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8th December 2005

by e-mail to: callforevidence@sternreview.org.uk

Dear Sir / Madam,

RE: Stern Review on the Economics of Climate Change

Please find attached the response by the Energy Saving Trust to the Stern Review on the Economics of Climate Change, announced on 12th October 2005.

The Energy Saving Trust was established by the UK Government after the Earth Summit in Rio in 1992, to help tackle climate change. We promote mass-market sustainable energy across the UK, which essentially means: domestic energy efficiency; small-scale renewables; and cleaner road transport.

The Energy Saving Trust provides major assistance to householders, local authorities, energy companies, and others to improve the energy efficiency of existing housing and we also run an Energy Efficiency Best Practice programme that addresses issues relating to new housing. Our submission focuses on energy intensity in the household and road transport sectors.

Thank you for the opportunity to input our views. Please feel free to contact us if we can be of any further assistance.

Yours faithfully,

Alex Veitch
Strategy Manager

Energy Saving Trust submission to the Stern Review call for evidence

"Energy efficiency is likely to be the cheapest and safest way of addressing all four objectives. Renewable energy will also play an important part in reducing carbon emissions while also strengthening energy security and improving our industrial competitiveness as we develop cleaner technologies products and processes."

- Energy White paper February 2003[1]

Background

This is the response of the Energy Saving Trust to the review by the Environmental Audit Committee on Sustainable Housing, announced on 20th October 2005. This response should not be taken as representing the views of any individual member.

The Energy Saving Trust was established by the UK Government after the Earth Summit in Rio in 1992, to help the tackle climate change. We promote mass-market sustainable energy across the UK. This essentially means: domestic energy efficiency; small-scale renewables; and cleaner road transport.

This submission concentrates on one question in the Stern Review terms of reference: "*The implications for energy demand and emissions of the prospects for economic growth over the coming decades, including the composition and energy intensity of growth*", and concentrates on our two areas of expertise: housing and road transport.

Summary

Economic growth is not dependent on increased energy consumption, and need not result in increased carbon emissions. The installation of energy efficiency measures can result in substantial financial savings to consumers - as much as £250 on their annual household fuel bills. This also means that energy efficiency has a key role to play in tackling fuel poverty.

To give an idea of scale at a UK level - investment in improvements in UK households has doubled energy efficiency since 1970. These changes have reduced carbon emissions by 28MtC per annum whilst saving consumers £10billion every year. This is three times the saving from the whole nuclear industry and almost as much as the emissions of the UK's fleet of coal fired power stations.

We estimate that the achievable annual potential for household carbon savings in the UK is 16MtC through existing technologies and excluding solid wall insulation, which equates to 36%[2] of household energy use. Realising this clearly has substantial benefits to consumers and the wider UK economy. Energy efficiency also provides considerable economic benefits by enhancing security of supply, through reducing the level of demand for primary energy in the first place and hence the level of dependency on energy imports overall. It is also worth noting that demand side activity can be implemented far quicker than changes in the supply side and will deliver carbon reductions with lower levels of low carbon supply.

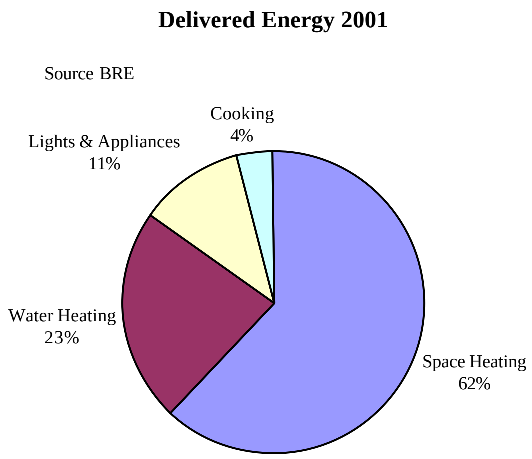
[1] http://www.dti.gov.uk/energy/whitepaper/ourenergyfuture.pdf
[2] Based on domestic energy consumption reported in the Digest of UK Energy Statistics 2005

