Swedish Commission on Fossil- Free Road Transport

UK Policy, Procedures, Measures and Interventions
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Introduction

> Domestic transport emitted around 137 $MtCO_2e$ in 2009, accounting for around 24% of UK domestic greenhouse gas emissions, by 2050 the transport sector will need to emit significantly less carbon than today. The Government's vision is that by 2050 almost every car and van will produce near zero emissions at the tailpipe, with the UK automotive industry remaining at the forefront of global Ultra Low Emission Vehicle (ULEV) development, demonstration, manufacture and use, driving investment, retaining and creating jobs and delivering growth. The key challenge in transport is decarbonising travel in a way that is both cost effective and acceptable to consumers.

UK Government, 2012, Box 17, page 51

The United Kingdom is the first country in the world to embed its climate change strategy and policy in statute so that the setting, revision and achievement of CO2 reduction targets are legal obligations falling on the UK government. The Climate Change Act (2008) provides a strong legally binding framework for driving all government activity including infrastructure investment, taxation, technology and R&D in the direction of CO2 reduction.

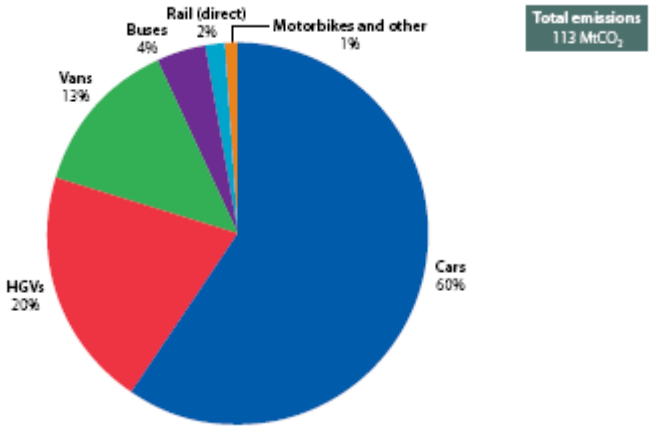
The 2008 Act set up a new governmental body, the Committee on Climate Change (CCC) and this Committee reports every year on targets and progress towards achieving those targets. In December 2010 the CCC set out its advice on the fourth carbon budget, covering the period 2023-2027. The advice was to accept a 50% reduction in emissions by 2025 relative to 1990 levels. This was accepted by the UK government and became law in June 2011 (Committee on Climate Change, 2012)

The CCC keeps under review all sources of greenhouse gases (GHG) and its 2012 report deals with science, policy, technology and progress in decarbonising the power sector, reducing emissions from buildings, industry, transport, agriculture and waste.

Transport in perspective

Figure 1 shows the breakdown of CO2 emissions by mode. Cars account for 60%, Heavy Goods Vehicle (HGVs) 20% and vans 13%

Figure 1 Breakdown of Surface Transport CO2 Emissions by Mode (2010)



Source: Committee on Climate Change (2012)

Section 1 A summary of national policies for reducing GHG emission from road transport

In this section of the report we will summarise national policies for reducing GHG from road transport under the following headings:

1. Taxation on fuel and vehicles (including company car taxation)
2. Introduction of biofuels
3. Electrification
4. Vehicle energy efficiency
5. Concrete measures for improving efficiency in transport and road traffic

Taxation

Fuel duty policy is a highly contentious area of policy in the UK. It was not designed as a transport policy instrument. It is an indirect tax that is reliable, difficult to avoid and raises a great deal of revenue for the government (£32 billion in 2011). Interestingly this revenue is expected to decline in future years as a result of fuel efficiency gains and modal shift (e.g. very high growth rates for rail transport) (IPPR, 2012). The combined impact of fuel duty and VAT on the price a motorist pays for fuel is a frequent source of complaint in the UK. It is 61% of the pump price compared to an EU average of 51%. In June 2012 the UK's petrol price was the 6th highest in the EU-27 (IPPR, 2012)

The UK also imposes **Vehicle Excise Duty or VED** which is an annual charge payable by all registered vehicles. Since 2005 VED has been graduated according to CO2 emissions as an incentive to drivers to purchase vehicles with lower emission ratings. The current rates are differentiated by CO2 emissions so that a car producing < 100g CO2/km pays nothing and a car producing over 225g CO2/km pays £475 pa VED rates at 1 April 2012. The full table of rates can be seen on

https://www.gov.uk/vehicle-tax-rate-tables

Electric vehicles are exempt from VED regardless of how the electricity was generated and there is no consideration of embedded energy in the calculation. They pay no annual tax. The definition of an electric vehicle for VED purposes is:

"The electricity must come from an external source or an electric storage battery not connected to any source of power when the vehicle is moving."

