting obligation for Member States
6. Measure 7b6 – Establish requirements for market surveillance checks

Sub-Option 7c: Create complementary EU level implementation and enforcement support capacities

This option includes all the measures provided for under option 7b, plus:

- Measure 7c1 – Complementary market surveillance
- Measure 7c2 – Products monitoring and testing facilities
- Measure 7c3 – Assistance to implementation for suppliers and MSAs
- Measure 7c4 – Third party channel for market surveillance

Table 85 Qualitative comparison of the impact of the options with regard to the specific objectives - the extent to which the different sub-options allow achieving the (specific) objectives

Specific objective	Baseline	Option 7a	Option 7b	Option 7c
Improve product sustainability				
Better access to sustainability information along value chains				
Incentivise more sustainable products and business models to improve value retention				
Improve application of sustainable product legislative framework				

Table legend:

Extent to which the objective is achieved	To a little extent	To some extent	To a significant extent	To a very significant extent
Grey scale				

Sub-option 7a

Effectiveness in achieving the specific objectives: In comparison with the current Ecodesign framework, the efficiency improvement in sub-option 7a has positive environmental impacts because it would allow to process more product regulations (incl. reviews) with the given resources and in a given timeframe. In addition, the sped-up Ecodesign process would help avoid obsolete standards due to long implementation time frames, while regulation-driven improvements of products would start earlier. Even though the former effect is difficult to quantify, these effects are expected to generate some environmental improvements. However,

with broader coverage, Ecodesign would still suffer from a similar share of non-compliance, which is addressed in sub-options 7b and 7c.

***Efficiency*:** Though it was not possible to reliably quantify the costs of improving the efficiency of the Ecodesign process, including small expenses for process optimisation, additional data provision, and third party conformity assessment, the estimated environmental improvements appear to justify the costs.

***Coherence*:** Internally, this sub-option is coherent with the other Policy Options and their respective sub-options. It supports the scope extension in PO 2 and new sustainability requirements under PO 3. This sub-option also displays external coherence since it only addresses the established Ecodesign framework.

Sub-option 7b

Effectiveness in achieving the specific objectives: Sub-option 7b would additionally strengthen market surveillance and bring about additional environmental improvements mainly through a reduction of non-compliance. It is assumed that of the 10% of potential energy savings that are lost due to non-compliance[387], 50% are captured by increased market surveillance, yielding environmental improvements in terms of e.g., 1.6% GHG emissions reduction and 0.8% particulate matter emissions reduction compared to EU totals (see Table 59).

***Efficiency*:** The costs for this policy-option could only be partially estimated. Next to one-off expenses for infrastructure and system setup, businesses face limited expenses for the digital provision of product data, while the Commission will have to provide additional staff trainings and technical support (estimated 2 extra FTEs for organisation, i.e. EUR 300,000 per year). Member States have to comply with reporting obligations and potentially perform additional market surveillance checks. The estimated environmental benefits are considered to justify the additional costs.

***Coherence*:** Same for Sub-option 7a + Sub-option 7b may have synergies with PO 4 regarding the digital provision of relevant product information to Market Surveillance Authorities.

Sub-option 7c

Effectiveness in achieving the specific objectives: The creation of complementary EU-level implementation and enforcement support capacities in sub-option 7c will increase the benefits of the other sub-options relating to efficiency and strengthened market surveillance. It is assumed that non-compliance can be reduced by 70%, leading to environmental improvements in terms of e.g., 1.8% GHG emissions reduction and 0.9% particulate matter emissions reduction compared to EU totals (see Table 60).

***Efficiency*:** The creation of complementary EU level implementation and enforcement support capacities is estimated to create a major cost burden on the Commission in the order of EUR 9 million per year. The assumed environmental improvement potential may not appear to justify the additional costs. However, the complementary EU level capacities may provide a considerable efficiency gain in the future, lowering the administrative burden of Market Surveillance Authorities as well as businesses.

***Coherence*:** Internal and external coherence are the same as for sub-option 7b.

[387] 'EU action on Ecodesign and Energy Labelling: important contribution to greater energy efficiency reduced by significant delays and non-compliance', Special Report 01, January 2020, European Court of Auditors

Table 86 Summary of benefit assessment

Benefits				
Description	***Amount***			***Comments***
	Option 7a	***Option 7b***	***Option 7c***	
Direct benefits				
Environmental and economic benefits from streamlined processes	+	+	+	More efficient processes can lead to more and better regulations
Reduction of non-compliance through strengthened market surveillance		++	+++	Environmental improvement potential of Ecodesign will be increased through higher compliance rate
Indirect benefits				
Additional product data can be used in other areas	+	+	+	Sales and technical product data valuable for other environmental policy initiatives
MS cooperation.	+	++	++	Streamlining and harmonisation efforts may increase cooperation between MS, which may benefit other policy fields
Benefits				
Description	***Amount***			***Comments***
	Option 7a	***Option 7b***	***Option 7c***	
Direct benefits				
Environmental and economic benefits from streamlined process	+	+	+	More efficient process can lead to more and better regulations
Reduction of non-compliance through strengthened market surveillance		++	+++	Environmental improvement potential of Ecodesign will be increased through higher compliance rate
Indirect benefits				
Additional product data can be used in other areas	+	+	+	Sales and technical product data valuable for other environmental policy initiatives
	+	++	++	Streamlining and harmonisation efforts may increase cooperation between MS, which may benefit other policy fields

Costs estimates – industry

Inputs on the cost increase were provided by nine industry associations representing the battery, home appliances, packaging and textile industries. Those industry associations were asked to provide an indication of the cost increase relative to the baseline (BAU) based on three levels: +) less than 1% cost increase, ++) between 1% and 5% cost increase and +++) more than 5% cost

increase. They were also asked to affirm whether the listed measures do apply to their sector or not ("Not applicable") or whether the cost increase is inconclusive (when data is missing or the measure is not deemed detailed enough).

Third party conformity assessment would imply contracting costs of tasks (which are sometimes already performed in-house).

Table 87 Share of respondents estimating the cost of individual measures to be less than 1% (+), between 1 and 5% (++) and more than 5% (+++)

Sub-PO	Measures	+	++	+++
7a	Provisions related to third party certification	31%	8%	62%

Source: Own calculations based on inputs from industry associations

Cost estimates – administration

Member State representatives from Sweden, Belgium and the Netherlands were asked during interviews to estimate the additional costs in terms of FTEs (full time equivalent staff) generated by the measures of PO7.

The strengthening of the market surveillance and the enforcement of the Ecodesign framework is costly and require more than 2 FTEs by MS (even more for bigger MS).

The setting of minimum surveillance obligations for Member States in relation to specific products or groups of products would also imply the recruitment of more than 2 FTEs (even more for bigger MS). The costs could also be significantly higher for MS that import a large share of their consumption (for example Belgium, Luxemburg). As a result, MS enforcement budget will have to be increased accordingly.

Stakeholders' views on the choice of options

Stakeholders were not directly asked to compare the specific sub-options. However, the consultations carried out provide insights into the favoured option.

Many stakeholders from industry were in favour of more harmonisation of market surveillance at EU level to avoid duplication of work and resources, and promote effective information sharing. There is also need for more resources in MSs and to increase training of staff and testing capacity. The answers to the open question highlighted that stricter surveillance of imported products and products on the online marketplace is needed.

EU citizens and other non-business organisations agreed that there is insufficient market surveillance and were in favour of improving resources available for monitoring, enforcement and verification. NGOs were in favour of penalties or consumer compensation for non-compliant products.

Stakeholder views on third party conformity assessment were mixed. With the combination of self-declaration and market surveillance, 3rd party conformity assessment was considered not necessary and not required to be mandatory by some stakeholders. However, most stakeholders were in favour of (harmonised) third party conformity assessment and found that self-declaration is not sufficient to address the main offenders.

SMEs were in favour of accompanying measures from the Commission to MSs, concerning market surveillance and enforcement of product compliance. Setting verification targets for products that are most likely to be non-compliant as well as creating a central reporting

point/website to enable feedback from consumers are were considered important by SMEs as well.

Assessment of subsidiarity and proportionality

Subsidiarity assessment

The subsidiarity attested to the Ecodesign Directive (2009/125/EC) as set out in § 41 of the preamble holds for sub-options 7a and 7b, since responsibilities between EU and MS authorities do not fundamentally change. For sub-option 7c, evidence points towards currently partially sub-optimal market surveillance and enforcement, which may justify complementary EU level implementation and enforcement support capacities

The EU level would step in where national efforts would not amount to effective enforcement of SPI requirements, undermining potential of SPI and creating an unlevelled playing field for businesses. Only the EU can effectively and independently perform this complementary and coordinating role. Also, the Commission actions would be to perform checks, cooperating with MS to take action when non-compliances are found.

Proportionality assessment

The proportionality should equally hold for all sub-options since the proposed measures would improve currently sub-optimal processes.

Preferred sub-option

Based on the above observations, sub-option 7b appears to have the best cost-benefit ratio in the long run.

Sub-option 7b generates relatively less benefits than 7c, however it implies less administrative burden for the European Commission and Member States. Overall, 7b is considered the preferred sub-option for the purposes of the impact assessment.

Annex 12: Preferred option

PREFERRED OPTION

The preferred combination of policy options

Based on the assessment and comparison of sub-options and their impacts, the overall preferred option package is a combination of sub-options **2b, 3b, 4b, 5b, and 6b.** For Option 7, **sub-option 7b** is considered for the purposes of the impact assessment.

The assessment of the sub-option retained for **Option 2** – extension of the scope of Ecodesign Directive – is **sub-option 2b**: Extension to all physical products. This will allow to potentially cover any products placed on the EU market, on the basis of clear criteria and a working plan. This will allow prioritization of most important categories and will make the framework flexible and futureproof at the same time. For construction products, the CEAP and SPI goals shall be mainly realised by means of the Construction Products Regulation (CPR). The CPR shall be able to mirror all obligations and requirements able to be set through the SPI, but for construction products – the same is explained in the Impact Assessment (IA) on the CPR revision.

Sub-options 2b would apply criteria for prioritisation that include the following (see annex 16 for more detail). In practice, the product groups identified as first priorities would likely be those under sub-option 2a. However, this sub-option also leaves flexibility to tackle other product groups if so justified, either individually or through horizontal measures:

- Contribution to meeting environmental, climate and energy targets and political priority;
- the environmental impacts of the product along its life cycle
- energy consumption;
- whether there are significant differences in environmental impacts within the product group;
- the potential for improvement in terms of its environmental impacts, energy efficiency and circularity aspects without entailing excessive costs (notion of affordability);
- social impacts along its value chain;
- the potential added value.

For **Option 3** – extension of sustainability requirements for products – **sub-option 3b is preferred**. This means that the product scope extension will be complemented by **new and strengthened provisions on minimum requirements for sustainability and circularity** to be adopted through product-specific SPI measures. In addition, it will include the possibility to adopt **horizontal requirements, applicable to a group of products sharing common characteristics**, for example setting reparability and upgradeability requirements for all electronic devices or minimum information requirements for all products containing substances of concern. Sub-option 3b will also allow the European Commission to spearhead work on **social requirements**, a dimension of sustainability so far not directly tackled through Ecodesign. This new dimension and the use of environmental profiles will build on the reinforcement of the provisions related to third party conformity assessment under Option 7 and build on synergies with the improved consumer and business information provisions under Option 4.

To ensure proportionality, each individual requirement will need to be justified for any product group before being applied. As such, a full toolbox will be available for ensuring sustainability for any product group, but each tool will only be used if suited to the problem at hand for the products being assessed. For example, for some products setting a minimum level of environmental footprint be appropriate, whilst for another it could be an issue of extending lifetime etc.

For **Option 4** – sustainability information for consumers and B2B – **sub-option 4b is preferred**. The extension of the scope of Ecodesign to products that are not energy-using products will make the **provision of information related to the environmental impacts and circularity of products increasingly relevant**, so businesses can demonstrate that they meet relevant sustainability requirements and select sustainable inputs in their production processes, and so consumers can make sustainable choices more easily. This sub-option would also allow for information requirements to be set in the form of classes of environmental performance and will create links with existing databases, like EPREL or the SCIP Database on substances of concern in products. The revised horizontal framework legislation will introduce the **European Digital Product Passport** and the main principles.

The operational details and IT infrastructure design will be developed through secondary legislation (and associated impact assessment), in close collaboration with stakeholders and also building on the results of a number pilot projects currently funded under the Digital Europe and Horizon Europe programmes. These projects will represent a "proof of concept", applied to at least three product groups (batteries, ICT and a third group to be proposed by the participating consortia). The content of each EU DPP will be decided when developing product-specific SPI measures, with the objective of only requiring the most relevant information, additional to what is already requested though existing legislations. The quantity and typology of information could be minimal at the beginning and increase progressively with time, depending on product groups and the experience gathered when deploying the EU DPP concept. The EU DPP will be used for sustainability aspects of products where relevant and, when relevant and technically feasible, also as a tracking & tracing tool to bring transparency along the value chains and facilitate the role of enforcement authorities. Annex 18 presents some possibilities currently available in terms of "design options" of the EU DPP. This is not meant to prejudge the future decision, but only to provide some examples to allow better understanding of the concept.

For **Option 5** – Reward more sustainable products through incentives – **sub-option 5b is preferred**. This means that Member States, whenever they aim at boosting the demand for sustainable products through incentives, they will be required (as is the case for Energy Labelling) to link their product incentives to classes of performance (developed under Option 4). Public authorities will also be required to align their procurement with specific Green Public Procurement criteria or targets, to be set out in measures adopted under SPI, thereby leveraging the weight of public spending to support more systematically a sustainable and circular economy. They will also be invited to expand their existing Extended Producers Responsibility (EPR) schemes to products covered by the framework and to ensure that fees are modulated as a function of the environmental performance of products, with rules in this respect also to be set out in product-specific measures adopted under SPI.

All sub-options under option 6 are proposed to be retained, to support circular business models and allowing for the introduction of bans on the destruction of unsold consumer products through SPI measures.

For **Option 7** – Strengthened application of the Ecodesign framework – **sub-option 7b** is considered preferred for the purposes of the impact assessment. The extended scope of the Ecodesign framework with even higher sustainability ambitions can only be successful if resources of both the European Commission and Member States are strengthened to a level commensurate with the ambitions. The European Commission (directly or through an executive agency, see section *7.10 European Commission Administrative setup* below), can play a stronger role to support the design and enforcement of Ecodesign for sustainable product measures.

Impacts of the preferred policy package

The different sub-options chosen all combine well: none of the preferred sub-options needs to be changed as a result of another one. In more detail, building on the extension of scope (2b):

– The addition of sustainability requirements (sub-option 3b) will increase costs for producers, but this should be more than offset by the environmental benefits and savings for citizens. The prioritisation of the different product groups for the development of specific requirements as implementing measures will need to reflect this widening of scope.

– The wider scope of products and sustainability requirements means there is further benefit to the enhanced information requirements and the European Digital Product Passport (sub-option 4b). For example, minimum requirements to reduce environmental footprints (under 3a) combines well with provision of information on this footprint through an Ecological profile (4a) or European Digital Product Passport (4b): the sub-options chosen are mutually reinforcing.

– Similarly, the enhanced incentive measures in 5b will allow for more efficient and effective delivery of the objectives for the product groups in scope, and the wider sustainability requirements.

– Sub-option 6 will assist with delivery of the environmental benefits, and support the effectiveness of the other measures. For instance by ***supporting the uptake of circular business models***, the compliance with requirements on reparability, durability and high-quality recycling (sub-option 3b) is expected to be easier.

– Sub-option 7b is similarly consistent with the other sub-options. The extended scope of the Ecodesign framework can deliver benefits commensurate to resources dedicated to its implementation.

– Thanks to this preferred approach, the Ecodesign scope will be extended to cover 65% of total GHG emission from products consumption in the EU, 64% of particulate matter emissions and 70% of resource depletion. Looking at GHG emissions only, assuming an improvement of 15% of environmental impacts over the entire scope from SPI measures, would lead to globally reducing GHG emissions by around 471 Mt CO2e, the equivalent of the annual emissions of Italy and Belgium.

Feasibility and proportionate implementation

Whilst the changes made through Option 7 and the improved administrative set-up including capacity will ease implementation, it will still be a challenge to respond to the expanded scope of the Ecodesign Directive. It is recognised that the longer list of product groups and environmental impacts to be tackled will imply prioritisation: the revised Ecodesign legislation will have to provide clear, transparent and effective methodological criteria for the selection of the product groups for which the SPI measures will be developed, based on those already foreseen in Article 15 of the current Ecodesign Directive and in Annex 16 to this IA (e.g. environmental, energy and social impacts and related potential for cost-effective reduction of such impacts). The selection will follow a fully transparent process, involving stakeholders, culminating in working plans outlining the priorities to give predictability to economic actors.

Importantly, the existing Ecodesign Directive approach of implementing measures being based on impact assessments carried out in line with the European Commission's Better Regulation guidelines will continue. As such, there will be an analysis of the economic, social and environmental impacts of different options for each set of product requirements. This will allow for proportionality to be maintained in future actions: for example, the analysis will examine the use of different design measures, a European digital product passport, minimum requirements or defining performance scales etc. This means that the assessment and identification of improvement options will be done on a product by product basis or for a group of product sharing common characteristics, underpinned by a sound analysis, and that this will largely determine the ultimate impacts for producers and citizens.

Regulatory burden and simplification

In terms of the overall **regulatory burden**, the financial costs and benefits of the overall package is uncertain and will depend on the SPI measures that follow. The experience from the Ecodesign Directive until now though is relatively positive, with win-win measures being identified. Overall, there are higher costs for business from applying the requirements and these translate into upfront costs for citizens that are more than offset over time. The cumulative costs for business (and citizens) are unlikely to be significant, being spread over a large market, and with the issue of cumulative costs revisited for the different product groups.

The policy proposal includes **simplification measures**, in the context of policy option 7. This will allow for example for streamlining of the procedures for the development and adoption of Ecodesign implementing regulations (changes in sequencing; ensuring information is collected efficiently; etc). Policy option 7 ensures that the structures put in place allow for efficient implementation, market surveillance and enforcement.

This policy proposal makes maximum use of the potential of **digitalisation** to ensure efficient application. In particular, the use of a European digital product passport will allow for efficient delivery of its objectives by ensuring that information failures are corrected by passing the right information downstream in a way that can be understood and accessed. Digital measures are also explored to facilitate efficient implementation with policy option 7, for example, including making relevant product information digitally available to market surveillance authorities (MSAs).

Table 88 European Commission's regulatory fitness and performance programme (REFIT) Cost savings

REFIT Cost Savings – Preferred Option(s)		
Description	***Amount***	***Comments***
Streamlining of the procedures for the development and adoption of Ecodesign implementing regulations		Savings will depend on the number of number of products covered
Collecting data from manufacturers and retailers regarding regulated products sales and usage		Savings will depend on the number of number of products covered

International competitiveness

An assessment of the economic impact demonstrates that the proposed initiative would not affect production costs in a significant manner in the long term. As seen in the problem definition, more sustainable products in general imply more production costs compared to less sustainable alternatives. It is expected that the companies selling products in the EU will have to face a cost increase in the short term due to the compliance to the revised Ecodesign legislation. However, the SPI would generate a level playing field in the EU. Furthermore, in the medium/long term the requirements introduced by the SPI measures are expected to become an international benchmark for the product groups concerned, as it is currently happening for products falling under the current Ecodesign Directive[388, 389].

[388] "[…] Many developing countries could model their regulations on existing ones (those of the European Union, for instance) […]", IEA (2020), Appliances and Equipment, IEA, Paris https://www.iea.org/reports/appliances-and-equipment

[389] "At least 45 countries outside the European Union have adopted minimum energy efficiency requirements for products, some of them in fact implementing ecodesign regulations in the context of association agreements or EU membership negotiations.", SWD(2015) 139 final

Requirements would not be more trade restrictive than necessary, and apply in a non-discriminatory manner to European and non-European producers, thus avoiding any form of hidden subsidies for EU products vis-à-vis products coming from EU trading partners. Likewise, European producers would not be disadvantaged in their ability to function inside or outside Europe. In line with current EU international cooperation, the EU will provide continuous support to developing and least developed countries for the green transition. In particular, efforts will be made to mitigate possible adverse effects (via technology transfer and capacity building). Moreover, the implementing measures of the revised legislation will be developed in a transparent manner and third countries and trading partner will be fully informed in the process.

The SPI measures would strike a proper balance between predictability and legal certainty and allowing for technological progress. This is important for products in fast changing markets, where there is a need to facilitate adaptability and regulatory responsiveness in line with technological and market developments.

Coherence with other initiatives of the CEAP Sustainable Products Framework

The assessment of the preferred policy options has confirmed the synergies that exist between this initiative, the Empowering Consumers for the Green Transition Initiative and the Green Claims Initiative, which altogether form the Sustainable Products Framework announced in CEAP. See Annex 14 for more details.

OVERVIEW OF COSTS AND BENEFITS

This section brings together the analysis of the chosen sub-options, to set out the overall impacts of the preferred policy option and how these occur over time:

- 1. The setting up of the overall framework, for which the main costs will be associated with setting up the European Digital Product Passport and strengthening of enforcement
- 2. The process for preparing an SPI measure for a product group or horizontal issue
- Most significantly, 3. the impacts that result from those SPI measures for the Member States, EU businesses, EU consumers and the environment as well as impacts outside the EU on businesses, citizens and the environment.

1) Setting up of the overall framework

Policy options 2 (product scope) and 7 (strengthened application of the Ecodesign framework) apply by nature at the level of the framework legislation. Policy Option 2 has no immediate costs. For Policy Option 7, strengthening application and in particular the market surveillance and the enforcement imply additional staff in the Member States, of more than 4 FTEs per MS. In addition, there would need to be 1 FTE for the mandatory obligation for monitoring and evaluation training. Furthermore, an average of two FTEs for customs national authorities in each MS. Overall, assuming that this translates into 210 FTEs[390], the administrative costs

[390] This is based on 4 people per MS, more for the bigger MSs plus several people in the Commission. This figure assumes a standard cost of EUR 50.000 per annum across the EU27 (including non-wage costs and overheads).

would be around **EUR 10.5 million per annum**. In the Commission, there will be 8 FTEs associated with market surveillance, support to EU testing capacity and customs controls.

These improvements in market surveillance and enforcement will pay off in terms of better implementation of the existing requirements, as about 10% of the potential energy savings delivered by Ecodesign and energy labelling are lost due to non-compliance with the regulations. Assumptions are set out in Annex 10 Section 8.4.1 showing potential economic benefit to consumers of around EUR 8.5 billion per annum (for sub-option 7c): whilst highly uncertain, they suggest that overall benefits should exceed costs significantly from improved enforcement.

Regarding the European Digital Product Passport (EU DPP), the intention is to have a general framework included in the legal proposal, establishing the notion of digital product passport, the option of creating a central registry, governance rules and requesting the empowerment to develop appropriate standards and detailed rules concerning the technical features and the IT infrastructure to be developed. Due to the decentralised design of the system, the administrative costs would be limited, and mainly related to running the EU central registry. The costs for the Commission to set up the European Digital Product Passport are estimated at around EUR 8 million as one-off investment and at least EUR 1 million as annual maintenance cost. However, this is a preliminary estimate based on the information collected and the extrapolation of the costs for other decentralised systems currently under development. The costs for business will depend on the SPI measures and the lessons from first experiences (which will act as a form of piloting). These costs are estimated at around **EUR 140 000** per billion of unique identifiers processed per annum[391], along with 0.5 FTE staff at the Commission in the initial stages.

Option 6a foresees the creation of an EU-wide hub supporting the uptake of circular business models. The hub could be integrated in an already existing structure/initiative and managed as part of a wider dissemination activity on the SPI (e.g. following the Ecodesign website model). Management costs could be minimised through synergies with other existing platforms, such as the European Circular Economy Stakeholder Platform, or the European Cluster Cooperation Platform, or the Circular Cities and Regions Initiative. Overall, the additional costs for IT development and technical inputs could indicatively remain within **EUR 250,000 per annum** along with 0.5 FTE staff at the Commission.

2) Preparing SPI measures

The **baseline administrative and compliance costs involved in the preparation of implementing measures** was estimated previously to be roughly EUR 7-12 million per year for manufacturers and about EUR 4 million per year for the Commission. The current annual administrative cost for the Member States of around EUR 10 million. A reasonable assumption is a total baseline cost of around EUR 25 million per annum, for manufacturers and competent authorities.

[391] With the total number of unique identifiers to be processed depending on the number of product groups for which the EU DPP will be requested and the granularity chosen for the unique identifier per product group (at single item level or at product model level).

The costs for implementation of the preferred policy package will perhaps double, so be around another **EUR 25 million per annum,** giving a total cost of around EUR 50 million per annum. This is based on another 30 SPI measures.

Included within this estimate is 13 additional FTEs to deliver Ecodesign Directive commitments for energy-related products. In addition, depending on the speed of delivery, up to 29 additional FTEs could be needed for new SPI products (essentially to deliver options 2 and 3). For example, a scenario consistent with the launch of work on 12 new SPI products in 2024 and then 2 to 4 new products every subsequent year, would require an additional 11 FTE Commission staff initially, rising to up to 29 depending on the level of ambition.

To some extent, the cost of analysis contributes to multiple policies. For example, an additional[392] Product Environmental Footprint Category Rules costs between EUR 300,000 and EUR 1,500,000, and allow for identification of environmental hotspots based on lifecycle analysis, whilst supporting companies in managing their production and in making green claims.

3) Impacts resulting from implementing measures

The specific obligations for businesses will arise as a result of the SPI measures. Some will arise immediately resulting from measures affecting design or production whilst others will arise throughout product lives, for example, ensuring support and the availability of spare parts. Impacts of life extension measures on product demand will only arise at the end of the lifetime of the newly marketed products.

A full and quantified assessment will be made when preparing SPI measures, taking into account the products concerned and the precise requirements set in line with the methodology in Annex 18, and also complying with the Commission's Better Regulation Guidelines. The **impact assessments accompanying SPI measures will consider:**

- The problem being tackled
- The different options for action ie the sustainability requirements set out under sub-option 3b
- The economic, social and environmental impacts associated with those sustainability requirements reflecting a range of factors such as implementation, magnitude and distribution of costs (including for SMEs), economic benefits for consumers as well as environmental and social impacts. This will allow for, amongst other considerations:
    - Assessment and consideration of any environmental trade-offs so that at the level of SPI measures conflicting objectives are identified and resolved;
    - Assurance that SPI measures are justified on cost-benefit grounds, including consideration of the net economic impacts and if those economic impacts are negative that they are justified by the environmental benefits.

The impact assessments accompanying the SPI measures will go into more depth and precision, proportionate to the more precise and binding nature of the SPI decisions. Given this, it is challenging to identify the overall costs and benefits, but the existing experience

[392] These will already be available for many priority products

with Ecodesign and the analysis undertaken[393] suggest that: **there is likely to be net economic benefits overall** at a global level; and any SPI measure with net economic costs will only go ahead if justified on the basis of its environmental impacts.

SPI measures will be used to implement policy option 3 and 4 (sustainability and information requirements) for specific products or groups of products. Annex 16 sets out in more detail the possible requirements to be made (minimum requirements and information requirements). Where possible, SPI measures will also implement policy options 5 (on incentives) and 6 (on business models and value retention), for example through linking performance classes to incentives or the modulation of EPR fees.

Distribution of impacts along the value chain and by location

The distribution of the impacts is important. Any additional costs for design and production will be incurred where those activities occur. The environmental benefits of improvements in production will also occur where the production takes place. For some pollutants, such as greenhouse gases, ozone depleting substance and mercury, these have a global impact. For others the impact is more local. Many design requirements imply no extra cost if included in the original design brief for new products at the conception stage, but are more likely to imply costs if requiring changes to existing models. Most additional costs arising from more stringent requirements will be passed on to consumers as higher prices. However, whilst measures leading to product life extensions may lead to some cost in terms of product design, they will primarily lead to benefit to consumers in terms of lower overall costs compared to replacing the product more quickly. These benefits will be realised for consumers of the products in the EU. However, their realisation depends on consumer choices.

Table 89 Distribution of impacts

	Production requirements	**Reparability and durability**	**Recycled content and recyclability**
Producer	Impact at place of production	Possible cost increase	Unlikely to alter costs
Other companies in the value chain	Could be positive	Likely to be positive	Likely to be positive
Environmental benefits	Benefit at place of production	Benefit at place of production and possibly place of disposal	Benefit of avoided resource extraction impacts but impacts of recycling activities
Consumer	Possible price impact	Potential lower use costs	Unlikely to affect price

Without pre-judging the future focus of SPI measures, it could be, for example, that the cost implications for producers of washing machines of making it possible to remove all electronic

[393] The assessment (in Annex 10) and comparison (in Annex 11) of policy options gives more detailed indications on the adjustment and compliance costs for industry resulting from SPI implementation.

circuitry in less than one-minute would be close to zero, whereas for recyclers this makes it possible to separately shred the steel shell and the valuable and critical raw materials in the electronic components, reducing impurities in the recycled steel and making recovery of electronics for recycling viable.

Beneficial impacts will accrue not only to consumers, but also to other businesses. For example, it could be assumed that an SPI measure prohibiting the use of a particular dye in fabrics might require the producer to substitute an alternative at low or zero cost, whereas this dye might result in ruined batches for a textiles recycler at great cost. In such cases the benefits will outweigh the costs my many factors, although each accruing to different actors. The preparation of SPI measures would focus on such areas of significant potential benefit. Similarly a company manufacturing car starter motors may incur some minor costs in modifying the design to enable dismantling for replacement of components (eg using non-proprietary fastenings, or sockets rather than glue), whereas these modifications could make the difference between viability or non-viability for a remanufacturer or repairer, and imply that consumers would be obliged to buy a new replacement. The balance of impacts here is likely to be – generally speaking – that costs will be borne relatively more by OEMs, whereas enabled value retention activities will be to the benefit of SMEs.

In certain cases design requirements may induce producers to adopt 'product as a service' models, whereby they retain possession of the product. This might amount only to including additional after-sales services, maintenance contracts and repair offerings through extended product warranties or take back agreements. For example Dell is taking back its computers for remanufacturing and placing back on the market. Or it could extend to retaining ownership of products, and the components and materials embedded in them, as a means of mitigating a range of supply chain risks (access to, and price volatility of, material inputs for example). Several examples exist of such models, which also depend on design choices for durability and recyclability. For example Philips provides lighting as a service favouring more durable and repairable bulbs, and Deso ensures that their leased carpets are made with fibres and dyes that can be made into new carpets in a closed loop system. Ensuring that repair and recuperation of components and spares is facilitated through Ecodesign should encourage more producers to consider offering such services and new business models.

A further element to be taken into consideration in terms of the distribution of producer impacts is the degree to which the production requirements would lead to impacts on production in the EU. Since EU producers are already subject to strict environmental requirements it might be that product requirements would not lead to any increased obligations. If they do lead to additional requirements on EU producers their impact might be relatively small in terms of increased costs and environmental benefits.

Conversely, the value retention activities on products placed on the EU market would be undertaken at the location of the product, and therefore normally within the EU.

Economic Impacts of SPI measures

Overview of economic costs

Minimum requirements for products can include aspects, for example, such as minimum requirement on the durability or reliability of the product or its components, on reparability and upgradability, on recycled content, on carbon and environmental footprints, or to reduce energy consumption/ increase energy efficiency. It could also include restricting certain

substances or compounds hindering circularity, or requirements on removability of components or modularity. The assessment of product improvement potential and emerging technologies should allow for estimates of the costs for manufacturers to redesign

The **costs of such changes are significant.** The additional costs of existing ecodesign and energy labelling requirements for industry, wholesale, retail and installation sectors are though translated into overall increase in business revenues and much higher savings for consumers[394].

- The combined measures entail a EUR 60 billion (5%) saving in 2020 on consumer expenditure (EUR 76 billion energy cost saving, EUR 7 billion consumables saved, EUR 23 billion extra acquisition costs). In 2030 this increases to EUR 118 billion (9%). The consumer's monetary saving is 0.4% (in 2020) and 0.9% (in 2030) of the GDP of the European Union (EUR 13 300 billion in 2020).
- Business revenues increase by EUR 21 billion in 2020 and EUR 29 billion in 2030 (5-6%), implying an increase of 324,000 direct jobs in 2020 and 430,000 in 2030.

This is around one billion Euros of economic costs per product group covered. Whilst costs will vary according to the requirements set, and the product group, it is likely that costs will continue to be of this level. A key issue for estimating the costs associated with the Sustainable Product Initiative is whether the costs associated with the Ecodesign Directive are a good basis.

- They could be underestimates as the number of products covered will be larger, as more aspects will be covered, as more environmental impacts are covered;
- They could be overestimates if the measures move away from covering use phase impacts systematically to other more technical and easier to resolve aspects (provision of information, reparability, recyclability, etc.)

Assuming that costs will be between one or two billion Euros, and on the assumption of another thirty SPI measures by 2030, implies **additional costs tentatively in a range of 30 to 60 billion Euros when fully incurred** (assuming those costs are of a similar level to under the baseline). This is based on 30 SPI measures to deliver sub-option 2b. Estimates of future costs are uncertain, and based on many assumptions, and so need to be treated with caution. For example, the time profile for adoption and implementation of additional SPI measures including the time profile for the purchase of the more sustainable products (some costs will only materialise in the years after the adoption of the SPI measures).

The **information provision** component of these costs will largely be about provision of existing information (such as use of certain materials) in a more targeted and accessible manner. There will be additional costs, for example, associated with estimating the sustainability characteristics of a product. As an example, the most ambitious approach would be to require a Product Environmental Footprint (PEF) study for all (16) impact categories at a cost of EUR 3,950 for each product placed on the market by a company[395]. The PEF study

[394] Ecodesign Impact Accounting, Status Report, 2020, European Commission (forthcoming)

[395] For cost estimates see the support study for the green Claims Initiative Impact Assessment. This cost assumes that a Product Environmental Footprint Category Rules (PEFCR) is available, which reduces costs per application. The update of a PEF study is assumed to cost EUR 1.185

would provide an environmental score for the product, allowing a minimum threshold for placing on the market to be set.

Product-specific elements of the **EU DPP**, in line with the general framework, for example the list of parameters to be included, their format, measurement or calculation, will be determined in SPI measures (if possible in the same acts introducing product-specific sustainability requirements). The costs of this will be minimised, for example, by ensuring synergies with the SCIP database or by building upon existing product information already passed along supply chains and to the consumer.

Focus on SMEs

SPI will entail some short term negative impacts on existing SMEs. Annex 19 sets out the analysis for SMEs in more detail. Nevertheless, in combination with mitigating measures, we estimate these impacts to remain proportionate for SMEs, with negative impacts offset over time by benefits. SMEs also tend to be more nimble in adapting their products with reduced need to change automated production lines. The negative impacts foreseen are notably linked to implementation of some of the product and information measures outlined under preferred sub-options 3b and 4b respectively, which may entail additional costs and administrative burden that is more difficult for SMEs to bear:

- For 3b, SMEs reported during consultations that they may find it challenging to test the durability of products or gain relevant certification (e.g. if performance classes are required), and may be in a difficult situation if the test fails. They also believe administrative burden will increase if due diligence requirements are set, as this would entail the need to ensure compliance beyond the first or second 'tier' in the product value chain, a process which may be more difficult for SMEs.
- For 4b, stakeholders reported during consultations that requiring an Ecoprofile in the form of a Product Environmental Footprint study would be more burdensome for SMEs, as would setting information requirements on social indicators, which would oblige SMEs to gather information from levels of the value chain to which they may not usually have access. Stakeholders also noted that establishment of the European Digital Product Passport is also likely to increase administrative burden for SMEs. This was confirmed by responses to a dedicated SME survey carried out in the context of this IA.

A number of factors are foreseen to offset these effects and assist SMEs:

- Impact assessments in preparation of SPI measures will consider proportionality of the measures for SMEs, as per Better Regulation rules. The 'Think small first' principle will be applied. Dedicated SME provisions will be foreseen if needed: justified exemptions or more lenient provisions for SMEs (e.g. longer transitional periods or exhaustion of stock provisions).
- Targeted guidance and support from the Commission: guidelines, training, user manuals, fostering of exchange of best practice will be foreseen. Measures under sub-option 6a will contribute, as will Commission networks like the Circular Economy Stakeholder Platform.
- Increased market opportunities are expected to increase the opportunities to further develop and harness the market for repair, refurbishment, remanufacturing and reselling, where most companies active on the market are SMEs. 70% of SMEs said

that regulations and incentives (e.g. 5b) can boost their innovation in sustainable products.

There is also evidence on the circular-readiness of EU SMEs: 51% of SMEs say they are fully or to a large extent ready to estimate their environmental and social impacts, if required by law. A majority are already introducing more sustainable products to the market. 42% said they expected a DPP to lead to higher economic returns for EU businesses.

Overview of economic benefits

The existing ecodesign measures have had significant economic benefits that outweigh the economic costs. The net savings for consumers were estimated at EUR 60 billion for 2020, rising to EUR 118 billion for 2030[396]. These savings comprise of energy savings and reduced expenditures for consumables (such as paper and toner for imaging equipment, water and detergents for washing machines and dishwashers, bags for vacuum cleaners, electrodes for welding equipment, etc.) minus extra acquisition costs for regulated and thus more expensive products. The vast majority of these cost savings are for the avoided energy use.

Whilst the economic benefits from Ecodesign so far considerably outweigh the costs, it is difficult to ascertain whether this relationship holds for products where energy savings (i.e. savings in the use phase) are not significant. There are arguments why energy related savings could be larger than for other resources, but consumers are also already aware of the costs of energy. Another significant possible cost saving comes from extending product lifetimes, but consumers are also aware of the costs related to this. There will be three main economic impacts of extended product lifetimes, a reduction in product sales, a reduction in annual costs for consumers and an increase in economic activity linked to repair and maintenance. Although significant energy savings will occur at macro level due to reduced demand for new products driving down embodied energy in products from extraction and processing of materials, this does not directly impact economically on the producer or consumer.

Designing products in a manner which enables their lifetime extension (for example through servicing, repairing and upgrading), optimisation (for example through providing products-as-a-service or peer-to-peer sharing), and which enables more value to be retained at the end of their life (for example through remanufacturing, component harvesting or higher quality recycling), will boost economic activities in providing these services. Such services will in nearly all cases be provided in proximity to where the products are used, that is to say within Europe. The amount of value retention, and the amount of related economic activity depends tends to be higher before a product becomes waste. It has been estimated that landfilling or incinerating 10,000 tons of waste generates 2 jobs, recycling generates 115 jobs, whereas repair activities (which would result in avoidance of waste) generates 404 jobs[397].

[396] Ecodesign Impact Accounting, Status Report, 2020, European Commission

[397] Gaia, Zero Waste and Economic Recovery, 2021

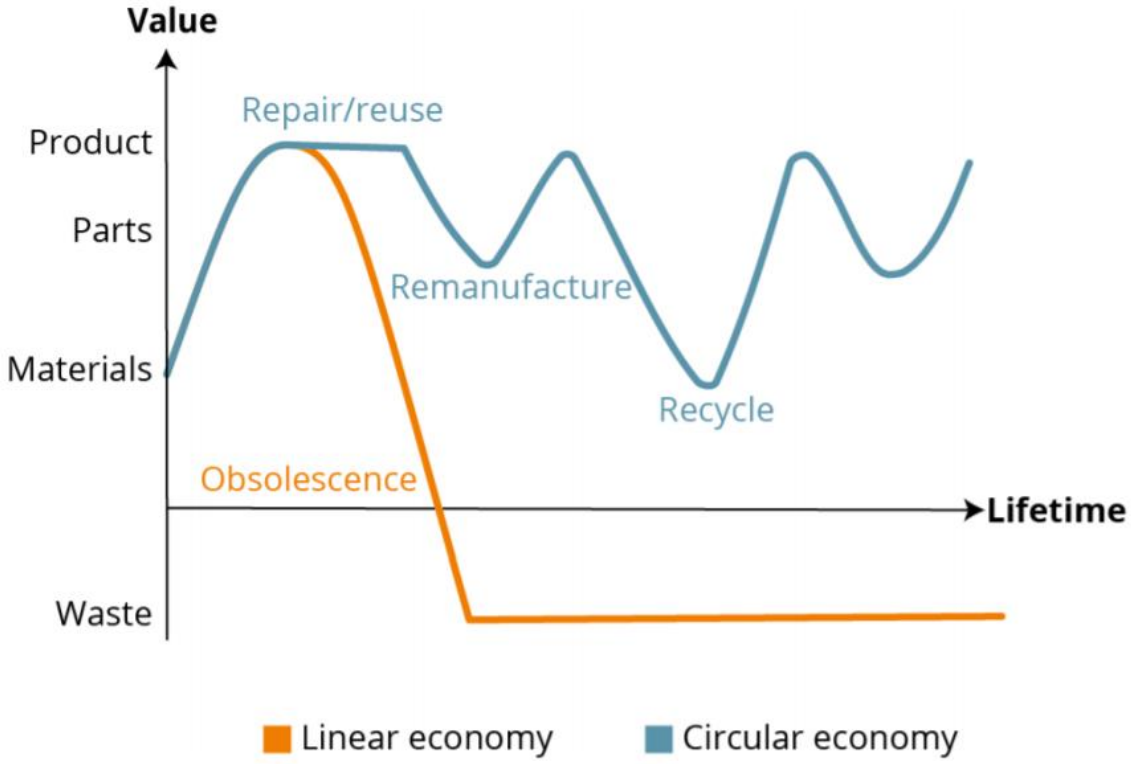


Figure 1 Linear vs circular economy value retention

The degression in value retention can be seen as one moves to the outer concentric circles in the graphic below.

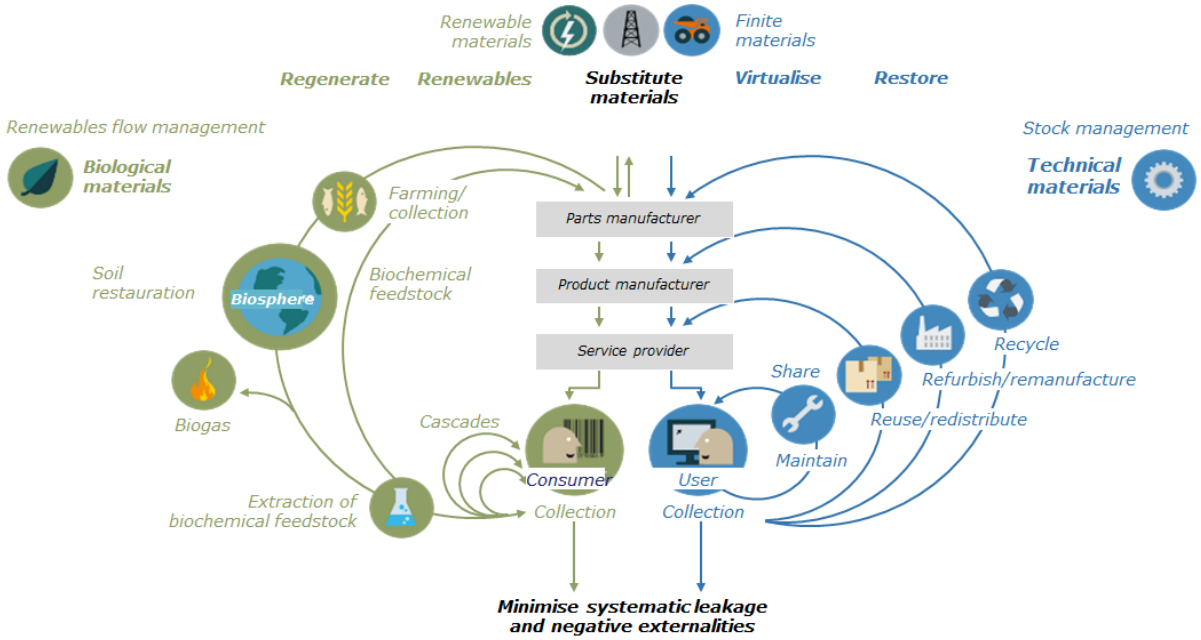


Figure 2 Circular economy systems diagram

Economic and employment effects of circular approaches can be split into three stages of the value chain. First, resource efficiency actions make production less material intensive. This

relative shift of factors of production implies adding more value per tonne of materials usually implying also using more labour. Resource efficiency then implies maintaining that product in operation for longer, and minimising the loss of materials at its end of life.

VDI, the German association of Engineers, has stated that "*businesses are often not very sensitized to the need to design their products in a resource-compatible way. A lack of practical experience often results in challenges in the introduction and management of product related resource efficiency strategies. In most cases, environmental and sustainability aspects are only integrated into the product design via legal requirements, e.g. the Ecodesign Directive 2009/125/EC*"[398]. VDI has calculated that material input costs for German manufacturing companies are more than double labour input costs, suggesting that material efficiency deserves even more attention than labour productivity. The potential for savings is also significant, and they cite one (perhaps extreme) example where 'A business was able to reduce its raw material costs by 90 % and its energy demand by 50 % compared with conventional competing products by designing products that were suitable for repair, dismantling and production and by complying with the requirements of the "Blue Angel"'

Secondly, once those materials are embodied in products and assets in the economy, circular approaches are directed at prolonging their lifespan (for example through servicing, maintenance, repair and upgrading) and at optimising their use (for example through peer-to-peer sharing, and product-as-a-service business models). These services tend to be labour intensive and involve many skills levels. Finally, at the end-of-life stage circular activities include preparation for re-use, remanufacturing, component harvesting, recycling and other forms of waste management and treatment. SPI will have impacts at each of these stages.

Modelling of the impacts of extending certain EuP lifetimes suggests that this can result in a reduction in lifetime costs to consumers. These cost savings reflect on the one hand lower purchase rates of new products and increased expenditure on their repair and maintenance. These impacts will however only be realised if consumers take the available opportunities offered. Evidence suggests that for many products their lifetime is not limited by technical failure but a desire to replace them before the end of their life. In such cases used-but-functional products are increasingly re-used (for example via services such as Vinted or Backmarket), but many still remain "dormant" or are disposed of.

This illustrates that mechanisms can be identified for measures prolonging the lives of products that could reduce the costs of them to consumers. It also illustrates some of the additional economic activity that would be expected to occur in the EU However, the degree to which these opportunities will be taken advantage of by consumers, and thus realised, appears to vary between product types. It will also be influenced by other factors outside the scope of this legislation. It is therefore not possible to define categorically the level of the economic benefits that would be realised or whether economic costs would be more than offset by them for the Sustainable Product Initiative. However, environmental benefits will also translate into economic benefits and, these are discussed below.

[398] VDI Centrum RessourceEffizienz "Resource Efficiency through Product Development Measures" p.12 VDI ZRE Brief analysis No. 20: Resource efficiency through product development (resource-germany.com)

Environmental benefits

Implementing sub-option 2a could potentially provide benefits in all environmental impact categories: the environmental impacts of the extension to products under sub-option 2a are between 4 and 16% of EU impacts depending on the impact category. In addition, there could also be reductions associated with applying a wider range of sustainability requirements to the existing product scope.

It is uncertain, what percentage of environmental impacts would be reduced by the new sustainability requirements. The existing Ecodesign Directive has had an effectiveness for product groups of around 15%[399].

It should be noted that some of the environmental benefits will occur outside the EU. While this can also be of relevance for the EU since they have global effect, this is generally only considered to be the case for a limited range of pollutants, for example greenhouse gases, ozone depleting substances, mercury and biodiversity. As a result international agreements have been implemented for these. Many other environmental impacts are more limited to the local dimension. It is legitimate for SPI to also reduce these, but it is important to understand the relative share since the way their value can be quantified for the EU will differ. One particular challenge will be the ability to verify compliance with any product standards and thus to have certainty that associated environmental benefits are reduced.

The scope of the new initiative will eventually cover 65% of total GHG emission from products consumption in the EU, 64% of particulate matter emissions and 70% of resource depletion. This is an increase in percentage points compared to the baseline of 16% of GHG, 39% of particulate matter and 20% of resource depletion. However, SPI can also deliver further environmental benefits for products already within scope as it has a wider range of measures to consider. Looking at GHG emissions only:

- assuming an improvement of 15% of environmental impacts over the increased (i.e. just the additional) scope from SPI measures, would lead to globally reducing GHG emissions by around 117 Mt CO2e[400]. Assuming a cost of carbon of EUR 100 per tonne CO2e[401], the **GHG savings would have a monetary equivalent of around EUR 12 billion per annum**.[402] These benefits would be realised once SPI measures take force for the products within scope and could for some aspects materialise only when the products affected have been replaced – which could be 20 to 30 years.
- If the new initiative delivered an improvement of 15% of environmental impacts over the whole scope, which is a much more optimistic assumption, it would reduce GHG emissions by around 475 Mt CO2e. Assuming a shadow price of EUR 100 per tonne

[399] Effectiveness varies according to the category being measured. The Ecodesign Impact Accounting 2020 reports an effectiveness of 10% for primary energy in 2020 rising to 18% in 2030, with variation shown by higher effectiveness for NOx (33% in 2020 rising to 64% in 2030) and lower effectiveness for PM (6% in 2020 rising to 34% in 2030).

[400] According to Annex 8, the baseline is a reduction of 498 Mt/a CO2 equivalent (12% of total EU GHG emissions for 2018). This is in relation to a current coverage of 2,366 MtCO2e. According to the Ecodesign Impact Accounting 2020, the saving is currently 170 MtCO2e (a 10% reduction) and forecast to grow to 266 MtCO2e. See Annex 4 for cost of carbon value.

[401] Based on estimates from "Handbook on the external costs of transport", DG MOVE, 2019

[402] Ecodesign Impact Accounting, Status Report, 2018, European Commission reports savings of 150 Mt CO2e in 2020, rising to 257 Mt CO2e in 2030

CO2e[403], the **GHG savings would have a monetary equivalent of around EUR 47 billion per annum**. Again, these savings would materialise over time.

This second and higher estimate, is more accurately an estimate of what SPI might deliver, rather than a clear estimate of the additional benefits of the changes resulting from this revision.

One factor more clearly relevant also for improving effectiveness for the existing product scope is improvement in the effectiveness of market surveillance and enforcement. It is estimated that some 10% of the achievable benefit from implemented measures is not being realised. Improvements to enforcement under policy option 7 can help to improve this situation and thus deliver a higher proportion of the available benefits. The reduction of non-compliance could reduce GHG emissions by around 22 Mt CO2e in 2030.