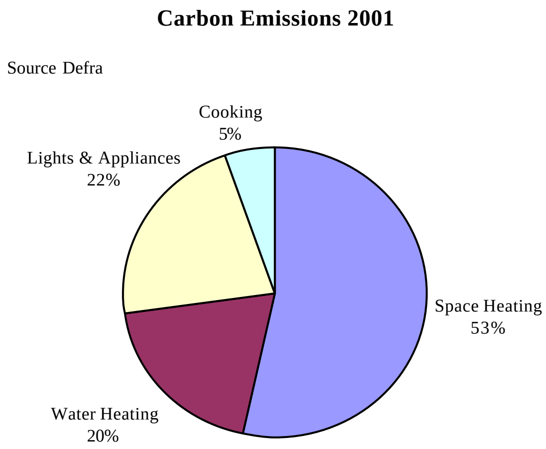
1. Domestic Energy Use

Household energy use accounts for nearly 30% of UK carbon emissions, which is roughly the same proportion as industry and transport. After a fall in emissions over the preceding two decades, household carbon emissions have remained fairly constant at around 40 MtC per annum since 1990.

1.1 Background: Energy use in the home

Domestic energy consumption has increased by 32 per cent since 1970 and by 19 per cent since 1990 (DTI, 2005). As shown below, space heating is by far the biggest use of energy in UK homes, accounting for around 62% of delivered energy, and 53% of household carbon emissions in 2001. The other major areas of energy consumption in the domestic sector are for heating water, for lighting and appliances and for cooking. Between 1970 and 2000, energy consumption in lighting and appliances increased by 157 per cent, while energy use in cooking has fallen by 16 per cent (DTI, 2005).





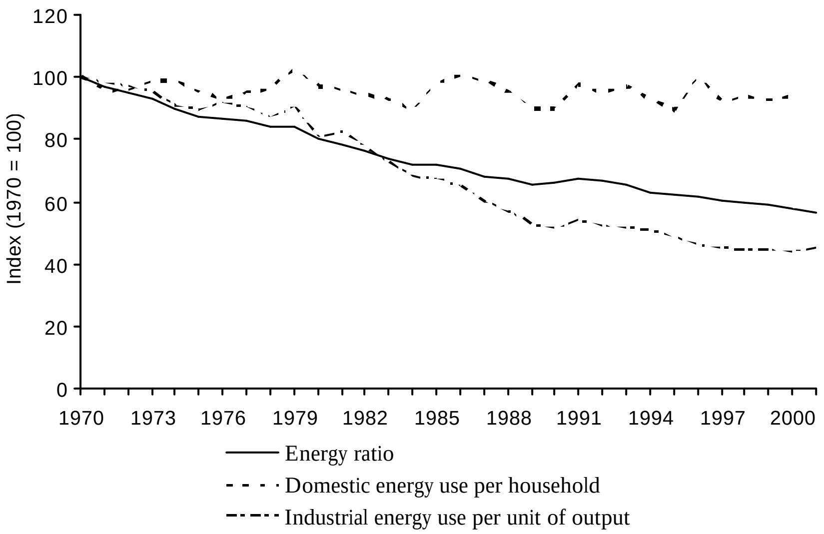
Household energy intensity

The DTI measures energy intensity in the domestic sector in three different ways – by the number of households, by population and by household incomes. The following points are some of the key trends in these indicators:

- Overall domestic energy consumption has gone up by a third
- Energy consumption per household has fallen by 6 per cent
- Energy consumption per person has increased by 18 per cent
- Energy consumption per unit of income has fallen by 44 per cent

In overall terms the energy ratio, which measures the relationship between GDP and energy consumption, has fallen at approximately 2 per cent each year since 1970, and by 2001 was 57 per cent of its 1970 value. Some key trends are displayed in the chart below.

Selected energy intensity indicators, 1970 to 2001. Source: DTI, 2005



The downward trend in the energy ratio can be explained by a variety of factors: most notably improvements in energy efficiency; fuel switching and a decline in the relative importance of energy intensive industries on[3]. In particular, investment in improvements in UK homes since 1970 have doubled energy efficiency saving consumers £10 billion every year and reducing carbon emissions by 28 MtC every year[4].

Demographic changes

The proportion of one-person households has almost doubled from 17 per cent in 1971 to 32 per cent in 2000. Part of this increase has been driven by the rise in life expectancy since the early 1970s: 50 per cent of those aged 75 and over live alone, compared with just 12 per cent of 25 to 44 year olds. The amount of energy required by two people living in two households is greater than the amount of energy required by two people living in the same household.