The CO2 differentiated VED is generally recognised as being effective in switching vehicle purchase behaviour towards lower emission choices (Green Fiscal Commission, 2010)

Company Cars

Approximately half the new vehicles purchased in the UK each year are purchased by companies and then allocated to employees for both business and private use (Potter and Atchulo, 2012). Traditionally this was seen as a perfectly legal tax avoidance scheme whereby staff could acquire and use vehicles with the bulk of the costs being paid by the employer and only small amount being charged by way of tax on the benefits of having a company car. In recent years this has changed in favour of higher taxation and CO2 emissions have been integrated into the taxation system so that more tax is paid as the CO2 emissions increase. The impact of taxation changes on reducing the number of company cars and reducing the kilometres driven by these cars is discussed in some detail in Scott le Vine and Jones (2012) with compelling evidence that the changes in company car taxation have led to a decline in car trips and an increase in rail travel.

HGVs

Lorries or "Heavy Goods Vehicles" (HGVs) account for 20% of the CO2 emissions from road transport and are a fast growing source of CO2 emissions. Reducing CO2 emissions from HGVs is a national government priority but other priorities are also important especially securing revenue from non-UK HGVs that are using British roads. A road user charging (RUC) system for lorries will be introduced in Britain in April 2015. There are currently no estimates of the impact of RUC on reducing the vkms of lorry travel.

Higher fuel costs can have the effect of reducing vehicle kms and this applies to both car and lorry travel. The relationship between fuel prices and demand is analysed in some detail in the literature on "elasticities" (VTPI, 2011):

"Economists measure price sensitivity using *elasticities*, defined as the percentage change in consumption of a good caused by a one-percent change in its price or other characteristics (such as traffic speed or road capacity). For example, an elasticity of -0.5 for vehicle use with respect to vehicle operating expenses means that each 1% increase in these expenses results in a 0.5% reduction in vehicle mileage or trips."

Source: VTPI (2011)

Elasticities point very clearly towards the use of fuel price increases as an instrument of demand reduction and GHG reduction. Britain already takes the lead on influencing fuel prices in an upward direction albeit as a way of raising taxes rather than as a way of reducing CO2. Diesel fuel prices in the UK are the highest in the European Union. European Commission data for 3rd December 2012 shows that the final consumer price of diesel fuel (Inclusive of duties and taxes) in Euros per 1000 litres in the UK is 1737 with Germany at 1502 and Sweden at 1674.

Data Source:

http://ec.europa.eu/energy/observatory/oil/doc/prices/bulletin_with_taxes/2012_12_03_with_taxes_1633.pdf

Biofuels

Biofuels are an important component of the UK approach to decarbonising road transport (DfT, 2009)

In 2009/10 1,568 million litres of biofuel were supplied under the Renewable Transport Fuel Obligation (RTFO). This was 12.8 TWh of renewable energy and 3.3% of the total supply of road transport fuels (UK Government, 2012)

The UK Bioenergy Strategy (UK Government, 2012) concludes that bioenergy will have to account for 10% of total energy used in the UK by 2050 compared to a current level of 2% in order to meet the 80% reduction target on a 1990 base for CO2 by 2050. The key points in this policy document include:

- Any use of bioenergy must meet strict sustainability tests
- Carbon Capture and Storage (CCS) should be used to capture carbon from the conversion stage of biofuel feedstocks
- Biofuels will play a role in reducing carbon from surface transport but from 2040 onwards will be overtaken by electric and hydrogen technology
- The aviation and shipping sector should use biofuel because there are few alternatives for decarbonisation
- Biogas is seen as a cost effective low carbon option

Biofuels have received a boost from the UK RTFO which came into force in April 2008. This obliges suppliers of fossil fuel for road transport to ensure that by 2010 biofuel blends accounted for 3.5% by volume of fuel supplies on UK forecourts in order to reduce carbon emissions and the country's reliance on fossil fuels. Targets have been set for every year up to 2013/14 when the requirement is for 5.26% biofuel contribution.