Environmental Externalities

Annex 11 sets out the significant possible environmental impacts for a range of environmental impact categories. In the current Ecodesign the main market failure was that enterprises did not introduce cost-effective energy savings - so, there was an economic gain that compensated for the extra costs. This will be the case under SPI to a lesser extent, which will instead have a stronger focus on externalities that are not integrated in prices. The benefits for society from improving the internalisation of environmental externalities will be significant but less directly reflected in economic estimates.

SPI would help respond to criticism – as recently confirmed by the European Court of Auditors[404] - that a more rigorous application of the polluter pays principle is possible, and can also produce positive macroeconomic benefits for the EU economy. This is the case for environmental impacts covered under SPI, such as air pollution and GHGs, water pollution, waste treatment, water scarcity and biodiversity loss.

A recent study of the degree of internalisation, shows clearly that EU polluters are not being made to pay in full – across all pollutants, in all Member States and across all sectors of the economy. The evidence is strongest in the case of air pollution and GHGs and water pollution, for which good data on both costs and emissions is available, but more localised evidence about other forms of environmental damage tells the same story.

The external costs of air pollution and GHGs amount to approximately €720 billion per year across the EU – around 5% of EU GDP – of which just 44% is internalised in taxes or economic instruments economy-wide. There is, however, wide variation both between economic sectors and among Member States. In other areas of environmental damage, internalisation rates across the EU are even lower. The EU-wide internalisation rate of water pollution costs reaches 16% for point sources, linked to households and industry, but is negligible for non-point sources.

[403] Based on estimates from "Handbook on the external costs of transport", DG MOVE, 2019

[404] European Court of Auditors (2021) Special Report 12/2021: The Polluter Pays Principle: Inconsistent application across EU environmental policies and actions, https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=58811

Estimates for water scarcity and biodiversity loss are harder to derive, because of their complexity and highly site-specific nature. Nonetheless, case studies assessed in this study suggest that in these areas the internalisation rates are also extremely low.

Overall, it is reasonable to assume that total environmental costs exceed €1 trillion per year[405]. The SPI will contribute by internalising some of these external costs, and also by reducing environmental impacts and hence their level.

Analysis of the potential for resource efficiency

Overall on resource efficiency

Resource efficiency can lead to financial savings, reduced supply risks- and footprint, innovation and market opportunities – saving at least EUR 600 billion for EU businesses[406], while combined with circular measures, benefits are much higher. Resource productivity improvements of 1-2% per annum can lead to positive GDP impacts up to 1% and to employment impacts up to 0.5% by 2030[407], while higher resource productivity increases are also possible, enabled by faster technology change and higher levels of circularity, leading to increased socio-economic benefits.

Benefits include resource- and financial savings; reduced supply risks and waste; innovation, competitiveness (first-mover advantage, corporate image etc.) gains and GDP growth; sustainable products for customers; local jobs (social integration), many in SMEs. Circular economy attracted EUR 17.5 billion private investments in 2016 (0.12% of GDP), provided 4 million jobs (1.7% of total employment) and generated EUR 147 billion value added (reaching around 1% of GDP). Circularity creates growth and jobs in secondary raw materials (SRM) markets (now 12% of raw materials demand).

The 'Towards Sustainability Scenario' of the International Resource Panel (IRP)[408] shows that resource efficiency and sustainable consumption and production can slow resource use dynamics significantly, so that incomes and other well-being indicators improve, while key environmental pressures fall. Global resource productivity can increase by 27% to 2060, and decoupling can boost economic growth by 8% over historical trends, outweighing decarbonisation costs and delivering a more fair income distribution and access to resources. Resource efficiency can reduce GHG emissions by 19% and help protect and restore native habitats. The International Resource Panel work on remanufacturing illustrates the practical potential for different ways of manufacturing to generate and retain value in the economy.[409]

Private investment in the circular economy sectors of the EU-27 attracted EUR 15 billion private investment in 2017, provided EUR 125.8 billion added value and 3.5 million jobs, yet most of the circular economy's full potential – concentrating at circular design, and products, waste prevention, durability and reuse, circular business models, efficiencies and synergies – is still to be unlocked.

[405] Green taxation and other economic instruments Internalising environmental costs to make the polluter pay, IEEP et al, 2021 (source for estimates of externality costs and degree of internalisation)
[406] The opportunities to business of improving resource efficiency. AMEC, 2013.
[407] Modelling economic and environmental impacts of raw material consumption. Cambridge Econometrics, 2014. and Links between production, the environment and environmental policy. Cambridge Econometrics, 2019.
[408] Global Resource Outlook 2019, IRP
[409] Redefining Value (IRP 2018) - Full Report.pdf (cec.eu.int)

What level of improvement is possible for SPI products?

An assessment of the environmental benefits requires an assessment of the percentage of environmental impacts avoided due to SPI. As discussed above, the reduction of CO2e thanks to the existing Ecodesign experience is 10% rising to 18%[410], with improvements for other environmental factors as well. A hypothesis is that SPI could reduce environmental impacts by 15% with a split between life extension and improvements in the product process:

- For a 7.5% benefit from **life extension**, an assumption is that half of consumers take advantage of the possibility and that the life extension is 20%. A 20% life extension reduces demand by 16% and if 90% of the lifecycle impacts are in the phases other than use, then this equals a 7.5% reduction in impacts if half the consumers use that possibility.
- The 7.5% benefit from **improvements in the production process** is plausible given the experience with in regulating production processes, supported by banning certain processes and impacts of enhanced information on environmental impacts. Nevertheless, account needs to be taken of the degree to which these impacts are already regulated for EU producers.

Life extension and improvements in the production process are discussed below in more detail.

Life extension

The environmental impact of prolonging the lifetime of a product depends on the ratio of impacts along its value chain. For example, the life-cycle impact of a smartphone is concentrated 80% in the pre-use phase (extraction, processing, production and distribution), whereas for certain other products (eg: TV or desk-top computer) the use-phase impacts are relatively higher[411] (and replacement with more efficient new products may even in limited cases provide environmental benefits). The environmental benefits of prolonging the life (and therefore avoiding the replacement with new) of the smartphone are therefore relatively higher. However, the role of consumers is key and replacement of products more associated with status (e.g. smartphones compared to washing machine) is more likely to be before their end of life and may be harder to influence.

- It is estimated[412] that a 1-year lifetime extension of all washing machines in the EU would save 0.25 Mt CO_2 per year by 2030; for notebooks, the figure is 1.6 Mt CO_2; for vacuum cleaners, 0.1 MtCO_2; for smartphones, 2.1 MtCO_2. Extending the lifetime of these four products in the EU by one year would therefore save around 4 MtCO_2 annually by 2030, the equivalent of taking over 2 million cars off the roads for a year. Extending the life of smartphones alone would be equivalent to removing 1 million cars.
- A lifetime extension of 3 years would save around 0.66 MtCO_2 annually by 2030 for washing machines; 3.7 MtCO_2 for notebooks; 0.3 MtCO_2 for vacuum cleaners; and 4.3 Mt CO_2 for smartphones.

[410] Ecodesign Impact Accounting, Status Report, 2018, European Commission
[411] Jens Malmodin and Dag Lundén (2018). The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015
[412] Coolproducts DOn't Cost the Earth Report (2019) European Environment Bureau

- A 5-year extension would correspond to about 1 $MtCO_2$ annually by 2030 from washing machines; 5 $MtCO_2$ for notebooks; 0.5 $MtCO_2$ for vacuum cleaners; and 5.5 Mt CO_2 for smartphones.

In general the global impact of extraction and processing activities are estimated at 50% of GHG emissions and 90% of biodiversity loss (however this includes food production and not only products)[413]. To date the focus of the Ecodesign Directive has been on reducing use-phase emissions, however embodied emissions and other environmental impacts are relatively significant.

One study calculated that consumer costs could decrease by around 15% from increased reparability (which includes the economic value of the repairs), whilst sales would decrease around 30% if all consumers took full advantage of the extended lifetime opportunity[414]. In practice, not all the potential benefit that would be realised. There are also studies showing positive economic returns to the ecodesign processes envisaged under the SPI[415].

According to another study, goods that have longer lifespans generally have a lower total lifetime costs compared to the standard option, mostly due to postponing the purchase of the replacement appliance[416].

Not all goods are only replaced at the end of their lives (as for example, fashion and other factors also play a role in the decision to replace a good), but there is evidence that a significant share of consumers will keep goods for a long time. For example, the results of the Eurobarometer 503 show that the main reasons that led respondents to replace their digital devices were that the device broke (38%), the performance of the device had significantly deteriorated (30%) and certain applications or software stopped working on the device (18%).[417]

Increasing the market share of products with a longer lifespan is generally[418,419] expected to contribute to a reduction of resource depletion, waste, emissions and other environmental costs associated with the production, distribution and disposal life-cycle stages[420,421,422,423,424]

[413] UN International Resource Panel, Global Resources Outlook (2019) Global Resources Outlook | Resource Panel

[414] Repairability criteria for energy related products'; KUL, VITO etc; June 2018

[415] ANALYSE DES BÉNÉFICES ÉCONOMIQUES ET FINANCIERS DE L'ÉCO CONCEPTION POUR LES ENTREPRISES https://librairie.ademe.fr/produire-autrement/1264-analyse-des-benefices-economiques-et-financiers-de-l-eco-conception-pour-les-entreprises.html

[416] EC Study on "The durability of products"

[417] European Commission, Attitudes towards the impact of digitalisation on daily lives, 2019.

[418] Some studies point out that some large household appliances might be an exception if newer models are significantly more energy efficient than the models own by consumers. In this case, it is possible that the environmental costs associated with materials, production, distribution and disposal of buying an appliance sooner than later are outweighed by the environmental benefits related to the energy savings of using a more efficient model. See for example: Iraldo, F., Facheris, C. and Nucci, B.Is product durability better for environment and for economic efficiency? A comparative assessment applying LCA and LCC to two energy-intensive products. Journal of Cleaner Production, 140, pp.1353-1364.2017.; Ardente, F. and Mathieux, F. Environmental assessment of the durability of energy-using products: method and application. Journal of cleaner production, 74, pp.62-73. 2014; and Reale, F., Castellani, V., Hischier, R., Corrado, S. and Sala, S.. Consumer Footprint-Basket of Products indicator on Household appliances. Technical report. European Commission, Joint Research Centre. 2019.

[419] The results of a JRC study showed that, "*for the global warming potential, prolonging the lifetime of a washing machine and dishwasher case studies is environmentally beneficial when the potential replacement product has up to 15 % less energy consumption during the use. For the abiotic depletion potential impact, mainly influenced by the use of materials during the production phase, prolonging the lifetime of both machines was shown always to be beneficial, regardless of the energy efficiency of newer products. Freshwater eutrophication showed a great influence by the impact of the detergent used during the use phase; thus, prolonging the device's lifetime is still beneficial for this impact category, although the benefits are negligible compared to the life cycle impacts of the products.*". See https://op.europa.eu/en/publication-detail/-/publication/72cd56e4-bab7-11e6-9e3c-01aa75ed71a1/language-en/format-PDF/source-126402524.

[420] See for example Estevan, H., Schaefer, B. and Adell, A., 2017. Life Cycle Costing State of the art report. Local Governments for Sustainability, European Secretariat. Available at: https://sppregions.eu/fileadmin/user_upload/Life_Cycle_Costing_SoA_Report.pdf.

[421] Bakker C, Wang F, Huisman J, Den Hollander M: Products that go round: Exploring product life extension through design. J Clean Prod 2014, 69:10–16.

Faster obsolescence of products is a growing concern for consumers. In their reply to the Open Public Consultation to support the Consumer Empowerment Impact Assessment, 76% of respondents (and 89% of citizens) mentioned they had experienced an unexpected failure of products in the past 3 years[425]. ICT products (47%), small household appliances (20%), clothing and footwear (19%), other electronics (18%), large household appliances (16%) and software programmes (15%) were most often cited product categories for unexpected failure.

On top of these cases of early obsolescence, there have also been a number high-profile cases of **planned obsolescence**, such as software updates having an impact on the performance of phones and accelerating their replacement, although consumers were not informed thereof[426]. It is important to note, however, that a number of manufacturers/retailers argue that planned obsolescence does not exist as a practice, and that shorter lifespans are impacted by consumer behaviour such as poor maintenance and increased use.

Available studies suggest that certain consumer goods have a shorter lifetime than would have been expected for such products in the past[427,428]. For example, an EU funded project, identified that a significant share of goods tend to fail right after the end of the minimum legal guarantee period (between second and third year) based on consumer reports in seven Member States[429]. Similarly, a 2015 German Study[430] concluded that the percentage of large household appliances replaced by consumers within five years due to technical defects more than doubled, from 3.5% in 2004 to 8.3% in 2012. Several other studies carried out[431,432,433] present evidence that the lifespan of some goods is becoming shorter, with technical failures being the main reason for product replacement. The project concludes that "a limited number of problem types account for four out of five failures, most of which refer to a specific part of a product, many of which appear to be shared across product categories (e.g. batteries, printed circuit boards and LCD screens)"[434].

Another study shows that in the case of smartphones and tablets, a large proportion of the devices are replaced after two years because of a few but frequent problems: (1) the battery stopped working and could not be replaced by the user; (2) the screen cracked and could not be replaced by the user; or (3) the manufacturer was no longer willing or able to support the

[422] Bakker, C., den Hollander, M., Van Hinte, E. and Zijlstra, Y., 2019. Products that Last 2.0: Product Design for Circular Business Models. BIS Publishers.
[423] Cooper, T. ed., 2016. *Longer lasting products: Alternatives to the throwaway society*. CRC Press.
[424] Ruth Mugge, Jan P. L. Schoormans & Hendrik N. J. Schifferstein, 2005. Design Strategies to Postpone Consumers' Product Replacement: The Value of a Strong Person-Product Relationship, The Design Journal, 8:2, 38-48.
[425] European Commission, *A New Consumer Agenda Factual summary report – public consultation*, 2020, p. 20.
[426] Autorita Garante della Concorrenza e del Mercato, *Proceedings initiated against Samsung and Apple for smartphone software updates*, https://en.agcm.it/en/media/detail?id=4d458a5b-49ad-4d30-80e9-d3e9692fca36 and https://www.agcm.it/media/comunicati-stampa/2018/10/PS11009-PS11039 (in Italian with more details).
[427] United Nation Environment Programme, *The Long View – Exploring Product Lifetime Extension*, 2017, pp 20-24.
[428] European Parliament, *Briefing – Planned obsolescence: exploring the issue*, 2017.
[429] Research carried out by the PROMPT project, an independent testing programme assessing the lifetime of consumer products. It brings together research institutes, national and umbrella consumer organisations as well as repair companies and platforms. The project has received EU funding under Horizon 2020.
PROMPT Project, *State-of-the-art of consumers' product experiences related to premature obsolescence*, forthcoming.
[430] Cited in: European Parliament, *Briefing – Planned obsolescence: exploring the issue*, 2016, p. 3-4.
[431] Umwelt Bundesamt, *Influence of the service life of products in terms of their environmental impact: Establishing an information base and developing strategies against "obsolescence"*, 2020, p. 85, p. 88, p. 24.
[432] European Parliament, *Briefing – Planned obsolescence: exploring the issue*, 2016, p. 4.

[433] M. Depypere, T. Opsomer, *Relevance of Policy Measures to Increase Product Lifetimes: a Literature Review*, 2018.

[434] PROMPT Project, *State-of-the-art of consumers' product experiences related to premature obsolescence*, forthcoming.

software[435]. Recently, national consumer organisations have also received more than 25 000 complaints concerning two components of a gaming console (i.e. its two controllers) which was failing prematurely and made difficult to repair or replace, rendering the console obsolete (well before the lifespan of 7 to 10 years advertised by its manufacturer) and in spite of the manufacturer being aware of the problem[436].

Improvements in the production process

The impact reduction potential of product groups can be defined as the difference between the life cycle environmental impact of the average product on the market and a product with amongst the best performance[437]. Due to data availability limitations, the reduction in climate change impacts is used as a proxy for the whole range of environmental footprint impacts. While 50% is frequently found as reduction potential for a purchase decision (see below), for some product categories, substantially higher savings were found: 80% for cars and 95-98% for electricity and space heating (see more below). Importantly, these percentages should not be taken as an indication of the likely effectiveness of SPI, which will only realise part of this potential.

Vehicles and mobility, person transport services, goods transport

For three specific car example pairs of battery electric vehicles (BEV) versus internal combustion engine (ICE) cars of the same car class, a recent study[438] found differences and hence reduction potential for climate change with an average value of - 67%, using the grid mix for electricity production. A more extensive literature review [439] finds variation in estimates of the LCA differences in different classes of cars, but does indicate significant potential.

Space heating and cooling systems

Covered within the Ecodesign Directive, changing the space heating mix with an efficient heat pump operated with EU grid mix electricity reduces the climate change impact by 52%. If, in addition, the heat pump is operated by a green electricity mix (see the analysis on electricity below)[440], the impact reduction is higher: the electricity environmental footprint is by far the main contributor (with the equipment production life cycle-wide impact contributing only to a limited extent).

Concrete

[435] Rizos, V., Bryhn, J., Alessi, M., Campmas, A. and Zarra, A., *Identifying the impact of the circular economy on the Fast-Moving Consumer Goods Industry Opportunities and challenges for businesses, workers and consumers–mobile phones as an example, 2019, p. 19, p. 25.*

[436] https://www.beuc.eu/publications/beuc-x-2021-002_nintendo_-_premature_obsolescence_complaint_to_the_ec.pdf

[437] See the Green Claims Initiative Impact Assessment for further analysis

[438] Auke Hoekstra & Maarten Steinbuch (2020): Comparing the lifetime greenhouse gas emissions of electric cars with the emissions of cars using gasoline or diesel. Eindhoven University of Technology.

[439] *Determining the environmental impacts of conventional and alternatively fuelled vehicles through LCA, Ricardo Energy and Environment, 2020*

[440] For the use phase, the PEF method requires to use the grid mix of the country of consumption. The analysis shall reflect the ratios of sales between EU countries/regions. Where such data is not available, the average EU consumption mix or a region-representative consumption mix shall be used.

The main contributor to the environmental impacts of conventional concrete is the cement, being (predominantly) Portland cement. While achieving equivalent concrete functionality, a substantial amount of this can be replaced by ground granulated blast-furnace slag (GGBFS), fly ash and other by- and waste products from other industries, much of which is currently not used but deposited.

The reduction shown for GGBFS is an established case to reduce the impact and it is possible to assume other pathways could also yield benefits. An impact reduction of 50% for climate change can be achieved already with this avenue. Further reduction can be expected, in dependency on different Portland cement production countries, production technologies and management.

Apparel and footwear

A study identified the following range of lowest and highest environmental impacts[441]

Table 90 Range of lowest and highest environmental impacts

	Climate change (kg CO_2 equivalents) compared to…		Freshwater eutrophication, compared to…		Water depletion, compared to…		Land use, compared to…	
	Mean values	Worst values	Mean values	Worst values	Mean values	Worst values	Mean values	Worst values
Cotton t-shirt[442]	-42%	-81%	-40%	-80%	-47%	-80%	-25%	-56%
Wool knitwear	-58%	-77%	-60%	-84%	-51%	-70%	-51%	-70%

By averaging all values, the reduction from mean to best is -46%, which reflects the environmental impact reduction due to purchasing a product that has a top class of performance as opposed to buying a product of unknown impact.

Raw materials from agriculture

For cotton growing per kilogram a 50% reduction respectively to mean values and 78% respectively to worst values were found. A 50% reduction value for the purchase of any renewable raw material, reflecting the environmental impact reduction due to purchasing material that has a top class of performance as opposed to buying a product of unknown impact.

[441] 2nd Edition of the Environmental Impact Valuation as base for a Sustainable Fashion Strategy. White paper Hugo Boss. Heinz Zeller, Rainer Zah, Michela Gioacchini and Mireille Faist

[442] Per piece of the same size. Note that this table does not yet consider the purchase change between natural and synthetic fibre, which are expected to yield a higher reduction potential, than within the cotton T-shirt variants.

1. HOW SPI WILL WORK IN PRACTICE

Case study A: The case of Denim Jeans

Disclaimer: this case study has been drafted to provide an indication of how SPI measures could be developed under the future legal instrument and the typology of requirements they could include. The choice of jeans as a product and thresholds and requirements used are included only to illustrate functioning of the SPI on a specific product category. They should not be understood as an indication of what future SPI measures on textile will include.

Background

Europe is a major market for denim fabric, which is mostly used for trousers. In 2019, there were 9.2 billion euros of imports, primarily from Bangladesh, Turkey and Pakistan (the three account for 67.8% of all denim imports into the EU)[6]. Germany, France and the Netherlands are predominant users and importers within Europe, as they represent 46% of intra-EU trade. The EU also has a large export of denim garment products, worth about 6.2 billion euros in 2019. Germany, Spain, the Netherlands and Italy are the main exporters.

1.1 The environmental and social cost of producing a pair of jeans

A pair of jeans contains 30 separate pieces of textile and accessories (fasteners, buttons) are required[443]. Most jeans are made from 100% cotton denim, although blended fabrics are increasingly used.

An example of jeans value chain production could start in India, which is the largest cotton producer in the world, or in Pakistan, which is also a major producer. The cotton would then be woven into fabric and dyed in Pakistan, with synthetic tincture made in China. The individual pieces would be assembled in Pakistan, due to cost factors and knowhow, with zips made in Japan, buttons produced in the Democratic Republic of Congo (DRC) and rivets from Australia. The jeans would finally be aged in Bangladesh to be distributed all over the world – including in Europe[444].

Overall, one pair of denim jeans emits around 20 to 40kg of CO_2 – including cotton culture, the use of agricultural machinery, the journey of the components, and the spinning, weaving and assembly work in the factory[445]. A pair of 501 Levi's jeans would have the following distribution of CO_2 emissions[446]:

[443] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[444] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[445] Petit R., January 2021. *Le denim : quel est l'impact social & environnemental de nos jeans ?* [Denim: what is the social & environmental impact of our jeans?], The Good Goods.
[446] Levi Strauss & Co., 2015. *The life cycle of a jean – understanding the environmental impact of a pair of Levi's® 501® jeans*.

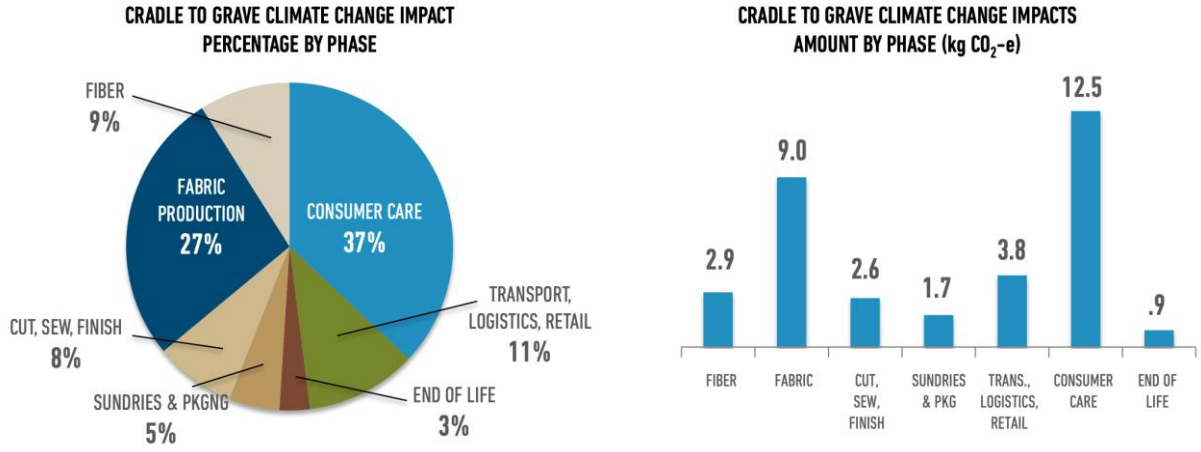


Figure 3 Levi's® 501® jeans: climate change impact

About 1 kilogram (kg) of cotton is necessary to manufacture one pair of jeans, which requires 2 kg of fertilizer and 75 grams (g) of pesticide[447]. Besides cotton, the 2.3 billion jeans manufactured each year consume 95% of global indigo tincture production. Production of 1 kg of synthetic indigo requires 1 tonne of oil, 9 kg of toxic solvents and 1000 litres of water. As this tincture is not soluble in water, the treatment of wastewater requires sodium dithionite, which produces sulphate and sulphite, both potent pollutants. The "worn in" look can be obtained through chemical bathing with acids, enzymes, bleach and formaldehyde, sandblasting or stone washing, with pumice[448]. These processes produce hazardous fumes and dust to which workers are, for the most part, directly exposed.

Workers are most often not protected against the health risks related to the pesticides and chemicals involved in the production of a pair of jeans, as they generally work without a contract and / or without social security benefits[449]. With a salary below the minimum wage, workers can barely afford housing, food, education, and medical treatment. Child labour is also common across the production line, because of the strong demand for cotton and garments, poverty, and weak legislation[450].

Wages remain low and working conditions bad in the supply chain because of the fierce competition on price between brands and of the complex and thus opaque chain of multilayer subcontracting that has been implemented by multinationals, which too often enables them to claim that they are not aware of what happens, and of the high demand for cheap garments, especially since the rise of fast fashion[451]. *I*n the past 15 years people have bought 60% more clothes but use them 36% less. This global figure hides major variations, with much higher clothing utilisation rates in many low-income countries masking worse and rapidly declining performance in other regions[452]. With fashion trends evolving fast, new models of clothes arrive in store 6 to 12 times a year.

1.2 Usage and end of life

The maintenance and end of life of a pair of jeans represents 40% of the total GHG emissions of their whole life cycle, including production, as they are often washed[453]. This requires energy, and this need

[447] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[448] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[449] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[450] International Labour Organisation, 2016. *Child labour in cotton: a briefing*
[451] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021
[452] Ellen Macarthur Foundation, 2017. *A new textiles economy: Redesigning fashion's future*.
[453] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021

is multiplied by 5 to 6 if a dryer is used. In addition, this increases the quantity of wastewater that must be treated.

When it comes to the end of life of worn jeans, consumers can sell them, throw them away or donate them[454]. Donations are sorted to be:

- Recycled into textile products like carpet padding, painter's cloths, or insulation;
- Donated to people in need;
- Sold in thrift shops. After a certain amount of time, they are exported to developing countries, to find a second life there. However, garments often end up being burnt, which impacts the local environment and inhabitants as developing countries generally do not have the suitable infrastructure to discard them safely[455]. It has been shown that 40% of the clothing traded at the Kantamanto Market (Ghana) ends up in landfill almost immediately due to its poor quality[456].

From end 2024 it will be obligatory to separately collect textiles in municipal waste across the EU[457]. A significant increase in this waste stream can therefore be expected, with less going to landfill or incineration as mixed waste.

Nowadays, the mechanical recycling of jeans is encounters challenges if they are composed of blended fabrics (cotton / polyester, cotton / elastane, cotton / polyester / elastane which are required for close-fitting cuts; cotton / cordura or Kevlar for professional clothing)[458]. Fibres recycled from mechanical processes always require to be spun with virgin fibres due to loss of properties and performances of the material. For synthetic fibres such as polyester, the amount will be higher but never 100% of the total material. Setting requirements for substances, for levels of recycled content in jeans, and for the enabling of high-end recycling could trigger stronger demand of recycled fibers. For instance, the "MonCoton" project aims to make jeans out of 100% recycled cotton fibre[459]. This could be beneficial for textile recyclers as this would equate to more business opportunities, and for workers who handle the substances.

In France, where the Extended Producer Responsibility (EPR) for clothing has been implemented[460]:

- 10,1% of the garments are recycled into industrial wiping cloth and 23,4% into new textiles, geotextile (for insulation) and secondary raw material;
- 57,8% are resold in France or abroad;
- 8,2% are transformed into solid recovered fuel or incinerated for energy recovery;
- 0,5% is landfilled.

However, at a global scale, 73% of clothing end up incinerated or landfilled[461]. At EU level EPR is obligatory for packaging and electronic and electrical equipment, but there are calls for extension to textiles.

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[454] Matteis S. & Agro C., January 2018. *What really happens to old clothes dropped in those in-store recycling bins*, CBC News.
[455] Matteis S. & Agro C., January 2018. *What really happens to old clothes dropped in those in-store recycling bins*, CBC News.
[456]The OR Foundation, *Dead White Man's Clothes*.
[457] *Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste*
[458] Cité des Sciences et de l'Industrie & ADEME, *Jean*, Exhibition from 8 December 2020-22 January 2022. Visited on 22 June 2021 ChemSec, February 2021. *What goes around – Enabling the circular economy removing chemical roadblocks*.
[459] The MonCoton project is financially supported since 2019 by the French environmental agency Ademe operating the Investment for Future Programme ("*Programme des Investissements d'Avenir*") https://www.ademe.fr/sites/default/files/assets/documents/laureats-concours-innovation-inov-ia-2019_010872.pdf
[460] Re_fashion, n.d. *Que deviennent vos textiles et chaussures usagés une fois déposés dans un point d'apport volontaire ?* [What happens to your used textiles and shoes once they have been deposited at a voluntary collection point?]
[461] Ellen Macarthur Foundation, 2017. *A new textiles economy: Redesigning fashion's future.*

2. IMPACT OF THE SPI PREFERRED POLICY OPTIONS

The section below is an attempt to describe how each of the preferred options in different areas of the SPI would impact the jeans value chain, the costs, and provide few example of possible requirements. Insights have been provided by industry associations and companies representing hundreds of textile brands including jeans brands. These have consulted some of their members and impacts have been quantified to the extent possible.

This case study assumes the availability of a Product Environmental Footprint Category Rules (PEFCR)[462] combined with the use of other tools and sources of information.

2.1. PO2b: Extension of the product scope of Ecodesign legislation to all physical goods

The product scope should be defined based on the "function" that the product performs and/or the consumer perception when buying products belonging to a certain group. This means, for example, that it would not be appropriate to include jeans in the same product group as t-shirts (even if they are both apparel products), as their main function is to cover different parts of the body). Following this approach, jeans could be put in the same product group with casual pants, dress pants, sport pants, shorts, etc. There would be no differentiation between sizes and gender, as these factors do not affect in a relevant way the production process and technical requirements for these products. Therefore, while for sake of simplicity we will refer to "jeans" in this case study, the information provided could be applied to all types of trousers and shorts.

With the **extension of the product scope of Ecodesign legislation to all physical goods**, jeans would have to comply with mandatory ecological requirements on aspects such as durability, reparability, high-quality recycling, water use, material use, polluting emissions, etc. The Ecodesign legislation could help diminish the negative impacts and external costs associated with the production and end of life, and support the adoption of less impactful innovations.

2.2 PO3b: Far-reaching sustainability requirements for products

The identification of the sustainability requirements (performance and information requirements) is based on the results of a technical, environmental and economic analysis carried out by the Commission in close consultation with stakeholders.

As far as the environmental criteria, the main source of information is the hotspot analysis included in the PEFCR. The entire life cycle (from cradle to grave) of the jeans is considered, including the raw material production (including that of packaging), manufacturing, distribution, use, and end-of-life life cycle stages. The hotspot analysis informs which are the most relevant impact categories, life cycle stages, processes and emissions related to "jeans".

For example, in the case of jeans, the most relevant impacts would be: Climate change (25% of the total impact), Resource use, fossils (15%), Water use (14%), Ecotoxicity, freshwater (8%), Particulate matter (7%), Acidification (6%), Eutrophication, freshwater (6%).

Based on the information included in the PEFCR and additional source of information, the following requirements could be included:

[462] Currenlty under development as part of the Environmental Footprint transition Phase

Minimising environmental footprint

- **Maximum climate change impact** per item: [xx] kg $CO_{2\text{-eq}}$
- **Maximum resource use** (fossils): [xx] MJ
- **Total environmental impact** requirement: Total environmental impact calculated against the 16 PEF impact categories no higher than [xx] points[463].
- **Minimum requirements at process level**, for example on spinning, weaving, bleaching, and finishing, as an alternative or in combination with previous requirements.

Having requirements on the whole life cycle would mean that the jeans manufacturer will have the freedom to identify where it is more cost effective to intervene in order to reduce the climate change impact and resource use, based on the way the production process is organised and the relationships with his/her suppliers.

This requirement implies that each manufacturer should carry out a PEF study on the product in scope. The average cost to conduct a PEF study based on a PEFCR is €3,950 and €1,185 for the update of such a study (covering expert costs, data collection costs, verification costs).

The company producing the jeans should not perform a calculation for each pair of jeans produced. The calculation should only be done on the product prototype size, defined as the median size of brand's own specific sizing chart. The most "impactful" colour available for the jeans produced should be chosen for the calculation (as a sort of worst-case scenario).

A new calculation would be required only when there are important changes in the bill of materials, with differences in terms of environmental impacts expected to be higher than 5% of the total impact or 10% of one impact category.

The company producing jeans would be asked to introduce in an IT-calculator provided by the Commission, the following data:

- Bill of materials, i.e. the list of all the raw materials, resources, components, assemblies and parts - and the quantities of each of them - that are required to manufacture a product;
- Data related to the manufacturing process (energy consumption, chemicals used, amount and typology of packaging used, etc);
- Some information about suppliers and clients (geographical location, logistics).

All the other information needed to calculate the environmental profile would be already available in the IT-tool as secondary datasets. This means that no manufacturer, independently from the size or its geographical location, would be penalised for not having access to suppliers' company specific data.

Alternatively, or in combination, minimum requirements at process level could be introduced. The PEFCR allows to identify the most relevant processes (in terms of environmental impacts) as shown in Figure 4:

[463] This requirement would be added to avoid possible shifts of burden from one impact category to another.

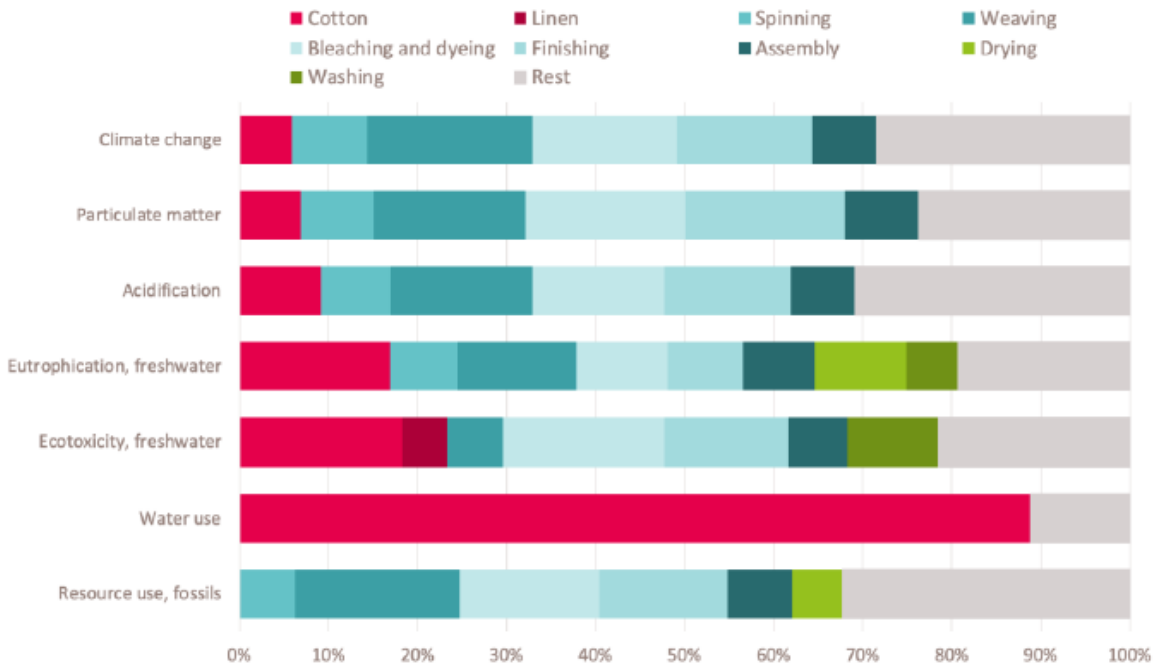

Figure 4. Identification of the most relevant processes in the production of jeans.

Based on this information, and building on other relevant sources of information like BREFs, it would be feasible, for example, to introduce requirements on **spinning**, **weaving**, **bleaching**, and **finishing**, which the PEFCR identifies among the most relevant processes for jeans production.

Circularity requirements

- **Durability 1: the jeans shall be able to withstand a minimum of 30 home laundries**. The manufacturer shall prove the compliance with this requirement through one of the following test methods: ISO 6330 4N with ISO 5077 wash/dry conditions based on care instructions, AATCC Monograph M6, according to care label and ISO 5077, AATCC Monograph M6, according to care label and AATCC 124.
- **Durability 2: provide an information on how to care for jeans visibly on the garment**. The jeans shall include accessible label that states:
  - Information on reducing washing frequency;
  - Instructions to wash at low temperatures (30°C or below);
  - Instructions to avoid tumble drying.
- **Recyclability 1: the jeans are made with chemicals that comply with level 1, zero discharge of hazardous chemicals manufacturing restricted substance list as a minimum**. Companies may verify conformance with ZDHC requirements of at least level 1 through the ZDHC 'Gateway' . Examples of methods that could be used to verify safe chemistry beyond ZDHC Level 1 include, but are not limited to: Bluesign and Cradle to Cradle Certified™.

- **Recyclability 2: include a minimum of [X%] cellulose-based fibres by weight in the total textile composition**.
- **Recyclability 3: include a minimum of [X%] post-consumer recycled content on average (by weight) of the total fabric composition**.
- **Recyclability 4: metal rivets are removed entirely or reduced to a minimum.**
- **Recyclability 5: enable easy disassembly of any additional material that is added to the fabric (accessories, metals, radio-frequency identification-RFID, etc.).**

A consumer survey in UK suggested that clothes were disposed, resold or donated because they did not fit anymore (42%), because the owner did not like them anymore (26%), or because they were damaged, stained, worn out or lost their shape (19%)[464]. **With the implementation of sustainability requirements** for jeans in terms of durability, reliability, reparability and upgradability, the significance of these reasons for disposal could be reduced. The harmonisation of these requirements would, in addition, limit the incurred costs for the companies[465].

The benefits from the sustainability requirements would depend on the number and types of tests to be performed by the companies, and the approach to ensure compliance[466]. It is to be noted that the durability of the garments (seam slippage, tearing strength, and appearance after wash) is already tested by the majority of retailers: the cost inferred by that criterion would be principally linked to the use of better-quality materials and accessories[467].

Due diligence requirements

Production of jeans includes as significant producers: USA, India, Brazil, Turkey, Pakistan, Italy, Bangladesh, China.

Should evidence stemming from a preparatory study indicate that specific risks of negative social impacts exist in the jeans value chains and that they are not sufficiently addressed by existing instruments (e.g. because more tailored or stringent rules are needed) the SPI measure on jeans could set requirements on due diligence. The requirements regarding **supply chain due diligence** would enable a greater transparency, which could lead to an increased trust from customers. This would provide a competitive advantage to some companies, which could increase turnover. Furthermore, this could improve working conditions along the supply chain, as companies would have the duty to detect, mitigate and remedy the potential adverse effects of their operations on their supply chain.

The requirement could be that manufacturers or importers need to prove compliance with the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment & Footwear Sector. In particular, compliance with Modules 1 to 7 and 11-12 may be proven.

As an example, the cost ranges provided by a study on Quantifying the Costs, Benefits and Risks of Due Diligence for Responsible Business Conduct carried out for the OECD are that costs for economic operators per company might be:

- One-off costs in the region of 40k€ to 300k€
- Annual recurring costs in the region of 40k€ to 500k€, of which, audit costs in the region of 13.500€ to 22.500€ for small companies / 90.000€ for large companies.

[464] Ellen Macarthur Foundation, 2017. A new textiles economy: Redesigning fashion's future.
[465] Textile industry company's input in the stakeholder survey, October 2021
[466] Textile industry company's input in the stakeholder survey, October 2021
[467] Textile industry expert's input in the stakeholder survey, October 2021

It should be noted that this applies to full due diligence system relating to different risks, where SPI due diligence obligation would relate to one or more specific risks linked to jeans. Moreover, where companies are subject to other due diligence obligations, they will be able to integrate the more specific or stringent SPI due diligence obligation into that system. The costs implied by potential SPI due diligence are therefore expected to be lower if a company is already doing due diligence by virtue of other instruments or initiatives.

Monitoring and providing the data will represent a cost for companies. A stakeholder survey with 180 responses from businesses and sectoral / businesses organisations from all sectors indicated that the yearly cost of participating to initiatives[468] or of using specific methods[469] ranged between EUR 5,000 and EUR 2 million[470]. Several elements influence this cost: the scope of the due diligence framework, the inclusion of the whole value chain (which can implicate different type of actors which have different capacities) or not, the harmonisation or not of the monitoring and enforcing mechanisms across the MSs[471]; but also training of the staff, training of the suppliers, using better quality suppliers, etc. [472]

However, the data can be used for several initiatives (e.g. requirements regarding supply chain due diligence under PO3b, DPP under PO4b, ecolabels, class of performance and GPP under PO5b), can help identify the specific strengths and weaknesses of the product, and can lead to new business opportunities. The benefits in relation to mitigation of potential reputational risks for companies should also be taken into consideration.

Class of performance

PEFCRs allows for building classes of performance on "sustainability" based on the 16 PEF indicators (total score) or based on one of the impact indicators included (e.g. climate change).

A possible class of EF performance for jeans is included in Table 91 (dummy values). The table reports two alternative possibilities: either classes of performance on the total environmental impact of the jeans or classes of performance built around one impact category (climate change is used in Table 91) or around specific processes (water use in Table 91).

[468] Initiatives based on commitments (e.g. UN Global Compact), reporting initiatives (e.g. Carbon Disclosure Project), indices (Dow Jones Sustainability Index), labelling initiatives (e.g. EU Ecolabel), initiatives by partnerships or platforms that are cross-sectoral (e.g. CE 100 network of the Ellen Macarthur Foundation) or sectoral (e.g. Sustainable Apparel Coalition)

[469] Standards (e.g. ISO 14040-44), other similar methods (e.g. Environmental footprint), methods underlying labelling (e.g. Swiss Ecolabel), certifications (e.g. Rainforest Alliance), reporting methods / organisation-level tools (e.g. UN Global Compact Indicators), rankings (e.g. SJSI Robecosam) and indicators internal to the company

[470] DG ENV, 2020. *Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods*

[471] Textile industry company input in the stakeholder survey, October 2021

[472] Textile industry expert's input in the stakeholder survey, October 2021

Table 91 Classes of performance for jeans.

Class of performance	Total score (points)	Climate change only (kg CO2-eq)	Water use (m3)*
Class A	< 2.07E-05	< 0.2	< 35
Class B	2.07E-05 ÷ 4.19E-05	0.2 ÷ 0.4	35 ÷ 45
Class C	4.19E-05 ÷ 5.05E-05	0.4 ÷ 0.5	45 ÷ 49
Class D	5.05E-05 ÷ 7.15E-05	0.5 ÷ 0.8	49 ÷ 90
Class E	> 7.15E-05	> 0.8	> 90

excluding the use phase.

2.3. PO4b: Digital product passport

The European Digital product passport (EU DPP) is expected to further enhance the effects identified for PO3b as it will bring enhanced value chain transparency, make the information more easily available to the different stakeholders, it will increase the efficiency of maintenance, repair and recycling operations, and will make products and related data more comparable and trustworthy..

The EU DPP will be available through a unique identifier accessible through a multi-functional data carrier (e.g. QR code). Scanning the data carrier would give access to information that has been identified as relevant during the preparatory studies, in collaboration with stakeholders and based on the outcomes of a dedicated impact assessment. As an illustrative example, Table 92 lists 2 potential information elements and their corresponding access right (see also figure 5).

Table 92 Information accessible through the EU DPP and access rights per stakeholder

Information	***Typology of information***	***Roles***	***Access right[473] & scope[474]***
Name of the manufacturer	Common part/Key identifier	Public (P)	Read
		Manufacturers & Importers (M&I)	Create/Change (limited to their company)
		Authorities (A)	Create/Change (limited to the territorial scope of the authority)
GTIN (Global Trade Item Number)	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read
TARIC	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read
Documents supporting legal compliance	Common part/Key identifier	P	No access
		M&I	Create/Change (company)
		A	Read
Track & trace	Common part	P	No access
		M&I	Create/Change (company)
		A	Read (territory of Public Authority)
Manuals	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Environmental footprint	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read

[473] "Read" Access means that the role (e.g. public, manufacturer, importer, public authority) can read the information concerned (e.g. TARIC, manuals) in the EU DPP but cannot create it or change it. "Create/Change" means that the role can read, create and change the information in the EU DPP. "No access" means that the role has no access to the information (e.g. TARIC, bill of materials)

[474] Scope indicates if there is a limitation to the access right (e.g. read/create/change). Potentially, a public authority could have access to all the information needed to exercise market surveillance for products in its own market.

Information	*Typology of information*	*Roles*	*Access right[473] & scope[474]*
Spare parts availability	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Recycled content	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Bill of materials	Attribute	P	No access
		M&I	Create/Change (company) Read (supply chain)
		A	Read (territory of Public Authority)
Durability	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Substance of concern included in the plastic components	Attribute	P	No access
		M&I	Create/Change (company) Recyclers / remanufacturers can access all
		A	Read
Dismantability instructions	Attribute	P	No access
		M&I	Create/Change (company) Recyclers / remanufacturers can access all
		A	Read

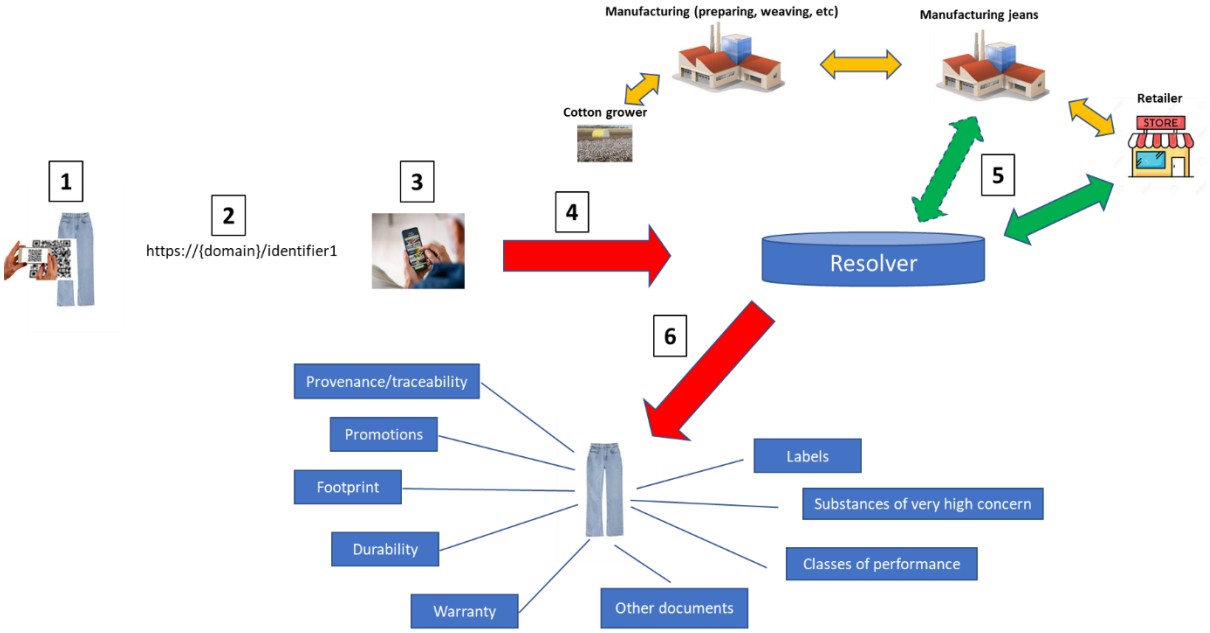

Figure 5 Multi-function data carriers in action: the example of a pair of jeans

[1] A user scans an unique identifier through an app; [2] the app reads the digital link identifying the product scanned and [3] asks back to the user to select what information (s)he is interested in. Once the selection is done this information is passed to the resolver that identifies the corresponding "link types" and [5] connects to the web pages where the different information is stored. [6] Once the information is accessed to, the resolver sends back to the user, via the app, the information selected to which the user has access rights.

Existing private digital tagging initiatives[475] have proven effective in improving the efficiency and reducing the costs for brands in monitoring and verifying due diligence along their supply routes. For example this can enable several brands to share information on inspections of factories and on sustainability performance of suppliers rather than carrying out multiple and duplicating inspections. The existence and success of such private initiatives indicates a strong business case and motivation for traceability and access to relevant data[476].

2.4. PO5b: Linking incentives to performance

The implementation of reputational incentives would lead to an initial expenditure for research and innovation and for data monitoring to comply with the requirements. This cost could be shared across several initiatives (DPP, economic and reputational incentives), which would reduce the overall burden. It is also critical to underline that such requirements will need to go hand in hand with support by the EU and Member States, including financial support, in order to ensure the capacity building to establish and implement a structure able to deliver the enforceability of the requirements by public authorities and the compliance and traceability of information by industrial actors (e.g. infrastructures and digital skills, clear set of information to share, etc.)

[475] Case Studies — TrusTrace – Traceability as a Service
[476] EON | Circular Product Data Protocol | CircularID Initiative (eongroup.co)

Qualifying for reputational incentives could equate to a competitive advantage and to financial gains for businesses, especially as economic incentives would encourage consumers to turn to sustainable products and increase their awareness regarding their social and environmental impacts. Economic incentives could, in addition, support the transition towards circular business models (CBMs). Reputational incentives are expected to have significant positive environmental impacts: labels can lead to a 18% reduction of GHG emissions, and a 43% reduction of impact on water eutrophication for a cotton t-shirt using 70% of recycled materials[477].