Type of housing and rented/owner-occupiers split

Type of housing can also have an impact on energy consumption. Flats have the lowest heat loss while bungalows and detached houses have higher heat-loss levels as there is a larger surface to volume ratio. In 2003/4 only 17 per cent of households in England lived in flats or maisonettes this was higher than the proportion in Wales and Northern Ireland, but less than in Scotland.

Dwellings that are occupied by their owners use more energy than rented dwellings, up to 60 per cent more according to figures from the Building Research Establishment. Owner-occupation has increased by 14 per cent since 1979. However, much of the difference between buildings is due to differences between dwelling types and ages in the different tenures.

Age of Housing

In Great Britain 40 per cent of the housing stock was built before 1945, 46 per cent between 1945 and 1984, and 14 per cent after 1984. Newer houses have to conform to much higher energy efficiency standards than previous building stock. However, considerable improvements

[3] DTI, 2005, Energy Consumption in the UK
http://www.dti.gov.uk/energy/inform/energy_consumption/index.shtml

[4] EST 2005, "Agenda for Change",
http://www.est.org.uk/uploads/documents/aboutest/CO101_Agenda_for_change.pdf

in insulation standards in existing homes have offset some of the energy losses that would have otherwise been incurred.

1.2 Space Heating

As the biggest contributor to domestic energy use, it is appropriate to discuss in more detail the trends affecting space heating in UK homes. The Energy Saving Trust has unique expertise and insight in this area, having been the dedicated Government delivery body working on these issues for the last 10 years.

Temperatures in the home

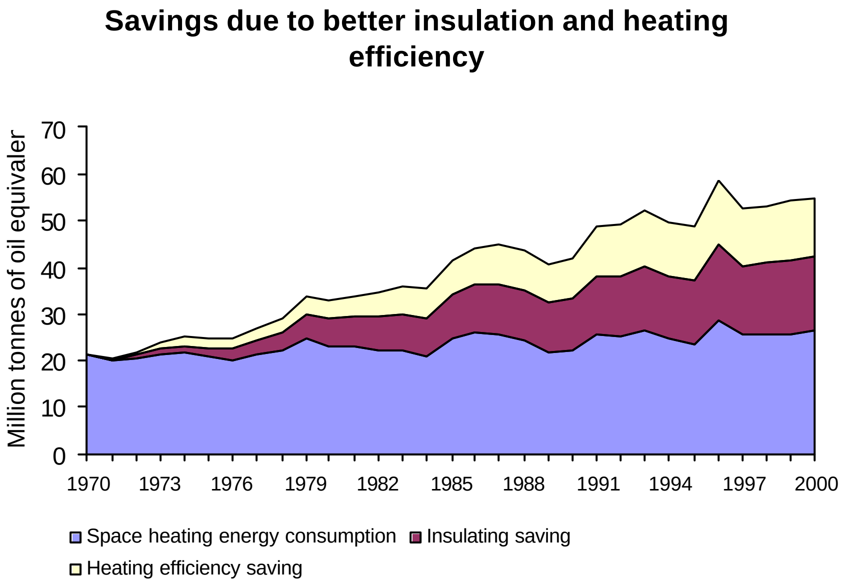
Average internal temperatures have been rising for many years and are forecast to continue to do so for some time, despite now being close to a “comfortable” 20C. From the perspective of fuel poverty, occupant health and housing quality, this is a welcome improvement and it is noteworthy that the improvements in insulation levels and boiler efficiency over the last 30 years have enabled this improvement to occur without increasing domestic sector carbon emissions. It is also worth noting that average *external* temperatures have risen from an average of 5.8°C in 1970 to 7.2°C in 2000, which also helps to keep the internal temperature at a comfortable level (DTI, 2005).

Insulation – historic trends

The main types of insulation in the UK are loft insulation, cavity wall insulation (CWI), double glazing and hot water tank insulation. In terms of take-up, DTI reported that, by 2000,

- 72 per cent of all houses in Great Britain had loft insulation
- 19 per cent had some form of cavity wall insulation installed[5]
- 39 per cent of houses in Great Britain had more than 80 per cent of their windows treated with double glazing
- Most houses with hot water tanks have hot water tank insulation

Without insulation energy consumption would have been 59 per cent higher by 2000 (see chart below).