A report by the Stockholm Environment Institute (Whitelegg et al, 2010) concluded that biofuels were an unreliable element in a decarbonisation strategy if they were (a) imported or (b) had the effect of replacing crops for animal and human consumption with crops for fuel. In these circumstances they should be excluded. This still leaves open the use waste stream products and biogas from sewage and waste products.

Electric vehicles (EVs)

The UK climate change strategy assumes that electricity will be decarbonised by 2050 (DECC, 2011)

A great deal of emphasis is being placed on the role of electric vehicles in decarbonising road transport and the links between the take up of electric vehicles and the decarbonisation of the power supply system. The view of the UK government is set out in "The Carbon Plan" (DECC, 2011) and emphasises the replacement of oil by electricity and the decarbonisation of electricity generation. The government has set up the "Office for Low Emission Vehicles" (OLEV) and in 2011 it produced a plug-in vehicle infrastructure strategy (OLEV, 2011) with the following key measures:

- A £400 million fund to assist private and business buyers to produce ultra-low emission vehicles (ULEVs). This provides up to £5000 per car and £8000 per van purchased

- A favorable taxation regime for plug in vehicles exempting or reducing VED

- A "plugged in places" programme providing funds for 8,500 charging points

- R&D funds to support ULEVs

Vehicle Energy Efficiency

The UK government view on energy efficiency in new vehicles (DECC, 2011) is that emissions have already fallen by one quarter in the last decade and will fall by a further third in the next as internal combustion engines continue to become more efficient.

Section 2
Programs and policy measures of international importance

Company cars

It is now clear that changes in the taxation system applied to company cars that have the effect of reducing the financial benefits associated with company cars have had a dramatic effect on British car use, miles driven and, by extension, CO2 emissions. Figure 2 tracks these changes (Scott le Vine and Jones, P, 2012)

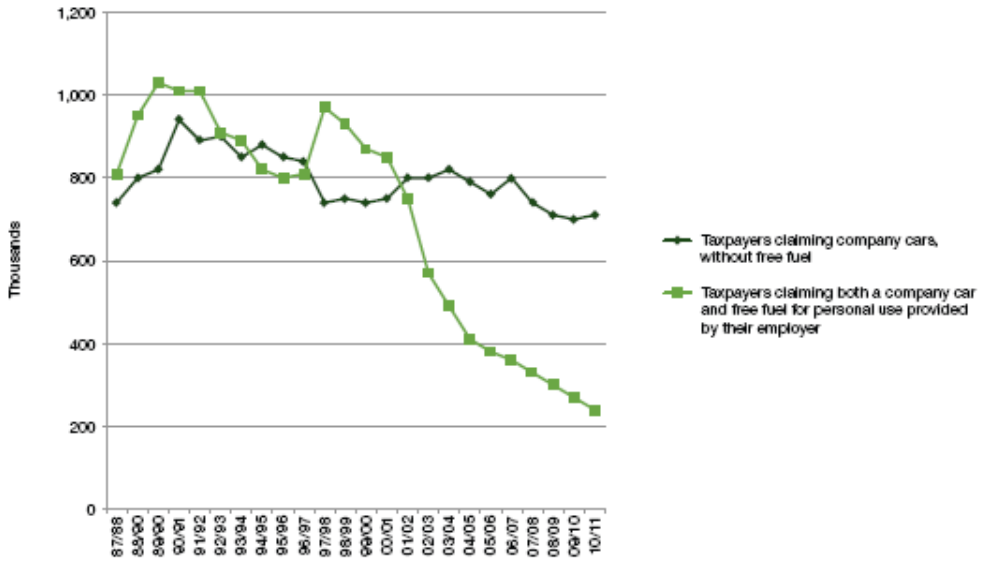


Figure 2 Number of taxpayers claiming company car benefit, 1987-8 to 2010-11

Scott le Vine and Jones (2012) explain the detailed changes in the way company cars are taxed in Britain and the impact this has had on reducing car mileage. Prior to the Finance Act 1976 company cars provided for personal use were not taxed at all