Even though the specific case of jeans could have a limited effect in this regard due to the functionality of the product, mandatory green public procurements would also support the shift towards more sustainable production practices for uniforms, workwear and other industrial garments, especially as there are often durability requirements. For instance, the Netherlands have set a target of a 50% reduction in raw material use by 2030[478]. EUR 102 million are spent each year by the Dutch government agencies for workwear, which represents 1% of the overall Dutch expenditure on clothing. Some government bodies, such as the Dutch Enterprise Agency, have used GPP to support this ambition, by setting the use of recycled fibre as a beneficial criterion. Another example is the French Ministry of Defence that spends around EUR 170 million annually to clothe 240,000 people. In 2010, it established a single-operator framework agreement, with requirements on the use of organic cotton and excluding a list of hazardous and toxic substances, for the supply of 150,000 cotton jerseys over three years[479]. The municipality of Herning (Denmark) set the recycling of workwear as one of the objectives for their procurement in 2014. Targeting the end of life as a criterion within procurements also has the potential to accelerate the scale-up of CBM for clothing – and more specifically for jeans[480].

Setting up EPR systems for textiles, whose fees would be modulated according to the class of performance, could encourage companies to increase the durability of their jeans to reduce the additional expenditure EPR would represent. It would increase the quantity of jeans that is recycled, as the French system has shown. Eco-modulation according to classes of performance is expected to have a better impact compared to a fixed approach. In addition, a harmonised eco-modulation across the European Union would ensure coherence and alignment with product requirements under the SPI, support the secondary material market, the development of recycling technologies and heighten the impacts of the EPR schemes. Industry could reduce costs for EPR implementation in case of stronger cooperation[481].

2.5. PO6b: Enhanced value retention

Although an extended durability of jeans would be desirable, it might not lead to "replac[ing] primary production or slow[ing] the consumption cycles": wardrobes can be expanded as a result of the low price of clothing in second-hand shops, which might have negative environmental impact as well[482]. Besides, older clothes contribute to microfibre pollution, as they shed more microfibres than new ones[483], although this might not be as relevant for jeans as denim is in principal made out of cotton.

[477] RDC Environment for ADEME, 2020. *Définition de critères d'éco-modulation applicables à la filière REP TLC* [Definition of eco-modulation criteria applicable to the TLC EPR sector].
[478] Ellen Macarthur Foundation, 2017. *A new textiles economy: Redesigning fashion's future*.
[479] European Commission, 2012. *Green Public Procurement – A collection of good practices*.
[480] European Environment Agency, November 2019. Textiles in Europe's circular economy.
[481] Textile industry companies and business organisation's input in the stakeholder survey, October 2021
[482] Levänen J., Uusitalo V., Härri A., Kareinen E. & Linnanen L., May 2021. Innovative recycling or extended use? Comparing the global warming potential of different owernship and end-of-life scenarios for textiles.
[483] Chemycal, June 2016. Patagonia Study Finds Synthetic Microfibers from Fleece Jackets Are Severe Pollutants.

Those elements will have to be considered in full life-cycle analyses to determine the optimal option for jeans production and consumption.

More durable jeans, through PO6 but also other policy options, would make them the preferred choice for leasing, repair and reuse models, and for product-as-a-service models of the textile cleaning industry.

A ban on the destruction of unsold goods could be applied to jeans via an SPI measure. In principal small retailers would not be affected by the ban as it would apply to large companies. These may improve stock management to prevent product surpluses and may look for alternatives to destruction, such as sale at a reduced price or donations. Some jeans may still be destructed under exemptions to the ban, for instance in case returned jeans turn out to be damaged. Companies will have to provide transparency on the amount of jeans destructed under exemptions, which would dis-incentivize the use of exemptions to circumvent the ban. After its introduction a ban on the destruction of unsold jeans (probably as part of an SPI measure focusing on a broader product category such as garments in general), it is expected that fewer unsold jeans are discarded. For instance, France estimates that for textiles, on a market of about 600,000 tonnes of textile every year[484], its national ban on destruction of unsold goods could avoid the destruction of 1,7-3,3% of that textile per year[485].

2.6. PO7b: Strengthen market surveillance by Member States

Streamlining the procedures for the development and adoption of Ecodesign regulations is expected to accelerate the adoption of SPI measures, such as the collection of data from apparel manufacturers and retailers regarding their sales and usage of jeans and the expansion of provisions related to third party conformity assessment. These measures would lead to a better and refined understanding on the weight of this specific garment in the overall clothing industry in Europe. The expansion of the provisions related to third-party conformity assessment is also expected to lead to improvements for non-compliant articles and to increase the traceability of jeans. The possibility for citizens to report suspected cases of non-compliance could increase their vigilance towards business practices.

An increase of market surveillance and customs controls capacity is expected to accelerate the adoption of other policy measures by businesses, as there would be more means within the European Commission to support that shift. Again, compliance and enforcement would be facilitated through the existence of the digital product passport.

[484] French Ministry of Environment 2020, Textile usagés, https://www.ecologie.gouv.fr/textiles-usages
[485] French Ministry of Environment 2020, The anti-waste law in the daily lives of the French people

CONCLUSION

Based on the results of SPI consultation strategy, overall, experts, companies and industry associations have been able to provide limited insights on precise costs and benefits for the different policy options. It would bring a level playing field in the sector as many companies are anyway trying to reduce their carbon footprint. Therefore, there is a strong appetite amongst many players in the textile industry to support stricter regulation in terms of durability. Yet, the capacity to enforce the requirements is crucial in order to achieve the level playing field. If such requirements are not introduced there is a risk for progressive companies to be frontrunners without proper legislation[486].

Overall, there is a clear support for the different elements of the SPI and the concrete policy options. One of the main arguments for that is that industry is already taking a number of sustainability measures within different global initiatives and the SPI would streamline these initiatives and create a level playing field. Companies have also recognised the benefits and the irrevocable trend for the industry and the society as a whole. They have also acknowledged that costs incurred under the different policy options within the SPI should be potentially looked at as extra costs to what is already being done within a number of companies. The full benefits of the transition would only materialise in case new requirements could be enforced.

Although the impacts presented in this case study apply to jeans, they can be extrapolated to other group products within the textile sector according to the consulted stakeholders.

[486] Interview with textile industry company, October 2021

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Case study B: the case of mobile phones and tablets

Background

Smartphones are a ubiquitous consumer product and have rapidly become an essential of modern life. The EU market for smartphones numbers around 130-160 million units sold each year, a number that has declined over the last decade and plateaued as saturation has been reached, i.e. most purchases are now for replacement by people that already own a phone, rather than by consumers that did not previously own a smartphone. The EU market is served primarily by imports, with very limited numbers of smartphones produced within the EU itself. The EU market is worth approximately €35 billion each year, a value that has increased over the last decade as an increase in average smartphone prices has more than offset the decline in smartphone sales[487].

The Circular Economy Action Plan 2020[488] strongly calls for the improvement of product durability, reusability, upgradability and reparability. Inter alia it foresees, under the Circular Electronics Initiative, regulatory measures for electronics and ICT including mobile phones, tablets and laptops under the Ecodesign Directive so that *devices are designed for energy efficiency and durability, reparability, upgradability, maintenance, reuse and recycling*.

The specificities of ICT products, and the need for a dedicated analysis on the relevance and feasibility of imposing requirements on their environmental impacts, were already highlighted in the Ecodesign Working Plan 2016-2019[489].

A 2020 study from the JRC[490] concluded that, when seeking to decrease the environmental impacts of smartphones, material efficiency aspects are very relevant. In fact, the direct impacts associated to the life cycle of such devices are mainly shaped by raw material extraction and manufacturing processes. Compared to other ICT products such as computers or TVs, smartphones have a relatively lower use of electricity in the use phase.

Smartphones are currently the subject of at least two important legislative initiatives in the EU:

- (1) on the preparation of Ecodesign and Energy Labelling measures – for which a preparatory study has been published[491] [referred to hereafter as 'the preparatory study'] and for which an impact assessment is being finalised currently. The Inception Impact assessment related to this initiative, noted that options to be considered included Option 1: no action; Option 2: self-regulation; Option 3: mandatory specific and/or generic Ecodesign requirements; Option 4: Energy labelling; and option 5: a combination of Ecodesign and Energy Labelling. The Ecodesign measures being considered include: improved resistance when accidentally dropped; protection from water and dust; battery accessibility and longevity; availability of software/firmware/operating system updates; product durability; ability of the product to be disassembled; availability of priority spare parts; data deletion and transfer

[487] Values in this paragraph based on the 2021 preparatory study for mobile phones, smartphones and tablets, the 2021 impact assessment study to assess unbundling of chargers and analysis of PRODCOM data.
[488] https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf
[489] COM(2016) 773 final
[490] Cordella, M., Alfieri, F., Sanfelix Forner, J., 2020. Guide for the Assessment of Material Ef-ficiency: Application to Smartphones.
[491] Fraunhofer IZM et al (2021) Ecodesign preparatory study on mobile phones, smartphones and tablets Final Report

functionalities; and, provision of appropriate information for users, repairers and recyclers[492]. Whilst Energy Labelling would provide an energy efficiency index based on battery endurance and capacity, addressing the direct energy consumption of the devices, noting that at 6-16 kWh/year on average that this is much lower than other product groups with energy labels (to be noted, that high values of the proposed energy efficiency index would also be linked to a battery with increased durability, thus improving this aspects alongside with energy efficiency) .

- (2) on the unbundling of chargers from smartphones – for which the EC has in Sept 2021 made a proposal, as part of a revision to the Radio Equipment Directive, to require standard USB-C ports on smartphones, tablets and other small devices; to remove the charger (external power supply) from the sale of these devices; and to establish common fast-charging interoperability standards for phones. This proposal still requires adoption by the Parliament and Council but would have important implications for how the SPI proposal may impact this product group.

National and industry measures are also having an important impact in this fast-moving sector, including the repairability scoring label introduced in France from 2021, and the EcoRating system launched by leading mobile phone service providers and supported by leading mobile network operators (also May 2021)[493].

1.1. The environmental and social cost of producing a smartphone

Results of the recent preparatory study on mobile phones, support other LCA work, which shows that the largest share of the environmental impact of a smartphone occurs upstream, and is especially associated with the materials used and, to a lesser extent, impacts occurring in the manufacturing process, see Figure 6, an extract from the preparatory study. The upstream environmental impact, in particular the raw materials usage, is not less than 40% of the total impact for any of the impact categories, and in the case of water, waste and many non-GHG emissions to air, land and water it is much higher. Manufacturing/assembling processes only represent a relatively small share of the modelled environmental impacts. Distribution is also a relatively small share of most impacts, with the energy use impact (transport fuels) registering as significant and corresponding impacts in GHG emissions, Persistent Organic Pollutants and PAHs.

Social impacts are also important in upstream manufacturing with the often scarce, high value materials required in the manufacture of smartphones not always sourced from suppliers with high social and environmental standards. Smartphones require conflict minerals such as Tantalum, Tin, Tungsten and Gold (also known as the 3TG), which are mostly mined in the Democratic Republic of Congo in poor conditions, sometimes in warzones. This is an issue which manufacturers are aware of and responding to, with Apple, Samsung and others carrying out supply-chain audits to attempt to remove such suppliers. Non-profit organisations are also highly active in monitoring the ethical aspects of materials sourcing for mobile phones.

Figure 6 is extracted from the 2021 preparatory study for mobile phones, smartphones and tablets, showing the impact per life cycle stage for various environmental impacts for base case 2, a mid-range smartphone with 6” screen.

[492] Many more specific measures were evaluated under these categories in the preparatory study.

[493] https://www.ecoratingdevices.com/ - this rates the durability, repairability, recyclability, climate efficiency and resource efficiency of smartphones.

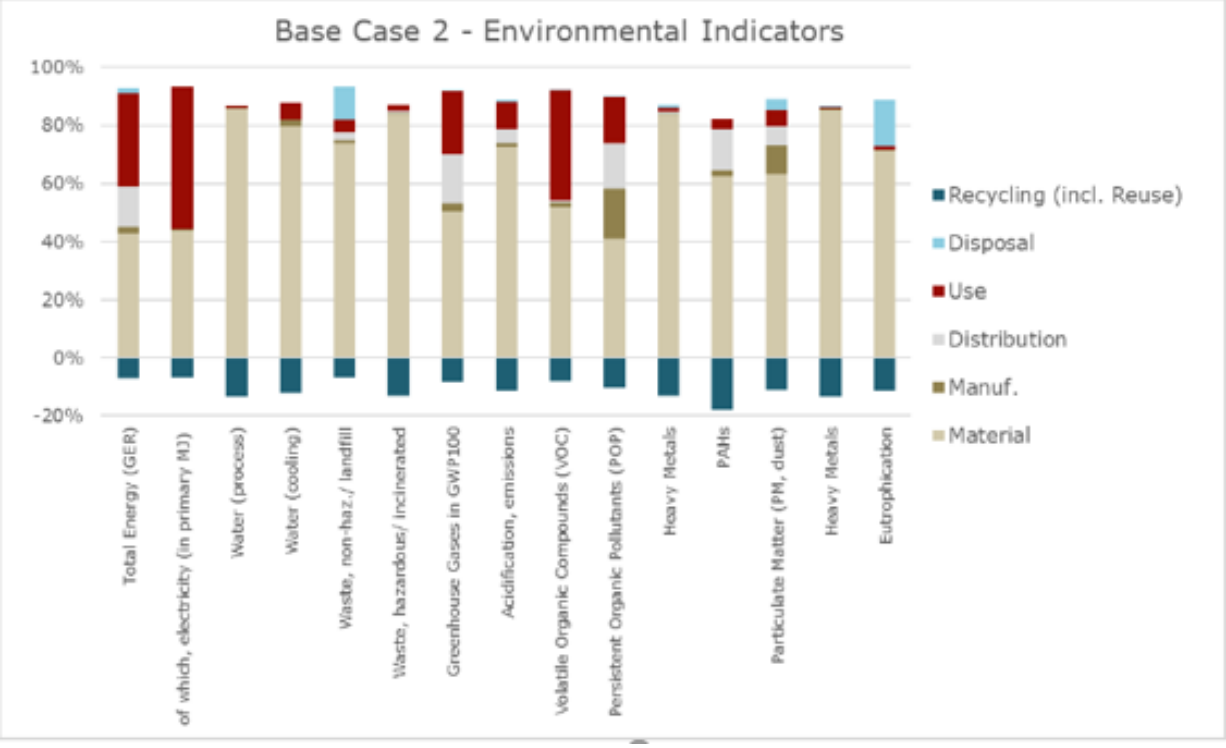

Figure 6 Relative contribution of the life cycle stage based on the EcoReport LCA results

Usage and end of life

As shown in the figure above, the environmental impacts occurring in the use phase of the smartphone life cycle are typically quite small. As expected, the electricity use from charging registers the largest share from the use-phase, around 50% of the total, with corresponding impacts from the electricity use in GHGs and other emissions.

End-of-life impacts from disposal are relatively small shares of the total impact, and only matter in a few categories. Typically end-of-life, through recycling and re-use results in net positive environmental impacts.

However, the end-of-life phase for smartphones is complex with sustainability concerns beyond the direct impact of disposal. On one hand the rapid replacement cycles, often tied to contracts with mobile phone providers, the fast pace of new phone releases and (planned) obsolescence of old phones, leads to a fast turnover of smartphones. On the other hand, there is a thriving market for used smartphones, where re-use, re-sale (often between individuals), giving away, and refurbishment is common. The high value of materials that can be recovered from old smartphones has also led to an active market for recycling of smartphones, to the extent where multiple companies compete to pay consumers to send their old phones for recycling. The preparatory study, on the basis of various surveys concludes that replacement cycle for smartphones has been lengthening over the last decade, with the average in a range of 2-2.5 years before replacement, and around 3-4 years for total active lifetime. Increasing these values could significantly reduce the associated environmental impacts[494].

[494] https://therestartproject.org/the-global-footprint-of-mobiles/

The accumulation of older smartphones still remains a challenge, as most people have several phones 'hibernating' in their drawers[495]. Attempts are being made to improve the collection of these by Producer Responsibility Organisations (PROs) and NGOs.

1.2. Need for EU action

Based on the findings above, the Commission is currently working on the formulation of potential Ecodesign and Energy Labelling Regulations (implementing measures) for mobile phones and tablets, with adoption of these measures foreseen within the first half of 2022. This very ambitious timing[496] rests on the following reasons/motivations:

- the commitments and deadlines of the Circular Economy Action Plan 2020, and in particular of the Circular Electronics Initiative
- the increasingly perceived importance of circular economy and ecodesign of products by consumers, in particular mobile phones: 77% of the respondents of a Eurobarometer survey[497] indicated that they would prefer to have their products repaired instead of buying new ones. A 2018 study[498] from the European Commission showed that consumers were generally willing to consider the durability and reparability of products when purchasing new products. In a survey that took place during 2020[499], 86% of the participants indicated that they will consider a more robust display when purchasing their next smartphone and 82% stated that they will pay particular attention to the battery lifetime.
- postponing the Ecodesign and Energy Labelling requirements – for whatever procedural or policy aspects by e.g. 3 years (which would be a consequence of bringing them as measures under a revised Ecodesign/SPI) would imply foregoing important environmental benefits. Based on figures from the Ecodesign preparatory study on mobile phones and tablets[5] it can be estimated that, only considering smartphones, 20TWh of energy would cumulatively be saved within the first 3 years following the introduction of the envisaged Ecodesign and Energy Labelling requirements.
- EU Member States already started proposing national regulatory initiatives in the field of circular economy for mobile phones and tablets. For instance, from 1 January 2021 manufacturers, importers, marketers and other retailers that put smartphones (as well as laptops and other products) on the French market have to inform, free of charge, downstream sellers and any person about the reparability index of their products. Without harmonised EU legislation, the internal market for these products would risk to become increasingly fragmented over the next years.

[495] The preparatory study notes examples from France and Germany, with tens of millions of smartphones being put into 'hibernation' each year.

[496] From the start of the preparatory study in March 2020, until publication of the Regulations on the Official Journal of the European Union in June 2022, there would be 27 months. The ECA, in the report referred to in Annex 6 of this impact assessment, estimated the duration of the theoretical regulatory process for adopting implementing measures under the Ecodesign and energy-labelling framework to be in the order of 40-42 months, with examples of measures taking up to 96 months to come to finalisation.

[497] European Commission, Brussels (2014b): Flash Eurobarometer 388 (Attitudes of Europeans Towards Waste Management and Resource Efficiency).

[498] Behavioural Study on Behavioural Study on Consumers' Engagement in the Circular Economy. Available online at https://ec.europa.eu/info/sites/default/files/ec_circular_economy_final_report_0.pdf.

[499] Bitkom e.V. (2020a): Smartphone-Markt: Konjunktur und Trends. https://www.bitkom.org/sites/default/files/2020-02/bitkom-pressekonferenz-smartphone-markt-20-02-2020-prasentation_final.pdf

1.3. What more could be done on smartphones under the preferred option in the SPI Impact Assessment?

It can be interesting to determine if the legal remit under the preferred option in this IA would enable policymakers to enact new classes of requirements, when compared to those contained in implementing measures currently developed under the framework of the current Ecodesign Directive 2009/125.

Specifically referring to smartphones, the following table shows the various classes of requirements under preparation, accompanied by a short description of how the requirements will be enacted/formulated under Ecodesign, together with the potential regulatory approach under the preferred option in this IA.

Table 93 Potential requirements for mobile phones and tablet – under Ecodesign and under SPI

Requirement class	via Implementing measures under Ecodesign Directive 2009 *	Under the preferred option (PO3b) in this IA	Other upcoming initiatives
Durability	- resistance when accidentally dropped, - protection from water and dust, - battery longevity, - availability of software/firmware/operating system updates	*(same)*	
Reparability	- ability of the product to be disassembled - availability of priority spare parts	*(same)*	Synergy with JUST initiative 'right to repair'
Preparation for reuse	- data deletion and transfer functionalities	*(same)*	Synergy with ENV initiative on the 'take back' scheme
Recyclability	- information requirements - dismantlability of certain components	*(same)*	
Recycled material content	- (optional) information requirement	Information/quantitative requirements	
Environmental impacts of the manufacturing phase	- Information requirements	Information/quantitative requirements based on PEFCR?	

Due diligence on the supply chain of products	*none*	feasible where appropriate based on preparatory studies	
Packaging requirements	*possible*	where appropriate based on preparatory studies, requirements on e.g.: - material content, recycled fraction content, etc. - 'efficiency' of packaging size	

* Based on the working documents discussed at the consultation forum on 28/06/2021

Table 93 shows that the preferred option is expected to offer policymakers the same regulatory possibilities as the current Ecodesign Directive (which is not surprising, as it can be seen as the 'evolution' of the Ecodesign Directive). This effectively corresponds to the measures included within SPI Policy Option PO3a. However, SPI through the revision of the Ecodesign directive will make sure that these possibilities will be more thoroughly used and enhanced (without contradicting requirement previously set by the "old" Ecodesign directive), particularly through the additions included in the preferred option (PO3b, which include PO3a) and can be more 'effective' in regulating certain specific aspects of the environmental impact of the products, namely via:

- Requirements on recycled material content
- Requirements based on the product environmental footprint
- Social requirements

Ecodesign requirements on the reuse of recycled material content (often also mentioned as 'secondary raw material') have been absent so far from the implementation of the Ecodesign Directive. In fact, establishing the content of secondary raw materials in a given product or component cannot be done through product inspections at the time of the placing on the market, as this would require verification measures throughout the whole upstream side of the supply chain, i.e. starting from the material sourcing. From this point of view, in order to operationalise this kind of requirement further legal solutions – as envisaged by the preferred option in this IA - are necessary.

The envisaged requirements (under the current Ecodesign Directive) for mobile phones and tablets related to environmental impacts of the manufacturing phase are information obligations. In legal terms, the Ecodesign Directive provides a basis for the possible introduction of certain requirements on the environmental footprint of products. The methods for setting new Ecodesign requirements are laid out in Annex I and II of the Ecodesign Directive. Within the ongoing work on potential Ecodesign measures for photovoltaic modules[500], Ecodesign requirements on the (compulsory reporting of the) carbon footprint of the manufacturing phase of these products are currently being examined. Under the preferred option in this IA, this category of requirements

[500] Discussion paper on potential Ecodesign requirements and Energy Labelling scheme(s) for photovoltaic modules, inverters and systems, available at: https://susproc.jrc.ec.europa.eu/product-bureau//sites/default/files/2021-04/Discussion%20paper%20Ecodesign%20Photovoltaic%20Products.pdf

could be systematically evaluated and – when relevant – proposed for inclusion in the SPI regulations. As in the case of requirements on recycled material content, dedicated conformity assessment procedures (as well as verification procedures for market surveillance) could be established, to allow the assessment of compliance throughout the whole upstream side of the supply chain.

Social requirements (e.g. due diligence along the supply chain) would be a novelty under the preferred option, as they are not in the scope of the current Ecodesign Directive. As for the other two previous typologies of requirements, this category entails the need of compliance assessment throughout the whole upstream side of the supply chain.

1.4. How could the transition work from existing/upcoming Ecodesign implementing measures under the preferred option in this IA?

With specific reference to this case study, but also with general validity, a dedicated procedure should be established, to be applied in the case of Ecodesign Regulations that would be already in application at the time when the preferred option in this IA would enter into force. Ecodesign Regulations are typically reviewed every 5 years (the specific time range varies case by case, and is foreseen in the 'review clause' article of each Regulation). For an Ecodesign Regulation that would need to be revised when the preferred option in this IA would already be in force, it could be foreseen as follows:

- The review should, first of all, focus on the topics referred to in the 'review clause' of the Regulation
- Secondly, the product group under review should be analysed under the broader sustainability perspective as envisaged for the preferred option in this IA, which is 'wider' than the current Ecodesign Directive. This would mean, in practical term, to explore the feasibility and relevance of a wider set of potential requirements applicable at product level, as indicated in Table 93 above. Obviously, coherence with the already existing Ecodesign Regulation will be sought, to ensure that none of the new provisions (as per the preferred option) would overlap with the requirements foreseen under the Ecodesign Regulation itself.
- In terms of supporting methodology to be used, please refer to Annex 16.

1.5. Impact of the preferred policy options

PO2b: Extension of the product scope of Ecodesign legislation to all physical goods

The category of smartphones is already addressed within the existing scope of the legislation. No additional impact from this option.

PO3b: Far-reaching sustainability requirements for products

As shown above in Table 93 significant durability and reliability, and reparability and upgradability requirements were already included within the preparatory study and will be part of the Ecodesign measures assessed as part of the ongoing impact assessment. Environmental and carbon footprints were also examined in the preparatory study which described possible requirements on the reduction of manufacturing impacts.

Restrictions on substances hindering circularity, minimum recycled content, requirements for high quality recycling and minimum requirements on re-manufacturability would all be, to a greater or lesser extent, additional to the existing policy measures as these are not considered in the Ecodesign and Energy Labelling IA.

Looking first at the measures included in PO3a, which are also part of the preferred option, and which are broadly equivalent to the Ecodesign and Energy Labelling measures evaluated in the impact assessment (PO5.1). We can find, that for smartphones the impacts in Table 94 are possible, these show that the measures are estimated to achieve a 24%-42% reduction in impact or costs on almost every measure, and whilst business revenues decline by a similar amount, jobs are estimated to increase by more than 12% due to increases in jobs in the repair sector.

Table 94 Selected results of Policy Option 5.1 of IA of smartphones and tablets, impacts for smartphones, feature phones and cordless phones in 2030, compared to baseline (no policy option)

Indicator [unit]	Baseline 2030 value	Impact in 2030 PO5.1 = PO3a	Difference [%]
Business revenue [mEUR]	78 000	58 000	-25.6%
Total energy use [PJ]	116	72	-37.9%
GHG emissions [mtCO2e]	7.2	4.2	-41.7%
Material consumption [t]	88 965	54 677	-38.5%
External societal costs and benefits [mEUR]	2 900	1 950	-32.8%
Employment [jobs]	22 600	25 400	+12.4%
Consumer expenditure [mEUR]	82 000	62 000	-24.4%

SPI with the additional measures in PO3b would be expected to increase the magnitude of these impacts. In the case of re-manufacturing, most manufacturers protect the spare parts through software locking which makes remanufacturing difficult. This protects against the use of spare parts from stolen smartphones but at the same time makes it difficult for repairers as they don't have access to the software. Requirements that open up spare parts accessibility would increase possibilities for re-manufacturing, although at a risk of increased use of stolen goods. In order for these requirements to deploy all their potential, it is also necessary to ensure the minimum skill level of a professional repairer. To this regard, the more recent Ecodesign Regulations (as well as the draft requirements under formulation for the Ecodesign of smartphones) foresee specific provisions on this[501].

[501] See e.g. under 'C ommission Regulation (EU) 2019/2023 of 1 October 2019 laying down ecodesign requirements for household washing machines and household washer-dryers pursuant to Directive 2009/125/EC of the European Parliament and of the Council, amending Commission Regulation (EC) No 1275/2008 and repealing Commission Regulation (EU) No 1015/2010 (Text with EEA relevance.), Annex II.8.3.a:
the manufacturers, importers or authorised representatives may require the professional repairer to demonstrate that:
(i) the professional repairer has the technical competence to repair household washing machines and household washer-dryers and complies with the applicable regulations for repairers of electrical equipment in the Member States where it operates. Reference to an official registration system as professional repairer, where such system exists in the Member States concerned, shall be accepted as proof of compliance with this point;
(ii) the professional repairer is covered by insurance covering liabilities resulting from its activity regardless of whether this is required by the Member State;

In terms of magnitude, the IA for smartphones assumed 10% of smartphones would be refurbished for PO5.1 (PO3a), if increased ease of remanufacturing were to double this rate to 20%-30% then the number of jobs created could increase significantly. Using the analysis in the IA and figures related to reparability rates[502], which are a logical proxy for remanufacturing, **then around 51 000 – 77 000 jobs could be created, or +126%-241% compared to baseline.** Whilst the % impacts are likely to be lower for the other indicators they would still be expected to increase through the additional measures, particularly for emissions and energy use, which are concentrated in the production phase of the product, and for which remanufacturing would reduce the need for.

For SMEs (EU-based) the requirements are likely to provide an opportunity, particularly to firms active in the repair and refurbishment markets. The requirements may also stimulate eco-innovation. Environmentally the impact of the preferred option, by pushing towards extended product lifetime and reducing sales would lead to a reduction in demand for new smartphones and consequently the impacts associated with materials, manufacturing and distribution, which constitute the largest part of the environmental impacts.

Due diligence requirements in the supply chain would also provide an additional area of impact, although it should be noted that significant activities in this area are already taking place, for example Apple[503] and Samsung[504] amongst others already pay significant attention to these aspects – but there remain significant gaps for other manufacturers. Improving due diligence across the smartphone sector could boost the environmental and social benefits of the policy option, but lead to higher consumer expenditure as costs are passed on.

Horizontal measures covering groups of products could potentially impact upon smartphones, but it is unclear which measures, if any, would be considered therefore these are not evaluated here.

Based on the PO3b policy option going beyond the policy option in the impact assessment on smartphones, which was estimated to reduce impacts and costs by 24-42% across various indicators, it seems reasonable to assume, **that reductions of 30-60% in energy use, emissions, material consumption and costs could be achieved by this policy option**. This would have consequent impacts on costs for manufacturers and prices for consumers, although the smartphone IA estimated that the impact of the Ecodesign and Energy Labelling measures on smartphone prices would be only around 0.8%, the additional SPI measures in terms of remanufacturing and due diligence would be unlikely to increase prices by greater than this amount again.

PO4b: Digital product passport

The Energy Label proposed in the current preparatory study includes some significant information requirements on energy efficiency, battery endurance (per cycle), battery endurance (in no. of cycles), [water] ingress protection rating, an environmental impact score (based on the updated MEErP Ecoreport tool) and a QR code to a product information sheet. This addresses some of the issues included in this policy option. The impacts of these measures are included in the totals in Table 94 above.

For SMEs and others active in the repair, refurbishment and end-of-life phases there will be some additional costs in investing in necessary hardware and software to interface with the DPP.

[502] With product legislation, we do not have 'direct legal coverage' of the repair operations/decisions, which will remain intrinsically linked to the customer behaviour. Appropriate realistic (and not overoptimistic) analysis, on the basis of available evidence, (and, when not available, on estimates) should be developed to this extent.
[503] https://www.apple.com/supplier-responsibility/pdf/Apple_SR_2021_Progress_Report.pdf
[504] https://www.samsung.com/us/sustainability/sustainable-supply-chain/

Nevertheless, it is expected that net savings will result over time as their work is facilitated by fast access to information. Reduced repair costs can be envisaged for consumers as a result.

PO5b: Linking incentives to performance

Reputational and economic incentives by Member States are unlikely to be necessary, or the highest priority use of MS resources, in the case of smartphones given the already high-level of consumer and NGO attention and the value already placed on these aspects by firms.

As functioning markets already exist for the reuse and recycling of smartphones, the case for modulating EPR fees is weaker as EPR fees based on the market share of sold phones would not very well reflect the volumes of smartphone e-waste reaching EPR waste processors. This is because old smartphones often do not reach EPR processors as phones are stored, or already recycled by other companies. It is also the case, that the business case for recycling of smartphones is already strong due to the relatively high value of the components and materials that can be recovered and recycled, so that incentives to businesses may not help much. Although they could provide additional stimulus to manufacturers to improve the environmental performance of their products, i.e. reducing product weight to reduce EPR charges, although as already noted, the market is already highly competitive.

Incentives to citizens to dispose of 'hibernating' phones may be more beneficial, as citizens habits are the largest obstacle for recovering old phones. The French circular economy roadmap had identified a deposit and return scheme (DRS) for smartphones to incentivise the collection, but it has not been implemented yet. This policy option by obliging action, could further incentivise MS to implement this, or other similar policy measures. These could be very impactful given that it is estimated that around 65% of all smartphones are hoarded / put into hibernation at end-of-life, a total that runs to hundreds of millions of old smartphones kept in this way. Incentives, even if these were only partially successful, could therefore still have a major impact in increasing the return of phones, increasing materials for recycling, re-use, remanufacturing and reducing environmental impacts. Based on an average phone weight of 190g[505], and the incentives leading to around 20 million smartphones per year being recovered then it is **possible around 3 800t of materials could be recovered annually, or around 4.3% of estimated 2030 material consumption.** Although the benefits would not only be in material consumption, but also in boosts to 2nd hand markets, reduced emissions, etc. If a similar relationship between impacts as was shown in Table 94 was evident, then **positive impacts of 2-6% or more could be foreseen for many of the other impact categories**.

Mandatory green public procurement (GPP) of smartphones could have an important impact. The Commission recently published updated voluntary GPP criteria for computers and smartphones[506]. These criteria focus on product lifetime extension, energy consumption, hazardous substances, end-of-life management and criteria for refurbished/remanufactured products. This SPI policy option aims to go beyond by setting mandatory GPP criteria. It would thereby ensure a more widespread application of such criteria. It is unclear what the impact of this may be as the role of public procurement in the smartphone market is unknown, estimates from the JRC study, point to a likely public procurement share of the ICT market in the range of 5-10%, likely for a consumer good such as smartphones the ratio of private purchases will be higher. A 5% share would equate to around 6.5-8 million smartphones purchased by the public

[505] Based on assumptions in Smartphones preparatory study

[506] JRC (2021) Revision of the EU Green Public Procurement (GPP) Criteria for Computers and Monitors (and extension to Smartphones). Technical report v3.0

sector each year, this compares to public administration employment of approximately 13.6 million in 2019[507].

The current voluntary GPP criteria address many of the points already proposed to be addressed under PO3b. Making some or all of those criteria mandatory will likely increase the purchase of phones with better environmental and social characteristics. Using the impact of the Energy Label in the IA as a proxy[508], an estimate of -0.2% reduction in material use can be made, from which **a range of impact of 0.1%-0.3% reductions in environmental and social impact can be estimated[509]**.

PO6b: Enhanced value retention

Guidelines and a hub to support Circular Business Models (CBMs) could result in adaptations of existing business models, particularly for mobile phone service providers. Many phone contracts already have many of the characteristics required for product-as-a-service business models and to relatively easily build in re-furbishing, re-manufacturing and recycling. Current contracts designed around 18-24 month replacement cycles typically involve selling the phone to the consumer, this could evolve to a leasing model (product-as-service) where phones are returned at the end of an agreed period and a replacement provided. Whilst not ideal from the perspective of extending product (first-)lifespans it would result in many more phones being returned for refurbishment, re-manufacturing or recycling. As the sector is very fragmented (i.e. there are few direct links between manufacturers, retailers, repairs/refurbishers, PROs, etc.) circular business models could have a significant beneficial impact. This argument is being illustrated in practice in cases where retailers are acquiring repair companies[510], thus improving the circularity.

Data on mobile phone service contracts being smartphone inclusive is scarce, values of 50-60% of all phones have been estimated in a UK context[511]. It is unclear what an EU average would be, however using 50% as an assumption it possible to estimate the potential impact of this policy option if part of these handset inclusive contracts adopted a leasing model. If 50% of smartphones were purchased via handset inclusive mobile contracts, then approximately 65-80 million smartphones are supplied in this way each year. If 20% of this share of the market were to move to a circular business model then this is already 13-20 million smartphones that could be recovered each year for remanufacturing, re-use and recycling. At an average weight of 190g per smartphone[512], **this represents a possible saving of around 2 500-3 800t of materials recovered, or around 2.8%-4.3% of estimated 2030 material consumption.** Although the benefits would not only be in material consumption, but also in boosts to 2nd hand markets, reduced emissions, etc; and with a similar relationship between impacts as in Table 94, then **positive impacts of 2-6% or more could be foreseen for the other impact categories**.; it is also particularly relevant due to high levels of hoarding of old smartphones, which these models may avoid. This could overlap with the benefits of option PO5b as both would address the hoarding issue, but in different ways.

[507] Eurostat [nama_10_a64_e] Employment in NACE category O Public administration and defence, compulsory social security.
[508] Often energy label categories are used as a proxy for the application of GPP criteria, with minimum energy label categories used as criteria in procurement.
[509] On the basis of the values in the smartphone IA for material consumption for PO4 Energy Label only, compared to the baseline PO1, then multiplied by the 5% of the market estimated to be affected by public procurement. The range of values reflects the ranges illustrated in the previous tables.
[510] For example, In France a leading retails FNAC has bought a smartphone repair company WeFix
[511] https://www.citizensadvice.org.uk/Global/CitizensAdvice/Consumer%20publications/Handset%20Report_%20Full%20draft%20(1).pdf
[512] See Smartphone preparatory study Figure 114

PO7b: Strengthen market surveillance by Member States

Given the active and ongoing process for Ecodesign and Energy Labelling measures this policy option would unlikely to be implemented in time to speed these processes. However, in the case that new measures would be introduced then this policy option could help to speed any future process, saving time and costs, and bringing forward environmental and other benefits.

Requirements under this policy option for collection of data from smartphone manufacturers and retailers regarding their sales and usage would lead to a better and refined understanding of the market and scale of environmental impact in Europe. Benefitting future research and preparatory studies. Costs relating to this dimension would be included in the costs listed under PO4b.

The impact of 3rd party assessment, monitoring and testing facilities would be expected to lead to more efficient implementation of the regulations. This could ease the burden on MS market surveillance authorities, whilst leading to a small increase in costs for the industry.

Improvements to market surveillance, notifications and sharing should lead to reductions in the number of non-compliant smartphones on the market, as these would be increasingly likely to be detected. Searches of RAPEX and ICSMS databases reveal very few reports of non-compliance for smartphones, therefore it is unclear how serious a problem there is to address, therefore the impact on non-compliance could be quite low.

However, these improvements would be welcome in a market where counterfeiting is understood to be significant, but also difficult to identify. Modelling on behalf of the European Union Intellectual Property Office (EUIPO)[513] has estimated that in 2015 approximately 14 million fewer legitimate phones (worth around €4.2 bn) were sold in the EU due to counterfeiting. Clearly the measures proposed under this option would aim to reduce this value, with even small improvements potentially benefitting the industry for hundreds of millions of euros, and protecting consumers from fraud and sub-standard, sometimes unsafe, counterfeit products. **If the measures under this option were to reduce counterfeiting volumes by 5% then by value this could be worth around €200 million or more**, based on the 2015 EUIPO estimates, values would likely now be even higher given the increase in average phone value since 2015. Increasing the effect to 70% as assumed in the main assessment would result in counterfeit products worth around €3bn being prevented.

Costs of enforcing the measures would fall on the EC and Member States, for the EC this could involve various start-up costs and ongoing enforcement costs, annual costs of €10 million per year are estimated in the SPI impact assessment, a small part of which could be apportioned to smartphones.

[513] EUIPO (2017) THE ECONOMIC COST OF IPR INFRINGEMENT IN THE SMARTPHONES SECTOR

Annex 13: Monitoring and evaluation of actual impacts

MONITORING OF THE IMPLEMENTATION OF THE SPI AND ITS SPECIFIC MEASURES

An Action Plan will be designed, allowing for a tracking of the implementation of actions and measures required against a specific timeframe. Implementation reports the European Commission should allow for an adequate monitoring of the SPI implementation.

Preparatory studies for the identification of priority products will be launched, and in collaboration with the Member States and industry, the methodologies for the measurement of the sustainability requirements beyond energy efficiency and water consumption need to be defined. For the first product-specific SPI measures, the relevant criteria for the classes of performance and related reputational and economic incentives need to be established, and the specifics of the European Digital Product Passport need to be defined – both in terms of content and technology.

Implementation reports by the European Commission should allow for an adequate monitoring of the SPI implementation.

MONITORING AND EVALUATION OF PROGRESS AND PERFORMANCE TOWARDS THE DESIRED IMPACTS

Figure 1, below, shows the main areas of **desired results and impacts** in the environmental and socio-economic spheres. At the core of the Sustainable Product Initiative is the intent to help reaching the green deal objectives of lower resource consumption and less environmental impact. It focuses on enhancing the environmental and social sustainability of the production and consumption of non-food products in the EU and aims at achieving these impacts by reducing the environmental and material footprints in the production and consumption phases, enhancing the life duration of non-food products, and reducing the creation of abiotic waste by households and economic sectors.

The diagram also shows how the actions and measures in response to the SPI specific objectives (see Section 4 Objectives: What is to be achieved?) are intended to be mutually reinforcing for the attainment of the expected results (see also the description of the preferred option in Section 7 Preferred option, above). The monitoring and evaluation framework is therefore structured around the desired results and impacts rather than identifying indicators for each specific objective separately.

Progress is monitored likely on an annual basis at the level of product group, and if considered necessary and relevant, product by product. A phased monitoring of progress for each product group separately will allow for the development of time series needed for the evaluation of the SPI independently of the evolution in scope over time.

Reporting by the Member States on the results of market surveillance, incentives and green public procurement will provide the European Commission with data on enforcement actions and compliance rates.

A **comprehensive evaluation** of the SPI would be done eight years after entry into force. This would be somewhat longer than the standard five years period, yet it needs to be considered that a meaningful evaluation requires that several implementing measures have actually been in force long enough to produce tangible results. The evaluation would build upon the results of product-specific review studies and focus on the attainment of an enhanced environmental and social sustainability of non-food products in the EU market.

The evaluation will examine whether there is a potential need to broaden the scope to include services as well, which could be done under the criterion of relevance. If such a need were identified, a follow-up impact assessment would be prepared to accompany the revision of the instrument.

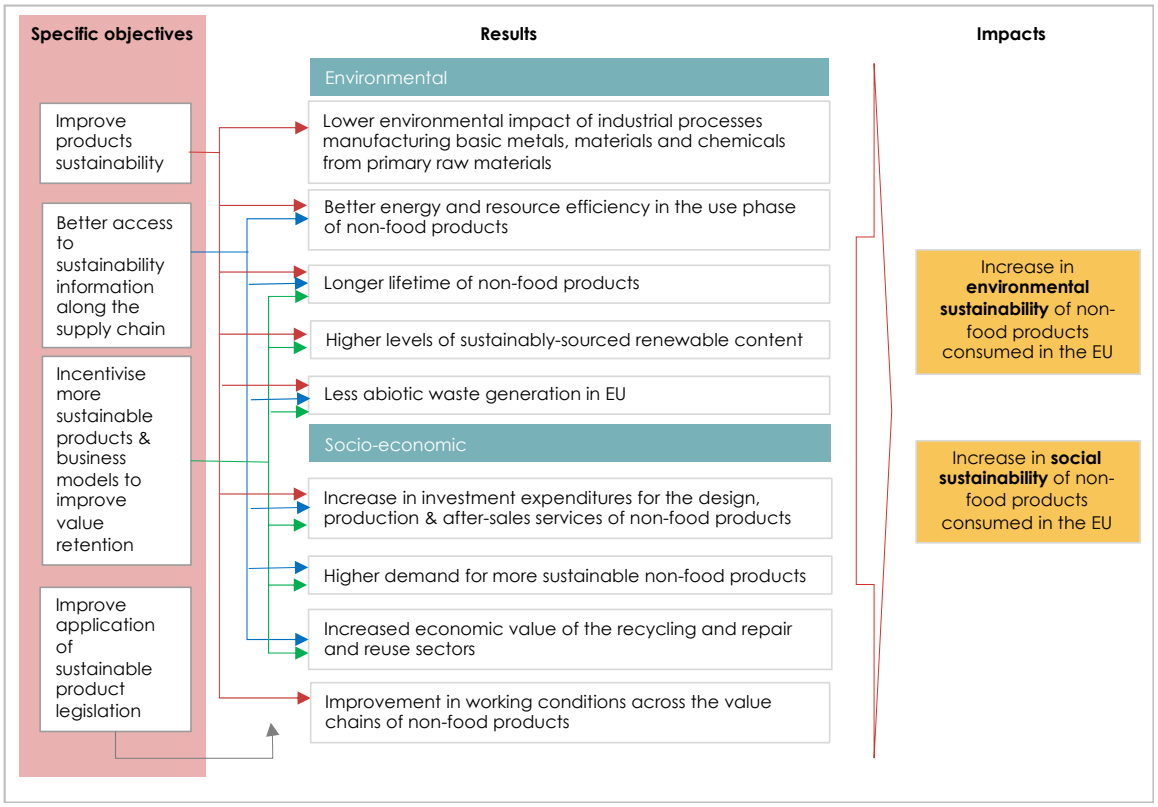

Figure 1 Main results and impacts based on the specific objectives

The **core indicators** listed in 95 and Table 96, below, are a selection of indicators and sources available for the measurement of progress towards the attainment of the desired results and impacts, respectively. The most relevant and comprehensive of these indicators have been included, following also a quality assessment in terms of frequency in publication, country coverage (in EU and beyond), relevance for the initiative (potential for filtering of sectors and products), and accuracy & transparency (availability of an explanation of the methods used to collect / analyse the data).

In most of the cases, **data** for these indicators already exist and are published from official sources, even though further development will be needed on their scope and purpose, as indicated in section 8 of the main report. Key data come from circular economy indicators, waste statistics, environmental accounting data, and business statistics. Additional data will be generated by the review studies for product-specific SPI measures.

Table 95 Core indicators for the monitoring and evaluation of progress towards desired results

Impact area	Expected result	Definition of the indicator	Source	Frequency of measurement	Geo coverage
Environmental	Lower environmental impact of industrial processes manufacturing basic metals, materials and chemicals from primary raw materials	Air pollutants and Greenhouse Gas (GHG) emissions by the manufacturing value chains feeding the EU Internal Market / Air emissions accounts by NACE Rev. 2 activity (g/capita, Kg/capita, Tonne, Th Tonne)	Eurostat (ENV_AC_AINAH_R2)	Annual	EU MS, Iceland, Norway, Switzerland, the UK, Serbia and Turkey.
	Better energy and resource efficiency in the use phase of non-food products	Energy efficiency of durable goods placed or put in service in the EU Internal market; Water efficiency of those durable goods using water, placed or put in service in the EU Internal market	Ecodesign Impact Accounting, VHK for the EC	Annual	EU aggregate only
	Longer lifetime of non-food products	Average life duration of the durable products as a consequence of (1) its intrinsic durability, (2) the maintenance, repair and upgrade operations it was subject to, and (3) the number of its successive users	To be gathered by product-specific review studies for each SPI measure		EU
	Higher levels of sustainably-sourced renewable content	Contribution of post-consumer recycled materials to raw materials demand of the EU Internal Market - for non-precious metals, Critical Raw Materials, and plastics.	Eurostat (cei_srm010), JRC	Every 3 years	EU aggregate only
		Circular material use rate - Share of material demand satisfied by secondary raw materials (% of total material use)	Eurostat (online data code: env_ac_cur)	Annual	Each EU MS + UK
	Less abiotic waste generation in EU	Volume of abiotic waste generated in the EU by manufacturing sectors and households - Generation of waste by waste category, hazardousness and NACE Rev. 2 activity	Eurostat (ENV_WASGEN)	Annual	Each EU MS + IS, LI, NO, UK, ME, MK, AL, RS, TR, BA, XK

		Generation of waste excluding major mineral wastes per domestic material consumption (DMC) / Percentage	Eurostat (cei_pc033)	Every 2 years	Each EU MS + UK, Norway, Republic of North Macedonia, Serbia, Turkey, Bosnia and Herzegovina.
Socio-economic	Increase in investment expenditures for the design, production & after-sales services of non-food products	Value added and its components by activity, ISIC rev4	OECD.Stat	Annual	61 countries + Euro area (19) + European Union (27) + Non-OECD Economies + Former Economies
	Higher market share for more sustainable non-food products	Supply table at basic prices incl. transformation into purchasers' prices, filter by industries categories of final uses and imports and categories of products and gross value added components.	Eurostat (NAIO_10_CP15)	Annual	Each EU MS + Norway, the UK, North Macedonia, Serbia and Turkey.
		Green public procurement - the share of public procurement procedures above the EU thresholds (in number and value) that include environmental elements	Eurostat Circular Economy Indicators - under development		
		Savings for consumers due to higher use-value which compensates the higher cost of products	To be gathered by product-specific review studies for each SPI measure		EU

	Increased economic value of the recycling and repair and reuse sectors	“Gross investment in tangible goods”, “Number of persons employed” and “Value added at factor costs” in the recycling sector and repair and reuse sector.	Eurostat (cei_cie010)	Annual	All EU MS except Czechia, Ireland, Luxembourg and Malta (confidential data), plus the United Kingdom, Norway, Iceland, Turkey, Serbia, Bosnia & Herzegovina.
		N / evolution of enterprises involved in the repair of computers and personal and household goods"	Eurostat, Annual detailed enterprise statistics for services (NACE Rev. 2 H-N and S95) [SBS_NA_1A_SE_R2]	Annual	All EU MS
	Improvement in working conditions across the value chains of non-food products	"Share of the working time performed along the value chains of the non-food products sold on the EU Internal Market where: - At least one worker is elected as their representative; - At least one collective bargaining agreement is applicable"	ILO Statistics on collective bargaining / ILO Annual review under the follow-up to the 1998 Declaration	Annual	Global

Table 96 Core indicators for the evaluation of attainment of the desired impacts

Expected impact	Definition of the indicator	Source	Frequency of measurement	Geo coverage
Increase in environmental sustainability of products consumed in the EU	Reduced environmental impact associated with consumption sustainable products covered by Ecodesign Directive: - CO-emissions - Organic Gaseous Carbon (OGC)-emissions - Particulate Matter (PM)-emissions - Primary material content	Ecodesign Impact Accounting	Annual	
Increase in social sustainability of products consumed in the EU	Number of occupational fatal injuries and deaths in the Value Chains supplying the consumption of non-food products in the EU (Categories of Product to be weighted as per their share of the EU consumption budget; within each category of Products, each country to be weighed by its market share, expressed in volume, in the category of Products.)	ILO - Data on fatal injuries and deaths in the mining and the manufacturing sectors	Annual	55 countries, including all EU 27 MS + NO + CH, the United States and Russia.

Annex 14: Articulation with existing legislation and other initiatives

Given that the SPI will both broaden the product scope of the Ecodesign Directive as well as broaden its empowerments to new kinds of requirements, it is necessary to define in so far as possible the SPI's articulation with existing legislation applicable to the products covered as well as other initiatives linked to or relevant for the goals of SPI. The aim is to prevent duplication so as to minimise the administrative burden for economic operators and authorities.

As set out in Option 2, the approach should be that the SPI sets requirements where existing legislation does not or insufficiently addresses sustainability aspects. To further specify the approach, **two categories can be distinguished**: product-specific legislation and legislation addressing horizontal aspects.

Product specific legislation refers to legislation focussed on a specific product or well-defined product group, often regulating mainly safety aspects (e.g. on Construction Products, Batteries, Toys, Detergents, and Packaging).

It is not feasible to provide for an articulation with every existing piece of product-specific legislation at the general level of the SPI. However, prior to establishing concrete requirements at product-specific level through SPI measures, potential overlaps or conflicts with any relevant existing legislation will be assessed in detail with a view to avoid duplication of requirements and excessive burdens for economic operators. As matter of principle, the SPI will then only intervene when existing legislation does not or not sufficiently address sustainability of relevant products (see also under Option 2).

In addition, SPI product-specific requirements will be included in SPI measures and as such cannot supersede requirements set through legislative acts such as Directives or Regulations (although they can be more specific), pursuant to the hierarchy of norms. This legal principle prevents conflicts between SPI measures and legislative acts.

Legislation addressing horizontal aspects refers to legislation addressing or empowered to potentially address SPI-related horizontal aspects in relation to a broad range of products, such as the relevant REACH rules and empowerments in relation to chemical substances in products.

Where there is legislation already addressing or empowered to address specific SPI-related aspects in a more horizontal manner, there is the clear need and possibility to define the articulation with SPI at a more general level.

This Annex intends to set out the SPI's intended articulation with the most relevant instruments of product-specific legislation and horizontal legislation, focussing on:

(ii) linked initiatives (i.e. on Green Claims, Empowering Consumers for the Green Transition and Sustainable Corporate Governance),

(iii) other relevant emerging initiatives, and

(iv) relevant existing instruments including potentials amendments or revisions.

1. RELATIONSHIP TO LINKED INITIATIVES: GCI, ECGT AND SCGI

Sustainable Corporate Governance Initiative (SCGI)

The SCGI aims to foster long-term, viable and responsible business models, which incorporate climate and environmental considerations and are in line with human rights. The proposal addresses two interrelated aspects of corporate governance: corporate due diligence and specific directors' duties.

As regards corporate due diligence, which is most relevant for the SPI, the SCGI intends to set a general due diligence duty, covering human rights and environmental aspects. Application of the different SCGI requirements would depend on the size of a company.

Coherence regarding due diligence

As set out in policy option 3b, the SPI intends to enable the setting of due diligence obligations related to specific social and human rights risks relevant to specific processes or materials, where the need for this is identified in relation to particular products' supply chains. As set out in more detail in the points below, this possibility would be used only if the identified risk would not be sufficiently addressed by other instruments.

1. *SPI and SCGI due diligence share general aims but have distinct specific objectives and approaches:*

The SCGI is a company law initiative fostering behavioural change. It aims at embedding sustainability firmly in corporate governance systems. One important component is a general due diligence obligation that applies primarily to large EU limited liability companies. It would apply throughout the companies' global operations, including all intermediary steps (i.e. not a specific product's value chain but a company's entire value chain, including all relevant product value chains).

The SPI, on the other hand, is a product policy initiative that aims to increase the sustainability of the products available on the EU market and will focus on specific products or groups of products. Its main component is the creation of a framework for setting, based on a dedicated preparatory study and impact assessment, concrete information and performance requirements for the placing on the market of specific products (i.e. minimum requirements) related to their most relevant impacts and sustainability aspects.

In that context, the SPI framework should have the possibility to set due diligence requirements in relation to specific social or human rights risks associated with specific materials, components or production processes relevant to the specific product at hand. This empowerment is intended to be used where the relevant preparatory study identifies such specific risks and finds that other instruments do not sufficiently address them. The aim is to progressively ensure that products available on the EU market are not linked to human rights violations - identified on a product-per-product basis as most relevant for products' individual supply chains.

2. *Companies covered by both SPI and SCGI due diligence obligations are faced with coherent obligations and can integrate their compliance with both initiatives:*

Notwithstanding these different approaches, there are likely to be companies covered by the SCG that, given their size or, possibly activities in a specific sector, are also covered by due diligence requirements under the SPI because they place on the EU market products covered by an SPI measure including such requirements. SPI will be in line with SCG due diligence steps (which are based on UN and OECD principles, see box below) and sectoral guidance to ensure coherence and to allow companies covered by both initiatives to integrate their SPI due diligence obligations into their due diligence system set up pursuant to SCG. Depending on the product and risks at hand, SPI due diligence would focus on specific steps and add more detailed instruction as appropriate.

Like other EU product-specific legal instruments containing a due diligence duty (see for example

Article 39 of the proposal for a Batteries Regulation[514] and the initiative on deforestation[515]), SPI due diligence would in this case apply as a *lex specialis*, meaning that the SCG due diligence would apply "in so far as there are no specific provisions with the same objective, nature and effect". The SPI would provide more detailed or stringent provisions on specific due diligence steps in light of the risks at hand. As such, the SPI would allow for the simultaneous and coherent application of other horizontal SCGI provisions.

(i)	**identification of actual or potential adverse human rights and environmental impacts in own operations, in subsidiaries and in the value chain**
(ii)	**prevention and mitigation of adverse impact in own operations, in subsidiaries and in the value chain**
(iii)	**tracking the effectiveness of measures**
(iv)	**establishment of a complaint mechanism**
(v)	**communicate how adverse impacts are addressed**

3. *SPI due diligence adds value to the SCGI by making due diligence in relation to specific social and human rights risks more product-focussed and effective:*

Apart from the coherence, the added value of due diligence requirements in relation to human rights risks set under SPI, compared to a situation where only the SCGI would apply, is that they can:

- **Make the due diligence obligation more concrete** in relation to the characteristics of the supply chain of the material or component or the process in question or introduce more stringent requirements.

  On the basis of the information available at the time of writing this report, the SCGI will set a general obligation to put in place a process for due diligence in a company, map its value chains, identify the risks and mitigate them. A general due diligence obligation at company level may therefore not ensure that due diligence is performed in relation to all products of a specific kind placed on the EU market where those products are associated with a specific human rights risk.

  The SPI, on the other hand, can target risks that are most important for a given product and ensure due diligence is performed for each product placed on the market. The SPI's focus on specific risks occurring at a specific point in a product's supply chain would allow it to provide a more detailed description of relevant risks and required actions (see examples below in *Example* section). Experience with due diligence under the EU Timber Regulation (EUTR) shows that a more precise description of due diligence can increase effectiveness by facilitating the understanding by relevant operators of the requirements that need to be met. An important finding of the ongoing Fitness Check is that improved information and guidance on due diligence for both operators and enforcement authorities is necessary to ensure compliance and a level playing field.

- Ensure that, for specific risks related to specific products, due diligence obligations apply to **all economic operators placing those products on the EU market,** whether they are covered by SCGI or not.

[514] COM/2020/798 final, see EUR-Lex - 52020PC0798 - EN - EUR-Lex (europa.eu).
[515] See Deforestation and forest degradation – reducing the impact of products placed on the EU market (europa.eu).

- Further **strengthen and facilitate compliance and enforcement** for the specific steps and risks covered by the SPI measure:
  - The SPI could require the involvement of independent third parties in the pre-market conformity assessment procedure, leading to third party verification of whether a company's due diligence system meets the SPI due diligence requirements (possibly involving audits and continued periodic surveillance). Relevant economic operators would be required to have available documentation demonstrating compliance with the due diligence obligations, including the results of the third-party verification.
  - In addition to the administrative enforcement regime envisaged by the SCGI, the SPI would also allow, in specific circumstances, for the prohibition or restriction of products placed on the market by economic operators not complying with their due diligence obligation set through SPI.

4. *SPI due diligence obligations will take account of the impacts on SMEs based on product-specific information and impact assessments*

An SPI measure, as it is common practice under the current Eco-design Directive, will be based on a detailed analysis of the structure of the relevant market and supply chain when formulating policy options. A dedicated impact assessment which, following the Better Regulation guidelines, includes an analysis of the impacts of the different options on SMEs, will also be performed. When deciding on whether to include due diligence requirements, the Commission thus takes account of the size of the companies they will apply to and the proportionality of the compliance costs they entail. Whether such requirements are feasible and whether the envisaged benefits (e.g. for the environment, but also for competitiveness including for SMEs) weigh up against the costs is decided on a case-by-case basis based on product-specific information and analysis. These decisions are made with input from industry (including SMEs and their representatives), NGOs and Member State experts and under the control of Parliament and Council.

The more targeted approach of the SPI also allows requirements to be adjusted to minimize administrative burden on SMEs. For example, SPI due diligence obligations could exclude specific steps, such as the establishment of a complaint mechanism, or adjust those steps to decrease the associated administrative burden, for example by simplifying the reporting step.

Where relevant, other possible mitigating measure could include:

- the delay of the date of application of specific requirements to allow more time to adapt;
- differentiation of requirements based on the number of relevant products placed on the market;
- issuing guidelines on the correct application of specific requirements;
- organizing workshops targeted at SMEs.

Example

As mentioned above, the empowerment to adopt targeted due diligence obligations under SPI would only be used where specific human rights risks are identified in relation to the supply chain of a product or group of products under consideration for the adoption of an SPI measure.

Product at times include materials that commonly stem from Conflict-Affected and High Risk Areas (CAHRAs) as defined under Regulation 2017/821 and are thus associated with a high risk of human rights violations including child labour. For example, a recent JRC study showed that 15% of the global production of fluorspar takes place in CAHRAs. This heightens the risk that refrigerators are associated with child labour.

The SCGI is expected to include the ILO Convention of the Elimination of the Worst Forms of Child

Labour as a reference for companies' overall due diligence systems, so companies should in principle take account of child labour risks. However, given the horizontal nature of SCGI due diligence requirements, the steps to be taken by companies in this regard will be identical across industry sectors.

An SPI measure, on the other hand, could add to the SCGI regime by requiring economic operators placing refrigerators on the EU market to take specific due diligence steps targeted at this particular risk.

The SPI measure could require economic operators, for example, to:

(1) track and document the country of origin and quantities of fluorspar used and the name and address of the relevant suppliers;

(2) take specific mitigating measures where risks of child labour involvement are identified, e.g. to immediately suspend transactions with the relevant supplier pending improvements;

(3) Have their due diligence actions required under SPI verified by an EU notified body.

Comparison table

The table below lists and compares specific aspects of the different initiatives, showing their interaction, for reference.

Table 97 Comparison table

Interaction SPI-SCGI	*SCGI due diligence*	*Added value of the SPI due diligence*
Description of due diligence duty	Horizontal duty applicable to all sectors and to the entire value chain: 1. Identify actual or potential adverse human rights and environmental impacts in own operations and in the value chain; 2. Prevent risk of and mitigate adverse impact in own operations and in the value chain; Mitigating measures include, as appropriate: - joint development of corrective actions with the supplier, - joining forces with other companies to exert influence on the supplier;	SPI will be able to set additional or more specific due diligence obligations in relation to specific products and their supply chain. Where deemed appropriate based on analysis of the product and existing requirements, including the horizontal due diligence framework, an SPI measure would set out the due diligence steps required and the specific materials, processes, and impacts to which they apply. As such, it would allow addressing in more detail the specific risks linked to the product addressed through SPI. Such additional or more specific due diligence obligations could relate to specific parts of the supply chain (e.g. more stringent auditing requirements regarding the sourcing

	3. Track the effectiveness of measures; 4. Establish internal complaint mechanism; 5. Report on due diligence activities - covered by the Corporate Sustainability Reporting Directive.	of a particular raw material).
Impacts covered	Human rights (including labour rights as set out in the ILO core conventions) and the environment	SPI due diligence requirements would focus on impacts not covered by minimum requirements on the relevant products set in SPI measures. As major environmental impacts will be covered by minimum or information requirements, the requirement of due diligence will focus on social and human rights risks. In addition, the due diligence requirements in SPI could be linked to the supply chain of specific materials or processes.
Product groups	All industry sectors are in principle covered, at least as regards the largest companies.	SPI due diligence obligation would a priori apply to all economic operators placing on the market specific products in the scope of relevant SPI measures. SPI will be implemented by adopting SPI measures setting out relevant requirements for a specific products in the SPI scope, going from product to product based on priority criteria. Those measures will only include due diligence requirements where deemed appropriate based on a preparatory study. In the process of developing such requirements, care will be taken to ensure consistency/complementarity with potential SCG requirements on due diligence or requirements stemming

		from other instruments.
Instrument	New	Revamped Ecodesign (legal instrument to be decided) and the product-specific measures adopted under it.
Scope	Companies based in the EU and companies generating a significant turnover in the EU, precise company size to be determined.	All economic operators placing the relevant product on the EU market
Third country coverage	Companies generating a significant turnover in the EU	All third country economic operators placing products on the EU market
Interlinkage	The SCG due diligence is *lex generalis* and would apply "*in so far as there are no specific provisions with the same objective, nature and effect*" in the SPI instrument, see also Recital 70 of the Batteries Proposal.	Like other EU product-specific legal instruments containing a due diligence duty, the SPI due diligence regime would *be lex specialis*. SPI due diligence obligations will be in line, to the extent possible, with the rules and concepts included in other instruments. Consistency and complementarity should be ensured at product-specific level to allow companies to comply with different sets of rules and minimise administrative burden. When deciding about the need for specific product-focused due diligence requirements, the interest of not creating a proliferation of unnecessarily different regimes will be duly considered.

Initiative on Empowering Consumers for the Green Transition Initiative (ECGT)[516]

This legislative initiative will tackle problems identified with:

- consumer information aspects at the point of sale, in particular the fact that consumers lack reliable information for choosing more environmentally sustainable products; and
- protecting consumers against certain unfair commercial practices in relation to sustainable purchase, such as greenwashing, early obsolescence of consumer goods and non-transparent sustainability labels or digital tools.

The IA report assesses policy options building upon the existing EU horizontal consumer law framework[9], including the improvements recently brought forward in relation to enforcement[10]. It will result in targeted amendments by "greening" existing consumer law (i.e. the Consumer Rights Directive and the Unfair Commercial Practices Directive).

Most important for SPI, the ECGT will include measures to (i) improve information on the durability and reparability of products at the point of sale and to (ii) provide better consumer protection against misleading practices in relation to sustainable purchases leading to early obsolescence. The ECGT was developed in close cooperation with SPI and is intended to work in full synergy with SPI's preferred combination of options.

Coherence regarding durability and reparability information

To improve consumer access to durability and reparability information, the Empowering Consumers initiative intends to set horizontal information requirements through consumer law. In relation to reparability, it will lay down a general obligation on sellers to provide consumers, at the point of sale, with a reparability score when required by EU law, or otherwise other relevant repair information whenever this is made available by producers. This obligation will apply to an open range of goods. In relation to durability, the initiative will lay down a general obligation for sellers to inform consumers, at the point of sale, of the existence and length of a producer's commercial guarantee of durability, whenever this is made available. This obligation will apply to an open range of goods. In addition, for energy-using goods, in cases where the producer does *not* offer a guarantee of durability of more than two years, this information should similarly be made available to consumers at point of sale. For all goods with digital elements and digital content/services, sellers will be obliged to inform consumers of the existence (or absence) of the minimum period of time during which the producer commits to providing free software updates if this period is longer than the period of the producer's commercial guarantee or when no such guarantee exist, and unless the contract provides for the continuous supply of the digital content or digital service over a period of time.

SPI, by laying down more specific product requirements (preferred sub-options 3b and 4b), will be able to elaborate on and further complement the above general obligations, in particular in relation to the reparability and durability of products:

- For *durability*, the SPI may set requirements on what the minimum life duration of a specific product (or its components) should be or how long its spare parts should be kept available after purchase to facilitate its repair. In addition, the SPI could set information requirements on the

[516] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12467-Consumer-policy-strengthening-the-role-of-consumers-in-the-green-transition_en

expected durability of specific products. Therefore, the ECGT's horizontal information requirement on producer's commercial guarantee is fully complementary to SPI.

- For *reparability*, the SPI could set requirements to improve the reparability of specific products, e.g. on a product's ease of dis-assembly or the minimum availability of spare parts. In addition, the SPI could set information requirements on reparability, possibly including a reparability score. Future SPI measures may also specify how this information should be communicated in relation to the relevant product or product group, including to consumers. Where appropriate and feasible, reparability information could also be required to be included in the European Digital Product Passport. In so far as these communication rules are relevant to sellers as defined under the ECGT, the SPI would function as a *lex specialis* and could provide more demanding or precise instructions where needed in relation to specific products or product groups. If not, the ECGT provides default rules for the seller's obligations in relation to reparability information on products when made available by producers. Therefore, the ECGT's horizontal information requirement on reparability is fully complementary to SPI.

Coherence regarding misleading practices linked to early obsolescence

In relation to *misleading practices*, the initiative will provide better consumer protection against certain unfair commercial practices hindering the green transition, including early obsolescence of consumer goods. Practices defined as unfair by ECGT in this regard will include omitting to inform a consumer about the existence of a feature of a good introduced to limit its durability or the fact that a product does not allow repair in accordance with legal requirements. This is complementary to the SPI, which aims to introduce specific requirements (e.g. on durability and reparability) for products or groups of products. Non-compliance with SPI product-specific requirements is likely to be an important factor in establishing whether a company engages in unfair practices.

The ECGT will facilitate public enforcement in order to stop unfair practices and will allow the harmed consumers to claim individual remedies where such practices are deemed unfair under consumer law. Where SPI requirement play a role in establishing an unfair practice, this option will also indirectly benefit the enforcement of the SPI.

For example, under the empowering consumers for the green transition initiative, a manufacturer of a **coffee machines** would have to inform consumers about any feature of the coffee machine introduced to limit its durability. The SPI could complement this by establishing specific minimum requirements that would further postpone obsolescence, for instance, on the minimum durability or minimum availability of spare parts for **all coffee machines placed on the market**.

Green Claims Initiative (GCI)[517]

The Green Claims initiative was announced by the European Green Deal, the Circular Economy Action Plan[518] and the New Consumer Agenda[519]. It aims to ensure that environmental claims are substantiated based on reliable, comparable and verifiable information. , The initiative would apply

[517] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12511-Environmental-performance-of-products-&-businesses-substantiating-claims_en
[518] COM(2020)98 final.
[519] COM(2020)696 final.

horizontally to voluntary claims related to products (goods and services, including food and non-food), and organisations, in a business-to-consumer and business-to-business context. It does not cover social sustainability.

According to the outcome of the Impact Assessment, the preferred option would make it mandatory for companies to observe certain methodological requirements regarding the substantiation and the communication of their voluntary environmental claims. For claims related to specific environmental impacts, life cycle or overall environmental performance, they need to substantiate them via a PEF or OEF report (based on a PEFCRs or OEFSRs, where they exist, and based on the PEF or OEF method[520], where no PEFCR/OEFSR is available) and respect requirements on minimum information content in their communication. The initiative will gradually introduce methodological requirements for a wider range of priority claims. Companies would remain free to decide if they make an environmental claim.

The Green Claims initiative, under the preferred option, would establish minimum information content for claims (for instance, claims will have to show only relevant impacts, provide proof of verification by accredited verifiers, and method used, so that the user of information has assurance that the information is reliable). At the same time, more and more PEFCRs/OEFSRs would be developed by industry, European standardisation organisations, Life Cycle Assessment scheme owners and the European Commission. Reliability of substantiation would be ensured by accredited verifiers, while correctness of claims would be checked by enforcement authorities in the Member States. The application of the EF methods require data and this will be ensured through an EU central database combined with a network of 3rd party databases. The Commission would also gradually formulate requirements for other priority voluntary environmental claims, developing substantiation methods, where necessary.

Coherence with SPI

The central difference between the SPI and GCI is that while the GCI seeks to ensure that voluntary environmental claims (related to goods, services or organisations) are substantiated based on reliable, comparable and verifiable information, using a standard methodology, the SPI will allow for the setting of mandatory information requirements (in relation to specific products and excluding services), including possibly on products' life-cycle environmental impacts. When SPI requirements relate to life cycle environmental impacts, the PEF approach is taken into account (see section 16 for details). Even though GCI's requirements will thus apply only to companies *voluntarily* choosing to make a green claim in relation to a product, the initiative was developed in close cooperation with SPI and is intended to work in full synergy with SPI's preferred combination of options.

Firstly, though SPI will not tackle misleading green claims directly, the information requirements it will set on products (preferred sub-option 4b) will indirectly serve to foster the GCI's aim of providing reliable information to consumers and supply chain operators on the sustainability and environmental performance of products.

Secondly, though the methodology to be employed by SPI will need to retain a certain flexibility (including to be capable of incorporating potential methodological developments over time – see

[520] https://ec.europa.eu/environment/eussd/smgp/

Annex 16 for more details), the use of PEF in the context of certain SPI requirements is likely and expected to bring positive benefits. This means that a high level of methodological coherence between the two initiatives can be expected. This will notably serve to limit the costs for those companies subject to SPI requirements for which a PEF study may be required (such as those linked to classes of performances) and willing to make an environmental claim on the basis of the same PEF study. The development of other methodologies on which the claims will need to be substantiated would be developed in synergy with SPI methodology.

How will this work in practice?

Given that SPI will lay down its detailed rules via SPI measures (i.e. not in the main act), its full implementation is likely to take place gradually. The same would apply for the methodologies to be developed for other aspects than those covered currently by PEF. The requirements for companies wishing to make a green claim for a product will nevertheless apply in all of the following cases (the description below considers as a starting point the use of the PEF):

- A product within SPI scope and for which an SPI measure *has been laid down*: In this case the interplay between GCI and SPI will depend on the typology of requirements included in the SPI measure (performance and information requirements). If the SPI measure will include the provision to communicate the environmental footprint (i.e. impacts along the life-cycle) of the product according to the PEF method, then the company making a voluntary environmental claim will be able to use the same information (i.e. PEF study) to comply both with the GCI and SPI requirements. If the SPI measure will not include such a requirement, then the company making the green claim will have to substantiate it according to the rules laid down in the GCI (i.e. through a PEF study). In case a DPP is developed for this product group as part of the SPI measure, a specific "attribute" related to the availability of the PEF study results to substantiate the green claim could be included, facilitating the communication of such information by the company.
- A product within SPI scope but for which *no SPI measure has been laid down*. In this case, a company wanting to make a voluntary environmental claim will have to substantiate it according to the rules laid down in the GCI (i.e. through a PEF study).
- A product *not covered* by the SPI scope (e.g. food products). In this case the company wanting to make a voluntary environmental claim will have to substantiate it according to the rules laid down in the GCI (i.e. through a PEF study)

1. RELATIONSHIP TO OTHER EMERGING INITIATIVES

1	**Proposal for a Batteries Regulation**

Legislative or non-legislative?	Legislative
Brief description	The European Commission proposed a new Batteries Regulation on 10 December 2020. Article 7 and Annex II of this proposal lay down rules on the carbon footprint of electric vehicle batteries and rechargeable industrial batteries. Article 7 sets an information requirement in the form of a carbon footprint declaration, their classification into carbon footprint performance classes and ultimately, their compliance with maximum life cycle carbon footprint thresholds. The timeline for the three requirements is 1 July 2024 for the carbon footprint declaration, 1 January 2026 for the performance classes and 1 July 2027 for the maximum life cycle carbon footprint thresholds. Annex II provides essential elements on how to calculate the carbon footprint. It states that the carbon footprint calculation should be in compliance with the latest version of the European Commission Product Environmental Footprint (PEF) method and relevant Product Environmental Footprint Category Rules (PEFCRs) and reflect the international agreements and technical/scientific progress in the area of life cycle assessment. The calculation of the life cycle carbon footprint shall be based on the bill of material, the energy, and auxiliary materials used in a specific plant to produce a specific battery model. In particular, the electronic components (e.g. battery management units, safety units) and the cathode materials have to be accurately identified, as they may become the main contributor for the battery Based on the information collected through the carbon footprint declarations and the relative distribution of the carbon footprint performance classes of battery models placed on the market, and taking into account the scientific and technical progress in the field, the European Commission will identify maximum life cycle carbon footprint thresholds for rechargeable industrial and electric vehicle batteries.
Interaction/synergies with SPI	This is an example of product specific legislation. According to what was indicated at the beginning of this Annex above, in those cases SPI is complementary to the product specific legislation. Accordingly, and given the extent of the requirements foreseen in the proposed Regulation, batteries will certainly not be considered as a priority for SPI. The latter might possibly intervene at a certain point in time regulating batteries only in case there would be additional sustainability requirements that would emerge as necessary to be set as a complement of the ones already set by the Regulation.

2	**Circular Electronics Initiative (CEI)**
Legislative or	Non-legislative initiative (TBD) and legislative initiative (TBD).

non-legislative?	
Brief description	The objectives of the circular electronics initiative (CEI) are to extend the lifespan of electronic devices (starting with mobile phones, tablets and laptops) to reduce e-waste, retain rare/valuable materials, improve recycling and boost European aftermarkets. To achieve this, these devices must be designed to be durable and allow for disassembly, maintenance, repair, reuse and recycling, and consumers should have a right to repair them (including a right to software updates). To meet these commitments, a two-pronged approach is currently envisaged. Upstream requirements need to be in place in order to ensure these devices are reparable and durable by design. On the demand-side, the CEI aims to ensure devices cannot only technically be repaired but that consumers have easier/affordable access to repair. This will be addressed by the initiative on 'Promoting sustainability in consumer after-sales and a new consumer right to repair' which may apply to various product groups (initiative described below).
Interaction with SPI	The CEI, as currently envisaged, consists of a number of actions to increase the sustainability of consumer electronics. These actions include, among others, planned Ecodesign measures that will be adopted under the existing Ecodesign Framework Directive and any future revised framework instrument, namely the SPI. While the CEI focuses on a narrow set of goods, the initiatives are complementary and could produce synergies. For example, the SPI could set out new types of sustainability requirements that could be applied to electronics at a later stage, increasing their circularity. The actions of the CEI may be referred to in the Sustainable Product Initiative package. As a successor to the current Ecodesign Directive, the revised Ecodesign legislation should continue regulating electronics products, including requirements to ensure that devices are designed to be durable and allow for disassembly, maintenance, repair, reuse and recycling. The review of EU rules on restrictions of hazardous substances in electrical and electronic equipment and guidance to improve coherence with relevant legislation, including REACH and Ecodesign, should be prepared in full consistency with SPI envisaged provisions on possible restrictions of hazardous substances in products (see REACH and RoHS) and on the tracing of substances of concern in products (see above).

3	**Promoting sustainability in consumer after-sales and a new consumer right to repair**

Legislative	Legislative initiative (Q3 2022)
Brief description	This initiative would encourage goods being used for a longer time, more defective goods being repaired and more second-hand goods being purchased. It would encourage consumers in an after-sales context to repair a product when it is defective. It would also encourage producers to design their goods in such a way that they last longer, would be easily reparable and to take better into consideration their use/reuse phase. The initiative could entail a package of targeted amendments of the Sale of Goods Directive and a new instrument on a right to repair. The Sale of Goods Directive could be amended for situations when consumers receive defective goods in sales transactions. Currently, according to the Directive, when sellers deliver defective goods, consumers have a choice between the repair of the defective product and the replacement with a new one during a liability period of at least two years. There are several options how to increase sustainability through targeted amendments of the SGD which will be examined in detail in the impact assessment. Among those options are the following: Consumers could be incentivised to opt for the more sustainable alternative of repair, for instance by restarting anew the liability period after repair. To further promote sustainable decisions, consumers could be stimulated to buy second-hand goods instead of new ones, for instance by aligning the liability period for second-hand goods with that of new ones. To encourage producers to produce goods which last longer, the liability period could be extended. A new instrument on a right to repair could create a consumer right to have a defective product repaired, probably by the producer, within a given period after purchase and for a reasonable cost. While the Sale of Goods Directive would continue to apply to defects which already existed at the time of delivery, the new instrument could apply to other defects, for example those due to the use of the goods or to a lack of conformity which becomes manifest after the liability period of the Directive.
Interaction with SPI	The SPI will, in relation to repair, mainly address the supply side by setting out substantial and information requirements for products placed on the market for defined product categories, for example on their reparability. This initiative could help to further address the demand side by providing incentives and tools for consumers to play their part in a more sustainable consumption by fighting the premature disposal of

	goods before the end of their useful life. Both initiatives would be complementary and produce synergies. For example, the scope and content features of the right to repair could be linked with the Ecodesign or future SPI measures. As a result, more use would be made of the repair option created through supply side measures. Vice versa, the supply side measures are a prerequisite for a right to repair as only repairable goods can actually be repaired.

4	**EU Strategy for Sustainable Textiles**
Legislative or non-legislative?	Non-legislative initiative (Q3 2021).
Brief description	The initiative aims to set in place a comprehensive framework to boost the competitiveness and resilience of the EU textile sector, addressing its environmental and social impacts. It will identify gaps and barriers for the sector and pull together upcoming initiatives that can shift the sector towards sustainability. To achieve this, the initiative will announce a comprehensive set of measures, which include applying the new sustainable products framework, both from the supply side (through SPI) and demand side (empowering businesses and consumers to choose, repair and reuse textiles). The initiative will provide incentives for new business models and for increased transparency in the value chains. As regards the end of life, the initiative will mobilise investment and finance to support the entry into force of the separate collection of textile waste and consider EPR schemes. The initiative will also launch the transformative pathway announced in the revised Industrial Strategy.
Interaction with SPI	In keeping with the preferred policy options set out in this impact assessment, the EU Strategy for Sustainable Textiles, which is due to be adopted before SPI, intends to confirm the inclusion of textiles as one of the product categories to be covered under the future SPI scope. In the context of SPI, therefore, the intention would be to develop eco-design measures to ensure that textile products are fit for circularity, free of hazardous chemicals, are repairable and include recycled materials. Also reflecting the preferred policy options set out in this impact assessment, the initiative intends to elaborate on the benefits of a digital product passport for textiles, which could facilitate the sharing of

	information with consumers but most importantly ensure the traceability and transparency of textile global value chains. Finally, the initiative will identify incentives for circular business models to promote new consumption patterns.

5	**Minimising the risk of deforestation and forest degradation associated with products placed on the EU market**
Legislative or non-legislative?	Legislative – forthcoming (Q3 2021)
Brief description	The objective of this initiative is to curb deforestation and forest degradation that is provoked by EU consumption and production. This, in turn, is expected to reduce EU-driven GHG emissions and global biodiversity loss. The initiative aims to minimise consumption of products coming from supply chains associated with deforestation or forest degradation – and increase EU demand for and trade in legal and 'deforestation free' commodities and products. The preferred policy option includes a mandatory due diligence system and a country benchmarking system that will categorise countries taking into account deforestation and forest degradation linked to the relevant commodities in the scope. There will be three categories of countries — low, standard and high risk. The obligations for operators and member states authorities will vary according to the level of risk of the country of production, with simplified due diligence duties for low risk and enhanced scrutiny for high risk countries. The intervention will also build on: 1) A deforestation-free definition, based on the FAO definition, which products need to comply with; and an additional requirement for products to be legal according to the laws of the country of production; 2) A progressive product scope, which is regularly reviewed and updated, focusing on commodities with the highest EU embodied deforestation (beef, palm oil, soy, wood, cocoa, and coffee) and related derived products.
Interaction with SPI	SPI requirements (both minimum and information requirements) which may be defined for products potentially associated with risks of deforestation or forest degradation (such as wood furniture) should be prepared in full alignment and synergy with this initiative – see also Timber Regulation below. Information requirements, including through the European Digital Product Passport, may lead to additional reporting requirements (for the industry) in complement to the due diligence system provided in this

	initiative.

6	**Simplification and digitalisation of labels on chemicals: CLP, Detergents, Fertilising Products (proposal(s) for a regulation(s))**
Legislative or non-legislative?	Legislative. Adoption by the Commission is foreseen for 2022
Brief description	This initiative concerns the labelling requirements under the Regulation on classification, labelling and packaging of substances and mixtures ('CLP Regulation'), the Detergents Regulation and the Fertilising Products Regulation. Given that labels are the primary means to communicate essential product information to users, including hazard and safety information and product use-instructions, clear communication is vital for the effectiveness of chemicals legislation in protecting human health and the environment. The Fitness Check of the most relevant chemicals legislation (excluding REACH) and the evaluation of the Detergents Regulation found that chemicals' labels are overloaded with information, making them difficult to read and understand, especially for consumers. This reduces the effectiveness of the communication, and could lead to an impairment of one of the legislation's aims, i.e. raising product user awareness through labelling. Following the findings of the Fitness Check and evaluation, means of simplifying and streamlining labels will be considered for the labelling requirements under the CLP and Detergents Regulation, with a particular focus on consumers. The evaluations also suggest that communication could be improved by using innovative digital tools for labelling (targeted) chemical product information. The current legal labelling requirements do not allow the use of digital labelling on its own, nor incentivise it as an addition to existing labelling information. At present, digital communication on product labels is done only on a voluntary basis. In order to secure effective communication for digital labelling, actions should be taken to avoid that a range of voluntary schemes lead to potential market fragmentation or systems that are incompatible with developments such as those under the Globally Harmonised System for the classification and labelling of Chemicals (GHS). Therefore, it is desirable to introduce the possibility of digital labelling based on a common framework at EU level. Means of digitalisation (alongside the physical label) will be analysed for the labelling requirements of all three afore mentioned pieces of legislation.
Interaction with	This initiative may lead to requiring or enabling the digital provision of

the SPI	information on chemicals products. Similarly, the DPP would require the digital provision of information on the products to which it applies. Contrary to the SPI and DPP, the digital labelling initiative will not include sustainability criteria (i.e. it will be limited to the digital provision of information required under the relevant pieces of chemicals legislation). Where the DPP applies to a chemical product subject to digital labelling, synergies and interoperability will be sought to maximally profit from the communication benefits offered by digital solutions and to avoid duplication of information requirements for economic operators.

7	**EU Toolbox against counterfeiting**
Legislative or non-legislative?	To be determined
Brief description	The EU Toolbox against counterfeiting would be to set out a coherent, effective and coordinated action against counterfeiting, both online and offline. The specific objectives of the initiative would be to: – clarify roles, actions and measures to be undertaken by right holders and intermediaries, both online and offline, to fulfil their responsibilities in an approach of mutual cooperation and information sharing, – enhance cooperation between right holders, intermediaries, and national and EU public authorities, – facilitate effective and efficient information sharing between all key actors, and – promote innovation, development and use of adequate tools and new technologies to prevent and detect counterfeiting activities.
Interaction with the SPI	Coherence between the SCGI and SPI initiatives, and in particular the European Digital Product Passport (DPP), and the EU Toolbox against counterfeiting initiative (and specific projects such as Blockathon project) should be ensured. The EU Toolbox against counterfeiting initiative could build on the SCGI and SPI as horizontal initiatives, and in particular the European Digital Product Passport (DPP), if they include the fight against counterfeiting in their scope. The EU Toolbox against counterfeiting could consist of guiding principles, good practices and tools to urge, in particular: - right holders to **conduct due diligence checks** on their business partners to increase supply chain transparency; - right holders, intermediaries, and national and EU public authorities (in

	particular law enforcement authorities) to increase the **protection of supply chains from the infiltration of counterfeit goods or components**, e.g. through the use of **new technologies**, such as data mining, AI-powered image recognition and blockchain-based solutions. For instance, the Anti-Counterfeiting Blockathon project is an **on-going pilot project** developed by the EU Intellectual Property Office (EUIPO) to design a blockchain-based infrastructure that will help **authenticate products** (use of a 'digital twin') and **exchange data between all actors involved in the supply chain** (involvements of law enforcement authorities and consumers are still foreseen as optional at this stage). This blockchain-based infrastructure would be integrated with (i) track and trace systems, (ii) the EUIPO IP Enforcement Portal and (iii) the EUIPO 'IP Register on blockchain' blockchain-based project. 1. Experience gained in the on-going pilot project Anti-Counterfeiting Blockathon project developed by the EUIPO could be useful for the elaboration of the European DPP. 2. Coherence between these projects should be ensured. 3. Interlink / interoperability between, or even inclusion of this IP enforcement –related project in the (horizontal) European DPP could also be explored (to avoid duplication of projects). Background: The fight against counterfeiting (and even broader the protection of intangible assets, such as intellectual property rights, reputation, and confidential information), could also be included in the scope of the SCGI as it is already part of some companies' CSR schemes (e.g. codes of conduct, charters of ethics with suppliers, service providers, business partners, etc.). Intellectual property crime is often complementary to other forms of criminal activity, such as money laundering, tax fraud and tax evasion, human trafficking and occasionally forced labour. Production, transport, storage, use and destruction of counterfeit goods could be detrimental to the environment and could be included in the scope of these due diligence requirements. See e.g. EUIPO, 2020 Status report on IPR infringement, 2020; EUIPO and Europol, IP crime and its link to other serious crimes - Focus on poly-criminality, 2020; EUIPO and Europol, IP Crime Threat Assessment 2019, 2019.

2. RELATIONSHIP TO EXISTING LEGISLATIVE INSTRUMENTS

1	**Packaging and Packaging Waste Directive (PPWD)**
Legislative or non-legislative?	Legislative, mandatory - European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste
Brief description	The PPWD covers both packaging design and packaging waste management of all types of packaging placed on the EU market (all types of materials and all type of functions: primary, secondary and tertiary packaging). It aims to deal with the increasing impact of packaging and packaging waste on the environment and to remove barriers in the internal market caused by diverging national rules on packaging design. Among other things, the PPWD requires Member States to take measures aimed at the prevention of packaging waste and to meet recovery and recycling targets. It also requires them to set up packaging extended producer responsibility schemes by end of 2024 in line with the minimum requirements of Art. 8a of Directive 2008/98/EC on waste as amended in 2018. Most importantly for the SPI, the PPWD also includes essential requirements for the placing on the market of packaging related to the manufacturing, composition as well as reusable and recoverable nature of the packaging. It also contains measures on marking related to the main packaging materials.
Planned revision or amendments	Revision of the PPWD is currently foreseen for Q4 2021. The revision will have an emphasis on reinforcing the essential requirements for placing packaging on the market with a view to, among others, improving design for reuse and recycling, ensure uptake of recycled content, and making requirements clearer and more specific to strengthen enforcement. Labelling to communicate the recyclability, recycled content, reusable nature, and/or compostability/biodegradability of packaging are also being considered. Lastly, given its harmonisation objective, changing the legal instrument from a directive to a regulation will also be considered.
Interaction with SPI	SPI will extend the scope of the Ecodesign Directive beyond energy-related products and enable the setting of appropriate minimum sustainability and/or information requirements for a wider range of products.

	In principle, SPI could address packaging as part of a product (e.g. include packaging requirements in an SPI measure for phones), as a product in its own right, or both. Given the existence of the sectoral packaging legislation, and its ongoing revision, it not envisaged to cover packaging as a (stand-alone) product under SPI. The proposed articulation is that: The SPI will allow for the setting, where appropriate, of requirements on the packaging of specific products covered by SPI measures (reinforcing the current Ecodesign Directive to enable this). The revised PPWD will set cross cutting (essential) requirements for all packaging and possibly requirements for specific packaging types. Coordination between SPI and PPWD drafting teams will ensure complementarity and alignment, to ensure at least the use the same wording to define the respective requirements and empowerments (e.g. using the same definition of 'recycled content') and making use of the same methodologies for their implementation (e.g. on measurement of recycled content). When drafting measures under the SPI, packaging should be considered in the design of products to ensure further sustainability gains beyond the reach of the sectoral packaging legislation. Packaging requirements under SPI could be particularly relevant where packaging is closely associated with functionalities of specific products and could lead to broader sustainability gains for the packed product as such. In so far as the revised PPWD will set information or labelling requirements for packaging, it needs to be ensured that any product-level information requirements set through SPI can be clearly distinguished from that information when included on a products' packaging.

2	**End-of-life vehicle Directive**
Legislative or non-legislative?	Legislative, mandatory - Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles
Brief description	The ELV Directive aims to prevent and limit waste from end-of-life vehicles and their components and to improve the environmental performance of all economic operators involved in the life-cycle of vehicles. It sets clear targets for the reuse, recycling and recovery of vehicles. By an average weight per vehicle the reuse and recovery rate should be at least 95%, the re-use and recycling rate should be at least 85

	%. The ELV Directive prohibits the use of hazardous substances when manufacturing new vehicles (especially lead, mercury, cadmium, and hexavalent chromium) except in defined exemptions when there are no adequate alternatives. The ELV Directive requires Member states to encourage design and production of new vehicles which take into full account and facilitate the dismantling, reuse and recovery, in particular the recycling, of end-of life vehicles, their components and materials and to encourage manufacturers to integrate an increasing quantity of recycled material in vehicles and other products, in order to develop the markets for recycled materials.
Planned revision or amendments	Revision of the ELV Directive is currently foreseen for Q4 2022. As mentioned in the inception impact assessment, the revision aims to address that the Directive is not fully adapted to the evolution of vehicle design (e.g. increased use of new materials such as plastics, electronics, critical raw materials) and to the objectives of the EU Green Deal and CEAP (e.g. facilitating re-use and recycling through eco-design, use of recycled content). In addition it addresses the situation of the large number of "missing vehicles", which are not reported, and represent about 35% of estimated ELVs each year.
Interaction with the SPI	Explored options for the ELV revision that are relevant to SPI include, among others, measures on product information and design requirements on parts and materials in cars to facilitate e.g. dismantling, reuse, remanufacturing and recycling; an extension of the scope to motorcycles and trucks; and requirements on the use of recycled content. The proposed articulation with SPI is as follows: o Given the existence of the sectoral ELV legislation, which is under revision, it not envisaged that the vehicles covered by that legislation will be a priority product group under SPI. o In principle, under SPI it remains possible to introduce product requirements for vehicles, if complementary to sectoral (end-of-life) vehicles legislation. Such requirements could be considered in case these are not proposed under the revision of the ELV Directive, or for vehicles not within its scope. Coordination between SPI and ELV drafting teams will ensure complementarity and alignment, to ensure at least the use the same wording to define the respective requirements and empowerments (e.g. using the same definition of 'recycled content') and making use of the same methodologies for their implementation (e.g. on measurement of recycled content).

3	**Construction Products Regulation (CPR)**[521]
Legislative or non-legislative?	Legislative, mandatory
Brief description	There is a clear division of powers in the field of construction. Member States have exclusive competence for the rules on design and construction of constructions works, while the EU ensures free circulation of the construction products. Given this background, the CPR ensures free circulation by different means than most product legislation. Instead of setting harmonised substantial requirements, the **focus is on creating a 'common technical language', i.e. to set harmonised assessment and communication methods for the performance of construction products** in relation to the basic requirements for construction works. The common technical language ensures that reliable information is available to professionals, public authorities, and consumers, so they can compare the performance of products from different manufacturers in different countries. More specifically, it provides the basis for national public authorities to set their performance requirements on construction works. Free circulation of construction products is then achieved by requiring that CE-marked construction products undergo a performance assessment prescribed by the common technical language - wherever they are made available on the EU market. This **does not, however, guarantee that a product bearing the CE marking can systematically be used** (i.e. incorporated in construction works) in every Member State, which depends on the applicable building regulation. The common technical language consists of harmonised technical specifications (hTS) containing performance assessment and communication methods, currently mostly in the form of CEN (European Committee on Standardization) standards cited in the Official Journal. The use of these standards is, contrary to most product legislation, compulsory.
Planned revision or amendments	A CPR revision proposal is currently planned for Q4 2021. In addition to improving the implementation of the common technical language, primarily by making more efficient the standardization process, and modernizing the CPR, the revision will potentially aim to address the sustainability aspects of construction products. On two fronts:

[521] Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products.

	○ By including the environmental performance of construction products in the common technical language; and ○ By ensuring that the CPR is able to set, where appropriate, minimum sustainability requirements for construction products.
Interaction with SPI	In the case the relevant option is retained, the CPR would include empowerments to address the sustainability aspects of an important product group. Therefore, the articulation with SPI should identify which instrument is intended to set requirements to realise the aims of the SPI. These include both requirements of substance, e.g. to respect a certain limit value, and information requirements. **1. Three fundamental principles** Three fundamental principles guided the development of a solution on how the two instruments shall articulate: - The situation that products are assessed under the SPI and the CPR should be avoided to the extent possible, not least to avoid double burden. But there might be situations where the two legal frameworks need to be complementary - The CPR system has the longstanding practice to balance intended requirements on construction products with construction work aspects. The SPI intends to set minimum sustainability requirements and information requirements for products, taking into account safety aspects where relevant. In so far as either instrument covers construction products, it should be noted that environmental and safety aspects of construction works are not directly regulated but should be taken into account where relevant when setting requirements on products. The CPR system is a priori better suited to do so for construction products, i.e. to identify and arbiter in a fine-tuned way the possible trade-offs between different safety and environmental aspects[522]. - Construction products shall be subject to the same level of stringency as other products covered by the SPI. This principle will have many concrete practical consequences, see e.g. below for the empowerments needed so as to enable measures similar to and as stringent as those adopted under the SPI. The application of this principle should lead to an assessment of priority construction products for the integration of sustainability aspects, taking into

[522] E.g. it can foresee, by relating to its load bearing performance classes, low minimum recycling quota for concrete intended to be used for high-rises and high minimum recycling quota for the big majority of concrete intended to be used for other purposes, thus avoiding that for safety reasons only a low minimum recycling quota can be established for all concrete.

	account existing policy planning, with objectives and schedule that would serve as a basis for the benchmarking against SPI policy objectives. **2. The architecture envisaged** In view of these principles, the following architecture is envisaged: o For construction products, the CEAP and SPI goals shall be mainly realised by means of the CPR. o The CPR shall be able to mirror all obligations and requirements able to be set through the SPI, but for construction product. Hence, it must have extensive empowerments, both for setting environmental product requirements as foreseen in relevant policy option for the revision of the CPR and for information requirements on environmental performance. It must also be able to keep speed with the SPI in case the SPI sets up obligations for economic operators which go beyond product requirements. o It shall aim at a high level of sustainability at product level without endangering safety or sustainability of the construction work. o The CPR method for the assessment and communication of environmental performances shall to the extent possible follow the corresponding method used by the SPI, as many suppliers provide components or materials both to the construction products industry and to other industries. o Where the CPR fails to deliver the same level of stringency, the SPI should be empowered to step in. This empowerment creates also an incentive for the CPR "to deliver". The architecture can be resumed as follows: the CPR formally operates independently, but applies the method and the regulatory features of the SPI. It is benchmarked against the SPI as the SPI can step in where the CPR does not deliver – see below for details. **3. Technical fine-tuning** A few elements of fine-tuning will be needed: o It should be determined under which conditions the SPI should intervene where requirements established within the CPR system fall without justification below the level of stringency needed to realise the goals set for SPI, or where the objectives and schedule pursued by CPR on sustainability aspects are not met. A set of criteria and a process for joint assessment could be incorporated into the SPI or the CPR to determine under which conditions the CPR has realised in a

	satisfactory way the goals set for the SPI. o The SPI can cover intermediate products (steel, glass etc.) regardless of what happens under CPR. The only exception is cement which has no other use than construction. o For most of the products covered by the current Ecodesign Directive[523], they would be primarily regulated by the SPI in continuation of the Ecodesign Directive, while respecting/taking into account safety aspects. The CPR would only regulate these products in a complementary way where there is a noteworthy need to do so, also taking account of other legislation on products such as on gas appliances, low voltage, and machinery. The rationale for this particular rule is that the current eco-design aspects are the dominant aspect to be regulated for these products whilst this will not change with the extension of the current Eco-Design Directive to the future SPI. As the borderline between these products and ordinary construction products might not be always clear, both legal instruments shall obtain the empowerment to adopt European Commission acts determining whether a given product falls under one instrument or the other. The committees involved in the adoption of those acts under CPR and SPI shall deliberate jointly[524]. o Potential loopholes or overlaps (e.g. products or components with different possible uses) will be addressed by coordination between the two systems. There are manifold situations that could in theory emerge and that cannot be anticipated other than by establishing comprehensive empowerments in both legal instruments.

[523] This concerns in particular products and systems in the field of heating, ventilation, cooling and lighting. A detailed analysis between the involved services currently taking place might come to the result that in particular certain products formally falling under the current Eco-Design Directive, but for which no effective requirements have been set up, namely due to technical difficulties to integrate construction works' aspects, might better go into the basket of the CPR.

[524] A merger of the two committees is unlikely to be legally possible. Conflicting decisions can, however, be avoided as the Commission has to adopt the acts, not the committees. The Committees would thus informally deliberate together, but give their opinion formally separately. The Commission will have to adopt the act(s) and arbiter in case of diverging opinions.