"The scale charge (the amount taxpayers were required to add to their taxable income) escalated rapidly year on year in the 1990s: for a car under 4 years old with an engine size of 1.4-2.0 litres, the charge grew from £1031 in 1987/88 to £3226 in 1993/94 (both quoted at 2101 prices)"

The system was more radically overhauled in 2002/03 such that the scale charges now depend on the car's CO2 band, with rates ranging from 15% for the lowest emission bands up to 35% for the highest per mile emitters. In more recent years company car

tax policy has further incentivised lower-emitting cars to the point that zero-emission cars (mainly EVs) have not been subjected to any company tax since 2010/11.

UK Government initiatives to reduce CO2 emissions from HGVs

CO2 emissions from HGVs are problematic because they continue to grow contrary to CO2 reductions targets and against a background of high fuel prices by EU standards. Government activity is focussed on 10 main areas (FTA, 2012):

1. Transferring freight from road to rail wherever possible supported by grants
2. Funding for the launch of trials for longer semi-trailers to reduce numbers of HGVs
3. An £8 million fund to pump prime investment in low emission HGVs
4. Sustainable biofuel research to power HGVs
5. Promotion of more efficient driving techniques (Eco-Driving)
6. Supporting initiatives to increase load sharing, backloading
7. R&D support for hydrogen HGVs
8. Carbon reporting for the road freight industry
9. Tyre labelling to promote fuel efficiency and reduce carbon emissions
10. Launch of competition for public gas refuelling infrastructure for gas fuelled trucks

In addition the DfT low carbon transport report (DfT, 2009) emphasises the importance of aerodynamic trailers (average 10% reduction in fuel consumption), electric bodies e.g. electrification of refrigeration (10-20% reduction in CO2 emissions) and automated manual transmission (7-10% reduction in CO2)

Parking

Several local authorities in Britain are experimenting with CO2 banded charges for parking as a mean of encouraging a switch to low emission vehicles/electric vehicles. Edinburgh City Council has introduced a residents parking scheme based on CO2 emission characteristics. Those with a car with more than 226 g/CO2/km pay an annual fee of £353 to park in the area in which they live and those with less than 100g/CO2/km pay £55 for a 12 month parking permit (Edinburgh City Council, 2012). York City Council has a similar scheme (York City Council, 2012).
Congestion Charging

Section 3 Private Sector and/or local government initiatives of particular significance

Private Sector

The main private sector activity of relevance to decarbonisation of road transport in the UK is carried out by companies involved in the manufacture of alternatively fuelled vehicles including EVs and hybrids. This activity is international in nature as

is car manufacturing itself and/or funded by the European Union and not specially British and is not described here.

A key player in the UK in the technology arena related to achieving the 80% reduction in CO2 emissions by 2050 is the private sector organisation "Energy Technologies Institute"

http://www.eti.co.uk/about/governance/

The ETI has an electric vehicle programme

The private sector and demand management

The national UK standardisation organisation, the British Standards Institution has produced the world's first travel plan standard which sets down what has to be done to reduce the demand for car travel to the workplace. This is BSI PAS 500 "Workplace Travel Plans"
http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030180397

The standard describes the usefulness of travel plans for reducing GHG emissions. More generally the private sector supports travel plans and demand management to reduce car trips and this activity is co-ordinated by the "Ways2work" organisation
http://ways2work.bitc.org.uk/whatitis/whatwemean