4	**Chemicals in products -** **Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)**[525]
Legislative or non-legislative?	Legislative, mandatory
Brief description	REACH, together with the Regulation on Classification, Labelling and Packaging of chemicals (CLP), is the key Union legal instrument for the assessment and management of chemical substances, as such or in mixtures and articles. REACH aims to ensure a high level of protection of human health and the environment from risks resulting from the intrinsic properties of chemical substances (mostly identified under CLP), as well as the free circulation of substances on the internal market, while enhancing competitiveness and innovation. REACH is organised around four processes, namely the **registration, evaluation, authorisation and restriction** of chemicals. Manufacturers and importers of substances are generally required to gather information on the properties of their chemical substances, which will allow their safe handling, and, for substances produced in quantities exceeding 1 tonne per year, to **register** this and other information in a central database. The European Chemicals Agency (ECHA) is empowered to assess the completeness and compliance of the registrations during the **evaluation** process. Most important for the SPI, the manufacturing, placing on the market or use of a substance (also when included in products) can be linked to information requirements in the supply chain (see section on 'Tracking substances in products'), to an **authorisation** procedure, or to compliance with the conditions of a **restriction**. Authorisation applies to the placing on the market and use of substances of very high concern (e.g. carcinogenic or very-persistent-and-very-bio-accumulative substances), aiming at their progressive replacement by submitting their use to specific conditions. Restrictions included in REACH Annex XVII restrict the manufacturing, placing on the market and use of certain substances (varying from a complete ban to a restricted use under specific conditions), including as part of 'articles', the terminology used in REACH for products (e.g. 'benzene shall not be used in toys or parts of toys where the concentration of benzene in the free state is greater than 5 mg/kg of the weight of the toy or part of toy'). Restrictions can be adopted in case of an unacceptable risk to human health or the environment (Art.68(1)), following a dedicated procedure involving the agency ECHA (Art. 69-73), or, in

[525] https://ec.europa.eu/environment/chemicals/reach/reach_en.htm

	cases of specific categories of carcinogenicity, germ cell mutagenicity or reproductive toxicity (Art. 68(2))
Planned revision or amendments	The recently adopted Chemicals Strategy for Sustainability[526] announces the targeted revision of the REACH Regulation (as well as the CLP and sectoral chemicals legislation), which will be limited to achieving the specific aims set out in the strategy (adoption of a proposal is currently planned for Q4 2022). Options include amongst other things: o Extending the generic approach to risk management (currently in REACH Art 68(2), restrictions based on hazardousness) to other categories of substances; o Simplifying the authorisation procedure; o Strengthening enforcement. It is important to note that the policy commitments in the strategy do not include any measures to broaden the scope of REACH beyond its current focus on chemical safety to include also other sustainability aspects. Therefore, the revision of REACH will not offer a basis to regulate the use of chemicals in products in order to improve their performance in relation to the aspects addressed by SPI such as durability, reparability or recyclability, if these are not (directly or indirectly) related to chemical safety.
Interaction with the SPI	REACH does not allow for the restriction of a substance for reasons other than chemical safety even if, in certain cases, restrictions can have an impact beyond safety. When assessing a particular product or product group under SPI, the restriction of a substance for which alternatives exist could lead to an improvement on sustainability aspects other than chemical safety (e.g. recyclability, high-quality recycling, upgradability, durability, reparability). That being said, REACH should remain the central instrument for restricting the manufacturing, placing on the market and use of substances. Therefore, the proposed articulation with REACH (as regards restrictions of chemicals in products) is that: o SPI will only allow the restriction of the use of certain substances in its product-specific measures if the main reason is to improve a product's performance in relation the sustainability aspects addressed by SPI and not to improve chemical safety (although this could be a secondary effect of the restriction) and if such a

[526] https://ec.europa.eu/environment/pdf/chemicals/2020/10/Strategy.pdf

	restriction does not affect negatively human health or the environment in a significant way. o Where the main reason for a restriction is to improve chemical safety, REACH (or another relevant chemical safety instrument) should be used. As the current Ecodesign Directive already contains the empowerment to restrict the use of specific substances[527], it needs to be ensured that the SPI lays down in more detail the delineation of such an empowerment with REACH (and with other relevant chemicals legislation) in order to reflect its complementary role outlined above. It will further be ensured that: o When adopting a restrictions under SPI, its effect on chemical safety (including the chemical safety aspect of any alternative substance that will be used to replace the substance restricted under SPI) is considered with the same level of care as for a REACH restriction; o Where the use of a substance in a product is restricted under multiple instruments, the stricter restriction should, as a general rule, apply.

5	**Chemicals in products -** **Directive on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS)**
Legislative or non-legislative?	Legislative, mandatory
Brief description	RoHS aims to prevent the risks posed to human health and the environment related to the management of electronic and electrical waste. It does this by restricting the use of specific hazardous substances in electronic and electrical equipment (EEE) if they can be substituted by safer alternatives. These restricted substances include certain heavy metals, flame retardants and plasticizers. It thus includes a set of restrictions for a specific sub-set of products.

[527] It currently lists – in its Annex I Part 3 - as a possible parameter for requirements the 'use of substances classified as hazardous to health and/or the environment according to the CLP regulation'. This parameter can be regulated in order to improve performance in relation to the 5 environmental aspects listed in Annex I Part 1.2, which includes e.g. the use of materials, generation of waste, the possibilities for reuse, recycling and recovery of materials. Other ecodesign parameters that can have an indirect effect on the use of chemicals include the 'avoidance of technical solutions detrimental to reuse and recycling' and a product's upgradability or reparability.

	RoHS also promotes the recyclability of EEE, as EEE and its components that have become waste contain fewer hazardous substances due to its restrictions. RoHS empowers the European Commission to, by means of delegated acts, change or add restrictions with a view to achieving the objectives set out in Art. 1, i.e. to contribute "to the protection of human health and the environment, including the environmentally sound recovery and disposal of waste EEE."
Planned revision or amendments	Revision started in Q1 2021 and is planned to be finalised by Q4 2022
Interaction with SPI	For purposes of restrictions related primarily to chemical safety, the same articulation as between SPI and REACH should apply to RoHS. However, where the SPI process leads to the consideration of a potential restriction on the use of substances in EEE (i.e. whose main reason is to improve a product's performance in relation the sustainability aspects addressed by SPI and not to improve chemical safety) and such a restriction can be defined as contributing to "the protection of human health and the environment, including the environmentally sound recovery and disposal of waste EEE", there could be potential overlap with RoHS. This should be avoided, and therefore close coordination between the two instruments will take place to prevent overlaps.

6	**Tracking chemicals in products** - **REACH (Art. 33) and the Waste Framework Directive (WFD, Art. 9)**
Legislative or non-legislative?	Legislative, mandatory
Brief description	REACH sets up a supply chain communication duty. Concretely, suppliers of articles (products and product components) containing substances in the Candidate List of Substances of Very High Concern (SVHCs) must communicate certain information to the recipients of those articles. This information must also be provided free of charge within 45 days to consumers, upon request. The Waste Framework Directive (WFD) provides for the obligation to provide that information to the European Chemicals Agency (ECA), which is tasked with the development and maintenance of a database containing this information (the SCIP database). The Agency manages the database and will have to provide access to the notified information to waste treatment operators and consumers. The current level of implementation of both provisions is limited and the situation is particularly worrying for imported goods and articles

	placed on the market via e-commerce, where there is a general lack of information on the presence of SVHCs. In addition, the information to be provided/submitted to the Agency remains very limited and is not sufficient to ensure adequate information about the general chemical composition and safety of products. Also, products that can also be defined as substances or mixtures are not subject to this obligation, although they are subject to, e.g., labelling requirements set by CLP. More specifically, the limitations are: The limitations of the current provisions of **Article 33 of REACH** are described in the Commission's Staff Working Document SWD(2020)247_final ("Review of certain provisions of Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restrictions of Chemicals (REACH), as laid down in its Article 138"). Identified issues are a lack of awareness of duty holders, the absence of adequate information management systems in certain companies, technical difficulties derived from the complexity of articles and their chemical content, and scarcity of information on imported articles. It is noted that the situation varies depending on the nature of value chains, the company's size or the existence of stable relationships with suppliers. SWD(2020)247 concludes: "In view of the challenges with its implementation and the low level of compliance with Article 33, as it stands now, the benefits of any extension of its scope to cover other dangerous substances are questionable. The extension of obligation would rather result in additional challenges, adding burden on companies and not further contributing to the objectives of REACH." In other words, the simple expansion of the scope of substances covered currently under Article 33 of REACH does not seem a sufficient route to meet the commitments of the Chemicals Strategy for Sustainability and of the CEAP to address and/or provide information on a broader set of substances of concern. One intention of the SCIP database recently introduced under **Article 9 of the Waste Framework Directive**, was to improve parts of the general implementation of REACH Article 33 to communicate information on substances of very high concern throughout the supply chain and to consumers. Another important intention was to extend the existing REACH obligation, to include now also and explicitly the waste managers. This should improve the safety of waste management practises and lead to higher quality secondary materials (less contaminated by substances of very high concern). The SCIP database was introduced without an impact assessment and has been severely criticised by the duty holders (industry). The main concerns raised are:

	○ the language issue (information only accepted if in English), ○ the diversity of implementation between member states (in terms of legal wording and of time required to transpose the Directive into national legislation), ○ the level of detail required because of the reference to REACH Article 33 (directly) and REACH Article 3 (indirectly, as it defines the term 'article'), i.e. information is to be provided even at the level of the smallest component of an end-product, which is not necessarily useful for the waste managers ○ confidentiality of supply chain details. Shortly after the publication of the revised Waste Framework Directive, a study on the 'Information flows on Substances of Concern in Products from Supply Chains to Waste Operators' was performed. The corresponding recommendations were the following: ○ market actors should apply both generic and sectoral information flow approaches to achieve the decontamination of waste streams and the production of more secondary materials with low content of substances of concern; ○ No one-fits-all recommendation can be given on the nature of information that should be provided to the waste sector, as this depends to a large extent on the sorting processes to be supported and the specific sorting target, i.e. the degree of differentiation of output waste streams related to their content of substances of concern; ○ Authorities and stakeholders should pay more attention to the simpler information flow approaches alongside sophisticated IT-centred concepts. ○ The level of sophistication of any IT tool selected to support the flow of information on substances of concern should closely correspond to the type of information to be transferred and the level of detail necessary to support waste operators. Based on these recommendations, a simple expansion of the scope of substances to be notified into the SCIP database, directly (by a change of the Waste Framework Directive) or indirectly (by a change of Article 33 of REACH), does not seem to be a sufficient, nor the most effective, tool to meet the commitments of the Chemicals Strategy for Sustainability and of the new Circular Economy Action Plan to provide information on a broader set of substances of concern.

Interaction with SPI	As described in measures 4a.3 and 4b.2, the SPI will aim to overcome the limitations of the current system for specific products or product groups. In SPI, tracing requirements would be set at two levels by: Laying down substances to be tracked for groups of products (initially limited to substances for which information requirements exist already today (substances identified as SVHC under REACH), to be gradually increased if needed) - provided that measure 3b.1 enabling the adoption of SPI measures for groups of products is retained. Specifying other substances of concern, including those that are not necessarily hazardous, but affecting the broader sustainability of the product, namely recycling, reuse, remanufacturing, to be tracked in product-specific measures. Under measure 4b.2, this obligation would also lead to the inclusion of the relevant information in the European Digital Product Passport (EU DPP). The introduction of such information requirements for specific products under SPI could cover the substances for which obligations exist already in REACH and the WFD. For reasons of legislative efficiency and to remove administrative burden, it will be envisaged to progressively lift the REACH and WFD obligations for products that are SPI-compliant and accompanied by a digital product passport. This decision would be taken only when the implementation of the European digital product passport has shown to be equally or even more effective in meeting the current REACH Art 33 and WFD Art 9 objectives. The SCIP database under the responsibility of ECHA can also play a relevant role in reducing economic costs for operators, in particular SMEs. The means to integrate the information, currently managed under SCIP into the broader European digital product passport concept have to be further investigated and developed with the ultimate objective of avoiding duplications and additional burden to operators.

7	**Chemicals as products -** **REACH, Chemicals Strategy for Sustainability[528]**
Legislative or non-legislative?	Legislative, mandatory
Brief description	There are some products that could be addressed by the SPI that consist (mainly) of chemical substances. Examples include: o Products that can be defined as 'mixtures' of substances under REACH and CLP, e.g. detergents; o Chemicals intended to be included in products (e.g. benzene); o Chemicals used in industrial or manufacturing processes (e.g. solvents). In so far as they include hazardous substances, REACH and sectoral chemicals legislation (e.g. the Detergents Regulation[529] and the Cosmetic Products Regulation[530]) include requirements to ensure safe use of those substances (as well as possible restrictions), which are applicable to various extents to different product categories. They are then also subject to CLP requirements, see next table.
Planned revision or amendments	The Chemicals Strategy for Sustainability announces the development and promotion of 'safe and sustainable-by-design criteria' (SSbD) for chemicals, materials and products. The scope and legal form of these criteria is still under consideration, but it is crucial that the sustainability criteria for the SSbD-approach are aligned, or at least compatible with, the corresponding sustainability criteria to be defined under SPI. In terms of information requirements, the Chemicals Strategy also announces that the Commission will assess how to best introduce information requirements under REACH on the overall environmental footprint of chemicals, including on emissions of greenhouse gases. Accordingly, the options for the targeted revision of REACH include revising the registration requirements for manufacturers and importers as regards environmental footprint information. Under REACH, substances need to be registered with ECA, which then makes publicly available parts of the information, if they are not claimed and justified to be confidential. This requirement would thus function at the level of the substance. For a mixture, a manufacturer/importer of a substance needs to

[528] https://ec.europa.eu/environment/pdf/chemicals/2020/10/Strategy.pdf
[529] Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents
[530] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Al32025

	register the individual substances of which a mixture is composed.
Interaction with SPI	It will be ensured that any substantial requirement set through SPI for products equivalent to substances/mixtures are coherent with the future development and implementation of 'safe and sustainable-by-design criteria' (or even based on them), as well as the other way around. *NB: a potential overlap would be the setting of restrictions on specific substances in chemical products (including mixtures). The same logic and articulation outlined above for the issue of restrictions of substances in products would apply.* For information requirements set through SPI, in so far as appropriate and feasible for relevant products, the focus would be to allow for differentiation of products based on their environmental performance (as a basis for consumer choice, or for the setting of incentives). In this context, the information should therefor relate to a certain quantity of chemical product as placed on the market. In so far as REACH takes the same approach regarding the information on the environmental footprint of substances, which can be included in products consisting mainly of substances, it should be ensured it uses methodology and calculation rules coherent with the SPI. Lastly, the obligations for the tracking of chemical content in these products should be the same as those indicated in (see 'Tracking chemicals in products")

8	**Chemicals as products -** **Regulation on Classification, Labelling and Packaging of chemicals (CLP)**
Legislative or non-legislative?	Legislative, mandatory
Brief description	As set out previously, there are products that could be addressed by the SPI that consist (mainly) of chemical substances. The CLP Regulation provides a general framework to identify the hazards of chemicals (both substances and mixtures), to inform users on the related hazards via labelling and to package those chemicals following certain requirements. The CLP hazard classification is also the basis for implementing most sectorial regulations in relation to chemicals (Cosmetics, Toys, etc.).

	Sectoral chemicals legislation (e.g. the Detergents Regulation and the Cosmetic Products Regulation) can contain additional requirements on labelling or the provision of information.
Planned revision or amendments	The Chemicals Strategy for Sustainability[531] announces the introduction of new hazard classes under CLP and additional interventions to improve the current regulatory framework. In addition, the Labelling of mandatory information as required under the CLP legislation is currently being looked at in light of the 'Simplification and Digitalisation'[532] initiative of labels on chemicals. The main objective of this initiative is to increase the effectiveness of communicating essential information on chemicals, including safety and product use-instructions, in order to further reduce the impact of harmful chemicals on health and the environment. The means of simplifying and streamlining information and introducing the use of digital tools for parts of the labels will be explored to fulfil this objective. An impact assessment will be prepared to support the preparation of this initiative and to inform the Commission's decision(s). The evidence base and impacts of a range of options will be supported by two comprehensive external studies.
Interaction with SPI	The proposed articulation with CLP, as regards classification and information requirements, is that SPI will only address the classification of and information requirements on products that can be defined as substances and mixtures under CLP if the main reason is to communicate a product's performance in relation to the sustainability aspects addressed by SPI and not its chemical safety. Moreover, if and when SPI measures would include requirements on the packaging of the products in their scope, coherence and alignment will be sought with any relevant CLP requirements. Lastly, synergies could be established between the work related to the European digital products passport (EU DPP) and the developments on work related to simplifying the labelling requirements and/or providing labelling as required under the CLP regulation digitally.

9	**Chemicals as products -**

[531] https://ec.europa.eu/environment/pdf/chemicals/2020/10/Strategy.pdf

[532]https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12992-Chemicals-simplification-and-digitalisation-of-labelling-requirements_en

	Sectoral chemicals legislation (Detergents, Fertilisers, Cosmetics)
Legislative or non-legislative?	Legislative, mandatory
Brief description	In addition to REACH and CLP, there is a range of legislation setting requirements for the placing on the market of products that consist of chemicals. This legislation aims at ensuring the free movement of the relevant products, as well as ensuring a high level of protection of human health and the environment. They include, among other things: o restrictions on substances included in the relevant products, o information and labelling requirements related the make-up of the relevant products and/or their safe use.
Planned revision or amendments	See the initiative below on "Simplification and digitalisation of labels on chemicals: CLP, Detergents, Fertilising Products".
Interaction with SPI	In so far as SPI measures would apply to products within the scope of the sectoral chemicals legislation, the proposed articulation is: In relation to restrictions, the same articulation as with REACH applies, i.e. that SPI only allows the restriction of the use of certain substances in its product-specific measures if the main reason is to improve a product's performance in relation the relevant sustainability aspects addressed by SPI and not to improve chemical safety (although this could be a secondary effect of the restriction) and if such a restriction does not affect negatively human health or the environment in a significant way. In relation to information and labelling requirements, the same articulation as with CLP applies, i.e. that SPI will only address information requirements on products that can be defined as substances and mixtures under CLP (which is the case for cosmetics, detergents and fertilisers) if the main reason is to communicate a product's performance in relation to the sustainability aspects addressed by SPI and not its chemical safety.

10	**EU Taxonomy regulation and technical screening criteria**[533]

[533] https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

Legislative or non-legislative?	Legislative, voluntary
Brief description	Regulation (EU) 2020/852, or Taxonomy Regulation (TR), establishes unified and harmonised criteria for determining whether an economic activity qualifies as substantially contributing to environmental objectives in the EU. This is primarily to enable financial market participants to make and report on sustainable investment decisions. The TR is centered on six environmental objectives: climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems. Technical screening criteria are developed for each environmental objective. In order to qualify for inclusion in the EU Taxonomy, economic activities will need to: (a) substantially contribute to at least one of the six environmental objectives, by complying with robust and science-based technical screening criteria; (b) do no significant harm to the remaining environmental objectives; and (c) respect minimum social safeguards, and (d) comply with robust and science-based technical screening criteria that determine what substantial contribution and do no significant harm means for a given economic activity and environmental objective. The technical screening criteria will be developed and adopted successively: a delegated act on the two climate-related objectives has been adopted on 4th June 2021, whereas a delegated act on the remaining four environmental objectives is scheduled for end 2021.
Interaction with the SPI	The two initiatives follow different approaches. Whereas the SPI focusses on setting requirements for the placing on the market of all products in a category, the taxonomy sets criteria for the qualification of the related economic activity as environmentally sustainable. The latter is therefore a "top runner" approach, aimed at rewarding the best performers. However, both initiatives set out to establish agreed, unified and harmonised criteria related to sustainability. For example, in defining criteria for qualification as a substantial contribution to transition to circular economy, the taxonomy includes an "increase the durability, reparability, upgradability and reusability of products, or […] reduce the use of resources through the design and choice of materials", and "developing 'product-as-a-service' business models and circular value chains, with the aim of keeping products, components and materials at their highest utility and value for as long as possible". Both also rely on scientific evidence and input from experts and relevant stakeholders, and reach a relatively high level of technical detail and granularity. It would

	therefore be logical, where possible, to use common methods and metrics. The Taxonomy "do no significant harm" criteria would be of particular relevance, with the Regulation stating that "The technical screening criteria should identify the minimum requirements necessary to avoid significant harm to other objectives, including by building on any minimum requirements laid down pursuant to Union law. When establishing and updating the technical screening criteria, the Commission should ensure that those criteria are based on available scientific evidence, are developed by taking into account life-cycle considerations, including existing life-cycle assessments, and are updated regularly". In so far as the SPI would set information requirements on products' composition or environmental performance, coherence in the background method would not only be logical, it would also reduce the administrative burden on companies reporting towards investors under the Taxonomy Regulation, and at the same time complying with any SPI measures. The EU Digital Product Passport should facilitate access to information relating to the taxonomy. Article 19 of the Taxonomy Regulation on requirements for technical screening criteria lists "where appropriate, build upon Union labelling and certification schemes, Union methodologies for assessing environmental footprint, and Union statistical classification systems, and take into account any relevant existing Union legislation". Accordingly, the proposed criteria on climate mitigation reference the Environmental Footprint methods, where relevant (e.g. where an activity is not covered by the EU Emissions Trading System (ETS) and a quantification of GHG emissions is required). Work is ongoing on the remaining four (non climate) environmental objectives, where the use of the Environmental Footprint methods is being explored. This could be a liaison point where product specific acts in SPI would reference the Environmental Footprint method as a tool. The first climate-related taxonomy delegated acts have been adopted, and the "Taxo4" non-climate related delegated acts will be adopted in 2022. They are likely to be complemented and updated periodically. Development of requirements for product groups under SPI implementing measures should take into account relevant existing and future technical screening criteria under the taxonomy delegated acts, including the significant harm criteria. In addition, technical screening criteria could where feasible be based on physical and data requirements included in SPI measures. Where such requirements distinguish the best from the worst performers (e.g. by means of performance classes), they could be potentially be used to define taxonomy criteria for the sectors involved in the manufacturing of that

	product or product group.

11	**Industrial Emissions Directive[534] – E-PRTR[535]**
Legislative or non-legislative?	Legislative, mandatory
Brief description	The Directive 2010/75/EU on industrial emissions (IED) is the main EU instrument regulating pollutant emissions from industrial installations. IED is based on an integrated approach, use of best available techniques, inspections and public participations. IED obliges around 52,000 installations to operate in accordance with a permit. This permit takes into account the environmental performance of the plant covering e.g. emissions to air, water and soil, generation of waste, use of raw materials, energy and water efficiency, noise, prevention of accidents and restoration of the site upon closure and includes emission limit values. In addition, through the EU pollutant release and transfer register (E-PRTR) emission data reported by operators are made publicly accessible via a web-based portal, which is intended to provide this environmental information the environmental performance of on major industrial activities.
Interaction with SPI	As for the EU pollutant release and transfer register (E-PRTR): the SPI has no impact on the information provided in that context. Emission data reported by Member States are publically available through the E-PRTR at facility level. In SPI, this type of information might serve as raw data for emissions for organisations calculating environmental performance information to comply with possible requirements set through SPI. In this case, the availability of primary data will be enhanced. In case of specific acts that would look at the life cycle of products from industrial sectors in scope of the IED (e.g. textile; chemicals; cement; tanneries; non-ferrous and ferrous metals…), the SPI should ensure to coordinate requirements with the BAT requirements under the IED, including on pollutant emissions.

[534] https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm
[535] https://prtr.eea.europa.eu/#/home

12	**EU Ecolabel[536] and Green Public Procurement[537]**
Legislative or non-legislative?	Legislative, voluntary
Brief description	The EU Ecolabel is the European Union voluntary label for environmental excellence. Criteria for getting the EU Ecolabel are defined by product group, and aim to limit access to the label to those products (goods or services) that are best-in-class in the given product group. Criteria development usually starts from existing life cycle assessment studies to help identify the environmental aspects that need to be covered by criteria. Currently, the EU Ecolabel covers 24 product groups and 75,796 products[538]. Green Public Procurement (GPP) is a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured. EU GPP is currently a voluntary instrument, and Member States and public authorities can determine the extent to which they implement it. Since 2008, the Commission has developed more than 20 common GPP criteria. Please note that this existing tool is separate from the one described under measure 5a.2 on mandatory procurement requirements.
Interaction with SPI	Whereas the Ecolabel and GPP are voluntary schemes, information requirements set though SPI would be mandatory for all relevant products when placed on the market. Nevertheless, it is important to ensure coherence between SPI and the EU Ecolabel and EU GPP criteria in order to send consistent signals to the market. It should be ensured that the methodology linked to information requirements set through SPI, especially possible classes of performance, and the methodology used in relation to the Ecolabel and GPP criteria are coherent. In addition, **EU Ecolabel and GPP criteria and SPI requirements should be prepared in close cooperation, potentially following the same background assessment method and where feasible using a common support study for both processes**. An envisaged synergy is to where feasible provide, in the Ecolabel criteria for a product also covered by an SPI measure setting classes of performance, that the Ecolabel should be granted to products that fall within the highest performance classes (or the highest performance classes

[536] https://ec.europa.eu/environment/ecolabel/
[537] https://ec.europa.eu/environment/gpp/index_en.htm, in particular Communication (COM (2008) 400) "Public procurement for a better environment"
[538] https://ec.europa.eu/environment/ecolabel/facts-and-figures.html, retrieved on 22/01/2021

	at the time of setting EU Ecolabel criteria) and in addition fulfil the Ecolabel criteria not covered by the SPI measure and its classes of performance. For GPP, procurement criteria can be straightforwardly related to make reference to SPI criteria, especially if the SPI includes performance classes. In so far as product specific acts in SPI reference the PEF method as a tool to calculate the life-cycle impacts, three aspects would need special consideration: o firstly, the EU Ecolabel does currently not use PEF as a background assessment method, although this is being tested for the on-going revision of Absorbent Hygiene Products. The CEAP also provides that "the Commission will test the integration of these [PEF and OEF] methods in the EU Ecolabel and include more systematically durability, recyclability and recycled content in the EU Ecolabel criteria"; o secondly, sometimes the EU Ecolabel criteria address issues (e.g. recyclability, recycled content, durability) that, whilst included in the how impacts are calculated, are not explicitly reported as impacts in PEF. In addition, they sometimes include very strict restrictions of hazardous substances able to possibly affect a products' environmental performance as assessed under SPI; o thirdly, the EU Ecolabel also addresses some social issues, where relevant for the specific product group, and includes fitness for use criteria. Management system related requirements are also included in a few cases.

13	**EU Energy label**[2]
Legislative or non-legislative?	Legislative, mandatory

Brief description	The EU Energy label is a mandatory labelling scheme for energy-using and energy-related products in the EU. It establishes a consistent and easy to understand EU wide labelling system with information on the energy efficiency of energy-related products (most prominent feature of the label with A-G scale), its energy use as well other as environmental (e.g. water use, noise) and functional parameters (e.g. washing efficiency) where relevant. The information included on the label focuses on energy efficiency and on consumption of other resources during use. The label also provides information on other functional and environmental performance of the products as long as it is based on data relating to physical product characteristics that are measurable and verifiable by market surveillance authorities. All products in scope have to be registered in a specific registry/database (EPREL) before being placed on the EU market (for improving user awareness and efficient compliance control).
Interaction with SPI	The EU Energy Label focusses on a product's energy and other resource consumption during its use, and it is limited to energy-related products. It may also provide information on other functional and environmental performance of products, relating to physical product characteristics that are measurable and verifiable by market surveillance authorities. In so far as the SPI sets environmental performance classes, they would not be limited to energy-related products and would relate to products' overall life-cycle environmental impacts, rather than focusing on use. There is therefore no conceptual overlap and they could be seen as complementary approaches. A clear articulation and differentiation of the two types of classifications will be essential in order to avoid confusion for consumers. As is currently the case between ecodesign and energy labelling, SPI and energy labelling requirements for products will need to be closely coordinated and rely on compatible methodologies.

14	**Regulation (EU) No 1007/2011 on textile fibre** names and related labelling and marking of the fibre composition of textile products
Legislative or non-legislative?	Legislative, mandatory

Brief description	The textile Regulation sets mandatory information requirements concerning the composition of fibers and minimum requirements for applications for a new fiber name. Market surveillance measures are also included.
Interaction with SPI	Possible SPI measures for textile, in addition to minimum requirements, would also likely include product information requirements that go beyond the requirements of the Textile Regulation (e.g. presence of chemicals that would hamper recycling). Therefore the Textile Regulation would not necessarily be impacted as such by SPI measures. It could be considered, for the sake of concentrating requirements in a single legal text, to merge or combine existing information requirements with the more far reaching ones that would be set by SPI.

15	**Timber Regulation**
Legislative or non-legislative?	Legislative, mandatory
Brief description	The Timber Regulation sets the obligations of operators who place timber and timber products on the market. To counter the trade in illegally harvested timber and timber products through three key obligations: 1) It prohibits the placing on the EU market for the first time of illegally harvested timber and products derived from such timber; 2) It requires EU traders (economic operators in this part of the supply chain) who place timber products on the EU market for the first time to exercise due diligence and 3) to keep records of their suppliers and customers to facilitate the traceability of timber products because, once on the market, the timber and timber products may be sold and/or transformed before they reach the final consumer.
Interaction with SPI	SPI would likely set minimum and information requirements concerning timber products (furniture at least). Those could probably coexist with the Timber Regulation with no need for further work in principle, although at the level of product-specific SPI measures it should be investigated if there would be room for synergies.

16	**EU Emissions Trading Scheme – main texts: Directive (EU) 2018/410; Directive 2003/87/EC; Decision (EU) 2015/1814**
Legislative or non-legislative?	Legislative, mandatory

Brief description	The EU ETS sets a cap on the total amount of certain greenhouse gasses that can be emitted by installations. This cap reduces over time, so that the total emissions fall. Within this cap, companies receive or buy emission allowances which they can trade with one another as needed. They can also buy a limited amount of international credits. The EU ETS covers the following sectors and gases: o carbon dioxide from: o electricity and heat generation o energy-intensive industry sectors including oil refineries, steel works, and production of iron, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals o commercial aviation within the European Economic Area; o nitrous oxide (N2O) from production of nitric, adipic and glyoxylic acids and glyoxal; o perfluorocarbons (PFCs) from production of aluminium.
Interaction with SPI	In order to surrender the right amount of allowances, companies have to collect and report information on their emission of the relevant substances. In SPI, this type of information might serve as raw data for emissions for organisations calculating environmental performance information to comply with possible requirements set through SPI. In this case, the availability of primary data will be enhanced. In case of specific acts that would look at the life cycle of products from chemicals or construction industry, the SPI should ensure to coordinate requirements on emissions with what exists in the EU ETS.

Annex 15: Evaluations of the Ecodesign/energy labelling legislation including the report of the European Court of Auditors

THE 2012 REVIEW OF THE ECODESIGN DIRECTIVE

The European Commission had to review the effectiveness of the Ecodesign Directive and its implementing measures by 2012. That review identified eight challenges for which the European Commission announced a number of non-legislative actions to improve the application of the Directive and its implementing measures[539]. The extent to which the actions announced in that review have already addressed the challenges varies as follows:

- 'Complex and lengthy preparatory procedure': the European Commission's report did not identify a specific action to address this although in fact the time to adopt measures has reduced by 7 months.
- 'Limited data to inform policy decisions': in 2013 a three-year contract was signed to develop a database on energy efficiency and other environmental aspects of energy-related products placed on the market[540]. However, the collection of data under the project was limited to six product categories[541] to keep the scope of the study manageable.
- 'Insufficient coordination of ecodesign measures with other pieces of EU legislation': a pilot project was initiated in which the European Commission's Joint Research Centre (JRC) provides technical support to the policy DGs for a number of products[542] and investigates the possibilities for a more integrated process of developing product specific policy measures. The project is on-going and should be finalised in 2015.
- 'Insufficient resources to deal with the increasing amount of regulatory, communication and standardisation work': a significant part of non-regulatory work was delegated to external bodies and experts[543]. As a result, the yearly number of ecodesign and energy labelling measures published increased to nine in 2013, against eight in 2012, two in 2011 and seven in 2010 (see *Annex 2: Stakeholder consultationn*). In 2014 the number dropped to seven, but only because adoption and publication of several regulations encountered a short delay into 2015 due to the change of the European Commission.
- 'Question on the level of ambition of some requirements': the European Commission indicated it would continue reinforcing the use of the expertise of stakeholders. For the ecodesign regulations adopted in 2013 the evaluation study gives a mixed picture: the regulation for space heaters is viewed as having the correct ambition level, whereas the one for computers is seen as clearly too low while others are considered in-between[544].
- 'Remaining potential to further address non-energy-related issues of energy-related products': the European Commission indicated it would continue reinforcing the use of the expertise of stakeholders. In 2013, durability and dust re-emission requirements were included in the ecodesign regulation for vacuum cleaners and nitrogen oxide emission requirements were included in ecodesign regulations for space heaters and water heaters. Noise was also

[539] COM(2012) 765 final
[540] http://ted.europa.eu/udl?uri=TED:NOTICE:52785-2013:TEXT:EN:HTML&tabId=1
[541] Tyres, vacuum cleaners, lighting, air conditioners, computers and electric motors
[542] Showers and taps, commercial refrigeration, professional refrigeration, space heaters and water heaters
[543] EuropeDirect, EASME and New Approach consultants
[544] Ecofys final technical report p.21-22

addressed for these products. Design requirements for recycling were included in the voluntary ecodesign agreement for imaging equipment. Requirements for information provision relevant for disassembly, recycling and disposal at end-of-life were included in the regulations for space heaters, water heaters and vacuum cleaners.

- 'Delays in the elaboration of suitable harmonised standards': external experts were contracted and NGOs were provided with support to allow for their active involvement. This is likely to result in standards that are better fit for purpose, but the problem of delay remains.
- 'Insufficient and ineffective market surveillance': funding opportunities for joint action on market surveillance between national authorities were provided[545] and the European Commission collected data from Member States on their enforcement activities. While the data show an overall increase in market surveillance activities over the years, the level of market surveillance is still relatively low.

THE 2015 REVIEW OF THE ENERGY LABELLING DIRECTIVE (2010/30/EU) AND THE ECODESIGN DIRECTIVE

The Energy Labelling Directive requires the European Commission to review the effectiveness of the Directive and its delegated acts by 2014.

The Ecodesign Directive required the European Commission to review the effectiveness of the Directive and its implementing measures by 2012. That review concluded that no immediate revision was necessary, but that the Directive could be reviewed again along with the review of the Energy Labelling Directive, since the effects of ecodesign implementing regulations and energy labelling delegated regulations applicable to the same energy-related products are often linked and complementary. The focus was on the framework Directives and not on the individual implementing measures, which are subject to their own impact assessment process. Recognising that there are potentially other policy measures that could increase the efficiency of energy-related products, such as fiscal measures, incentive schemes, etc., the review addressed the specific problems that have arisen in the implementation of the two Directives.

The problems that are common to ecodesign and energy labelling were identified as follows. Firstly, non-compliance with ecodesign and labelling requirements, in part related to weak enforcement by national market surveillance authorities. Secondly, a number of product regulations have a low level of ambition and, thirdly, a long rulemaking process, leading to outdated technical and preparatory work at the time of policy decisions. A final problem related predominantly to ecodesign was that environmental impacts other than use-phase energy consumption could receive more attention.

The following policy options to improve the energy labelling and ecodesign framework were considered to address the problems:

1. New non-legislative action

1+. New non-legislative action plus legislative improvements for energy labelling

2. Significant legislative reform of both ecodesign and energy labelling

3. Comprehensive reform of ecodesign and energy labelling extending the scope to non-energy-related products and centralising market surveillance at EU level.

The three problems common to ecodesign and energy labelling were addressed by a mandatory product registration database (in option 1+ only for labelling, in options 2 and 3 for both labelling and ecodesign), providing the information needed to improve enforcement and the rule making process,

[545] Under the Intelligent Energy Europe (IEE) Work Programme 2013 and Horizon 2020 call for 2014 and 2015

and to some extent addressing the problem of low levels of ambition. The alternative measure of a study collecting data (option 1; and in option 1+ for products covered by ecodesign but not by labelling) addressed the same problems although to lesser extent and not for enforcement.

Additional measures to address the problem of low levels of ambition were i) using learning curves to determine the least life cycle cost at which requirements are set (options 1, 1+ and 2) and ii) changing the least life cycle cost requirement to a significantly more ambitious 'break-even point' requirement (option 3).

Additional measures to address non-compliance and weak enforcement were supporting joint surveillance actions through EU-funded projects (options 1, 1+ and 2), legal alignment with the European Commission's proposal for a new market surveillance regulation (options 1+ and 2), streamlining legal provisions of the Energy Labelling Directive (options 1+, 2 and 3), requiring third party certification for all product groups (options 2 and 3) and centralising market surveillance at EU level (option 3).

The problem concerning other environmental impacts was addressed by extending the scope to non-energy-related products for which such impacts dominate over energy use (option 3) or, alternatively, by reviewing and updating the ecodesign analysis methodology ('MEErP') to better address material efficiency impacts of energy-related products (options 1, 1+ and 2).

The options of significant (option 2) and of comprehensive (option 3) legislative reform of both ecodesign and energy labelling would have achieved the highest energy savings. However, these options could have created disproportionate obstacles with regard to international trade, because they include third party certification for all products. Furthermore, for the extension of the scope beyond energy-related products in option 3 it was not obvious that the principle of proportionality was respected: ecodesign and energy labelling may not have been the right instruments for such products and for a number of product groups this measure would have overlapped with other environmental policies. It thus appeared to go beyond what is necessary to achieve the identified objectives.

The option of non-legislative action plus legislative improvements for energy labelling (option 1+) appears to be the optimal one from the perspective of all impacts combined.

EUROPEAN COURT OF AUDITORS SPECIAL REPORT; EU ACTION ON ECODESIGN AND ENERGY LABELLING

In this audit, the European Court of Auditors assessed whether the EU's actions on Ecodesign and Energy Labelling contributed effectively to reaching its energy efficiency and environmental objectives. They examined whether the European Commission managed the regulatory process well and adequately monitored and reported the results achieved. They also examined whether the European Commission had overseen and supported market surveillance activities effectively and whether EU-funded projects had led to sustainable improvements in market surveillance.

They concluded that EU actions contributed effectively to reaching the objectives of the Ecodesign and Energy Labelling policy, but that effectiveness was reduced by significant delays in the regulatory process and non-compliance by manufacturers and retailers.

The policy covers most of the products with the highest energy-saving potential. The European Commission used sound and transparent methodologies to decide which products to regulate, so that the policy would have maximum impact.

However, they found that the process to establish product-specific regulations is lengthy, and the European Commission could have avoided some delays. In addition, the European Commission's decision to adopt measures as a package meant that product groups that are ready to be regulated are delayed even longer. This reduced the impact of the policy, as the product design requirements do not

always reflect technological progress. Moreover, energy labels no longer always help consumers to differentiate between products.

The way the European Commission integrated circular economy concepts such as reparability and recyclability in the Ecodesign and Energy Labelling policy has been ad hoc. However, they noted that recently adopted product regulations showed that the European Commission had paid more attention to these aspects.

Every year, the European Commission reports on the results of Ecodesign and Energy Labelling policy, providing stakeholders and policy-makers with useful information. They found that the current methodology applied for the impact accounting is incomplete, as it does not take into account the impact of non-compliance with the regulations, implementation delays and the difference between real-life energy consumption and theoretical consumption.

Effective market surveillance should play a critical role in ensuring that products sold in the EU comply with Ecodesign requirements and that consumers benefit from accurate energy labels. It is the role of the Member States to check that products sold comply with the legislation. The data available shows, however, that non-compliance by manufacturers and retailers remains a significant issue.

The European Commission facilitates cooperation between Market Surveillance Authorities. The Information and Communication System on Market Surveillance, operated by the European Commission, should enable cooperation by allowing authorities to share inspection results. They found that some functional limitations in the database reduced its effectiveness. The European Commission is setting up a product database, which will, among other things, facilitate market surveillance, but this is behind schedule.

The EU-funded projects aimed at improving market surveillance have delivered results, but they have only provided a temporary solution for a recurring need.

The Court’s report makes recommendations to the European Commission aimed at improving the impact of the Ecodesign and Energy Labelling policy. Their recommendations cover:

- improvements to the regulatory process to deliver more timely and impactful product-specific regulations;
- improvements in the way the impact of the policy is measured and reported;
- actions to facilitate exchange of information between Market Surveillance Authorities and improve compliance with the policy.

Improvements to the regulatory process

To improve the regulatory process, the European Commission should:

a) define and apply a standard approach for review studies to avoid the need for additional studies;

b) develop a standard methodological framework for including the circular economy requirements to be applied during preparatory and review studies so that their findings can be presented early in the consultation process;

c) adopt implementing measures when they are ready, rather than when a package is complete;

d) in particular for products based on fast-moving technologies such as ICT, more regularly assess market data so as to ensure that energy efficiency requirements and labels that are no longer relevant are swiftly updated.

Improvements on the impact accounting

The European Commission should:

a) improve the impact accounting assumptions, notably by accounting for non-compliance, implementation delays and deviations between energy consumption based on harmonised standards and real-life usage;

b) assess the scope for evaluating the results of the policy using sample-based methodology to measure actual energy consumption by end users with a view to improving the accuracy of the impact accounting model;

c) quantify the policy's contribution to the 2020 energy efficiency target in the assessment report on the progress made by Member States.

Improvements to market surveillance activities and to facilitating MSAs cooperation

To improve market surveillance activities and facilitate exchange of information among MSAs, the European Commission should:

a) deliver improvements to the ICSMS to facilitate cooperation between Market Surveillance Authorities, for example by enabling the quick identification of equivalent model numbers by cross-linking it with EPREL;

b) upon request, provide online training to MSAs to promote the use of ICSMS to support their activities;

c) assess the MSAs' uptake of best practice on market surveillance activities identified by EU-funded projects, including carrying-out cost-effective inspections.

Annex 16: Methodology for SPI

The objective of the methodology for the Sustainable Product Initiative (SPI) is to enable the European Commission to implement SPI, in particular to prepare and adopt measures contributing to the main objective of SPI, i.e. reduce the negative life-cycle environmental and social impacts of products and improve the functioning of the internal market. This annex presents the main steps of and requirements on the methodological framework.

Four main steps are being considered:

- Prioritisation of the products
- Assessment of the products
- Definition of requirements
- Monitoring of results

The Methodology for Ecodesign for Energy-related Products (MEErP) is the methodology used so far for Ecodesign for the assessment of energy-related products and the definition of requirements. Please see Annex 6 for a more complete description of the methodology.

For SPI, there is a need to set up a new methodology that complements and integrates MEErP and its ongoing revision, in particular, to ensure that impacts along the products life cycle and other related aspects (circularity, social impacts, etc.) are correctly assessed, while keeping the flexibility needed to address a large variety of products. The methodology should include a decision tree on the prioritisation and assessment methods to be applied, distinguishing in particular energy-related products already covered by an Ecodesign measure or included in the Ecodesign and Energy Labelling Working Plans[546], or other energy-related products for which energy consumption in the use stage is dominant. For these products, a simplified life cycle assessment may be used in accordance with the MEErP and its revision. By default, following Commission Recommendation 179/2013/EU on the assessment of environmental impacts along the life cycle of products, the Product Environmental Footprint method (PEF)[547] shall be the recommended method. The different assessment methods should continue to evolve and converge progressively.

This annex gives the main elements on the methodology to be implemented but this is still work in progress in parallel to the work on the legal drafting and to interinstitutional discussions. The methodology and the incorporated methods will have to be ready when the revised legislation enters into force.

Given the above, the SPI legislative framework/legal text should ensure consistency, robustness and flexibility at the same time, so that future methodological developments may be incorporated and used in SPI measures where deemed appropriate.

[546] 2016-2019 Ecodesign and Energy Labelling Working Plan, and 2022-2024 Ecodesign and Energy Labelling Working Plan.

[547] Product Environmental Footprint (PEF) is a method developed by the European Commission and adopted in the Commission Recommendation (2013/179/EU) of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products. The Recommendation is expected to be updated in December 2021.

INTRODUCTION

The SPI methodology will have to provide:

- a way to **prioritise products** for the development of specific requirements in SPI measures;
- a way to **assess the products** and collect all the information and data needed to decide on possible requirements;
- a way to **define requirements** and any test standard, measurement method or certification needed to enable effective implementation and enforcement;
- a way to **monitor results** of SPI measures and of the legislative framework as a whole, with a view to enable the evaluation of its effectiveness, cost-efficiency and relevance.

The SPI methodology will provide a decision tree and criteria guiding the prioritisation and assessment steps, differentiating between:

- energy-related products already covered by an Ecodesign measure or included in the Ecodesign and Energy Labelling Working Plans[548] or other energy-related products for which energy consumption in the use stage is dominant; the MEErP and its revision may be used; possible exceptions concerning products for which the energy consumption in the use phase is not dominant, will be evaluated when drafting the working plan;
- Other energy-related products, for which criteria should be developed to choose the appropriate assessment method;
- Other products in SPI scope, for which an environmental LCA based on PEF, should be used.

Under the current Ecodesign Directive framework, which addresses the environmental impacts of energy-related products, the overall workflow is similar:

- Working Plan
- Preparatory Studies (based on the Methodology for Ecodesign for Energy-related Products, MEErP)
- Impact Assessments / Draft Regulation
- Ecodesign Impact Accounting

It should be noted that MEErP is currently under revision in order to better integrate non-energy environmental impacts and circularity aspects (following also the work related to the revision of the Energy Labelling Directive and Ecodesign Directive in 2015). The ongoing work is considering to incorporate some parts from the PEF method to enhance its Life Cycle Assessment (LCA), in particular:

- the life cycle inventory (LCI) datasets (i.e. datasets representing average inputs and outputs, including emissions, of processes run with a specific technology in a specific geographical location);
- the Circular Footprint Formula;
- where relevant, 16 impact categories, complemented by energy consumption, CRM indicators and biodiversity.

[548] 2016-2019 Ecodesign and Energy Labelling Working Plan, and 2022-2024 Ecodesign and Energy Labelling Working Plan

The SPI framework will cover:

- **product scope**: all physical goods except food and feedstuff (incl. also intermediate products)[549];
- **scope of impacts**: mostly environmental sustainability, some social sustainability aspects as a safety net, and taking into account economic considerations;
- **width of the impacts**: the full life cycle along the entire value chain, from extraction of raw materials to recycling/final disposal.

The possible approach for each of the steps of the SPI methodology is:

PRIORITISATION OF PRODUCTS (STEP 1)

A prioritisation exercise will need to be conducted to identify the order in which the products under its scope should be regulated by SPI measures. The process could be based on the one carried out for the elaboration of the Ecodesign Working Plan:

- Prioritisation of energy-related products already covered by an Ecodesign measure for which a review is legally required;
- Screening and identification of a first list of products and horizontal initiatives;
- Analyses of selected products and horizontal initiatives;
- Proposal for a Working Plan.

Stakeholders would be involved at each step of the process.

The following aspects should be considered in particular when prioritising:

- contribution to meeting existing environmental, climate and energy targets, including the thematic priority objectives of the 8th Environmental Action Programme, EU international commitments and to closing gaps in EU environmental and climate policy and law;
- the economic weight of the product (the product shall represent a significant volume of sales and trade);
- the total of the environmental impacts of the products versus planetary boundaries (considering the quantities placed on the market and/or put into service, and therefore the total environmental impacts at consumption level) based on relevant MEErP studies, PEFCRs or PEF studies;
- energy consumption; energy cannot be limited to its environmental impacts: security of supply and cost (for end-users) are other aspects that need to be taken into account;
- circularity aspects like durability, reusability, reparability, recyclability (if/where they are not fully reflected in the environmental impacts);
- the potential for improvement in terms of its environmental impacts, energy efficiency and circularity aspects (if/where they are not fully reflected in the environmental impacts) without entailing excessive costs (notion of affordability);
- significant social impacts along its value chain (mainly related to specific raw materials or specific processes)[550];

[549] Sub-option 2a 'Extension to a limited number of priority products' proposes to extend the scope of the current Ecodesign Directive to enable the adoption of SPI measures for the following range of products: Energy-related products (including electronics and ICT, means of transport); Textiles; Furniture, High impact intermediary products; Chemicals. Under sub-option 2b 'Extension to all physical goods', all products placed on the market can, in principle, be eventually subject to SPI measures.

[550] See sectorial guidance documents in preparation for the Sustainable Corporate Governance initiative

- appropriate scale or grouping of products for which requirements may be defined (considering for example the possibility of horizontal requirements, of public procurement, of requirements on intermediate or final products);
- political priority in terms of strategical relevance for the EU (e.g. policy documents such as CEAP, SOTEU, Green Deal Communication, various other strategies);
- economic benefits expected from the product improvement;
- EU added value, by producing results beyond what would have been achieved by Member States acting alone.

As the detailed product assessment will be done in Step 2 (see below), some of the aforementioned aspects will be assessed qualitatively.
The final result is a work programme or an equivalent guidance document that includes an identification of which branch of Step 2 will be followed for each product group identified therein.

ASSESSMENT OF PRODUCTS (STEP 2)

The objective of this step is to provide all the information necessary on the product to define appropriate requirements.

For the assessment of energy-related products already covered by an Ecodesign measure or included in the Ecodesign and Energy Labelling Working Plans[551] or other energy-related products for which energy consumption in the use stage is dominant the MEErP and its revision will be used.

[551] 2016-2019 Ecodesign and Energy Labelling Working Plan, and 2022-2024 Ecodesign and Energy Labelling Working Plan

The below figure provides an indicative overview of the approach for this step for other products, based on the steps of the MEErP.[552]

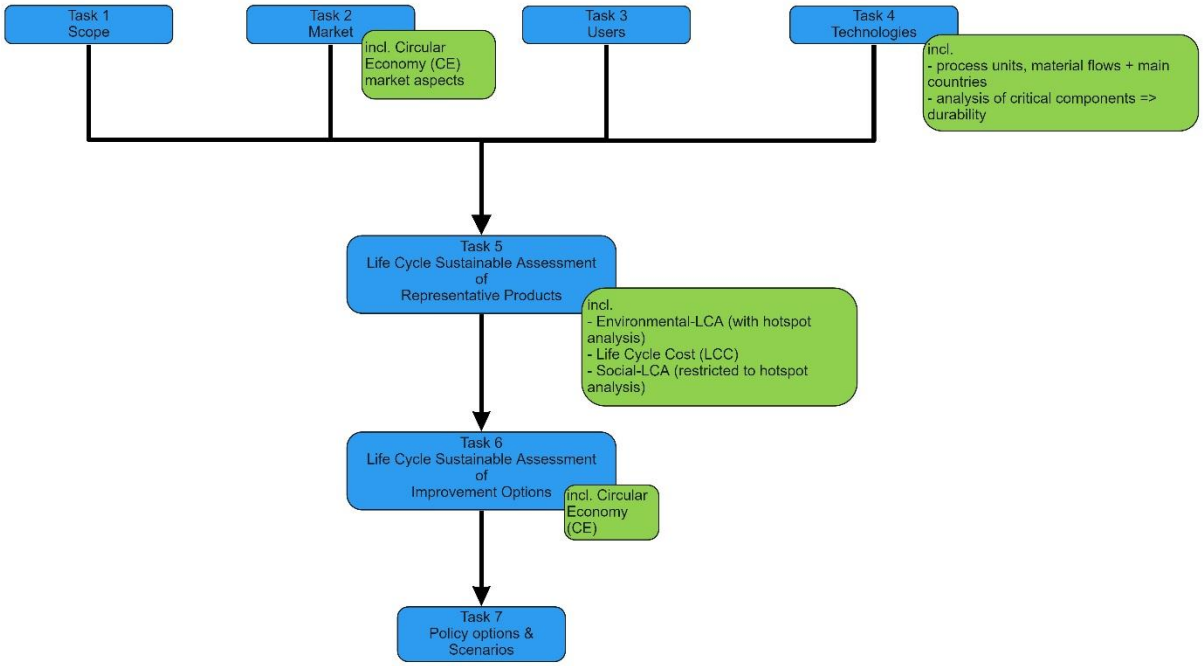

Figure 1 (Indicative) overview of the SPI methodology for the "Assessment of products" showing the main differences to the existing MEErP[553]

As the SPI methodology is based on the well-proven MEErP, it consists of the same 7 tasks (see blue boxes). However, the SPI methodology will include changes, the major changes are (see green boxes):

- Task 2 (Market) will cover Circular Economy market aspects;
- Task 4 (Technologies) will include 1) a description of the process units and material flows with information regarding the countries and 2) an analysis of critical components to assess the durability of the product;
- the environmental LCA (E-LCA) and Life Cycle Costing (LCC) analyses of the representative products will be enhanced by a social LCA (S-LCA)[554], so that an assessment of the Life Cycle Sustainability impacts would be carried out in Task 5 and Task 6. The E-LCA would be in line with the PEF method.
- Task 6 will take better and more systematically into account the Circular economy aspects.

[552] MEErP includes following tasks: Task 1: Scope, Task 2: Market, Task 3: Users, Task 4: Technology, Task 5 LCA and LCC of Bases Case, Task 6: Design Options and Task 7: Scenarios.

[553] For example the MEErP revision plans to include a more systematic inclusion of material efficiency aspects and of environmental footprint/ecological profile aspects in the design options and in the LLCC curve.

[554] Even if the S-LCA would be restricted to a hotspot analysis, due to the lack of data in this field

The key modules for the product assessment are the one dedicated to the **Life Cycle Sustainability Impact** and the one dedicated to the **ranking** of the improvement options.

For assessment of environmental aspects, it is crucial to:

- **assess the impact of the representative products** (Base Cases)
  The "representative product" may or may not be a real product that one can buy on the EU market. Especially when the market is made up of different technologies, the "representative product" can be a virtual (non-existing) product built, for example, from the average EU sales-weighted characteristics of all technologies around. Step 2 may include more than one representative product if appropriate.
- **identify the hotspots**
  The major environmental impacts and stages of the life cycle as well as the processes where these impacts occur should be analysed, based on the PEF as far as possible. If, for example, a Product Environmental Footprint Category Rule is available and conforms to all aspects defined in the goal and scope definition phases, or if it can be developed for this purpose, this should be used for this analysis and provide consistency with other policies using PEF as assessment method (for instance, the Green Claims Initiative).
  For the aspects that PEF would not be able to cover, other complementary approaches would be necessary, e.g. to identify circularity or social hotspots.
  This step may also be referred to as "hotspot" analysis. Contributing elements may be specific life-cycle stages, processes, or individual material/energy inputs/outputs associated with a given stage or process in the product supply chain.
- **identify and assess the impacts of improvement options**
  Based on the hotspot analysis and on the distribution of performance of products on the market, possible improvement options are identified, including BATs and BNATs where appropriate.
- **do a ranking of the improvement options** in order to assess later the appropriate level of requirements.

In the MEErP, the improvement potential is analysed according to the Life Cycle Costs (LCC)[555] and the Environmental Impact of products (incl. Design Options).
When the use phase is not dominant in the product environmental impacts, improvement options might not lead to a LCC reduction (e.g. through energy costs savings); the LCC should then be assessed from the end-user but also the societal perspective, meaning that external environmental costs would be taken into account.[556]

Carrying out 1) the LCA with the PEF method, 2) complementary assessments on environmental and circularity aspects not covered by PEF, on social aspects and 3) the economic assessment including with a Life Cycle Cost method[557] would deliver the main information for the analysis. This work should be carried out for Base Cases and then for the Base Cases in combination with identified improvement options. The LCC analysis should be carried out from both perspective: the end-user one and the societal perspective, which includes the costs related to environmental impacts (externalities).
The improvement options would include a broad range of possibilities aiming at covering all major aspects identified in the assessment.

[555] The LCC is a tool to guarantee affordability for the end-user.
[556] The manufacturer perspective would be also required to assess the impact on them.
[557] including purchase price and in operation / in use cost, and disposal costs (when applicable)

Furthermore, it should be noted that when the environmental analysis follows a PEF Category Rules (PEFCR), when available, then PEF studies performed in compliance with a PEFCR provide comparable results for products of the same category.

Social aspects

There are several research and international projects on social indicators on the life cycle of products and due diligence on supply chains.

Given that SPI will not need to be in a position to fully address the *social* dimensions of product sustainability, but only to take human rights risks into account in a 'safety net' approach, an appropriate methodological approach in the overall product assessment and in the ranking of the Improvement Options – as well as for identifying and addressing the required underlying information and data – will need to be set in place.

In relation to methodological considerations underpinning potential SPI *due diligence requirements on the supply chain of products* (see sub-option 3b): it is important to note that, given the *lex specialis* role that SPI is intended to fulfil in this area in relation to the initiative on **Sustainable Corporate Governance** (see Annex 14), the future methodological approach here will need to be closely aligned with that of the latter initiative.

Taking this into account, such an approach is likely to include the following features:

- **Establishment of *specific conditions* to be met in order to allow SPI action to be taken**: the *lex specialis* role of SPI means that it will only be able to act in cases where the initiative on Sustainable Corporate Governance cannot do so, for example, to address social impacts relating to *specific product groups* (e.g. linked to the materials or components used in them, or to their production processes). Clear conditions allowing for SPI action will be needed.

  These may include:
  - The existence of real or potential adverse human rights impacts associated with *pre-defined categories of risk*, e.g. forced labour, child labour and occupational health and safety risks;
  - Sufficiently *reliable and publicly available information* – such as independent reports – about those adverse impacts and their significance;
  - The *absence of other EU law, international instruments or voluntary agreements* capable of sufficiently and effectively addressing these risks.

- **Alignment of rules with internationally recognised principles**: Where relevant conditions are met, SPI should be able to set supply chain due diligence requirements on products. To ensure alignment with the initiative on Sustainable Corporate Governance, as well as enforceability, it will be important to align these rules with a core set of internationally recognised principles. These may include: the Ten Principles of the United Nations Global Compact[558], the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy[559], and the OECD Due Diligence Guidance for Responsible Business Conduct (RBC)[560].

[558] The Ten Principles of the UN Global Compact, available at https://www.unglobalcompact.org/what-is-gc/mission/principles
[559] Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy, available at https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/--- multi/documents/publication/wcms_094386.pdf
[560] OECD (2018), OECD Due Diligence Guidance for Responsible Business Conduct, available at http://mneguidelines.oecd.org/OECD-Due-Diligence-Guidance-for-Responsible-Business-Conduct.pdf

- (*Where conditions for SPI action have been met*) **Setting supply chain due diligence rules**: These rules will again need to be closely aligned with those of the initiative on Sustainable Corporate Governance, and will likely require products placed on the market to be accompanied by documentation showing that steps have been taken to address the risks previously identified. Such steps could include: in-depth risk assessment processes (e.g. linked to raw material extraction, and taking into account supplier activities); adopting and implementing risk mitigation measures; monitoring and tracking measures etc.

Regarding potential SPI *information* requirements on a set of social indicators (see sub-option 4a): these could be based on social life-cycle assessment (S-LCA) frameworks (including impact categories such as "child labour"), which have been elaborated and could be used as a starting point, with a view to identifying hotspots (i.e. points along the value-chain that may have significant positive or negative social impacts). The specific set of social indicators would be established within the product specific SPI measures, in close coordination with relevant existing legislation (see Annex 14).

DEFINITION OF REQUIREMENTS (STEP 3)

Step 3 corresponds to the part of methodology aimed at preparing SPI measures. Based on the analysis carried out previously, the following types of requirements, which can be combined, could be set as appropriate, and supplemented by others, where necessary (this list is not exhaustive):

- **Performance requirements on:**
  - durability or reliability of the product or its components
  - reparability and upgradability
  - reusability
  - re-manufacturability
  - establishing a threshold for the presence of substances hindering circularity
  - recycled content of the product or its components
  - the reduction of carbon footprint and other environmental impacts set for a given life cycle stage or for the whole life cycle
  - recyclability of the product, to produce high-quality secondary materials
  - due diligence on the supply chain of products
  - energy consumption and energy efficiency

- **Information requirements**:
  Information requirements on the environmental impacts along the life-cycle of the product, for example in the form of an Ecological profile[561]. Social performance of the product could be also provided taking for example the form of a set of social indicators[562]. Other information requirements, including those currently provided in the Ecodesign directive, could be considered as appropriate, and supplemented by others, where necessary:
  - on the durability or reliability of the product or its components
  - on reparability and upgradability, including a reparability scoring

[561] or Environmental Footprint profile, when the PEF method is used. If the information requirements are based on PEF impact categories, this would require manufacturers to perform a PEF study (following an adopted PEFCR) for each model of product put on the market. Dedicated IT- software would be made available by the Commission to allow SMEs and any other company to perform the required calculations minimising costs and resources.

[562] For example, rate of injuries and illnesses per working hour, Ratio of annual cost of health and safety measures vs turnover, percentage of workers paid a minimum wage, etc.

- on the presence of substances of concern and tracing them, linking with the SCIP Database where relevant
- on the recycled content or recyclability of the product or its components

Information requirements could be provided in the form of environmental performance classes, possibly taking the form of a label

For all information requirements the questions to answer are: How to define the exact content, calculation methods, prepare implementation/enforcement? Which information should be provided by the EU DPP and how this should be implemented?

- **Other possible measures requiring methodological developments**:
  - horizontal requirements covering a large number of products sharing common characteristics[563]
  - provision of guidelines for Member States to introduce reputational and economic incentives
  - requirements to Member States to use classes of performance for reputational and economic incentives
  - mandatory Green Public Procurement requirements
  - ban on the destruction of unsold consumer products

The requirements resulting from this process should be technology neutral for the manufacturers (i.e. not technology-prescriptive). By setting the requirements, the dominant environmental impacts should be considered as well as additional strategic indicators/metrics reflecting the political priorities (e.g. energy efficiency or critical raw materials). The requirements should be set in such a way, that the dominant environmental impacts of the product will decrease without impacting negatively other impacts and the strategic indicators.[564] To achieve this, the methodology will assess the impacts of single improvement options as well as of their combinations. Furthermore, in order to properly assess the impact of CE aspects, the impact of the product should be assessed per unit appropriate to the part or product concerned (e.g. number of years or number of uses). The durability of the product will take into account the possible extension of the original durability of the product according to the CE measure applied. When trade-offs are identified (options improving some aspects at the detriment of others, or incompatible options dealing each with different aspects), they should be presented transparently, with all consequences of options and possible ways to mitigate their negative consequences.

The definition of such requirements should make use of different methodologies, standards and methods, depending on the products or the requirements concerned. In particular, for:

- **energy efficiency:** The MEErP and its ongoing revision include a method for setting out requirements on energy efficiency.

- **durability:** While there are already some requirements for energy-related products[565], the review of the MEErP is looking into the systematic inclusion of durability in the methodology. For certain products, approaches for determining durability are available, e.g. through ISO or EN standards. In particular, the approach provided by EN 45552:2020 "General method for the assessment of the durability of energy-related products" may be used as a basis. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. An approach to the durability of apparel is also being developed in the framework of the PEFCR on apparel and footwear, to enable the PEFCR to take durability into account. A similar exercise was done for decorative paints during the EF pilot phase. Further standards or

[563] this would have the possibility to tackle large improvements potentials in terms of environmental and social impacts

[564] justification should be provided, if this approach is not possible for a possible product and a trade-off has to be done regarding the indicators.

[565] For example, operational motor lifetime and hose durability for vacuum cleaners

technical specifications may be needed for specific products or groups of products – to be decided when developing requirements for specific products.

- **Reparability:** While there are already some requirements for energy-related products[566] (dismantling of spare parts with the use of commonly available tools without damage to the product, minimum spare parts and repair information to be made available, minimum time of availability and minimum time of delivery), the review of the MEErP is looking into the systematic inclusion of reparability in the methodology. The approach provided by EN 45554:2020 "General methods for the assessment of the ability to repair, reuse and upgrade energy-related products" may be used as a basis. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. In particular, it defines parameters and methods relevant for assessing the ability to repair products; the ability to access or remove certain components, consumables or assemblies from products to facilitate repair. In addition, the JRC report on reparability scoring (which takes account of this standard) can be used for such requirements.

- **Reusability:** The approach provided by EN 45554:2020 "General methods for the assessment of the ability to repair, reuse and upgrade energy-related products" may be used as a basis. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. In particular, it defines parameters and methods relevant for assessing the ability to reuse products; the ability to access or remove certain components, consumables or assemblies from products to facilitate reuse.

- **Upgradability:** The approach provided by EN 45554:2020 "General methods for the assessment of the ability to repair, reuse and upgrade energy-related products" may be used as a basis. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. Among others, this standard defines parameters and methods relevant for assessing the ability to upgrade products; the ability to access or remove certain components, consumables or assemblies from products to facilitate upgrade.

- **Ability to remanufacture**: The approach provided by EN 45553:2020 "General methods for the assessment of the ability to remanufacture energy-related products" may be used. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. This standard elaborates the assessment and process of re-manufacturability in a horizontal, cross-product way. However, a fully appropriate assessment can only be done in a product-specific way, taking into account specific parameters of a specific product.

- **Recyclability, including high quality recycling:** While there are already some requirements for energy-related products (design for dismantling, recycling and recovery, marking of components, availability of dismantling information), the review of the MEErP is looking into the systematic inclusion of recyclability in the methodology. The approach provided by EN 45555:2019 "General methods for assessing the recyclability and recoverability of energy-related products" may be used. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. This standard provides a general methodology for

[566] https://ec.europa.eu/commission/presscorner/detail/en/qanda_19_5889

assessing the recyclability of energy-related products, their recoverability, the ability to access or remove certain components or assemblies to facilitate their potential for recycling or other recovery operations, the recyclability of critical raw materials. Requirements on chemicals – restriction on chemicals hindering recyclability or other sustainability aspects not directly connected to chemical safety, tracking of substances of concern, including those hindering recyclability is considered. Checks have to be performed to determine whether materials contain chemical substances that affect recycling as part of a more general requirement to track substances of concern in products. ISO22628:2002 for automotive products is also relevant.

- **Recycled content:** The approach provided by EN 45557:2020 "General method for assessing the proportion of recycled material content in energy-related products" may be used. The standard has been developed for energy-related products, however as energy consumption is not part of the method, the principles of the standard seem to be applicable to all types of products. Standards and guidance also exist on the traceability of specific material streams, e.g. EN 15343:2007 Plastics – Recycled Plastics – Plastics recycling traceability and assessment of conformity and recycled content.

- **Resource efficiency:** While there are already some requirements for energy-related products (e.g. water efficiency), the review of the MEErP is looking into the systematic inclusion of resource efficiency in the methodology.

- **Carbon/Environmental footprint:** For products where life cycle environmental performance is an important determinant of environmental performance, requirements may take the form of thresholds of carbon or environmental footprint (e.g. products with a life cycle carbon footprint higher than x kg CO2 equivalents would not be able to enter the market for a given product category). The EU tool available for covering this aspect is the EU PEF method. The EU PEF method defines how to calculate the life cycle environmental performance of a product along 16 impact categories: climate change, ozone depletion, human toxicity – cancer, human toxicity – non-cancer, particulate matter, ionising radiation – human health, photochemical ozone formation – human health, acidification, eutrophication – terrestrial, eutrophication – freshwater, eutrophication – marine, ecotoxicity – freshwater, land use, water use, resource use – minerals and metals, resource use – fossils. The PEF method covers all emissions from cradle-to-grave (whole life cycle, i.e. from the extraction of raw materials until the end of life of the product). The PEF method relies on existing approaches whenever possible (e.g. it relies on related ISO standards), but where several methodological choices are available, it chooses a common approach wherever feasible. The method was revised based on these experiences and an updated version of the Recommendation on the use of Environmental Footprint methods was published in December 2021[567]. Several ISO standards have been under consideration while developing the PEF method: ISO 14044:2006 specifies requirements and provides guidelines for life cycle assessment (LCA); ISO 14025:2006 establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations. Additionally, PEFCRs define benchmarks, which correspond to the average performance of a product on the EU market. This allows to set classes of performance, which could be a further input for defining SPI requirements (thresholds or information requirements).

[567] https://ec.europa.eu/environment/publications/recommendation-use-environmental-footprint-methods_en

Furthermore, it should be noted that the PEF method allows for a comparison of intermediary products and therefore for the setting of requirements on environmental footprint of intermediary products, .

MONITORING THE RESULTS OF SPI (STEP 4)

The monitoring of SPI should cover a broad scope of environmental and social impacts as well as resource aspects (incl. Critical Raw Material).
Two levels of monitoring would be possible:

- on the **micro level**: based on the reporting obligations of manufacturers (technical documentation) possibly provided through the EU digital product passport where this is implemented within SPI, it will be possible to monitor the trends for a specific product category. The IA considers also a measure enabling the Commission to request market data from economic operators. This will facilitate the review process of product regulations under the SPI framework.
- on the **macro level**: the impact of all products regulated by SPI should be monitored. Monitoring indicators are considered in this IA (see Annex 13)[568]. The methodology should provide the approach for collecting the information, calculating the indicators and making the link between micro and macro levels indicators – how are progresses at product level reflected or not at higher level?

IMPORTANT REMARKS

The draft SPI methodology needs to be further developed. The objective is to introduce a highly coherent and consistent approach, maximising synergies with other existing legislation and tools. However, it will also include the required flexibility to fully take into account specific issues, when relevant.

Regarding the **environmental dimension**, the main open points are:

- Link to the Life Cycle Costs: if the externalities were taken into account, which parameters should be considered? Are there alternative methods to rank improvement options and take account of the costs for the end user and/or for society as a whole?
- Identify suitable approaches to address specific environmental issues that are not yet sufficiently covered in international standards and methods (e.g. marine litter, microplastics, etc.);
- Energy should be included in the methodology not only in relation to whether it is renewable or fossil, and not only in the supply chain. Energy at the use stage and energy efficiency should be considered too.
- Circularity aspects may require to consider not only the life cycle of the product in assessment, but also of other products using the same material (assessment of recyclability and recycled content) or even some components (in relation to remanufacturing).
- Methods for the definition of Green Public Procurement requirements in SPI product–specific rules, requirements on reputational and economic incentives and on the modulation of EPR fees, and requirements banning the destruction of unsold consumer products may require specific developments.

[568] Annex 13 distinguishes two sets of indicators: 1) Core indicators for the monitoring and evaluation of progress towards desired results (impact areas considered: environmental and socio-economic) and 2) Core indicators for the evaluation of attainment of the desired impacts (expected impacts considered: increase in environmental sustainability of products consumed in the EU, increase in social sustainability of products consumed in the EU)

Regarding the **economic dimension**, the following points will be investigated:

- Some costs, as labour costs associated with repair operations, can vary significantly across the EU. How can this be taken into account?
- The use of third-party verification/certification may require specific methodological developments: when to require it? How to define exactly what should be certified and how? What is the cost for third-party verification/certification (i.e. calculation of the 3rd party costs in order to feed the economic analysis or the LCC curve)?
- The economic dimension of circular business models should be better taken into account, for example to compare purchase and leasing costs;

Further points will have to be clarified in the elaboration of the methodology:

- Trade-off between increased durability and improvement of product performance with time due to technological progress;
- Possible trade-offs between durability and reparability/recyclability;
- other trade-offs: see above (options improving some aspects at the detriment of others, or incompatible options dealing each with different aspects)
- The likely number of repairs or upgrades per product group should be investigated
- Resources required to apply the methodology by different actors (time and cost)?
- Flexibility for approach to differ between different product groups
- International aspects (i.e. need for analysis or validation for impacts outside the EU, and analysis of trade aspects, or non-EU legal aspects, impacting on the definition or implementation of requirements)?
- Governance rules and the role of the European Commission when requirements development features an active role for external stakeholders (e.g. drafting of PEFCR lead by industry); assessment of risks and possible mitigation measures of these risks.

Annex 17: Environmental impact variation within product groups

ASSUMPTIONS ON ENVIRONMENTAL IMPACTS

This annex looks at the variation in environmental impacts for some selected product groups.

PURCHASE DECISIONS WITHIN SAME PRODUCT CATEGORY

This includes purchase decisions by consumers, businesses[569] and the public sector.

The **baseline** for this element is derived from the JRC-developed normalisation data for the EU27 of 2010[570], modified to consider developments until 2030 in view of the anticipated reduction of climate change impacts under the EU Green Deal and other commitments. The following considerations and limitations apply:

- The EU is a net importer of environmental impacts, a trend that is increasing[571]. The overall EU-wide consumption-based environmental impact is likely to be at least 10% higher than impacts generated on the EU territory (the figure is a few percent for climate change, above 10% for acidification, eutrophication, photochemical ozone formation and particulate matter; unknown but likely more for several toxicity impacts, land use, resource depletion). As the EF methods take into account the whole value chain and the uptake of EF analysis is expected to trigger impact reductions in global supply chains, this would lead to a higher potential for impact reduction. However, due to challenges in identifying changes in the "import" of impacts, this effect is not taken into consideration.

- EU policy efforts are expected to reduce the EU's environmental footprint by 2030, therefore the amount of emissions is expected to be reduced. For example, due to improvements by 2030 a decision to purchase a greener product in 2030 will correspond to less reduction of kg CO_2 equivalents than now (i.e. 50% reduction in 2024 correspond to more kg CO_2 equivalents than 50% reduction in 2030). The analysis starts from the EU aim of reducing the EU (territorial) GHG emissions by at least 55% until 2030 compared to 1990[572]. In 2019, this figure is 24% below the 1990 values. It uses the forecasted figure for 2027 for the EU27 to scale the savings for EF-supported decisions until 2030. EU27 territorial greenhouse gas emissions (without LULUCF[573]) were 3,744 Million tonnes per year in 2019 and were forecasted for 2030 to go down to 3,415 Million tonnes CO_2-equivalents per year[574]. The value for 2027 is 3,504 million tonnes CO_2-equivalents per year.

- A relevant share of the annual emissions is related to the operation of durable products such as vehicles and buildings, i.e. those will continue to emit despite changes in purchasing

[569] To avoid double counting/ overlaps, we did not include purchases of intermediate products – taking into consideration that products are in each other's life cycle. By completely disregarding these purchases, we underestimate the benefits of the possible green claims policy.
[570] These data are territorial, i.e. do not consider import and export of products and the associated environmental impacts.
[571] European Commission (2012): Life cycle indicators for resources: development of life cycle based macro-level monitoring indicators for resources, products and waste for the EU-27. European Commission, Joint Research Centre, Institute for Environment and Sustainability. EUR 25517 EN. ISBN 978-92-79-26423-8. doi:10.2788/49877
[572] "The effective implementation of national energy and climate plans as submitted to the Commission in 2019/2020 could lead to EU-27 greenhouse gas reductions of 41% in 2030 compared to 1990. Projections indicate that, if current EU and national policies are fully implemented, EU-27 greenhouse gas emissions reductions by 2030 would be around 45% lower compared to 1990 levels when excluding land use emissions and absorptions, and around 47% lower when including land use. The existing legislation will now be updated with a view to implementing the new proposed target of reducing net greenhouse gas emissions by at least 55% by 2030. The Commission will come forward with proposals by June 2021." (https://ec.europa.eu/clima/policies/strategies/progress_en)
[573] LULUCF corresponds to greenhouse gas emissions and removals from land use, land use change and forestry
[574] EEA: https://www.eea.europa.eu/data-and-maps/data/greenhouse-gas-emission-projections-for-7 EU27, i.e. excl. UK.

choices. Even though for buildings renovation measures are used to reduce their environmental impact for the remainder their lifespan, these changes are done typically at the end of the technical life time of e.g. heating systems, or when other major renovations are undertaken. Decisions in the course of renovations/ new built could be influenced by EF-based claims, while they cannot influence the performance other buildings in use. For vehicles, we assume that EF-based green claims would act only on new vehicles. It is challenging to quantify this effect: for products with long lifetimes, overall purchasing decisions act only on a part of overall emissions, as not all products are replaced, repaired and/or improved each year. To mitigate these limitations and uncertainties in the modelling, we assume a conservative reduction figure of 50% for all products (thus, also for space heating and cars). The figure is conservative, as GHG reductions of purchase decisions for these products were found to be more in the range of 67% (vehicles) to >90%. For these products, we don't take into account consumption-based additional reduction potential.

– The environmental impact figures are mostly provided for climate change impacts, while the benefit of EF-driven purchasing decisions is per definition always reducing the overall aggregated environmental impact. We argue that on average, all other 15 impact categories would be reduced to the same extent. The broad coverage of products means that specific differences (e.g. agricultural products have much higher contribution to land use and water use than most other products) are levelling each other out. Also for these impacts, the attributed reduction under the green claims policy is proportionate to the climate change reductions. At the same time is it crucial to explicitly consider all the other impacts in calculating benchmarks per product category and impacts of individual products, to avoid the shifting of burdens among impacts.

– The relative contribution to the EU wide impact per broader product group / consumption cluster is mainly taken from the Environmental Impact of Products (EIPRO) study[575], noting the limitation of data age and the sector-based method that does not always match the product based differentiation in this report. The categories have been combined and renamed to some degree.

[575] Tukker, A.; Huppes, G.; Guinée, J.B.; Heijungs, R.; Koning, A. de; Oers, L. van; Suh, S.; Geerken, T.; Holderbeke, van M.; Jansen, B.; Nielsen, P (2006): Environmental Impact of Products (EIPRO) Analysis of the life cycle environmental impacts related to the final consumption of the EU-25. European Commission, JRC-IPTS. Technical Report Series, EUR 22284 EN.

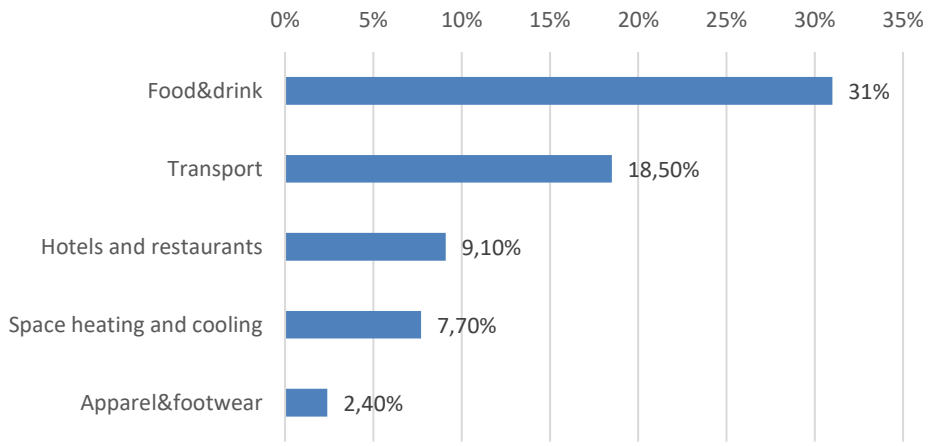

Figure 1 Relative contribution to the EU wide impact per broader product group / consumption cluster

– In terms of the number of products per category that might carry PEF-based information, we assume that 600 products per PEFCR would do so on average. If we divide the approximately 120 million products (by stock keeping unit - SKU) on the EU market (assumed to be about half of the 240 million products globally that carry a European Article Number, i.e. EAN code) by the roughly 5,000 representative products in the 1,000 PEFCRs that could cover (most of) the entire market, we would have on average up to 24,000 products under each representative product. Considering the considerable variation of the number of products per PEFCR[576] and that some of the prominent product categories will have a very low number of distinct product that require a distinct PEF study, we assume a smaller average number of products per PEFCR, namely half of the 120,000. **We estimate that a typical PEFCR could cover some 60,000 distinct products.**

The net impact reduction potential of any individual purchase decision per broader product groups / consumption cluster. The potential is the relative difference between the average product on the market and the one with among the best performance. These percentage values are compiled for specific product examples, averaged and used as potential reduction factor for the respective broader product groups of relevance for the green claims initiative.

For clarity and due to data availability, we use reduction in climate change impacts as stand-in for the whole range of impact covered by the EF. While 50% is frequently found as reduction potential for a purchase decision (see more below), for some of the most relevant product categories, substantially higher savings were found: 80% for cars and 95-98% for electricity and space heating (see more below).

As to the reduction potential across the various impact categories, we consider the numbers in the tables below to be less differentiated than they would be under the more rigorous PEF/OEF methods and using EF background data: many existing studies have a reliable carbon footprint, but other impacts are often stemming from energy conversion processes mainly, i.e. fossil power plants and process heat. Hence, impacts tend to closely correlate with climate change, while in truth there is substantially more variation.

[576] There are e.g. less than 250 distinct car models on the market. Also the number of distinct space heating and electricity products on the EU market is assumed to be well less than the average 120,000 products per PEFCR. For other products such as e.g. dairy products, or toys, the number is argued to be very big; it was not possible to get robust numbers per product category, however. We note in this context that the exact number has little effect on the benefit of impact savings the PEF can have, therefore this lack of quantitative data is not an issue.

However, also the baseline foresees that some of these potentials are realised by autonomous developments and due to other policies. So, the reduction potential needs to be reduced in a second step, considering only the net extra reduction that is attainable due to the policy. This refers to policies that act on the final product, but also on relevant upstream impacts, e.g. for battery driven vehicles also policies that act on electricity production resulting in an increasing share of e.g. renewable energy, as this improvement is part of the life cycle-wide impact reduction. The commonly used factor for this is also 0.5.

Vehicles and mobility, person transport services, goods transport[577]

For three specific car example pairs of battery electric vehicles (BEV) vs. internal combustion engine (ICE) cars of the same car class, a recent study[578] found differences and hence reduction potential for climate change of between -54 and -82%, with an average value of - 67%, using the grid mix for electricity production. The conventional vehicles of those pairs does not represent a worst case, but a typical case, so we consider this to be the average case from which to derive the potential reduction.

The authors note the substantial reduction in climate change impacts that have been achieved for battery production in recent years, what reduces the net contribution of the battery to the future BEV car production impacts and hence increases the net benefit over the entire life cycle. Further improvement that can be expected for the next years is not considered, hence make the reduction estimate even more conservative.

As to the reduction that is achieved by other policy instruments, the upcoming batteries regulation[579] includes the carbon footprint (based on the rechargeable batteries PEFCR), but does not cover comparisons of battery applications, e.g. vehicles with different drivetrains against each other.

Over the period 2021-2030, the analyst Fitch solutions expect nominal sales growth of electric vehicles of 383.1%, with units sold reaching almost 6.2 million in 2030 in Europe[580], These projections do not considering the green claims initiative and other policies under development until then.

Beyond the change from of diesel/gasoline to electricity driven vehicles, there is an additional reduction potential from shifting from the grid mix to renewable/green electricity. If the use of green electricity is considered to charge the batteries, the extra reduction potential of the electricity change itself weighs in, at -98% for climate change. Factoring this in, the combined reduction potential from conventional diesel/gasoline ICE to a green electricity powered BEV is approximately - 80%.

Space heating and cooling systems

Changing the EU28 space heating mix with an efficient heat pump operated with EU grid mix electricity reduces the climate change impact by 52%, while very variable for other impacts. If, in addition, the heat pump is operated by a green electricity mix, the impact reduction is much higher: the electricity environmental footprint is by far the main contributor (with the equipment production life cycle-wide impact contributing only to a limited extent). The reduction potential – similar to electricity itself – is close to 98%, possibly about - 95% compared to the current space heating mix.

[577] Note: airplane transport is not considered to be highly relevant for PEF, because a) ongoing and cost-driven efforts to reduce fuel consumption are expected to realise most of the attainable reduction, and b) very long development cycles for new aircraft technologies, what limits the possibility of breakthrough changes within the next decade. Still, the change to renewable feedstock based kerosene is an avenue that could be better informed with the help of the PEF, next to e.g. the Renewable energy Directive and Fuel quality Directive. Input considered: IATA (2019): Aircraft Technology Roadmap to 2050

[578] Auke Hoekstra & Maarten Steinbuch (2020): Comparing the lifetime greenhouse gas emissions of electric cars with the emissions of cars using gasoline or diesel. Eindhoven University of Technology.

[579] https://ec.europa.eu/environment/waste/batteries/

[580] Estimate of Fitch Solutions, 2021

Electricity

The change of electricity used has a particularly big environmental benefit. To estimate reduction potential, we use the EF 3.0 datasets of the electricity grid mix (example Germany) against wind power mix as one of the best performing options. The reductions are - 98% for climate change, - 99.9% for land use and - 94% for water use. We use the –98% figure for the general impact reduction potential, which reflects the reduction potential from switching from the grid mix to a green mix (e.g. wind power or certified green electricity mix). This is one of the product categories where the reduction potential is very high.

Equal competition based on environmental performance between electricity sources, as assessed against the grid mix would require taking into account a broad range of impact categories.

Based on the data referenced above, if studies consider climate change only, electricity from solid biomass has about 1/5 of the impact of electricity from biogas, and 1/9 of the impact of the grid mix. The weighted single score impacts would show impacts from biogas and biomass-based electricity to be almost the same and both would still have about 2/3 of the grid mix impact: this is due to relevantly higher impacts in land use (around 100 times higher), water use and some other impacts, even though climate change has a high relative weight among the impacts. When also considering wind power, electricity from both solid biomass and wind power would be among top performers based on climate change only. When using the single score, only wind power would be a top performer: wind power has a much lower (1/15) single score impact respectively to electricity from solid biomass. In other words: climate change alone may lead to false decision support.

Apparel and footwear

A study identified the following range of lowest and highest environmental impacts[581]:

Table 98 Range of lowest and highest environmental impacts

	Climate change (kg CO_2 equivalents) compared to…		**Freshwater eutrophication, compared to…**		**Water depletion, compared to…**		**Land use, compared to…**	
	Mean values	**Worst values**	**Mean values**	**Worst values**	**Mean values**	**Worst values**	**Mean values**	**Worst values**
Cotton t-shirt[582]	-42%	-81%	-40%	-80%	-47%	-80%	-25%	-56%
Wool knitwear	-58%	-77%	-60%	-84%	-51%	-70%	-51%	-70%

[581] 2nd Edition of the Environmental Impact Valuation as base for a Sustainable Fashion Strategy. White paper Hugo Boss. Heinz Zeller, Rainer Zah, Michela Gioacchini and Mireille Faist

[582] Per piece of the same size. Note that this table does not yet consider the purchase change between natural and synthetic fibre, which are expected to yield a higher reduction potential, than within the cotton T-shirt variants.

By averaging all values, the reduction from mean to best is -46%. We assume **a reduction of 50%,** which reflects the environmental impact reduction due to purchasing a product that has a top class of performance as opposed to buying a product of unknown impact.

Raw materials from agriculture

For cotton growing per kilogram a -50% reduction respectively to mean values and 78% respectively to worst values were found.

Annex 18: the European Digital Product Passport (EU DPP)

A. VISION, CONCEPT, SCOPE AND STRATEGY

Why a European Digital Product Passport?

Transition to sustainability and circular economy requires smarter management of product-related data across the product life-cycle, from manufacturing to use, re-use and recycling. Most of this information exists somewhere, but is not available to all actors along the value chain today (see figure below). This is lost potential for the entire economy, and increases EU dependency on primary materials. Circular economy is primarily about value retention in the economy, and increasingly the value of products is bound up in the data they hold or generate. The loss of this data therefore implies lost value for companies and the wider economy, less informed consumers and authorities, less efficient processes along the life-cycle of the product (production, maintenance, repair, recycling), lost functionality for consumers, and negative environmental impacts of premature replacement.

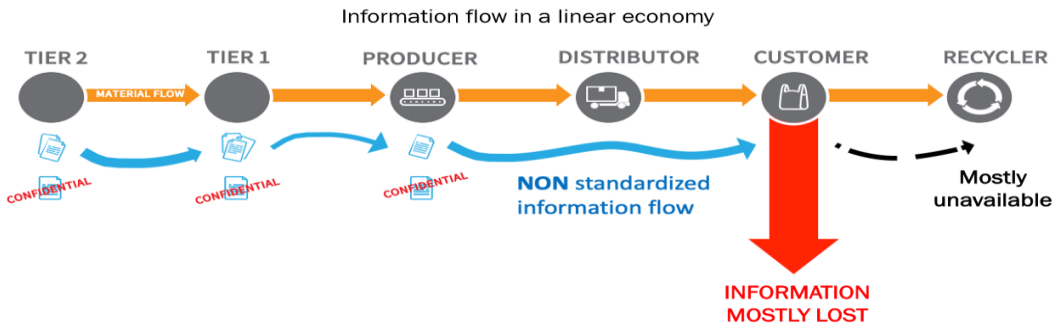

Figure 1 Information flow in a linear economy

Digital technologies already provide the possibility to localise and share product-related data, down to the level of the individual components and materials. The emergence of tracking and tracing technologies has revolutionised many aspects of value chains in recent decades, enabling companies to manage their logistics, just-in-time systems, customer services, marketing, inventories, reporting and accounting. As industry has applied these technologies, their costs have diminished, and the power to manage associated data has expanded strongly.

Consumers, governments, and civil society organizations are increasingly demanding that businesses behave responsibly and recognise and resolve current and potential harmful effects on human rights, the environment, and human health. Enterprises more and more aim for displaying credibly their sustainability efforts, while there is also growing cynicism at “green washing” and false claims, which undermine the efforts of those companies providing bona fide information. This has led more recently many industry sectors applying technologies to improving product traceability and transparency. However these various initiatives lack a common and consistent language and protocol for exchange and access data across the product lifecycle.

The EU DPP can play an important role as a means for digital transformation of the internal market. It may facilitate customs and market surveillance authorities to better carry out their duties on the basis of standardised information, in some cases already verified through independent third-parties. For example, this could be a useful feature to implement policies like the upcoming Carbon Border Adjustment Mechanism, by including the carbon footprint of the imported intermediate products (e.g. steel). The EU DPP can also be expected to help public authorities at various levels by facilitating the monitoring of material flows and waste generation and enabling the estimation of scope 3 emissions[583] related to products.

The proposed European Digital Product Passport (EU DPP) will harness the technological possibilities for product identification, tracking and tracing, to ensure that data essential for other businesses, consumers and public authorities to promote sustainability and circularity is made accessible. Such accessibility implies agreement on standards, ontology and interoperability.

What would the European Digital Product Passport do?

The EU DPP will enable citizens and economic actors to quickly and easily find answers to their inquiries regarding the product in front of them: Where did this originate? What materials is it made of? Which spare parts are available? How am I to best utilise it? What effect does it have on the environment? What is the best way to recycle it? How can I safely dispose of it?

Moreover, it will enable a number of potential benefits for different actors along the value chain, as explained in Table 99.

[583] Indirect Emissions from activities of the organisation, occurring from sources that they do not own or control. These are usually the greatest share of the environmental footprint, covering emissions associated with raw materials, components, chemicals, logistics, etc.

Table 99 Potential benefits of the EU DPP for different stakeholders

INPUT SUPPLIER	**PRODUCER/ Intellectucal Property (IP) right holder**	**RETAILER/ RESELLER**	**CONSUMER**	**MAINTAINER/REPAIRER/UPGRADER**	**RECYCLER**	**PUBLIC AUTHORITY**
Transparency and traceability enhance trust in sourcing. Clear chain of custody simplifies due diligence and ensures level playing field where compliant suppliers are authenticated and not undercut by unscrupulous suppliers.	Potential repeat revenue from products through maintenance, resale or other circular business models. Customer engagement – cross-selling, service etc	Instant digital identification of products	Easy access to transparency and life-cycle sustainability information on product (eg water, land and pesticide use in cotton production, pre-washing of synthetics to remove microplastic particles). Enabling choice between comparable products.	Trusted source of information on the spare parts. Certification of origin or of conformity with the requirements of the Original Equipment Manufacturer (OEM).	Identification of products and materials	Progress towards decoupling of growth from resource depletion and its impacts on climate, biodiversity and pollution.
Digitally enabled information exchange across end-to-end value chains, enables customer feedback (including recall if necessary)	Post sale data, intelligence and insights from products and customers	Access to essential product and material data for scale and optimising resale value	Access to tailored services (apps) to process extensive and complex sustainability data and provide guidance on sustainable choices . Potentially provided by retailers, consumer organisations, NGOs, companies etc The transparency and credibility of such services when marketed towards consumers will be ensured by minimum fairness requirements to be introduced in the initiative on Empowering	Instant access to information necessary for maintenance, repair or upgrade: • Process of dis-assembly / re-assembly; • Test & diagnostic procedure; • List of spare parts and of means to access them; • Instructions for maintenance / repair; • Specifications of modules and components. Potential for industrialising maintenance & repair operations, and hence to	Automated sorting and separation of materials at levels of detail sufficient to ensure high purity, and hence high quality of recyclates (comparable to virgin raw materials – no “downcycling”), and at speeds and costs compatible with competition with virgin materials	Improved strategic autonomy due to increased stocks and flows of recyclates

			Consumers for the Green Transition.	improve competitive position on cost and quality of maintenance or repair vs. purchase of new product.		
Closed loop systems enabled, so that dependable and uncontaminated secondary raw materials are recaptured.	Operational capacity to meet transparency requirements and provide due diligence information regarding supply chains (including the fight against counterfeiting), based on inclusion of data regarding sourcing and on consolidation of data received from suppliers.	Facilitate measurement for non-financial and CSR reporting with view on full lifecycle impact of products	Care instructions	Safe operations in maintenance, repair and upgrade operations by clear location of parts with hazardous substances.	Increased quantity of fibre-to-fibre recycling (which is today at about 1% in Europe), and increased quality (and therefore increased value and revenue) of secondary materials due to reduced contamination and mixing.	More accurate analysis of investment gaps in industrial ecology for textile recycling infrastructure
Recovery for remanufacturing facilitated.	Inclusion of data to enable automated ecomodulation of fees in potential extended producer responsibility schemes	Data exchange with brand, recyclers etc.	On-going services from brand, repair etc.	Capacity to engage in preventive and predictive maintenance, based on data accumulated over the full lifecycle of the product and of each part.	Operationalisation of reverse logistics	Better direction of research funding to develop substitute chemicals, chemical recycling processes and sorting technologies.
Re-manufacture of spare parts of product models no longer supported by their OEM is facilitated, because the technical file is digitally available.	Data exchange with retailers, consumers, recyclers to enable sustainable commerce. Reduced cost of due diligence by sharing information with several other IP right holders regarding safety, the fight against counterfeiting or other environmental or social sustainability inspection of production facilities, instead of each carrying or contracting out their own inspections.	Ensure authenticity of product	Information to enable resale recycling. Trust in authenticity for resale	Capacity to maintain or repair product models no longer supported by their original OEM.	Identify and exclude problematic dyes and adhesives that can ruin a recycling batch (eg: PVC screen prints on polyester)	Easier reporting on collection, sorting and recycling rates of textiles (in view of incoming legal obligation for separate collection)

Provision of proof of recycled content in materials, so comply with future requirements on this feature	Authentication and identification of products	Supply customers with trusted information	Visibility into product certifications	Enable the provision of guarantees following maintenance, repair or upgrade at a level equivalent to that of new product.	Facilitate measurement and reporting of recycling (including in view of legal obligation for separate collection of textiles in municipal waste from 1/1/24)	More accurate data on textile resource flows and their environmental impacts (climate, pollution, resource depletion etc).
	Combatting counterfeits through identification/authentication	Consumer confidence in green claims	Access to brand content – styling resources, etc.		Enable programming of investment to meet demand	Potential jobs in circular value retention activities.
	Evidence of taxonomy alignment to facilitate access to green funding.		Access to leasing, peer-to-peer lending and other services, for example sharing of expensive and seldom used garments (ski-wear, ball gowns, wedding attire etc) reducing purchasing costs for consumers and increasing the optimisation and added value of the product.		Recuperation of certain vat and reactive dyes (eg: Indanthren Blue, Red and Brilliant Green, Levafix Blue, Remazol Brilliant Blue, Remazol Black B) for re-use.	Facilitation of green public procurement (eg: uniforms for emergency, military and health workers, textiles for hospitals etc) based on dependable life-cycle data.
	Provide access to Life-cycle data as validation for "green claims" (in line with future requirements). Providing access to EU Ecolabel data. Rewarding those putting bona fide green products on the market.		Potential to verify "green claims" on the product		Identification of more valuable fibres (eg: cashmere) for re-use.	

With a harmonised EU DPP:

- Companies will be better able to address financial, operational, and reputational risks through increasing transparency in value chains. Traceability in value chains also enables businesses to react more quickly to unexpected disruptions, comply with relevant rules and regulations, guarantee product quality and safety, fight

counterfeiting, provide follow-up services and adapt product designs according to real-world and even real-time performance. Companies providing services further down the value chain also benefit, for example repair and maintenance services benefit from technical information and spares, remanufacturers have access to important information regarding components, and recyclers benefit from information on hazardous or valuable materials.

- Consumers benefit from increased transparency and access to relevant data since they have more, and more accurate, information about the sustainability, life cycle and circularity claims made regarding goods and processes. As a consequence, traceability and transparency have a lot of potential for fostering trust among all stakeholders in the value chain.
- Administrations can exploit synergies between different information systems already existing, optimising resources and focusing on areas of major concerns from a regulatory viewpoint.

How would the European Digital Product Passport work

The EU DPP objectives, its governance, principles on access rights (need-to-know basis), importance of global standards, typology of information that could be requested, could be put in place through the main SPI horizontal legislation, and apply to all intermediate and final products in scope of SPI.

The starting point for the development of specific EU DPP are product groups covered by the SPI. However, the operationalisation of specific EU DPP will need to be rolled out progressively, focusing on product groups where the potential for and benefits of sustainability and circularity are strongest, and where evidence is available. For those products or product groups, detailed requirements for example concerning minimal data or technical aspects, the detailed access rights management, data verification, etc., will be developed through secondary legislation to the horizontal act. The detailed requirements will be based on product specific impact assessments. Steps to operationalise product (group) specific passport will be carried out in close collaboration with stakeholders and standardisation organisations, also building on the results of the research projects like those funded by Digital Europe Programme starting from 2022. Further piloting and supporting studies may be fostered as considered necessary.

Although SPI will widen the scope of application of Ecodesign to a very wide range of product groups, it may be that its passport requirements could be reflected in other sectoral legislations (e.g. as already happened in the case of the new Battery Regulation).

The EU DPP specific information could be composed of two main "families" of data:

- "**Track & trace**" information, composed of categories of information that are common to all product groups;
- "**Attributes**", including categories of information that are specific to a product group.

Both families of data could become accessible to the users through a unique identifier, meaning a multi-functional data carrier (e.g. a QR code) to be attached to the product.

An alternative option could have been to develop the EU DPP as a separate self-standing legislation. While this approach could allow a wider number of product groups to be in scope

of the EU DPP, it might also require longer development time. Other legislative initiatives that would like to use it for conveying information[584] would have to put a placeholder for allowing this instead of copying first the few requirements that could be introduced in the framework, and copying later on the detailed requirements that will be laid down in a horizontal SPI measure. This approach would guarantee a truly coherent way of implementing various passports, eliminating the risk of loss of interoperability by copy pasting requirements from one legislative instrument to another.

However, as the EU DPP follows the same structure and process as Ecodesign rules, it seems more logical that it becomes a key element of the Sustainable Product Initiative, based on application of the Ecodesign Directive across the Single Market. It can play an important part in achieving the objectives of the SPI due to its potential to make available in a systemic, coherent and interoperable way, information considered essential to empower businesses to adopt circular and sustainable models and activities.

The EU DPP could be implemented via a system that relies on data collected along the value chain, including a unique product identifier. These data should be structured, with a clear, standard ontology of meta-data, so that it be susceptible to automated search and processing.

The EU DPP system aims to integrate existing information but this may need some adaptations in how the database hosting this information are structured. and may require technical changes to the systems The extent of these changes, and the assessment of costs and benefits, will be analysed in depth in the context of the detailed design of the EU DPP data architecture, with the objective of achieving the highest degree of interoperability with the minimum degree of changes to existing systems and related adaptation costs.

The EU DPP is not meant to accumulate exhaustive data, but rather to make available to different stakeholders targeted information on a "need-to-know" basis[585]. Identification of the most relevant and valuable data will take place in consultation between the Commission, stakeholders and authorities, driven by the SPI sustainability and circularity objectives. It would be based on underlying principles set out in the European Strategy for Data and the Data Governance Act and would make use of the relevant Common European data spaces[586]. Federated cloud services supporting the Common European data space infrastructure could implement the acquired levels of data sovereignty and provide the necessary guarantees to public and private data providers that reuse conditions and access limitations are being enforced on their data. It would be important to develop the EU DPP concept and design also looking at what is happening at international level, for example in the context of the ongoing work in UNEP, UNECE, OECD and the World Business Council for Sustainable Development. If designed and developed through an open dialogue with international partners (for example on technical standards, classifications and agreements on data sharing), it may help removing trade barriers, lowering investment costs, compliance costs and marketing costs.

[584] Green Claims initiative, the revised of the Construction Product Regulation, Farm to Fork, Carbon Border Adjustment Mechanism, etc.

[585] Digital inclusion is an EU-wide effort to ensure that everybody can contribute to and benefit from the digital world. The EU is fostering digital inclusion through several policy areas, including digital skills and social inclusion. https://digital-strategy.ec.europa.eu/en/policies/digital-inclusion

[586] A Dataspace for Smart Circular Applications is foreseen in the European Data Strategy as part of the European Green Deal Dataspace, and linked to the Manufacturing Dataspace.

The legal entity putting the product on the EU market would be responsible for the provision, accessibility and accuracy of the required data in relation to that product. That entity should ensure that its suppliers make available and accessible required upstream data either directly (e.g. via an identifier on a component), or to the final producer, who can then provide a link to the source data via the unique identifier on the final product.

Ideally, the EU DPP should be based on a cascading / recursive process, whereby the EU DPP of the final product contains the link to the Unique Identifiers of each of the parts, and hence to their respective EU DPPs, which can then provide access to the EU DPPs of their own parts and materials. However, the feasibility of this comprehensive approach, or the need to implement a more simplified one, will be assessed on a case-by-case when developing SPI measures.