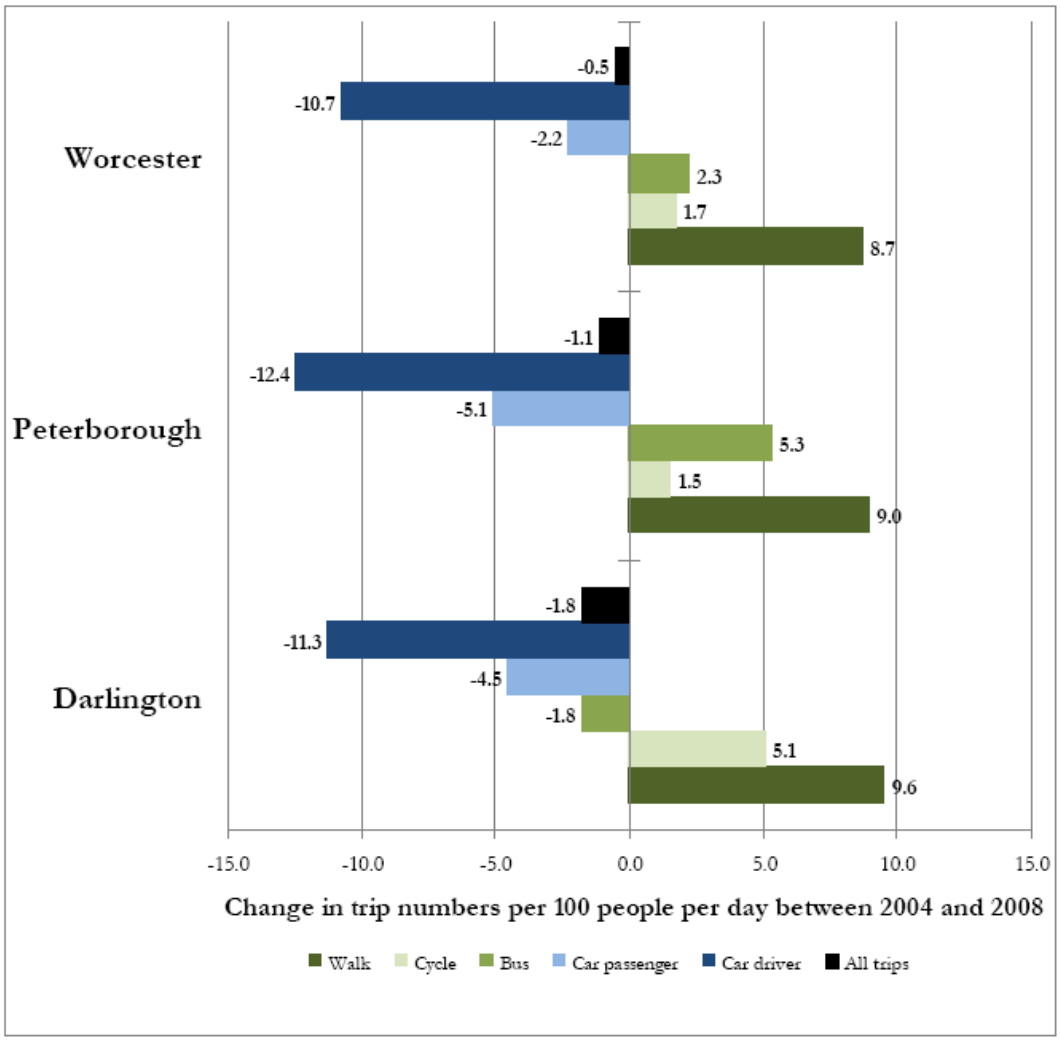
Local Government

Local government activity in the UK is making a significant contribution to decarbonisation. This is mainly though behavioural change interventions that are summarised in the DfT (2010) report "The Effects of Smarter Choice Programmes in the Sustainable Travel Towns". This work was funded by central governemnt (DfT) at a cost of £15 million and carried out by local authorities and transport consultants. The interventions produced results that are summarised in Figure 1 from the report.

The main interventions were in marketing, awareness raising, publicity, meetings and direct contact with target groups to present the case for embracing alternatives to the car together with the promotion of workplace and school travel plans.

The official evaluation of the impacts of the interventions concluded that carbon emissions had been reduced by 50 kg pa per capita in 2008 compared to 2004. The annual per capita CO2 emissions from road transport were 2.0 tonnes in 2010 (DECC, 2012) so a reduction of 50kgs is a very modest 2.5% reduction. Across the three local government areas there was a total annual reduction of 17,510 tonnes of carbon dioxide. The population of the three local government areas in total is 337,000 and the total cost of the programme was approximately £10 per person.