In principle, the EU DPP should be able to host both static data (unchanging, persistent and not for modification) and dynamic data (periodically updated as new information becomes available). Dynamic data might include performance data where relevant and possible[587] (for example for electronic equipment), recording periodically the functionality and efficiency of the product or its components. The use of dynamic data would automatically require a full serialisation of the EU DPP, meaning that the specific passport would need to be available for each item placed on the market. The relevance and feasibility of including dynamic data in the EU DPP of a specific product group will be assessed when developing SPI measures at product-group level.

Subsequent to placing on the market, event or transactional data may be added (for example to indicate a new owner, replacement of a part, servicing or second use) if this is identified as important when SPI measures are developed. Provision of this data may not be mandatory, as compliance would be difficult to enforce in most cases; however, the experience of voluntary schemes has demonstrated that stakeholders do often find benefit in providing such data, for example to verify the identity and authenticity of a product or better estimate its residual market value. Such voluntary initiatives are still not available in many sectors or open to all actors; therefore there would be potential benefit in providing access to certain data of this type via the EU DPP. The entity initially putting the product on the market would not be responsible for any data introduced afterwards by third parties. In the case of a remanufactured product being put on the market again with a warranty, provision of this data would normally be mandatory and the responsibility of the remanufacturer.

Contacts with a number of privately established and voluntary product passports indicate that the parallel existence of the EU DPP, with requirements for a unique identifier and with data protocols and standards, will help them by ensuring wider data compatibility, interoperability of systems and roll-out. It would also be likely to lead to further voluntary sectoral initiatives. Nevertheless, data provided in the context of such initiatives is not considered as forming a part of the EU DPP and would not be accessed via the EU DPP. The EU DPP will on the one hand be able within its scope to require access to data that would otherwise not be made available via such sector initiatives, and on the other hand, outside of its scope, facilitate the interoperability and wider roll-out and application of these sector initiatives. The distinction between the EU DPP and data derived from other initiatives would be clear to users.

[587] And in compliance with existing rules on the protection of personal data

The Policy Context and Mandate

With the European Green Deal (EGD), the European Commission has committed to taking ambitious action on climate and environment-related challenges. The EGD is a concerted growth strategy for a climate-neutral, more resource-efficient and competitive European economy.

The digital and green transitions are closely linked and interdependent. They will require new products and services, markets and business models, which must be grounded in European values and our social market economy. Digital technology and solutions (e.g. low energy computing, smart energy-, traffic- and resource management systems, efficient communications equipment and infrastructure) can reduce emissions and improve efficiency and circularity across all sectors. But digital technologies can just as easily be used to accelerate linear, unsustainable production and consumption systems. Therefore a clear policy framework is needed to ensure that their potential is harnessed towards public good and environmental sustainability across all sectors.

To restart Europe and to build long-term resilience, the European Union has decided to invest EUR 750 billion in recovery and resilience of the Member States under NextGenerationEU. Each Member State has committed to spending at least 20% of their recovery and resilience funds to foster digital transition and 37% to speeding up the green transition.

European Policy on Data

Transforming the internal market, underpinned by the free movement of goods, into a data-driven internal market, calls for the use of a common language to exchange information on products. The value of data lies in its use and re-use. Improving data use requires discourse between the data holder and the (potential) data user, but also depends on the nature of data involved. That value can lead to data hoarding, but availability of data is often essential for the public good, for health, fighting crime and of course environmental protection.

The EU DPP will, on the one hand, reflect the identified need to better exploit the increasing amount of data related to products. As President Von der Leyen stated in her State of the Union speech of 2020: "*The amount of industrial data in the world will quadruple in the next five years - and so will the opportunities that come with it. Though up to date 80% of industrial data is collected and never used".* On the other hand, it will ensure that it is exploited for the public interest. The European Strategy for Data[588] sets out the principles for a European approach to data, where *the data collection and use must place the interests of the individual first, in accordance with European values, fundamental rights and rules. Further the increasing volume of non-personal industrial data and public data in Europe, will constitute a potential source of growth and innovation that should be tapped."*

Moreover, the forthcoming Data Act[589] (Q4/2021) will "clarify the rights and obligations of parties in data transactions and ensure fairness in the allocation of data value among the actors

[588] Brussels, 19.2.2020 COM(2020) 66 final

[589] Inception Impact Assessment https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13045-Data-Act-&-amended-rules-on-the-legal-protection-of-databases_en

of the data economy"[590]. It has explicit objectives to incentivise sharing and using of B2B data and preventing unfair terms and conditions that may prevent other businesses from developing and flourishing.

European Policy on Circular Economy

The Circular Economy Action Plan defines a circular economy as "where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised". This has been explained as making the European economy less like a river, with materials flowing in at one end and emissions and waste out at the other, and more like a lake, where resources are exploited continually and optimally. Many of those resources are embodied in products, and therefore prolonging product life and optimising product use are essential to value retention. For that reason the new Circular Economy Action Plan (CEAP)[591] establishes the sustainable product policy and Sustainable Product Initiatives. And as the physical and digital worlds come closer, the value of products is increasingly bound up in the data linked to them.

Both the European Green Deal[592] and the new CEAP identify the European Digital Product Passport as a way to contribute to an effective product policy. The European Council identified this potential and urged the European Commission to bring forward a proposal and launch pilots for a European digital product passport in value chains identified in CEAP[593]. Funding opportunities to test the EU DPP concept in three key value chains will be available as part of the Digital Europe Programme in November 2021.

A concept similar to the EU DPP has already been proposed in EU legislation. The proposal for a Regulation on Batteries[594], published Q4/2020, introduces a "battery passport" for introduction in 2026 as a means to provide information about the basic characteristics of types and models of electric vehicle and industrial batteries placed on the market. It will allow accredited economic operators to gather and reuse data on individual batteries placed on the market, to increase efficiency, create more value and to make better informed choices in their planning activities. It also establishes categories of data that must be more openly accessible and protected data relating to compliance.

Potential stakeholders' benefits

[590] Margrethe Vestager, Executive Vice-President for a Europe fit for the Digital Age

[591] COM(2020) 98 final

[592] COM(2019) 640 final

The European Green Deal notes that "*Digitalisation can also help improve the availability of information on the characteristics of products sold in the EU. For instance, an electronic product passport could provide information on a product's origin, composition, repair and dismantling possibilities, and end of life handling*".

[593] *Eco-innovation: enabling the transition towards a circular economy*, Council Conclusions 15811/17, 18 December 2017; Council Conclusion on *Digitalisation for the benefit of the environment*, December 2020.

[594] COM/2020/798 final: Proposal for a Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020

The Business Case

The EU DPP comes with a strong business case associated to it; there are already several examples of similar voluntary initiatives (e.g., Global Battery Alliance[595], WBCSD pathfinder[596], Circularise[597], Product Circularity Datasheet developed by the Luxembourg Ministry of economy[598]), however these lack the underlying public interest objective or the convening, arbitration and regulation power of the EU DPP initiative. Industries in all sectors would benefit from the EU DPP's existence as it would support value retention of materials and products, creating the conditions for the flourishing of new business models and new companies creating value from the information made available through the passport (as it is happening with many start-up companies active in the area of food and health). Key benefits for businesses stemming from the Digital Product Passport being led by EU public authorities lie in providing a clear business case for investment in the underlying infrastructure: (1) the interoperability of the system's components ensures a consistent use of IT infrastructure and investment through all value chains; (2) the synchronisation of the deployment of the DPP under a public and shared calendar enables the timely allocation of resources to investment, ensuring that the surrounding and supporting infrastructure will be implemented coherently by all business partners at the same time; (3) the mandatory nature in the EU Internal Market of the underlying technical standards ensures that the investment in the IT infrastructure will be useful, and avoids the risk of it remaining as a stranded asset and (4) a level playing field in respect of minimum data requirements, based on a consultative process and with legislative force.

The European digital product passport may bring multiple benefits to all actors of the value chain. Several private sector voluntary product passport initiatives already demonstrate a clear business case for product identification and data access, without the additional capacity of regulatory approaches to ensure scale, interoperability, inclusivity, public interest objectives and common open standards and a level playing field. These voluntary initiatives already provide a clear proof of concept, demonstrating that an EU DPP could:

- Allow tracking of **raw materials extraction**, supporting due diligence efforts by mining companies located around the world, recognising the efforts of the best and opening up market rewards. The advantages of a secured tracking system could equally benefit activities related to use of agricultural products or raw materials[599] used by the apparel industry [600](e.g. cotton).

- Benefit **manufacturers** allowing the creation of digital twins[601] of products[602], embedding all the information required either by legislation (e.g. chemical composition) or by customers in B2B transactions, and enabling predictive

[595] https://www.globalbattery.org/battery-passport/
[596] https://www.wbcsd.org
[597] https://www.circularise.com/
[598] https://pcds.lu/
[599] Transforming the mineral supply chain with blockchain technology | Minespider
[600] TrusTrace – Traceability as a Service, EON | CircularID Protocol | Connected Products (eongroup.co)
[601] A digital twin is a virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision-making
[602] For example, The solution of the 'digital twin' is the solution foreseen in the Anti-Counterfeiting Blockathon project developed by the EU Intellectual Property Office (EUIPO).This on-going pilot project aims to design a blockchain-based infrastructure that will help authenticate products (use of a 'digital twin') and exchange data between all actors involved in the supply chain (involvements of law enforcement authorities and consumers are still foreseen as optional at this stage). This blockchain-based infrastructure would be integrated with (i) track and trace systems, (ii) the EUIPO IP Enforcement Portal and (iii) the EUIPO 'IP Register on blockchain' blockchain-based project.

maintenance. Where appropriate and useful the DPP could also include dynamic (and product-generated and geo-specific) data, as well as static data. Implementing traceability of components and products at the scale of the batch or of the individual item throughout the supply chain enables transparency, from basic material processing and refinement, to the on-the-shelf product, then to recycling. Traceability has facilitated warranty claims and recalls[603], and allows OEMs to zero in on the suppliers, component batch, and the specific process step that has led to a particular defect. This traceability is also a key enabler of a circular economy and supports the anticounterfeiting measures of OEMs[604]. In addition, traceability helps to control the production process by establishing the link between any potential product flaws and the precise set of parameters used in the manufacturing process[605].

- Generate **new business opportunities** and models by facilitating transactions along value chains, reducing friction costs and enabling effective operation of markets for products during their lifetime. For example it is expected that once the efficiency of electric vehicle batteries is too low for mobility purposes, they will more optimally be used for energy storage. Identifying the point at which this stage is reached, and the market price based on existing and predicted performance will rely on access to static and dynamic data[606].

- Track the life story of a product, enabling services related to its **remanufacturing**, **reparability, second-life, recyclability**, new business models, and better management of its final disposal when needed.

- Facilitate **collaborative business models** such as "products as a service", peer-to-peer sharing and leasing, by enabling relevant technical data on use and performance to be attached to the product.

- Facilitate **compliance with non-financial reporting** for the 60-70,000 largest companies in the EU, that will be obliged to demonstrate alignment with the EU taxonomy regulation[607], including in relation to circular economy.

- Benefit **market surveillance and customs authorities**, by making available the information they need to carry out their tasks efficiently and effectively.

- Support **financial services** – better product information implies lower risk and higher potential for value retention, benefiting producers and their buyers by impacting insurance calculation, valuation, financing etc. The EU DPP should facilitate proof of alignment with the taxonomy, thereby enabling access to green financing funds.

The Consumer Case

The EU DPP concept does not intend to replace the information provided to consumers on printed labels. This is particularly important for the digitally excluded. It will rather

[603] European Rapid Alert system for dangerous products (RAPEX) | Joinup (europa.eu)
[604] TrueTwins
[605] "Industry 4.0 - Capturing value at scale in discrete manufacturing", McKinsey July 2019
[606] Establishing a sustainable and responsible battery value chain - Global Battery Alliance
[607] Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment

complement this information and be more permanently available than tags or packaging that are removed after purchase.

The EU DPP will allow consumers to have access to relevant and verified information related to the characteristics of the products they own or are considering purchasing/using and therefore to make more informed and sustainable decisions.

However, it is already challenging for consumers to process and analyse the existing levels of information they receive. The EU DPP framework will also facilitate the provision of services to consumers (e.g.: product comparison apps), based on verifiable sustainability data. These could be provided by consumer associations, retailers, NGOs or private actors. Such services would of course need to be in full compliance with EU data protection rules, and the fairness of such services when marketed towards consumers would be ensured via the requirements to be introduced under the initiative on Empowering Consumers for the Green Transition.

The EU DPP will enable enhanced possibilities to resell products, based on accurate product data (e.g. on the maintenance and repair operations, and their compliance with the quality requirements set by the OEM), increased buyer confidence and reduced market friction. It will also open up enhanced possibilities to buy pre-owned products with confidence.

It will also open up access to "products as a service" such as renting and peer-to-peer lending, enabling use of products without the upfront purchase costs and subsequent servicing.

The information made available through the EU DPP could enable consumers and other economic actors to make better-informed and more sustainable decisions on the basis of clear, actionable data accessible via the passport. Although consumers would have direct access to an increased amount of data, this could not automatically translate into more informed decisions as there would be the risk of an excessive amount of information dumped on the user. To address this risk, the EU DPP is designed in a way to foster innovation also by enabling third parties (consumer associations, NGOs, retailers, other companies) to develop applications to help consumers navigate and compare available products, and by providing tailored advice before purchase on the best economic and environmental choices. In conjunction with the measures to be taken under the initiative on Empowering Consumers for the Green Transition to ensure such services comply with certain fairness requirements when marketed towards consumers, this could boost the visibility and credibility of sustainable businesses and products.

The Government Case

The EU DPP should assist public authorities and policy makers at different levels in several ways, including:

- making available reliable information of key importance for monitoring of systemic sustainability-related impacts and **better policy design**;

- enabling the possibility of **rewarding sustainabili**ty (e.g. taxation of use of primary raw materials as opposed to recyclates, preferential VAT rates on repair services) and inform work on future Ecodesign requirements;

- Providing a more comprehensive and evolving picture of resource stocks and flows, permitting **evaluation of strategic autonomy and risks** of supply shocks, and analysis of environmental and other impacts;

– Allowing a more accurate view of investment gaps and **planning of investments** to develop circular activities and jobs;

– Facilitate **Green Public Procurement** (GPP) - including by private purchasers that wish to follow the GPP criteria - by providing public purchasers with the information they need to integrate sustainability and circularity in their procurement criteria and strategies.

– Enable efficient monitoring and **enforcement** operations, the Commission, national competent authorities, and any designated external auditor through full access to the data contained in the European digital product passport.

Stakeholder Feedback and Recommendations

Based on the outcomes of the Open Consultation, a targeted stakeholder workshop organised in June 2021 and a number of bilateral interviews carried out with stakeholders involved in major initiatives involving digitalisation of information along value chains, the following general recommendations were identified:

1. A **decentralised/distributed system** would be more appropriate to the EU DPP developed under the SPI than a centralised one, given the broad scope of product groups and geographical coverage across the value chains. It would be very difficult to manage a centralised database with such a wide scope;
2. Bringing together and **building upon existing initiatives** when developing the EU DPP under the SPI. All existing relevant initiatives expressed a high level of willingness to cooperate and collaborate, both with each other and the Commission;
3. Companies expressed a **willingness to make data accessible** via a DPP, even where there is no direct benefit to them, if the public interest objectives and utility are clear.
4. The EU DPP needs an **international perspective and approach**, both in terms of development and application. This is because the value chain of the SPI will most likely cover partners outside the EU (e.g., in sourcing of raw materials and products). Therefore, a common understandable perspective and approach needs to be adopted, and sensitisation of extra-EU operators to comply with data requirements needs to be considered;
5. The EU DPP should be **based on open source systems, and ensure interoperability and access for everybody**;
6. Clarify and **harmonise the terminology used and standardisation applied**.
7. **Include social and environmental impacts**, both in the use phase and along the value chain.
    - Social aspects are considered as important, but they are often not included yet due to unclear agreements on which are the most relevant and how they need to be reported (according to which standard). This results in the potential to collaborate with Global Reporting Initiative (GRI) related to transparency at corporate level;

- It would be ideal to link the EU DPP with the Product Environmental Footprint (PEF) methodology in order to capture the environmental impact in a harmonised way.

8. **Resolve potential resistance beforehand.** In order to resolve reluctance of European countries and companies, a special communication and training could help to sensitise and mitigate.
9. **Confidentiality needs to be considered in the design phase** of the EU DPP already in order to develop a system that is compliant with data protection rules and enforces the data reuse and access conditions.
    - The information must be purpose-driven: the purpose of the product passport should determine the information to be included in the passport. Therefore, mandatory information should be limited to what is relevant and necessary for the purpose. The product passport should include the minimum amount of data needed to fulfil the purpose in accordance with the data minimization principle. It is therefore important to identify the right and reasonable amount of detail so that information management is not overly complicated, energetically unsustainable and administratively burdensome.
    - To guarantee the authenticity of transferred data, third party/independent verification and the appropriate supporting technology of immutable data storage systems are needed. One solution to this issue could be to build on the work of the EU's European Block-chain Services Infrastructure (EBSI) project which has done a lot of work on the notarization of documents based on block-chain technology (basically registering electronic "fingerprints" of documents in the form of hashes);
    - Companies need to keep control of their data and be accountable for its accuracy. In fact, liabilities should be defined in the design phase of the product passport system providing clear responsibility and penalties in case of non-authenticity of transferred data. It is also important to control how data is shared and accessed in order to have a data sharing of personal and non-personal data, including sensitive business data that is secure and allows all stakeholders to have easy access to high-quality industrial data.

10. For the development, it is crucial to **have IT developers and database experts on board**.
    - The designers of the EU DPP data structure should be business analysts and IT developers. They should be able to develop a structure that can standardise data to avoid duplication, to maintain its reliability and limit the information storage space. Compliance with international data models (e.g.

EU customs Data Model[608], WCO data model[609]) should be sought as much as possible.

- When drafting the wording in the legislation a database expert should review the wording, since non-rigorous technical wording could lead to ambiguities in the technical specification and to significant implementation difficulties later.

11. For the long-term implementation, consider to **include independent parties to ensure trustworthiness**.

- This could apply to the whole initiative, running it through an NGO, for instance;
- And to the gathering and ranking of information that would be done through an independent interface or intermediate in order to make it digestible for consumers.

12. For a user-friendly use in practice, an **application that would recognise each link to the product** (e.g. scan the data carrier and automatically lead consumer to the description of the product) would be the desirable option.

13. Facilitate an **inclusive development of the application.**

- The IT framework of the SPI should be inclusive for SMEs as well as importers;
- The EU DPP validation process should include the option to choose between different stages of (self-) auditing that includes a light version for SMEs;
- IP right owners might be an important party to include as they all increasingly aim to keep a closer relationship to their customers;
- The system developed should be geared to include and facilitate all verification that the EU decides to authorise.

14. The EU DPP should be correctly anchored in legislation in order to facilitate its operation and purpose.

- This would especially include to formally make it mandatory to disclose certain kinds of data relevant to ensure a clear, consistent and comparable EU DPP;
- There is also a need to make sharing of information mandatory this way to ensure transparency;
- In order to properly execute financial and environmental calculations on the product's impacts, more environmental aspects have to be made available. The same applies for schemes, formats and kinds of data related to (building and construction) products, which should be aligned across countries or the EU DPP should support all formats (which however, will require more capacity).

[608] https://ec.europa.eu/taxation_customs/customs-4/union-customs-code/eu-customs-data-model-eucdm_en
[609] http://www.wcoomd.org/en/topics/facilitation/instrument-and-tools/tools/data-model.aspx

- For that information that should not be accessed by all publics for a good justification, legislation should define the conditions under which this information should be accessible in the DPP – who should have access, how to define and verify rights, possible fees or commercial conditions of access if justified, etc.

15. **Examine in great detail if digital twins are necessary** as such a system requires to have many companies across the value chain in different parts in the world to participate before you begin, which could sacrifice the chain of custody and breaks the whole system.

Coherence with ongoing initiatives

There are a number of policy activities and developments within the timeframe of SPI which are closely related to the EU DPP, others will inform the further development of the EU DPP and specific DPP.

The **proposal for the Battery Regulation**[610] introduced the concept of a **battery passport** (and database). By January 2026, manufacturers, importers and distributors of industrial and electric vehicles (EV) batteries would be required to have a unique digital passport for each individual battery (identified through its serial number) placed on the market. It would consist of a combination of static information (fixed at the moment of placing the battery on the market) and dynamic data generated throughout its use to facilitate reuse and refurbishment[611]. By that date the European Commission shall also set up a battery information database consisting of a public part (B2C) accessible after purchase, a restricted part (B2B), a compliance part (B2G) and an online portal giving access to those three parts.

In a similar way, the European Commission is working towards the establishment of a **digital building logbook**. A study[612] identified business models, key points for good practice with respect to usage, data management and digitalisation of building logbooks. The digital logbook will probably host both static and dynamic information. In addition work is ongoing towards the revision of the **Construction Products Regulation (CPR)**. It could possibly address the issue of the digitalisation of the CE marking system for the products in scope.

In order to gather insights, test practicability and inform future legislation, a call for "**a digitised, resource-efficient and resilient industry 2022**" as part of **HORIZON Research and Innovation Actions was published.** The proposal should cover critical raw materials in at least five complex supply chains, including batteries value chain.

And a call for an eighteen month' **Coordination and Support Action** under the Digital Europe Programme (2021) will be launched in November 2021 **piloting three European digital product passports** in the areas of batteries, electronics and one other key value chain of the CEAP. This pilot will be carried out in close cooperation with industry and businesses.

[610] COM(2020) 798/3
[611] Full requirements are contained in Annex XIII of the Regulation
[612] Study on the development of an EU framework for Digital Building Logbooks | Internal Market, Industry, Entrepreneurship and SMEs (europa.eu)

The upcoming initiative on **Empowering Consumers for the Green Transition** will introduce certain fairness requirements for sustainability information tools (e.g. apps). These requirements will ensure the transparency of such tools when marketed towards consumers by traders. This will be an important safeguard to ensure that the expected proliferation of such services as a result of the increase in product sustainability information provided by the EU DPP will not lead to consumers being provided with misleading or unreliable information.

B. THE EU DPP FRAMEWORK

Examples of possible design principles

All the design requirements presented below are illustrative examples and should not be understood as a final decision on any of the technical details. Such decisions will be taken based on the outcomes of existing and future pilot experiences, consultation with stakeholders, and dedicated impact assessments.

Functional requirements of the European Digital Product Passport

The European Digital Product Passport should comply with the following general requirements:

- A unique identifier (data carrier) links the product with the data contained in the European digital product passport;
- The data present on the EU DPP remains available even after the bankruptcy, the liquidation or the cessation of activity in the EU of its originator;
- Its content is written in an open, standard, inter-operable format;
- This standard is usable under open licences or under Fair, Reasonable And Non-Discriminatory (FRAND) legal and economic conditions;
- This standard is usable over very long periods of time;
- The EU DPP (and its content) is machine-readable;
- The content of the EU DPP is searchable;
- The rights to access and modify information are controllable;
- The access to information is on a “need-to-know” basis;
- The author of the information is authenticated;
- The reliability of the information is assured;
- The integrity of the information is assured.

The **Unique Identifier** of the product, which connects it to the content of its European Digital Product Passport, is physically linked to the product. The type of data carrier and its placement is defined at the level of SPI measures as it depends on the characteristics of the product group.

The data contained on the EU DPP remains **accessible** as long as the product that it refers to, and the materials that this product is made of, are present in significant numbers on the territory of the European Union. This data is indeed needed for maintainers of the products,

for repairers and ultimately for recyclers. This period of time when data on the product is necessary for third parties may last years, or even decades, after the product was manufactured, and an even longer period of time after the product was placed on the market. This holds specifically for long-lived products and materials such as those in the construction sector, but is valid for all products, particularly in circumstances where the SPI will be implemented and will have delivered on its policy goal of increasing product lifetime.

It is possible that the company having manufactured or imported the product in the EU Internal Market disappears (because of bankruptcy or in case of liquidation), or has ceased operating the EU, before the end of the period in which the data should remain available to third parties.

It is thus necessary to ensure the availability of this product-related data on the European digital product passport infrastructure to the third parties needing it, over the time period when it is needed even in the cases mentioned above (bankruptcy or liquidation of the data originator, cessation of its activities in the EU).

The European digital product passport contains information on a product that supports:

- Operators along the supply chain to consolidate (a) the data received from their suppliers on the environmental and social impacts of their input and (b) the environmental and social impacts of their own operations into a figure (for each category of impacts) ready to be transmitted to and used by their own customers, and (c) the data received from their suppliers on the environmental and social impacts of their input (if relevant and appropriate);
- operators along the supply chain to perform their work efficiently in terms of natural resources and energy and of economic value, specifically as regards value-retaining operations (maintenance, repair) or value-restoring operations (refurbishment, upgrade, retrofit, recycling);
- final consumers in their purchasing decisions towards higher environmental and social sustainability of products;
- market surveillance and customs authorities.

There is a significant risk that each of these players use a different, incompatible technical system to store product data, so that the policy objective of having the information transmitted along the value chain be missed. As a consequence, the issue of **standardisation**, at the detailed level of **inter-operability** of the storage and transmission of data, is an essential feature of the European digital product passport.

This inter-operability should exist on all levels:

- Technical on the addressing space, the item (or batch) identifier, the data format and the metrology measurement units, the communication protocol;
- Semantic on the meaning of each element of data, to guarantee common understanding through the value chain, exchangeable formats, unique identifiers for product categories, materials, services, common API's, common federation services (authorisation, authentication, accounting, transformation, etc.), shared data models.

If a private company or a public body external to the European Union were to hold a monopolistic grip on the Intellectual Property underlying the standards defining a product passport, so that this standard be proprietary, it would extract a potentially considerable

economic rent from the fact that this product passport would be of universal and mandatory use across the whole European Union. It would in addition be in a position of exerting pressure on all economic players in the EU non-food manufacturing sector. Because of the nature and the magnitude of this risk of having the standard for the European digital product passport being proprietary, we consider that the standards for a Product passport should be available under **open licences** such as those produced by the Internet Engineering Task Force (IETF)[613] or under **Fair, Reasonable and Non-Discriminatory (FRAND)** economic and legal conditions.

In view of the need for data to be available for a long period of time, the standard used to write the information on the European digital product passport and the system to retrieve the information must be **stable** over a long enough period to enable it to be retrieved and interpreted at the end of life of the product (see the section on "permanency of URL" for further considerations on this issue).

In addition, the standard should be able to **evolve** over a long period of time, while maintaining backward compatibility with all previous versions since the start of the implementation of the EU DPP.

Similarly, **access** to the relevant **information** along the value chain should be fast and accurate, exploiting the potential of new technologies and building on the numerous apps already existing on the market able to read unique identifiers, so as to enable **automated** treatment, e.g. in the following usage scenarios:

- Verification of the sustainability claims and of their authenticity;
- Testing, dis-assembly, diagnostic, maintenance, repair, refurbishment;
- Detection of the presence and of the location of substances of concern;
- Consumers' and procurers' access to sustainability and circularity related information, including prior to purchasing the product in question;
- Market surveillance and customs' operations;
- Sorting of materials upon recycling.

This would call for the information to be **machine-readable**.

The information present on the EU DPP is susceptible to grow to large proportions, specifically if information is collected and tracked along complex value chains with a large number of modules and components involved. In order for this information to be usable in practice, the EU DPP needs to be **searchable**.

The information contained in an EU DPP could be potentially very comprehensive for the sake of maintenance, repair or re-manufacturing – but also therefore **confidential**, at least during the period of time when the company is actively supporting the product. For this reason, the European digital product passport should enable access to information on a "need-to-know" basis, with the exception of market surveillance, customs authorities and the Commission who should have access to any information, at their discretion, and without

[613] https://www.ietf.org/about/mission/

needing the consent of the originator of the data. This is without prejudice to EU data protection rules regarding the processing of personal data.

The author or authors (legal or physical person) of an information written on a European digital product passport bears **responsibility** for this information. This is true for information related to the sustainability features of the product, which, in the framework of the implementation of the Sustainable Product Initiative, will acquire economic value: products that are more sustainable are likely to be sold with a price premium [614]. It is also true for information related to maintenance or recycling, for which false information creates harm to the user of that information (e.g. because it reduces the purity, and hence the quality, of the recycled material).

Thus, the European digital product passport should contain means to **authenticate** the author of each information item written, so that this author be clearly identified, cannot repudiate having written the information, and thus bear full responsibility for this information. As regards the fairness of voluntary environmental claims made towards consumers, any misleading claims will be subject to enforcement measures foreseen under both the initiative on the Empowering Consumers for the Green Transition and the Green Claims Initiative.

Information only has a value and can be used appropriately if it is true. The technical features and the institutional arrangements governing the generation of information to be stored on the European digital product passport should ensure that this information is true.

Information on the European digital product passport is susceptible to have economic value (e.g. when bearing on sustainability features of the product) or to cause harm if false, as seen above. It should not be modified illegitimately.

The European digital product passport should thus contain technical features that ensure the **integrity** and the **immutability** of the information that it contains, i.e. that make sure that the information, once written, cannot be modified without this change being duly recorded.

Building on existing practices, tools and standards

The design of the EU DPP has a deep impact on how it may contribute to achieve the SPI objectives of making available relevant information to different stakeholders groups. There are already existing EU databases (e.g. EPREL, SCIP, and many more) that include relevant information that shall be embedded and made available through the DPP.

The amount of information already existing and the objective of minimising any unnecessary burden for industries and governments suggest designing the EU DPP not as a centralised repository of information but rather as an interface allowing smart access to the information needed. This situation calls for building on what industry sectors have already been doing for many years when it comes to exchange of product-related information/data. During the preparatory phase and deployment stages, a close collaboration with the relevant stakeholders and feedback from existing similar private initiatives will be necessary to complement and fine tune the design framework.

[614] As it currently already is the case for organic cotton, which is sold at a 18% price premium compared to conventional cotton. See Textile Exchange – Organic Cotton Market Report 2020. https://textileexchange.org/wp-content/uploads/2020/08/Textile-Exchange_Organic-Cotton-Market-Report_2020-20200810.pdf

Any company who is producing, transferring, and/or selling products or components is already identifying products digitally with Stock Keeping Units (SKUs) and using digital solutions that carry some relevant information related to that product/component. The most used and known ones are the barcodes[615], the QR codes, data matrix, watermarks, RFIDs. These are some among the many existing "unique identifiers" (UI) used to digitally transfer information along the supply / value chain.

For example, in France half of manufacturers and 100% of fast moving consumer goods (FMCG) retailers automate the exchange of data by using Electronic Data Interchange (EDI). They electronically send and receive the documents forming the basis of their transactions in a predefined format. This automation has resulted, among other things, in the elimination of the costs related to paper, data that are more reliable and in the reduction of manual inputting.

The use of these unique identifiers relies on a number of standards for business communication that have been developed by multiple market actors, often building on, or evolving into, ISO/IEC standards. Company-specific (non-standard) additions should be avoided, as they add complexity and cost to the supply chain, as well as reducing interoperability.

The relevance of full value chain traceability

Materials (here referred to as traceable assets in this context) are utilized as inputs to processes that convert them into new and distinct traceable assets on a recurring basis. These outputs must also be tracked and connected to their inputs, so that when the client gets a finished product, all the inputs can be recognized — by tracing the chain's connections back to the start. Each step of the value chain requires the definition of traceable assets, as well as the definition and recording of the connection between traceable assets that are inputs and traceable assets that are outputs.

In order to work and be effective, an end-to-end track and tracing system require all components of the supply chain to be part of the system, without any derogation based on size or geographical location. To ensure the integrity of identifiers for traceable assets across the value chain and to validate additional traceability information, connections between identifiers for traceable assets, company identifiers, and physical location identifiers must be created.

While this encompassing approach (covering the full value chain), should be the default architecture for the EU DPP, it is also clear, that for specific products a case by case appraisal, including relevant stakeholders, is a necessary first step. This needs-based (modular) design will help a gradual deployment of the EU DPP concept.

In figure 2 an example of this concept for the textile and leather industry is shown.

[615] The Uniform Product Code Council, established in 1973 for the US market, created the first barcode standard to identify items in grocery stores. Now 47 years later, this standard is used worldwide on everything from medicines to shipping containers.

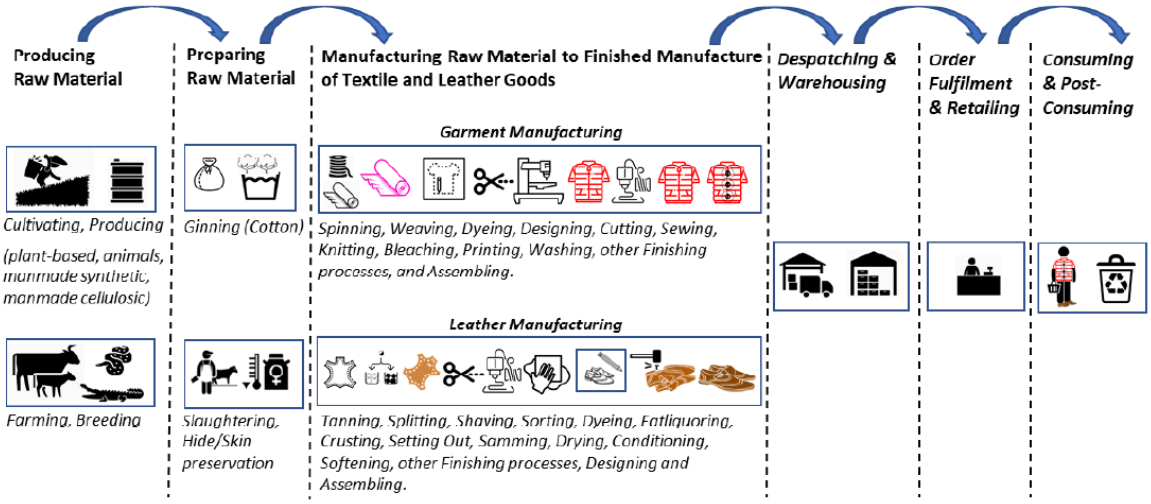

Figure 2 The main value chain stages for textile and leather products, parts and components[616]

When tracing the possession and/or location of products, it is also critical to keep track of unique identifiers for logistical units. When traceable assets are aggregated (combined) or disaggregated for transportation reasons, a logistics unit is formed. Logistics units come in a variety of sizes, from boxes to pallets to containers.

Due to the complexity of the majority of supply chains, each participant must ensure that traceability data may flow in both directions (upstream and downstream). Systems must be able to support parties requesting data that may exist upstream or downstream of the organization. Standards for data identification, capture, and exchange already exist and they are critical to providing the necessary interoperability to connect the systems of the various parties.

Most of this information is already included in the unique identifiers currently in use. Implementation of the European digital product passport require a different set of actions depending on the level of maturity of the track and tracing system used by a company. In particular:

- If a company already has in place a track and trace system based on a unique identifier, the company will have to:
  - Align it to the different global open standards that will be listed and/or developed;
  - Integrate/interconnect their system into the overall architecture of the EU DPP;
  - Collect/calculate the specific information requested for that product group, as identified in the corresponding SPI measure adopted by the Commission;
  - Add the information to the unique identifier, filling in the corresponding data template;
  - Establish the persistent URL linking the product data to the unique identifier;

[616] Recommendation No. 46 : Enhancing traceability and transparency of sustainable value chains in the garment and footwear sector ; UNECE/TRADE/C/CEFACT/2021/10

    - Send the information related to each newly created unique identifier (and the corresponding "track & trace information") to the EU central registry.
- If a company does not have in place any track and trace system, then it will also have to set up the IT system components, interfaces, infrastructure, and procedures.

Possible technical and institutional arrangements enabling the fulfilment of the functional requirements

Table 100 provides a list of features that could be included in the design of the European digital product passport. The subsequent paragraphs provide further details and some preliminary considerations on possible choices to be made. However, the decision on the detailed design of the EU DPP will only be taken in secondary legislation, based on dedicated impact assessments and thorough consultation with stakeholders.

Table 100 Examples of technical and institutional arrangements to fulfil the functional requirements placed on the European digital product passport

Feature	Solution proposed
A data carrier links the product and the data contained on the European digital product passport	Use of a multi-functional unique identifier, meaning a data carrier that includes a persistent URL
The unique identifier is available at the right level of granularity	The SPI measures would define, for each product group, what is the right level of granularity required for the unique identifier(s) (item level, batch level, class level)
Its content is written in an open, standard, inter-operable format	Mandatory usage of a single set of standards defining the technical and semantic aspects of inter-operable, end-to-end communication and data transfer
This standard is usable under open licences or under Fair, Reasonable And Non-Discriminatory (FRAND) legal and economic conditions	The Intellectual Property Rights included in the standard are made available for all players to be used under conditions recognised as FRAND, such as those of the IETF[617] of ETSI[618] or of CEN/Cenelec[619]

[617] IETF, "Rights Contributors Provide to the IETF Trust", RFC 5378, 2008, https://datatracker.ietf.org/doc/rfc5378/
[618] ETSI, "Intellectual Property Rights policy", 2020, https://www.etsi.org/images/files/IPR/etsi-ipr-policy.pdf
[619] "CEN and CENELEC position on: Standard-Essential Patents and Fair, Reasonable and Non-Discriminatory (FRAND) committments", 2016, https://www.cencenelec.eu/News/Policy_Opinions/PolicyOpinions/EssentialPatents.pdf

This standard is usable over very long periods of time	Evolutions of the standard are backward compatible over a duration depending on lifetime of products (per product group). The standard contains provisions for an indefinite number of evolutions.
The EU DPP introduce a set of information common to all products and product-specific information	Distinction between “track & trace” information and “attributes”
The content of the European digital product passport is automated	The multi-functional unique identifier includes a persistent URL that links the attributes included in a data carrier to information laced in a product-specific web page.
The content of the European digital product passport is machine-readable	Information could be stored as text and numbers. Each information item could be accompanied by meta-data describing the nature of the data
The content of the European digital product passport is searchable	Several options are possible, like for example the use of apps allowing to search for any information
The rights to access and modify information are controllable	Each participant in the system is assigned a role. The granting of a role is controlled by the operating authority. Each role has a differentiated set of access rights.
The access to information is on a “need-to-know-“ basis	Different groups of stakeholder would have access to different information included in the EU DPP. The specific access rights will be identified when developing product-group specific SPI measures.
The data present on the European digital product passport remains available even after the bankruptcy, the liquidation or the cessation of activity in the EU of the economic operator placing the product on the market	Each economic operator who will have to produce an EU DPP could set up a technical back-up data repository, managed by an independent third-party service provider, subject to specific rules regarding technical security and financial sustainability. Periodic replication of the data contained in the Digital Product Passport into that back-up data repository is mandatory. The URL enabling access to the technical back-up repository shall be transmitted to the Resolver and the central registry.
The author of the information is authenticated	Usage of existing identity management solutions (e.g. evolution of eIDAS).

The reliability of the information is assured	Third-party independent verification could be required for the most relevant data points. Specific verification requirements will be identified at product-group level
The integrity of the information is assured	Data integrity would be part of the design process of the system.

A single set of standards

There are significant advantages in having the European Union mandating the use of a single set of technical standard ensuring inter-operability of data transmission along the value chain and the product life-cycle. By doing so, the EU would reach simultaneously several policy goals:

- provide an essential infrastructure for the propagation of sustainability information along the value chain and for the industrialisation of circular value-retaining or -recovering operations (maintenance, repair, re-manufacturing, refurbishing). This would lead to an increase in the reliability and efficiency of these operations, an improvement of their quality and a reduction of their cost – leading to better acceptance by manufacturers and consumers alike of the Sustainable Product Initiative;
- give a synchronisation signal to all players in the non-food industrial value chains (thereby avoiding the "penguin effect") to implement a common, interoperable, open communication infrastructure for the reliable transmission of messages along the whole non-food industrial value chain, while assuring FRAND economic conditions for all players to use it. This would provide EU-based industrial companies with a first-mover advantage in the market of the Industrial Internet of Things, by being the first to enjoy the benefits of such a comprehensive communication infrastructure.

The European Union has achieved already, at least once, the political and technical ambition of mandating by law – and of implementing in practice – the unification of the standards defining the interoperability of a large digital system within the EU: the GSM standard[620].

A straightforward means to have a standard being developed to support EU legislation on the Internal Market is to mandate the European Standardisation Organisations (ESOs), namely CEN, Cenelec and Etsi, to develop one, as per the New Legislative Framework[621]. This mandate should build on the work already done by existing work of international standard-setting organisations (e.g. GS1) and complement it on any missing part.

There is a risk however that this international standard-setting work be overly delayed by conflicts between corporations defending competing solutions. This delay could significantly limit the benefits of a European digital product passport. It would additionally increase the risk of digital monopolists taking advantage of the standardisation and legal vacuum to

[620] https://www.3gpp.org/specifications/gsm-history

[621] The new legislative framework consists of:

- Regulation (EC) 765/2008 setting out the requirements for accreditation and the market surveillance of products;
- Decision 768/2008 on a common framework for the marketing of products;
- Regulation (EU) 2019/1020 on market surveillance and compliance of products.

attempt imposing their proprietary systems *de facto*, under arguments of speed and of lower costs, but with important drawbacks in terms of fragmentation of the Internal Market, of cross-sectoral inter-operability and of capture of industrial value added by these digital monopolists.

Typology of unique identifiers

The typology of data carriers used (barcodes, 2D identifiers, watermarks, data matrix, RFIDs, etc) shall be compatible with different typology and number of information that the passport carries on. Linear data carriers, like barcodes, are probably not adequate for the scope due to the limited amount of information they can support.

In order not to hinder future technological innovations, rather than prescribing a specific data carrier, it could be preferable to identify the specific objectives and functionalities the EU DPP would provide and let companies and value chains who have developed their own solutions to adapt the existing carriers to the specific interoperability requirements of the European digital product passport, and specifically to link it explicitly to the Unique Identifier that could be the entry point to the EU Digital Product Passport infrastructure. In particular, a **multi-functional data carrier solution** could be suggested. It is an entry point for a network of connected information and services. This single point of entry is used by a variety of apps that meet business-to-business and business-to-consumer needs through the usage of open or access-controlled resources. In this way companies already using any data carriers (but barcodes for the reason explained above) would be able to continue using them, adapting certain features to the DPP needs and design.

Multi-functional data carriers

Barcodes and other data carriers have historically served as a point of reference to link information about the designated object certain item to information stored in a computer. This, usually in a web page. This means that the link the data carriers establish is not to a product but to a web page. Moreover, this is often restricted to data kept on the computer or computing infrastructure to which the scanner is connected.

As a result, manufacturers frequently need to aggregate data, which means creating a local copy of a combination of master data, data managed by other business partners (including supplier traceability information), information made available to regulators, information for customers (websites, apps), etc. This typically requires data to be harmonised in some form and controlled through a centralized mechanism, with the consequent need for human and other resources and risks of mistakes.

However, a new alternative approach to this traditional way of linking data carrier, consists in **linking the data carrier to a specific product**. These multi-functional data carriers bring together the World Wide Web (through a persistent URL) with existing data carriers like QR codes, RFID, watermarks, data matrix, etc. They provide a standard way of expressing the attributes included in a data carrier in a format that can be used on the web through a persistent URL. This connects scanned items to an infinite number of data sources, whether kept locally or remotely, regardless of who manages them. The presence of a multi-functional data carrier, enables to use a single API to access many locations on the Web, making it simple to search for information on one specific thing.

The use of multi-functional data carriers has several benefits, like:

- Data carriers and other symbols occupy less space on the pack,
- The lower number of data carriers reduce the risk of confusion for consumers,
- Mobile phone users do not have to install a specific app in order to obtain certain types of information, therefore not requiring the use of multiple apps.

This practically means that the use of persistent URL can assist in overcoming semantic interoperability conflicts and providing cross-border services to citizens and businesses, thereby supporting the Single Market and the mobility of people, information, and goods in the EU.

How to search for information stored in the EU DPP

The EU DPP will include different elements of information related to different life cycle stages and characteristics of the product (environmental, social, technical circularity, legal compliance, supporting information, instructions, etc).

In order to help the users to navigate through this potentially wide and dispersed amount of information, it is necessary to find ways to structure the information and simplify its search-ability.

It is expected that third party service providers will developed tailored solutions for different users to implement the search functionality. As for many other technical specifications, the intention is not to impose a one size fit all solution but rather to identify the objective and design a system that is flexible enough without undermining the overarching objective of a full interoperability.

An example of a technical solution to provide the search functionality is based on the so-called resolvers. A resolver is a system that saves the web address of the information an economic operator shall (or want) make available to the different stakeholders. Typically, the data themselves are not saved on the resolver, which simply redirects requests to the location where the required data are stored.

Resolvers may provide hyperlinks to a variety of resources. Some will be readable by humans, while others will be machine-readable. Certain links will take the user to public resources, while others will require authorization (see section on access rights).

There are at least two possible options for the identification of resolvers in the context of the European digital product passport implementation: a centralised approach and a decentralised one.

A **centralised** resolver has the following advantages:

a) There is no dispute about where an application should look for information about a certain item.
b) It minimises the replication of data.
c) It makes the data immediately available to all interested parties, with no potential incoherence due to the slow propagation of location of data among different Resolvers
d) Technical replication and mirroring avoid single points of failure.
e) It allows verifying that every data discovered via a unique identifier links to brand-authorized data.

A **decentralise**d approach has the following advantages:

a) A resolver can be run by anyone. This includes brand owners and solution providers, all of which are free to operate the service according to their own policies.
b) From an engineering standpoint, the presence of several resolvers avoid the possibility of a single point of failure. Additionally, if a resolver is unable to respond to a particular query, it might forward the request to another service.

Based on the prevailing opinion of the stakeholders consulted, the experiences with centralised databases, the minimisation of costs related to new IT infrastructure needed, and the overall philosophy of the European digital product passport of being an "entry gate" to information often already available, it would seem preferable, rather than centralizing data, to design the European digital product passport as a tool enabling routing queries to the location of the required data.

Multi-function data carriers in action, the example of jeans

To access the requested information the user needs to use one of the many already existing smartphone applications or another suitable scanner device (like those available in many retailers). The app scans the data carrier used on the item, creates a web link starting from the information returned by the scan (persistent URL) and then contacts the resolver, which redirects to the web page where the information is stored. Link types should not normally be included in data carriers. It is an application that adds the request for a specific "link type" before resolving the identifiers. One of the underlying assumptions is that each item has its own dedicated Web page set up by the economic operator placing the product on the market. Figure 3 shows how a multi-function data carrier works.

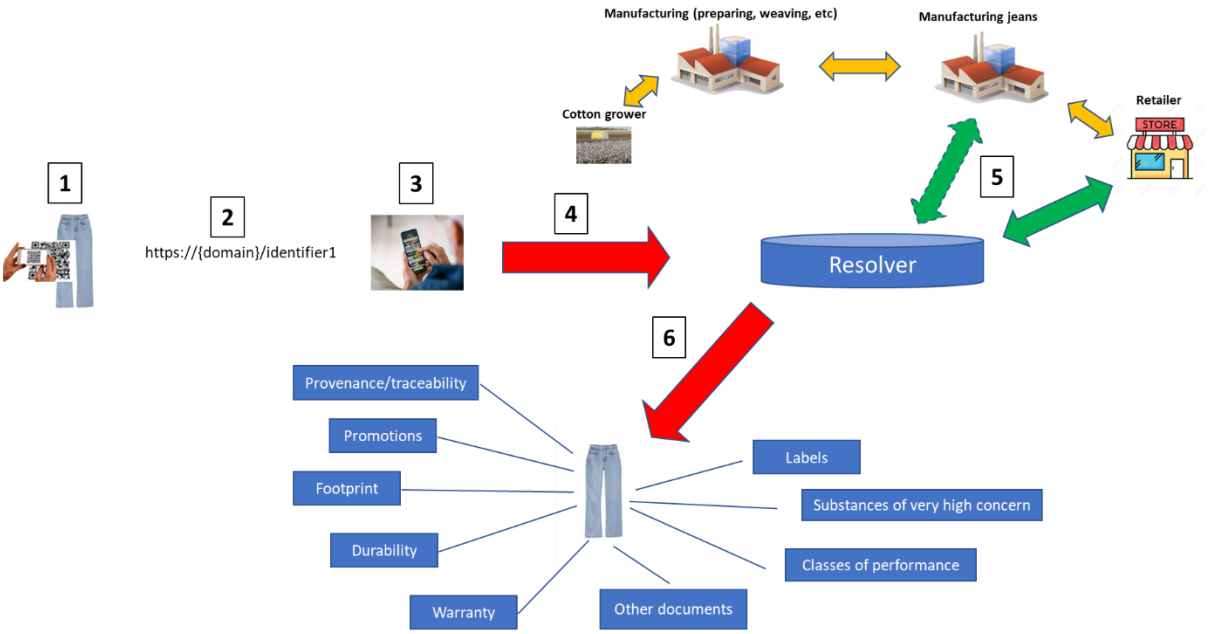

Figure 3 Multi-function data carriers in action: the example of a pair of jeans.

[1] A user scans an unique identifier through an app; [2] the app reads the digital link identifying the product scanned and [3] asks back to the user to select what information (s)he is interested in. Once the selection is done this information is passed to the resolver that identifies the corresponding "link types" and [5] connects to the web pages where the different information is stored. [6] Once the information is accessed to, the resolver sends back to the user, via the app, the information selected to which the user has access rights.

Much of the software required to accomplish this is freely accessible, particularly the software libraries that handle the scan and the libraries that converts element strings to the link. As a result, any app developer is likely to be able to construct an app, or even better, add new functionality to a current app, enabling the read of the European digital product passport.

Open source tools and developer's documentation are freely available on the web[622].

Persistent uniform resource locators (URL)

The following description of an Uniform Resource Identifier (URI) can serve as an example for an option implemented with current technology. The final decision will be taken after a further analysis/study that will be done by the upcoming DEP project and other studies.

URI is a short, unique string of characters that uniquely identifies an abstract or physical resource. The increasing growth of open data and the goal to promote its interoperability have resulted in an increased dependence on URIs as identifiers for a broad range of concepts.