Figure 1: Changes in numbers of trips by residents between 2004 and 2008



Source: DfT (2010)

Electric Vehicles in London

TfL is extremely proactive in encouraging the uptake of electric vehicles in London. The Mayor has unveiled the London Electric Delivery Plan which highlights the aims of 25,000 charge points to be installed across London by 2015, 100,000 EV's on London streets as soon as possible and 1,000 electric vehicles to be bought for the Greater London Authority fleet by 2015. London offers the following incentives:

- Congestion charge: Free of charge for Electric Vehicles saving up to £2,000 per annum.
- Free parking: Certain London boroughs offer free parking for electric vehicles.
- Charging infrastructure: Over 200 charge points already installed, plans to install 25,000 charge points by 2015.

- Plugged in Places: TfL will bid for the OLEV infrastructure scheme and are working with industry to achieve this.

www.london.gov.uk/electricvehicles

Section 4 Research programs of particular relevance for the choice of instruments and measures for the abatement of GHG in the transport sector

The most relevant research work in the UK has been carried out by Professor David Banister at the Oxford University, Transport Studies Unit:

> **Policy Scenario Building** - this has been undertaken in the context of sustainable urban development and transport. The perspective taken is a long term one (2030+), and it explores the future of cities and how transport can contribute to that future. Novel methods of modified backcasting have been used to develop visions of desirable city futures, together with the analysis of policy packages and paths to move towards those futures. Research has been carried out for the EU (POSSUM and ICTRANS), the German Government (URBAN21), the RICS, the DfT (VIBAT) and HEFCE (UrbanBuzz: VIBAT-London), and for other cities such as Delhi, Vancouver, Auckland, Jinan, Oxfordshire, the European Parliament (ETAG project), and most recently as part of the Global ITPS and the ASEAN Studies. The EPSRC Visions 2030 project also uses the same methodology.

Source:

http://www.tsu.ox.ac.uk/people/dbanister.html

Contact: david.banister@ouce.ox.ac.uk

Visioning and Backcasting for Transport Policy in London (Vibat London)

The London VIBAT project is especially relevant to the discussion about choice of instruments and measures for carbon reduction in road transport:

http://www.vibat.org/vibat_ldn/index.shtml

The Vibat London study examines the possibilities of reducing transport emissions in London by 60 per cent to 2030 and 80 per cent to 2050 through a modified backcasting and scenario-building approach. It examines a range of policy measures (technological and behavioural), and assesses how they can be effectively combined to achieve these levels of emissions reduction. The intention is to assess whether such

ambitious target are feasible, identify the main problems (including the transition costs), and the main decision points over the future time horizons.
The reduction scenario is expressed diagrammatically in Appendix 1

Section 5 Interesting proposals that have not (yet) resulted in government policy or action

Synergy

At the time of writing there is no "joined up" thinking in the UK on the subject of decarbonisation of road transport. In this context "joined up" means deploying all available measures and interventions in a clearly structured and synergistic manner as described by Dalkmann and Brannigan (2007). They describe this fundamental approach to synergy and policy linkage as the "ASI Strategy"

A= Avoid so that through land use planning and accessibility planning destinations are co-located with residential areas and distances are kept short. This leads to a lower level of car use and a higher level of use of non-motorised transprt. Curitiba in Brazil and Singapore have developed spatial strategies and land use patterns that lead to lower CO2 emissions from transport than cities that pursue low density developments or extensive suburbanisation.
S= Shift so that wherever possible transport demand can be shifted from cars to public transport, walking and cycling and freight can be shifted from truck to rail and water. The objective is to transfer demand to less carbon intensive modes
I= Improve so that vehicles that use fossil fuel can be designed to be more fuel efficient

A very similar strategy was recommended by the Stockholm Environment Institute (Whitelegg et al, 2010) for the total decarbonisation of road transport in the UK. Up until now there has been no UK governmental recognition that a structured, phased and synergistic approach is absolutely necessary to achieve decarbonisation.

Congestion charging

Both London and Stockholm have adopted congestion charging (CC). Monitoring reports in London show a reduction in vehicle kilometres, air pollution and GHG emissions. Whitelegg (2011) has shown that there is a case to scale up the London CC so that it would apply to the total area of Greater London and its 7 million inhabitants. This would generate a daily income of £3.5 million (approximately 37.5 million SEK) and reduce vehicle kilometres by 10% from current levels.

Section 6 The name and contact details of any government commission/committee that may currently investigate measures to be used for making road transport less carbon polluting

Government

The main UK governmental committee is the Committee on Climate Change (CCC). The CCC contact persons are:

Eric Ling, eric.ling@theccc.gsi.gov.uk, who deals with transport, and the head of analysis there, Adrian Gault, adrian.gault@theccc.gsi.gov.uk - Adrian is actually ex DfT so a useful contact for this purpose

The main contact persons in the UK Ministry of Transport (The Department for Transport or DfT) are:

Rupert Furness, rupert.furness@dft.gsi.gov.uk; his boss is Graham Pendlebury, graham.pendlebury@dft.gsi.gov.uk.

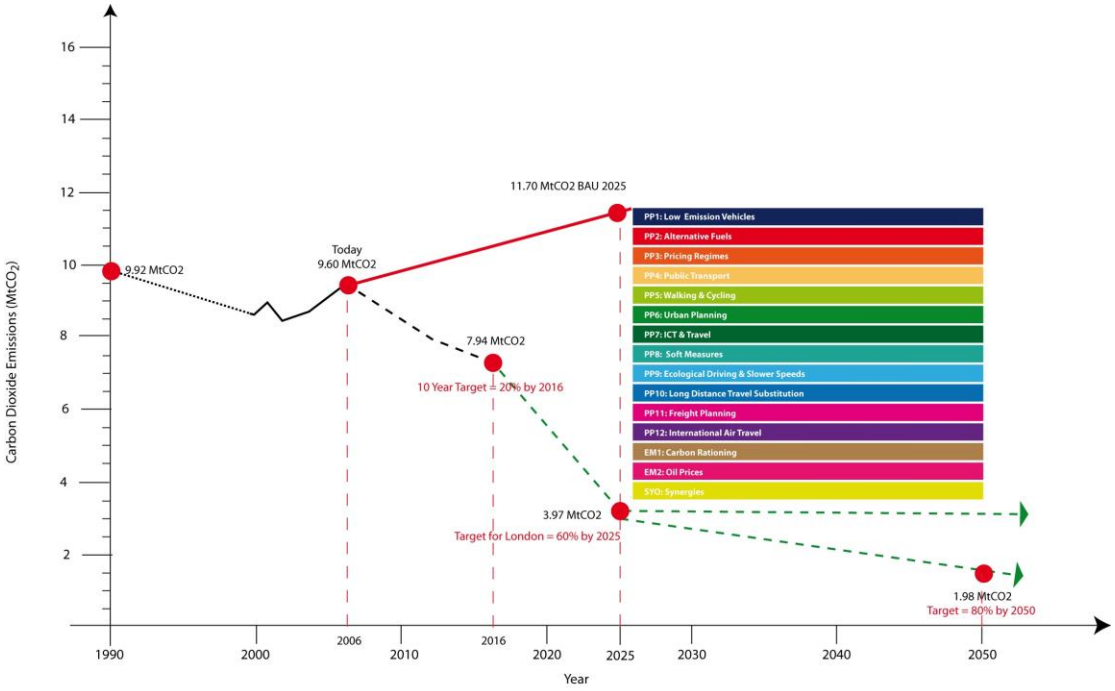
Academia/Think Tanks

United Kingdom Energy Research Center (UKERC)
www.ukerc.ac.uk
Contact : Dr Jillian Anable
j.anable@abdn.ac.uk

Stockholm Environment Institute, University of York (UK)
Contact: john.whitelegg@sei-international.org

Appendix 1

VIBAT reduction scenario



Source:

http://www.vibat.org/vibat_ldn/index.shtml
With thanks to Robin Hickman and David Banister for supplying the image

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