In order to enable long-term availability of the information connected to the EU DPP, it is important that the URL connected to the data carrier is persistent. Persistent URIs should not include file extensions or technologies. Many URI sets will be published and de-referenced programmatically and this will be done using a particular technology. 15 years ago it would

[622] For example at *https://github.com/gs1*

probably have been done using Perl, 10 year ago it would be done with PHP, today it might be with Python, Ruby, ASP.Net or any number of alternatives. Even something as seemingly stable as .html should be avoided. A document might be published today in HTML but in 20 years, maybe HTML8 will be so different that the file extension .html8 becomes common and some important documents might get updated accordingly. File extensions often reveal the technology used to create the resource and few things change as rapidly as technology. It follows that query strings should always be avoided too. So, something like http://example.com/getId.aspx?id=7is almost guaranteed to be ephemeral. Better to establish a URI such as http://example.com/id/7and let the server deconstruct it and return the relevant data through whatever technology is in use at the time, which can be updated as required with no change to the URI[623].

An example of pattern for a URI designed for persistence is[624]:

http://{domain}/{type}/{concept}/{reference}

where,

{domain} is a combination of the host and the relevant sector. It is a matter of choice whether the sector is defined as a sub-domain of the host or as the first component of the path.

{type} should be one of a small number of possible values that declare the type of resource that is being identified. Typical examples include: 'id' or 'item' for real world objects; 'doc' for documents that describe those objects.

{concept} might be the type of real world object identified, the name of the concept scheme, etc.

{**reference**} is a specific item, term or concept

This comes originally from Designing URI Sets for the UK Public Sector[625]. The rules to be implemented to ensure permanence of the URL used in association with the data carriers shall be formalised in an open global standard. Other examples of persistent URIs are available in the Inspire Directive[626] and in a guideline developed by the Flemish Administration[627].

Granularity

The EU DPP should allow the different market actors to perform the following three tasks:

- Introduce relevant information in the system;
- Capture the information in a unique identifier;
- Allow access to information on a “need-to-know” basis.

The granularity of the system, meaning at which level the unique identifier is placed, should be appropriate for the product group and the typology of information that is most relevant to be made available. While more granularity improves accuracy, it also adds complexity (more

[623] ISA, Interoperability Solutions for European Public Administrations – D7.1.3. “Study on persistent URIs, with identification of best practices and recommendations on the topic for the MSs and the EC”, 2012
[624] idem
[625] Available at https://www.gov.uk/government/publications/designing-uri-sets-for-the-uk-public-sector
[626] https://inspire.ec.europa.eu/implementation-identifiers-using-uris-inspire-%E2%80%93-frequently-asked-questions/59309
[627] https://joinup.ec.europa.eu/sites/default/files/document/2018-03/URI_Guidelines_Flanders_v0.9.pdf

unique identifiers to use and maintain) and costs, both internally and across the value chain (in transformation processes and shipments).

There are three main levels of identification for the information related to a product (granularity of the traceable asset):

- **Class-level**, for example used for tertiary packaging (e.g. boxes). All items of a particular category are identically labelled. It allows to distinguish one product from another but not of distinguishing two identical products of the same category. This is generally the least expensive method of marking since the marking may be included into bulk-printed package artwork. It gives the ability to see where different products are used along the supply chain and to collect statistics based on product counts. However, because all events related to a particular item are indistinguishable at this level, true tracing is not possible only based on unique identifiers at class-level. Class-level information is relevant for all features that are defined at the design phase and are identical for all items of the same model, such as energy and resource use, durability or maintainability.
- **Batch/lot-level**, used for products that show similar characteristics and that may not require serialisation. All products of a certain sort within a batch/lot are identically labelled. An information system is capable of distinguishing not just one product from another, but also two items of the same type from different lots/batches. However, it does not allow for the differentiation of two identical items within the same batch/lot. This is notably beneficial in business operations that deal with batch-by-batch quality concerns, such as a product recall due to a contaminated batch/lot, and to the computation of the environmental or social impact of a batch, which depends on the decisions taken in the production phase on the sourcing of the materials and parts of that batch. Traceability at the batch/lot level enables to determine the locations across the supply chain where a particular batch/lot has been transported, as well as the amount of goods present from that batch/lot.
- **Item-level**, used for products that have specific characteristics, changing from product to product, or that require serialisation. Each unique instance of a particular product is identified by a unique serial number, and therefore the combination of the class-level and serial numbers creates a globally unique identifier for a single product instance that is distinct from all other physical things in the universe. This enables the tracking or tracing of specific product instances, and hence the exact correlation of observations made at various points throughout the supply chain. This is advantageous for items with a lengthy product lifespan, as traceability requirements extend to business activities associated with the product's usage and maintenance. The benefit of instance-level identification is that the identifier reflects a single unique instance that may exist in just one location at a specific point in time. The other identification levels permit the existence of numerous instances or quantities (fixed or variable measure) bearing the same identifier at various places at a given moment in time, therefore limiting the quantity of knowledge about the instance(s).

While serialisation is not always necessary, it would enable the tracking of individual products as they move through the supply chain. Serialisation is the process of serialising

anything, whereas "unique identification" is the process of creating and applying codes or serial numbers that can be used to uniquely identify each particular instance of a given object.

The "serial number" (which may be numeric or alphanumeric in nature) is allocated to each instance of an entity for the duration of its existence; it may be created consecutively or randomly and may be expressed in human-readable (e.g. alphanumeric text) or machine-readable form.

While it is up to each economic operator to identify the most suitable level of granularity to be used for their own operations and products, the Commission could, when developing product-specific SPI measures, identify certain specific needs, for example related to the requirement (or not) to introduce a serial number to identify each single product item.

Data access models

There are several data access models based on different technical architecture concepts. Two of those are:

- Client – server, where the different participants in the system can either push the information (i.e. one-way transfer of data initiated by one economic operator) onto the repositories or the information is pulled from the economic operators.
- Distributed, loose architecture, with multiple layers based on Internet protocols. Such a system requires the establishment of well-defined entry points for economic operators. These could be automatic (e.g. through Application Programming Interfaces or APIs), manual or semi-automatic. Data availability (including the required data replication) as well as the integration technology could be left to each economic operator.

The advantages of the client/server model include, among others, tighter control of the system and the data, but its scalability is severely limited, the integration costs are usually higher and it is fairly obsolete, rendering such a system unfeasible.

The internet-based data access model is scalable, secure –if properly designed-, flexible, and cost-effective. Such a system requires setting up a data architecture, that would comprise management, governance and, if needed, migration of the data. It is suggested to use such a system that could be designed using the principles of the Open Group's TOGAF 9.2 standard[628].

Specific care should be taken to ensure that any data entry into the system does comply with the interoperability constraints placed on the EU DPP data. This implies that the software enabling entry of EU DPP data into an IT system shall be controlled and approved to ensure this interoperability. Similarly, restrictions should be placed on the right for a company to change or erase data after certain deadlines are reached, such as the placement on the market of a given product class, or the end of production of a given batch or item.

[628] The TOGAF® Standard, Version 9.2 (opengroup.org)

Management of access rights and identity

Two possible scenarios are foreseeable with reference to EU DPP access rights:

a. Access on a "need-to-know" basis

b. "Open access"

In both cases, when developing the product specific SPI measures, the Commission, in close coordination with relevant stakeholders and enforcement authorities, will identify for each attribute the corresponding access rights based on the role of the different actors along the supply chain (public, authorities, manufacturers and importers, recyclers/remanufacturers). Authorities would have access to the totality of the information included in the EU DPP (track & trace information + all attributes).

To clarify how access rights would be granted in practice, let's suppose the European Commission is developing the EU DPP for a "desktop computer".

1. Access on a "**need-to-know**" basis.

   The EU DPP would contain information that is common to all products (e.g. name of the manufacturer), including the track and trace information pointing to sub-components of the product and the main events it has gone through. It will also contain information relevant only for "desktops", like the operation manual, the availability of spare parts, how can the desktop be disassembled or even the bill of materials.

   In the case of "need-to-know", sensitive information will only be seen by public authorities and other companies in the value chain -like recyclers-, beyond the manufacturer. Other information will be generally available to the public, who can consult it, but can only be introduced and modified by the responsible manufacturer or importer.

   The following table lists the common and specific parts that would comprise the EU DPP for desktops:

Table 101 Illustrative example of access role and rights for the EU DPP on a "need-to-know" basis.

Information	***Typology of information***	***Roles***	***Access right[629] & scope[630]***
Name of the manufacturer	Common part/Key identifier	Public (P)	Read
		Manufacturers & Importers (M&I)	Create/Change (limited to their company)
		Authorities (A)	Create/Change (limited to the territorial scope of the authority)
GTIN (Global Trade Item Number)	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read
TARIC	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read

[629] "Read" Access means that the role (e.g. public, manufacturer, importer, public authority) can read the information concerned (e.g. TARIC, manuals) in the EU DPP but cannot create it or change it. "Create/Change" means that the role can read, create and change the information in the EU/DPP. "No access" means that the role has no access to the information (e.g. TARIC, manuals)

[630] Scope indicates if there is a limitation to the access right (e.g. read/create/change). Potentially, a public authority could have access to all the information needed to exercise market surveillance for products in its own market.

Information	*Typology of information*	*Roles*	*Access right[629] & scope[630]*
Documents supporting legal compliance	Common part/Key identifier	P	No access
		M&I	Create/Change (company)
		A	Read
Track & trace	Common part	P	No access
		M&I	Create/Change (company)
		A	Read (territory of Public Authority)
Manuals	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Environmental footprint	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Spare parts availability	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Recycled content	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Bill of materials	Attribute	P	No access
		M&I	Create/Change (company) Read (supply chain)
		A	Read (territory of Public Authority)
Sleep mode power demand	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Substance of concern included in the plastic components	Attribute	P	No access
		M&I	Create/Change (company) Recyclers / remanufacturers can access all
		A	Read
Dismantability instructions	Attribute	P	No access
		M&I	Create/Change (company) Recyclers / remanufacturers can access all
		A	Read

In case a consumer takes the desktop to a repairer, it could scan the data carrier attached to the desktop and –given the access rights the repairer has- download the necessary information to perform the repair. In this case public authorities and manufacturers, importers, recyclers, remanufacturers would have to be registered and use their credentials to access the system. Other stakeholders, like consumers or CSOs would not need any registration, but they will only have access to the public information. The registration process could be handled either by a separate system developed and operated by the European Commission, or could be left to the market once a set of technical specifications are established to allow for interoperability.

2. "**Open access**" basis. According to this scenario, most of the information would be available to every operator that scans the data carrier. A limited amount of data will remain only be accessible to the Commission and enforcement authorities.

In the case of the desktop repair described above, only manufacturers, importers and public authorities would have to be registered. All others (public, recyclers, and remanufacturers) would have open access to the system.

Applying this scenario to the same "desktop" may result in the following access rights:

Table 102 Illustrative example of access role and rights for the EU DPP on an "open access" basis.

Information	***Typology of information***	***Roles***	***Access right & scope***
Name of the manufacturer	Common part/Key identifier	Public (P)	Read
		Manufacturers & Importers (M&I)	Create/Change (limited to their company)
		Authorities (A)	Create/Change
GTIN (Global Trade Item Number)	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read
TARIC	Common part/Key identifier	P	Read
		M&I	Create/Change (company)
		A	Read
Documents supporting legal compliance	Common part/Key identifier	P	No access
		M&I	Create/Change (company)
		A	Read
Track & trace	Common part	P	Read
		M&I	Create/Change (company)
		A	Read
Manuals	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Environmental footprint	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Spare parts availability	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Recycled content	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Bill of materials	Attribute	P	Read
		M&I	Create/Change (company) Read
		A	Read
Sleep mode power demand	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Substance of concern included in the plastic components	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read
Dismantability instructions	Attribute	P	Read
		M&I	Create/Change (company)
		A	Read

The EU DPP would also require an identity management system that a) is able to identify which users can have access to the system, and b) grants access rights to each user. If, in the example above, a user moves from company A to company B, the user should be able to edit information belonging to company B but not to company A.

The identity management system will use existing identity systems (e.g. eIDAS), thus reducing development costs.

Consumer Protection, Security, Privacy and Malicious content

The architecture of the European Digital Product Passport should be built in a way that commercial actors will not be able to interact with the consumer via spam, notifications, targeted advertising or any type of unwanted or personalised publicity. The EU DPP should not be a means to facilitate tracking, profiling or any other type of monitoring of consumers preferences or behaviour.

This would go against the core objectives of the EU DPP and, possibly, undermine the trust and the interests of consumers in using it.

Operation of the EU DPP will require standard security management practices, based on existing standards such as the family ISO 2700X. As a minimum, all sensitive information should be stored and sent encrypted. Given that this is a standard business practice it will not increase neither development nor operation costs.

Long term data availability

The economic operator responsible for placing the component/product on the market could identify a third-party independent service provider that acts as a back-up data repository for all the information (track & trace information and attributes) attached to the corresponding EU DPP. The details of the back-up data repository could be included as key information in the central registry managed by the European Commission.

The data supplied on the technical back-up infrastructure should be identical to those present on the Digital Product Passport. They should be updated at a frequency that ensures this identity of content to be maintained over time.

Operators of such backup services could be subject to requirements regarding:

- Their technical ability to ensure data security and integrity;
- Their financial independence and sustainability;
- Their capacity to ensure the compliance of the data entered in a mirror of the DPP with the technical requirements placed on that data (specifically: regarding interoperability);
- The provision to guarantee access to data, restricted to the Commission and to Market Surveillance and Customs Authorities.

This solution could ensure the **technical backup** and hence the safety of the data in case of bankruptcy or technical failure (including because of fire, flooding, earthquake) of the economic operator placing the product on the market and the data collected along the supply

chain. If one of such event happens, the Commission, a market surveillance authority or a customs authority should have direct access to the information stored in the back-up data repository.

An alternative option could be to have the data present only once in the system, with no replication made for data safety or security. This is obviously a cheaper option, but not in line with the general practice regarding high-reliability IT systems, nor with the level of data safety and security to be expected from the EU DPP infrastructure.

Data authentication, reliability and integrity

Whatever open standard is chosen, it shall also support the possibility of authentication and authorisation features to guarantee that only the economic operators who have introduced the data are also able to modify or delete them from the repository, with all the changes recorded in an audit trial.

The most relevant information could require an independent third-party to strengthen the reliability of the information provided. The details about the choice of the information requiring third-party verification and the verification modalities could be established when developing the product-group specific SPI measures.

The envisaged authentication and authorisation capabilities shall allow guaranteeing that competent authorities and the Commission have full access.

Any moving data through a network must use secure, authenticated, and industry-accepted encryption mechanisms and order security initiatives as such, data should be encrypted via application level, data traffic must be transmitted over Secure Sockets Layer (SSL), using only strong security protocols, such as Transport Layer Security (TLS), the connection between the database storage and application should also be encrypted end-to-end.

Track & trace information and attributes

The EU DPP includes two typology of information:

a) **Track & trace** are a set of information related to the producer and events related to the track and tracing along the value chain;

b) **Attributes** are information specific to the sustainability, circularity, compliance history and other technical characteristics of the component, or product.

The track & trace information belongs to five main categories:

1. **Who**, it identifies the entity that is engaged in the handling processing, possession, or ownership of items as they move through the supply chain. Where it is necessary to differentiate the entity and their involvement in the process, this should be included;
2. **What**, it may this information may relate to both individual goods and product shipments. Additionally, it may contain other physical or virtual things such as manufacturing processes, modes of transport, equipment (including returnable transportation goods), and documents.
3. **Where**, it specifies the location where these movements or events took place. Uniquely identified locations are critical to understanding the path an object takes across a supply chain.

4. **When**, the chronology of an object's journey through the supply chain is determined by the date, time, and time zone when a particular event happened.
5. **Why**, it gives the business context for the events that have taken place. A dispensing event may show that a specific medication was provided to a patient, while shipping and receiving events reflect changes in a chain of custody or ownership. Transformation events in manufacturing occur when one or more ingredients are permanently mixed to produce one or more new outputs or products.

Examples of track and trace information that could be included in the European digital product passport are:

a. the manufacturer's name, registered trade name or intellectual property right (e.g., trade mark);
b. the global trade item number or equivalent;
c. TARIC Code;
d. Global location number or equivalent;
e. Documents/information supporting legal compliance
f. Name, contact details and unique identifier of the authorised representative based in an EU Member State and/or person responsible for regulatory compliance;
g. Name, contact details and other references of the service provider acting as technical back-up data repository, permanent URL of the technical backup.

The track & trace information could be the only one that is systematically sent to the central registry managed by the Commission.
The attributes are the "core business" of the EU DPP, as they include all the information related to sustainability, circularity and other technical characteristics of the component, or product.
Examples of attributes that could be included in the EU DPP are:

a. Size, color,
b. Net content and unit of measure;
c. picture of the model based on standards
d. Content of substances of concern;
e. Recycled materials
f. Information related to due diligence in supply chain
g. Life cycle environmental footprint (including carbon footprint)
h. Technical parameters
i. Information on durability and reparability

The attributes could not be sent to the central registry. However, in order to carry out market surveillance, customs and other controls, in case of impossibility to have access to the attributes directly through the scanning of the data carrier, the enforcement authorities and the Commission should have access to the attributes through the technical back-up data storage facility of the economic operator that places the material, component, product on the market or puts it into service (the references of which is one of the track & trace information).

EU DPP central registry

The EU DPP central registry could be a thin centralised registry similar to the old "phone book". It could include the "Track & trace" information component of the passport, like for example the name of the producer, the unique trade number, the TARIC code, the reference of where the back-up information is stored.

The central registry would not act as "entry point" for users looking for EU DPP information (that access may go directly through the decentralised access system). The registry would be used by the Commission, Member States, market surveillance and custom authorities for:

- Running statistical analyses for internal purposes;
- Have the references (digital link) to the location of the back-up storage, in case there are technical difficulties to access the manufacturer's data or, for example, in case of bankruptcy.

The operational running of the central registry could be externalised to an external service provider in order to limit Commission involvement.

Operating Authority of the European digital product passport

The Operating Authority of the European digital product passport may be a public entity established at the scale of the European Union, in charge of:

- setting up and operating the "EU DPP central registry",
- granting the access rights to different stakeholders,

The role of the operating authority could be played by the Commission, directly or identifying an independent service provider, or one of the European executive agencies.

Governance of the European digital product passport

The governance of the European digital product passport is the set of rules on "who decides on what and how".

Roles in the system

The roles in the system could be the following:

1. Operating Authority of the European digital product passport;
2. Manufacturer or provider of product;
3. Importer and distributor;
4. Retailer, including second-hand seller;
5. Consumers, consumer associations and NGOs;
6. Maintainer or repairer of products;
7. Re-manufacturer of products;
8. Recycler;
9. Enforcement authority;

Nature of decisions susceptible to be taken

The decisions for which such rules are to be defined could relate to:

a) The governance rules themselves and their evolution over time;
b) The functional requirements placed on the EU DPP;
c) The definition of roles in the system;
d) The requirements placed on entities to be granted each role;
e) The definition of the categories of information in the system;
f) The nature of the information to be placed on the EU DPP, for each category;
g) The format of the information to be placed on the DDP;
h) The point in the course of their economic activity at which each role will gain access to the information to be placed on the DPP (e.g. for consumers, before or after purchase).
i) The measures ensuring the comparability of the information present on the EU DPP (e.g. measurement methods);
j) The measures ensuring the veracity upon writing of the information introduced on the EU DPP (e.g. third-party verification schemes);
k) The measures ensuring the integrity of the information present on the EU DPP once written;
l) The rights on information for each role and for each category of information: knowing the existence of the information, read, write, erase;
m) The allocation of a role to a given entity and the withdrawal of that role;
n) Evolutions of security features.

Bodies susceptible to take decisions

The bodies susceptible to take decisions could be:

- The EU legislator;
- The European Commission, under a delegated or implementing act;
- Member States;
- The Operating Authority of the European digital product passport;
- The European Standardisation Bodies CEN, CENELEC or ETSI;
- International ICT standardisation bodies, be they institutional (ISO, IEC) or based on private consortia.

Costs and Benefits assessment

The lack of a standardised way to communicate information entails costs for both producers and retailers. Producers/brand owners devote important resources (in the area of thousands of hours per year) to provide data to retailers in a wide range of formats. Retailers, for their part, spend significant time verifying data, collecting information from multiple sources to identify missing or inaccurate data and to synchronise formats and requirements across online and offline channels.

Figure 4 Challenges and concerns for brand owners and retailers due to the lack of standardised information along supply chains (Source: Mckinsey 2020).

SKU stands for stock keeping unit. It is a distinct type of item for sale. SKU can also refer to a unique identifier or code, sometimes represented via a barcode for scanning and tracking, that refers to the particular stock keeping unit.

The availability of a set of standards to communicate relevant information across the industry will have direct cost benefits especially in sectors for which the online shopping is becoming relevant. This so-called "omni-channel shopping experience" will be more seamless, and managing and exchanging product data will be faster, easier, and cheaper[631].

Based on forecast studies (McKinsey 2020), first movers are expected to see up to 5 to 10 percent improvement in online sales due to better data availability and product searchability in the near term. Moreover, the increase amount of information related to a product available for consumers before purchase, could lead to fewer product returns. This benefit will be especially important in categories such as apparel, where online sales and return rates can reach 25 percent. According to the same study, producers expect a standard data model exchange as the one enabled by the EU DPP, to reduce the efforts required in data preparation by 40 to 60 percent—saving some companies tens of thousands of work hours a year.

[631] McKinsey & C. "Want to improve consumer experience? Collaborate to build a product data standard", April 2020.

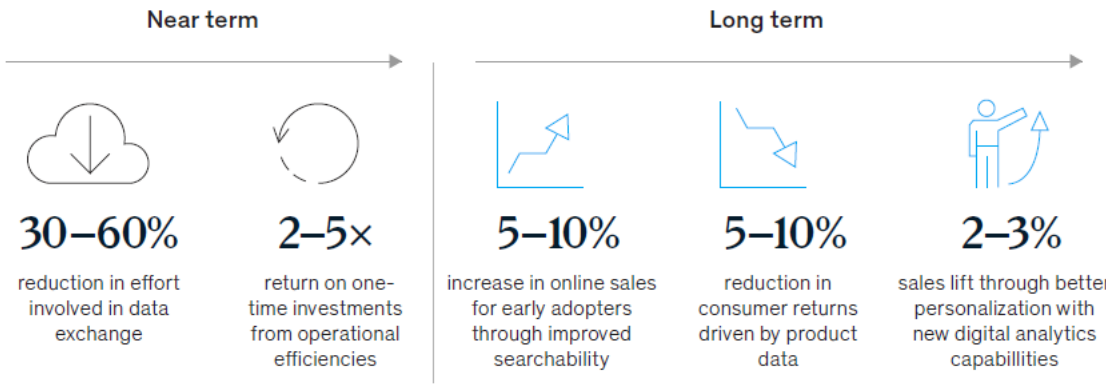

Figure 5 Some of the expected benefits from EU DPP implementation for producers and retailers (McKinsey, 2020)

Even without standard data formats and systems, the benefits for companies of implementing tracking and tracing systems for their products is clear from their wide adoption. Apart from the obvious advantages in terms of stock control, logistics and marketing, Accenture[632] have identified further reasons that this is considered important. Their research showed that 63% of consumers refuse to buy products and services from companies they do not trust. 31% of CEOs mention supply chain complexity as a top-three business risk. They also found that maintaining consumer trust has a potential value in protecting sales from boycott of $5bn per annum and a potential $10bn in mitigating product recall costs. They calculated $9bn of revenue potential across the overall consumer base in traceable products, and potential savings of $26bn in operating costs through improved standards.

The deployment of the EU DPP entails some one-time investment from all companies who will need to adopt and implement the protocols and standards developed to make the EU DPP operational. The different actors along the value chains need to analyse gaps between the data models they use today and the EU DPP model. This analysis will help identify necessary changes in the systems they use to create and exchange product.

Cost estimation and cost allocation are critical elements in the adoption and implementation of the EU DPP. Effective and efficient public and private incentive structures, as well as accountability measures, also play a significant role.

The EU DPP, if designed in line with the indications provided in the sections above, reduce the need for significant investments in systems and technology for data input, product labelling, and different degrees of process, product, part, and component verification at all stages of the value chain. In reality, the investment's usefulness will be determined by how much each company has already implemented some (or all) of the required components.

Many players seeking traceability are concerned about these expenses, particularly non-vertically integrated businesses, brands, and SMEs.

Costs associated with the European digital product passport deployment can be classified into two categories:

[632] Accenture Strategy – "Trust, Transparency and Traceability: Creating business value through enhanced trust and reduced risk across the value chain" (2016) https://www.accenture.com/t20160729t074954__w__/cr-en/_acnmedia/pdf-27/accenture-trust_transparency_infographic.pdf

(1) CAPEX costs, associated with the cost of system's equipment, installation, installation support and implementation.
(2) OPEX costs include operation of the system, data collecting, enabling data interchange across systems, inventory management, and labelling.

Additionally, expenses associated with fulfilling sustainability verification requirements like certification or auditing may exist, but are not necessarily related to the EU DPP per se, as these verification requirements could be enacted even in the absence of the EU DPP.

The costs related to the acquisition/calculation of the attributes to be added to the European digital product passport (e.g. amount of recycled content, environmental footprint, testing certificates, etc.) are not included in the assessment costs, as such information would be identified as a requirement in the SPI measures, and would be incurred by companies also if the European digital product passport is not implemented.

There are very few examples of European digital product passports already deployed by public authorities to look at in order to extrapolate cost-related information. Most of them are in Europe: the traceability system for tobacco products, the identification system for medical devices, and more recently and still under development, the European digital product passport for industrial and electric vehicle batteries.

However, a direct correlation between the costs estimated for these three legislations and the SPI EU DPP is not possible, not only because they have different objectives (especially true for tobacco and medical device systems) but mostly because the design of the systems, and therefore the specific requirements and needs, are very different. All of the above-mentioned trace and tracking systems are largely based on centralised systems (a semi-centralised one for batteries), whilst the European digital product passport for SPI has been conceived as a decentralised system. This choice leads to major cost reductions for the Commission compared to a centralised system, but the lack of equivalent data does not allow a full quantification of those savings.

Moreover, as already mentioned, a large number of companies already use track and tracing systems, meaning that the costs related to the IT infrastructure and, partly, to data collection is expected to be much lower compared to a company that is starting from scratch.

Therefore, the figures provided in Annex 10 should only be considered as a reference, as the real costs will change depending, among other things, on the product group, the availability of standards and data, the need to include dynamic information, the number of components, the IT readiness of the different economic operators.

Marking products with a unique identifier

The marking of a product with a unique identifier involves the following tasks:

- Generation of the unique identifier(s) at the required level of granularity (single item, batch, class level);
- Application of the unique identifier;
- Optical verification if the unique identifier(s) have been correctly applied (e.g. random test to check conformity with ISO/IEC 15416:2016 on unique identifiers' readability).

All three tasks outlined above are the responsibility of product manufacturer and importers. Where following supply chain operators, such as distributors, aggregate (or re-aggregate) the

products, the operators in question is permitted to create unique identifiers themselves or request them from the manufacturer. These operators are subsequently be tasked with the responsibility of applying and validating them to aggregated packaging.

The cost of creating the unique identifier is very low and proportional to the number of codes requested[633]. The UI issuing cost could become higher in case of serialisation, as it happened for the tobacco products. In that case, the cost is at minimum of 0.39 € for 10.000[634].

Numerous experts consulted emphasize the critical nature of using open and worldwide standards in order to maximize the global efficacy of a tracking and tracing system. According to experts, the deployment of proprietary solutions by certain businesses or sectors would jeopardize the European digital product passport's overall compatibility. Thus, the possibility of delegating responsibility for the creation and use of unique identifiers to industry is coupled with a clear constraint on the standards to be utilised.

Along with standardisation information and since the European digital product passport is based on open standards, these data exchange standards must include authentication and authorisation capabilities that ensure economic operators cannot alter or remove data from the repository.

The economic impact of permitted data carriers on manufacturers and importers is determined by the cost of adapting their manufacturing processes to include printing and affixing operations. It is anticipated that each manufacturing line would print just one data carrier, and that some economic operators will have to modify their lines.

As previously mentioned, the manufacturer's cost related to marking a product with a unique identifier is dependent on which of the three possible situations is considered:

- Economic operators already own the required equipment and may easily print or attach the data carrier.
- Economic operators own comparable equipment and may configure it for printing or affixing the permitted data carriers.
- Economic operators lack the required equipment, which they must include and integrate into their manufacturing processes.

In Table 103 are reported the costs used for the tobacco tracing impact assessment[635]. These costs are expected to vary depending on the sectors, the size of the companies, the kind of data carrier, and the level of current implementation of track and trace systems, and therefore serve only as an illustration.

[633] GS1, personal communication.
[634] The cost vary from Member State to Member State, depending on overheads.
[635] Commission staff working document (2017) 455 final

Table 103 CAPEX unitary costs for the printing and checks of the unique identifier.

Task	***Type***	***Minimum***	***Maximum***
Primary product printer and verification equipment (including installation)	High speed production line	290,000 €	355,000 €
Primary product printer and verification equipment (including installation)	Low speed production line	30,000 €	57,000 €
Aggregated packaging (e.g. carton) printer and verification equipment (including installation)	High speed production line	112,166 €	112,166 €
Aggregated packaging (e.g. carton) printer and verification equipment (including installation)	Low speed production line	6,000 €	9,000 €
Tertiary packaging (e.g. pallet) printer and verification equipment (including installation)	All manufacturing facilities	3,000 €	3,000 €
Equipment for reading the data carriers – 1 computer + 2 optical readers (check and control system)	All manufacturing facilities	10,000 €	10,000 €
Company server and software	All warehousing facilities	6,000 €	6,000 €
Serial number generation (when serialisation is required) – cost per item		0,000229 €	0,000628 €

Table 104 OPEX unitary costs for the printing and verification of the unique identifier.

Task	***Minimum***	***Maximum***
Operational cost per item printed	0,00015 €	0,0006 €
Operational cost per carton/pallet printed	0,0021 €	0,0021 €

Processing, storing and sharing data

To enable efficient monitoring and enforcement operations, the Commission, national competent authorities, and any designated external auditor must have full access to the data (and any underlying calculation/information) contained in the European digital product passport.

The economic operator responsible for placing the component/product on the EU market shall store the information included in the European digital product passport as part of their own data storage facility and appoint an independent party to act as technical back-up data storage provider.

In terms of sharing data along the supply chain, there are relevant standards (e.g. ISO 19987:2015 EPC Information services) that defines how to exchange information on the different supply chain events that may occur (e.g., dispatch, receipt, goods movement, trade, and (dis-)aggregate). This standard covers both the data model and the technical communication methods used to transmit this data safely. ISO/IEC 19987:2015 EPC Information services is considered the best reference standard based on its completeness, flexibility and proved functioning in international supply chain production systems.

The cost of data storage is mostly determined by the sizing estimation, which is based on a standard data model that contains information about the average size of various messages. As a result, the charges are independent of the actual goods reported, as they just indicate alternative identities.

The estimates below are based on the average size of each message type and conform to the ISO/IEC 19987:2015 EPC Information services standard.

Table 105 Assumptions regarding the estimation of the data storage sizing[636]

Assumption	Value (in bytes)
Average message size when reporting a traceability event at unit level.	1,024
Average message size when reporting an event with aggregation information.	3,072
Average message size when reporting an event about reverse logistics or repackaging.	3,584
Average message size, in bytes, for exchanging trade information.	10,240

The data storage sizing requirements change depending on the product groups and the number of events to be recorded by each economic operator. As a matter of example, for the tobacco products the number of unique identifiers released each year is around 29 billion. This is equivalent to an expected yearly storage capacity between 32 and 100 TB.

For the tobacco products this led to an estimation of costs of around 161.5 million Euro (CAPEX) and 5 million Euro (OPEX). This is equivalent to an annualised cost of about 8 million Euro, i.e. 0,00026 € per item marked.

Administrative costs for the Commission and national authorities

One component of the economic burden on public authorities is determined by the cost of the equipment required to conduct inspection and control operations properly (scanners and verification equipment). According to the previously done impact assessment (e.g. for the tobacco products track and tracing system), there are many kinds of scanners that allow the reading of a range of various forms of data carriers depending on their nature. As a result, the effect is proportional to the quantity and kind of data carriers to be used for the European digital product passport.

As far as the cost of running a central registry, it is only possible to indirectly assess this cost through extrapolation of the costs incurred to implement the central registry for the tobacco products track and tracing system. However, a decision, if such a central registry is adequate and of added value, will be decided upon at a later stage.

According to Regulation 2018/574[637], the tobacco products central registry (called secondary repository) has the following tasks:

[636] This information is extracted from the Commission SWD (2017) 455 final

[637] COMMISSION IMPLEMENTING REGULATION (EU) 2018/574 of 15 December 2017 on technical standards for the establishment and operation of a traceability system for tobacco products, OJEU L 96/7 16.04.2018

a) it contains a copy of all data stored in primary repositories;

b) it provides for graphical and non-graphical user interfaces that enable Member States and the Commission to access and query the data stored in the repositories system. In particular, it allows:

    a. retrieval of any information concerning one or multiple unique identifier(s), including the comparison and cross- checking of multiple unique identifiers and the related information, in particular their location in the supply chain;

    b. creation of lists and statistics, such as product stocks and inflow/outflow numbers;

    c. identification of all tobacco products that have been reported by an economic operator to the system, including the products reported as recalled, withdrawn, stolen, missing or intended for destruction.

c) it shall allow for the receipt, storing and making available of offline flat-files for the purpose of updating verification devices used by Member States for offline decoding of unique identifiers;

d) The provider of the secondary repository shall set up and manage a router.

For the tobacco registry the cost[638] is estimated in the order of **1.4 € per ten thousand unique identifiers**.

However, due to the specificities of the products in scope and the objective of Regulation 2018/574 (combating illicit trade in tobacco products), the centralised nature of the system (and the related need to host a duplication of all data), and the additional features requested, the costs of the tobacco products central registry are expected to be higher than the costs to run the EU DPP central registry.

The exact costs will depend, among other things, by the number of identifiers processed on a yearly basis, the amount of data to be included in the track & tracing system, the availability of statistical analysis tools.

Incentives

Financial incentives include both positive and negative economic and fiscal incentives that governments may use to promote value chain traceability and transparency.

Several of these potential incentives include the following:

- Financial assistance for technical innovation in the digital domain
- Infrastructure investments, both physical and digital
- Direct financial incentives for developing interoperable systems and digitalization
- Financing loans and grants with preferential terms based on traceability and transparency requirements

[638] DG SANTE, confidential information

- Financial support for feasibility studies and pilot initiatives, with a special emphasis on value chains with a high proportion of SMEs.

The Commission and Member States should provide financial and fiscal incentives (both positive and negative) to encourage the establishment and implementation of value chain traceability and transparency systems, particularly for micro and small businesses, producers, and other vulnerable groups such as women, young workers, home-based workers, and migrant workers.

In particular, SMEs integration can be facilitated through a combination of financial and non-financial incentives, including increased market access, facilitated payments, specialized managerial and workforce training, infrastructure investment, expedited processes, and public visibility. Additionally, technical and organizational assistance should be provided.

Moreover, non-financial incentives should be provided, such as steps to ease market access, fast-track procedures, environmentally and socially responsible public procurement criteria, specialized management and worker training, public exposure, peer-learning, and non-financial reporting requirements.

Annex 19: SME Test

(1) Preliminary assessment of businesses likely to be affected	
• SMEs are among businesses likely to be affected by SPI. If the Ecodesign legislation is extended to several priority groups (part of CEAP), SMEs will be affected to the extent that they are part of the value chain of these product groups: o Textiles, wearing apparel and leather and related products (35% SMEs by turnover, 23% by employment[639]) o Chemicals (29/39%) o High impact intermediary products, such as steel (basic metals: 24/29%) o Motor vehicles and other transport equipment (6/14%) o Furniture (64/71%) • A shift of activity from the processing of primary towards secondary raw materials and from production of products to maintenance, reuse, refurbishment and repair is expected to benefit SMEs significantly because they are more active in these sectors.	(See Annex 10, analysis of PO2 and PO3)
(2) Consultation with SMEs representatives	
- A first dedicated SME consultation from April to June 2021 received 332 responses, with 90% of the respondents being Enterprise Europe Network (EEN) members. Over 50% of the businesses are located in four EU Member States: In total, 17 countries are represented. 56% of the companies are active in industry, followed by services (21%), wholesale and retail (11%) and construction (3%). - SMEs also had the chance to express their views in 7 workshops organised by the Commission as well as through the open public consultation (OPC). In the OPC, 64 SMEs (representing company/business organisation with less than 250 employees) participated. The majority of these SMEs (65%) produce intermediate and/or final products, with the remaining involved in other business, such as services. 81% of the SMEs responding to the OPC are located within the EU and 21 countries are represented. - A second targeted SME survey was launched in October 2021 and lasted 2 weeks. It built on the first SME survey described above and drew on the expertise of organisations representing SMEs (Enterprise Europe Network (EEN) contact points and other SME representative bodies) to	(See in particular summary of SME survey within Annex 2 Stakeholder consultation)

[639] Eurostat (2021). Structural Business Statistics. Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2). SBS_SC_SCA_R2.

gain a better understanding of the potential impacts on SMEs of some of the main options. The targeted survey received 35 replies. Responding organisation indicated they were located in the following EU Member States: Belgium, Denmark, Germany, Spain, Italy, Poland and Portugal.

Main conclusions of the OPC and first SME consultation:

Company environmental/social impact and engagement in sustainable products

- SMEs are engaged in the sustainable product transition and are to some extent aware of their impact. Most SMEs can estimate their environmental and social impacts at least to some extent, with 53% fully or to a large extent.
- Almost half of the SMEs are currently introducing more sustainable products to the European market frequently (24%) or almost always (21%).
- In terms of innovation activities, SMEs are more frequently engaged in sustainable product innovation compared to regular product renovation. SMEs are less frequently engaged in innovation concerning circularity, and to a lesser extent with innovation concerning social aspects and design aspects.

Internal market fragmentation

- 66% of SMEs (OPC, n=59) strongly agree or agree that products sold in the EU are not sustainable because there is no harmonised set of requirements to foster sustainable design of products;

Extending sustainability requirements for products

- More than half of SMEs participating in the OPC (56%, n=59) are in favour of setting binding rules at product group level to oblige producers to improve product durability, reusability, upgradability and reparability, in order to foster sustainability of products in the EU.

- 55% of SMEs in the OPC (n=57) are in favour of banning substance(s), such as those that inhibit product recyclability.

Circular business models

- SMEs are most familiar with green supply chain management, shorter supply chains and product-service systems where buyers do not necessarily buy a product but rather services associated to the product.
- SMEs are least familiar with sustainable design models and social models (giving model, social mission model, etc.). Of the established circular business models, SMEs are most familiar with recycling/ upcycling, reuse network, industrial symbiosis and customer advice on repairs.
- SMEs find that regulations and incentives both incentivise innovation in sustainable products (70% agree or strongly agree) as well as enable circular business models (69% agree or strongly agree). Sufficient access to financing also is a key enabler of circular business models according to

SMEs (66% agree or strongly agree) • According to SMEs participating in the OPC, the most effective circular business models are collaborative and sharing economy, reverse logistics and product-service systems. • SMEs participating in the OPC consider the lack of a clear regulatory framework to support circular business models (65% score at least 4 out of 5, n=54) and lack of consumer awareness of and responsiveness to circular business models (62%, n=55) to be major barriers to a successful deployment of these types of business models • During the second workshop on policy support for circular business models, stakeholders agreed that business support and network opportunities for SMEs and start-ups needs to be emphasised, particularly at regional level. *Economic and reputational incentives for product sustainability* • According to SMEs, the economic incentives with the greatest benefit are direct subsidies and other financial incentives (tax exceptions/VAT reductions) linked to products that meet certain sustainability criteria. This is followed by conditions attached to EU financing instruments and State aid; circular innovation vouchers; eco-vouchers; product standards, etc. • Sustainability labelling based on environmental, social and circularity impact as a reputation incentive are expected to have high benefits. • SME support facilities for development of circular business models patterns and Green Deals that combine support for the removal of regulatory barriers and R&D funding are also considered to benefit, but to a lesser extent. • SMEs responding to the OPC find the following incentives effective in the following order: modulation of fees on the sustainability of products under Extended Producer Responsibility schemes, improving access to finance for production and consumption of more sustainable products, better use of standardisation to promote sustainability, increase transparency on the performance of products, develop and implement mandatory Green Public Procurement criteria and targets, recognise voluntary commitments by producers to increase sustainability of products and better use and promotion of voluntary sustainability labels (e.g. EU Ecolabel). *Digital Product Passport* • The main environmental impacts expected from SMEs from the Digital Product Passport (DPP) are increasing the amount of products with low climate impact and lowering pollution levels, followed by gradually phasing out the use of environmentally harmful materials in product on the EU market and mitigating biodiversity loss. • The main social impact expected is increasing consumer empowerment due to greater availability of product information, followed by improving working conditions and reducing environmental crime at a global level. • In the first SME survey, approximately three times more SMEs agreed or strongly agreed that introduction of a DPP 'could contribute to higher economic returns for EU companies' than those that disagreed or strongly	

disagreed with this statement. • In response to the OPC, SMEs consider that the following information should be collected in a DPP (≥50% agree or strongly agree, in order of agreement): how product should be recycled/handled at end of life; instructions and safe use; product environmental and/or carbon footprint; presence of hazardous chemicals; relevant information for testing, disassembly, maintenance, repair or reassembly; economic actors at the origin of information; list of present materials/substances in product; expected lifespan of product; list of legislation and standards complied to by product; any possession of sustainability labels; recycled content of each material present in product; quantities of materials and substances present in product; information on origin of product components, results of compliance tests against legislation/standard/technical specifications, information on material sources, information relevant to re-manufacture and spare parts and social conditions along the value chain. • During the third workshop, focusing on Digital Product Passports, stakeholders brought up the concern that there should be a distinction between SMEs and large companies, since SMEs may lack the capacity to comply with the requirements of DPP. *Unsold consumer products* • SMEs are most likely to handle unsold consumer products by systematically discounting the price until they are sold to a customer or recovering materials from unsold products (or sending them to professional recovery/recycling services). Approximately 16% agreed or strongly agreed that such products would be sent to be incinerated or landfilled, while approximately half disagreed or strongly disagreed that this would take place. • SMEs participating in the OPC are supportive of fostering reconditioning and remanufacturing schemes (69%) as well as boosting more sustainable business models (59%) as additional measures to decrease the amount of unsold goods in the EU (n=51). • According to SMEs in the OPC, products that pose a health or safety risk should be excluded from a ban of the destruction of consumer products. *Market Surveillance* • SMEs participating in the OPC are particularly in favour of accompanying measures from the Commission to MSs, such as guidance support, carry out market surveillance and enforcement of product compliance. Setting verification targets for products that are most likely to be non-compliant as well as creating a central reporting point/website to enable feedback from consumers are both considered important by SMEs as well. *Costs vs. benefits* • 56% of respondents to the SME survey anticipate a high to very high increase in administrative burden compared to the baseline scenario. However, this must be put in perspective with the overwhelming support, across all stakeholders (including SMEs) for a digital product passport.	

As indicated in indirect cost, 42% of SME respondents expect higher economic return for EU businesses. Results of the consultations show that expected environmental benefits are worth the cost of the measure.

- The SME survey results indicate however that a majority of SMEs would be unaffected (29%), not concerned (19%) or negatively affected (4%) by a requirement for public authorities to purchase a minimum proportion of sustainable products in the total public procurement.
- 70% of the respondents agree or strongly agree that regulations and incentives incentivise innovation in sustainable products.

Main conclusions of second targeted SME consultation *(please see full details in Annex 2):*

Product Sustainability requirements

- Indication that **product sustainability requirements (such as relating to *reparability, durability* and *reusability*)** may give rise to some negative impacts for SMEs (such as medium to high administrative or compliance costs) but bring added value over time
- Indication that **minimum recycled content requirements** are likely to cause some negative impacts for SMEs (such as medium to high administrative or compliance costs) but bring added value over time

Information requirements for products

- Mixed views on likely impact on SMEs of **requirements to provide information on the ecological profile of products**: strong indication that though these may cause some negative impacts (such as medium to high administrative or compliance costs) they may bring added value over time; risk nevertheless signalled by some of potential for high negative impact
- Mixed views on impact of requiring SMEs to provide information on social conditions of production
- Indication that the administrative and compliance costs associated with the above-mentioned information requirements would be would be medium to high for SMEs

Incentives

- Indication that mandatory Green Public Procurement criteria may bring positive benefits for SMEs
- Indication that linking incentives to classes of product performance may bring positive benefits for SMEs
- Mixed to poor indication that modulation of EPR fees according to classes of performance would be of benefit for SMEs

Destruction of unsold consumer products

- Suggestion that an EU-wide ban on destruction of unsold consumer products may have a positive overall impact on some SME business models, while others many remain largely unaffected by such a ban. Risk nevertheless signalled that some SMEs may experience negative effects due to the need to find alternative options for these goods.

(3) Measurement of the impact on SMEs	
Annex 10 elaborated on the impacts of different options on economic operators. No specific measurements of the impact on SMEs could be performed but, whenever possible, it has been pointed out what the impact of Policy Options on SMEs is.	(Insights on impacts are in Annex 10)
• An increase in compliance costs for SMEs in sectors covered by the Ecodesign Directive is expected;	
• A cost increase is expected with regards to adapting aspects of the operation such as raw material requirements, product design, post first use and end of life;	Analysis of PO2
• Additional costs are expected with regards to testing equipment/paid studies on environmental performance as well as complying with targeted due diligence requirement where applicable;	
• Businesses (including SMEs) will benefit from higher prices and higher margins for better, more sustainable products;	
• Improvement of the level playing field between companies in Europe	Analysis of PO2
• For recyclers (among which the share of SMEs is big): growth in the market of recycled materials and of their quality is expected;	
• Growth in the sector of repair services, refurbishment, remanufacturing and sale of second-hand products and thus jobs in these sectors, in particular social and social economy organisations and SMEs;	
• For some sectors (for example electrical and electronic products), there is an opportunity for European companies to develop and capture the repair and refurbished market where significant growth has been seen recently;	
• A positive impact on innovation among SMEs is expected similarly to the impacts that have been observed within the Ecodesign Directive for businesses as a whole. These are proportionate to the level of ambition of the legislation;	Analysis of PO3
• Competitive advantage globally for EU companies (a big share of SMEs) providing sustainable products / services and focused on sustainability will be observed;	
• New business opportunities for SMEs in terms of products or services provided;	
• Decreasing activity (or adaptation) for companies producing single-use, low-cost products, possibly new partnerships;	
• Decreasing activity for mining and quarrying sector which will impacts SMEs in the sector as a supplier;	
• SMEs, like other businesses, will have to face the cost of new information collection and reporting and these will weigh more heavily on SMEs as fixed costs are spread over lower sales. For example, in the textile industry, collection of information on durability and reliability has been estimated by an industry association at about €10,000 to €20,000 per company to set-up the collection process, especially in the absence of standards for estimating durability. These costs will be relatively heavier for SMEs;	Analysis of PO4

• Differentiated taxation, GPP and eco-vouchers are all instruments that contribute to an increase of demand for sustainable products and services, which impacts positively the turnover of companies (including SMEs) providing them (associated with reputational gain)[640]; • While option 5a could result in cost increases for companies to invest in sustainable production, it also provides opportunities for companies that are currently designing sustainable products. That can be especially profitable for SMEs that provide innovative solutions[641]. Compared to large companies, SMEs are usually less innovative, even though some are highly innovative with a potential to reach higher productivity levels[642]. These very innovative SMEs could benefit from a willingness from private and public consumers to buy 'greener' products or from the implementation of incentives shedding the light on more sustainable products. On the other hand, there are less likely to benefit from economies of scales; • According to an EU-level study, **servitisation** brings a 1-10% increase in annual turnover to servitised SMEs in Europe[643]. Manufacturing SMEs report an increase of revenues as a result of introducing services, as well as the generation of new clients[644]. Although still in its early stages, the market for **circular reverse logistics** is expected to generate a strong economic impact with the surge of online sales, where 30% of products bought online are returned; • SMEs could specifically benefit from a streamlined Ecodesign process since it will be less burdensome to participate in, or follow the process. However, expanded provisions related to third party conformity assessment will affect them economically more than they will affect larger businesses. Overall, the proposed policy interventions do not represent a disproportionate burden to SMEs compared to bigger enterprises.	Analysis of PO5 Analysis of PO6 Analysis of PO7
4) Assess alternative options and mitigating measures	
The following measures could be considered to specifically mitigate the impacts on SMEs.	Annex 10, analysis of PO3

[640] DG ENV 2020, Report on 2018-2019 stakeholder consultations regarding the potential future use of the Product and Organisation Environmental Footprint methods
[641] Irish Department of the Environment, Climate and Communications 2021, Green Tenders - an Action Plan on Green Public Procurement
[642] OECD 2018, Promoting innovation in established SMEs
[643] Ibid
[644] European Commission. Study on the potential of servitisation and other forms of product-service provision for EU SMEs (2018)

• **Assistance with environmental and carbon footprint calculation/life cycle assessment methods, including PEF** (such as the availability of simplified calculation tools, access to low-cost expertise Life Cycle Assessments, access to software and databases enabling the performance of Life Cycle Assessments, and support through existing funding and financing tools). *To note*: The Commission is considering possible measures to facilitate the preparation of PEF studies by SMEs, including free IT calculation tools to reduce the costs for carbon footprint calculation. • The implementation calendar of sustainability requirements for each product **group** could be arranged so as to match that of introduction of the next generation of products, so that these requirements do not generate the need to design a supplementary generation (*this measure could also benefit non-SMEs too*). • **Dedicated SME provisions**: where justified, based on detailed impact assessments prior to **adoption** of SPI measures, certain exemptions or more lenient provisions for SMEs (e.g. longer transitional periods or exhaustion of stock provisions). • **Simplified SME procedures**: e.g. for reporting. • **Targeted guidance and support**: guidelines, training, user manuals, fostering of exchange of best practice will be foreseen by the Commission. Measures under sub-option 6a will contribute, as will Commission networks like the Circular Economy Stakeholder Platform.	Analysis of PO4 Analysis of PO4