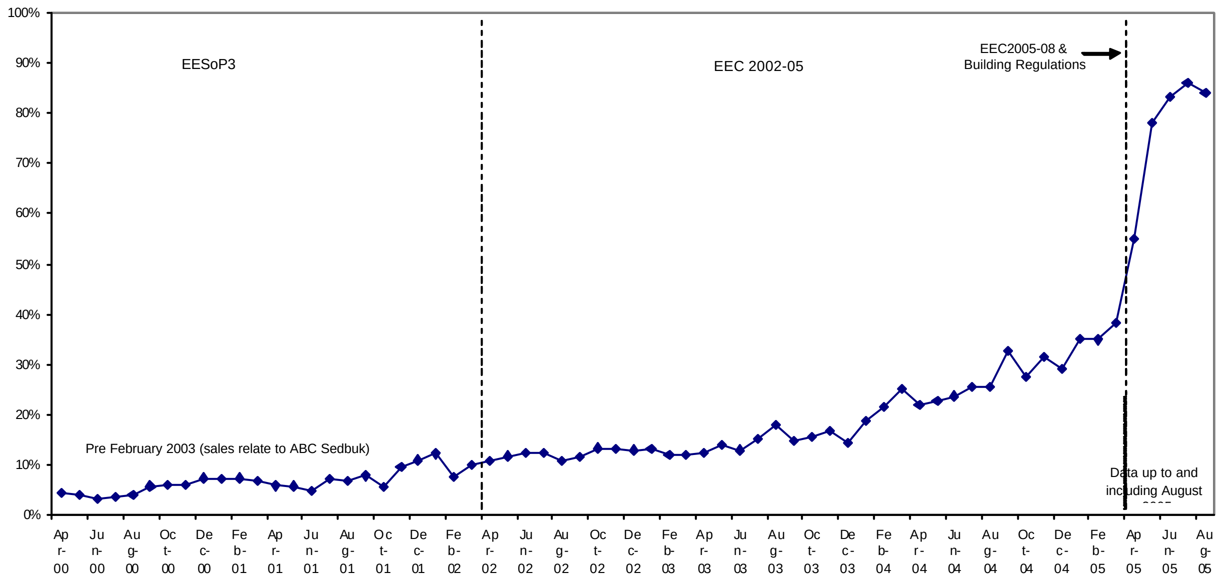


1.3 Water Heating

[5] Cavity wall dwellings account for 69 per cent of the housing stock with the remainder being largely accounted for by solid wall dwellings

The Energy Saving Trust has long promoted the use of more efficient boilers. The most important single step here is the recent change in law: from 1st April 2005 onwards, most new gas boilers fitted in England and Wales must be high efficiency condensing boilers (with a few exceptions depending on suitability). We calculate that if everyone in the UK installed a high efficiency boiler, savings would be sufficient to pay the entire annual fuel and power bills of almost two million households. As the chart below demonstrates, the market share of the most efficient boilers has been transformed to over 80% in 2005 initially through a combination of fiscal incentives (through the Energy Efficiency Commitment combined with Energy Saving Recommended labelling scheme that paved the way for mandatory requirements.

Market share of condensing boilers A & B Rated - source SBGI



1.4 Other Measures

There are many other actions which can be taken now, are cost effective, and which can significantly improve the energy efficiency of homes (see below).

Measure	Annual Saving (£/yr)	Installed Cost £	Installed Payback	DIY Cost £	DIY Payback
Cavity Wall Insulation	£100-£120	Around £135	13-16 months	-	-
Internal wall insulation	£210 - £260	From £40/m	-	-	-
External wall insulation	£220 - £270	From £1800	From 7 years	-	-
Loft Insulation (0-270mm)	£140 - £170	Around £135	< 1 year	From £275	18 months - 2 years
Loft Insulation (50-270mm)	£40 - £50	Around £200	4-5 years	From £200	4-5 years
Draught proofing	£10 - £20	From £75	4-7 years	From £50	3-5 years
Floor insulation	£30 - £40	-	-	From £100	From 3 years
Filling gaps between floor and skirting board	Approx £10	-	-	Around £20	2 years
Hot water tank jacket	Approx £15	From £54	From 4 months	From £10	From 8 months
Primary pipe work insulation	Approx £10	-	-	£5 - £10	1-2 years
Source: Energy Saving Trust http://www.est.org.uk/myhome/assumptions					

1.5 Energy Efficiency Programmes

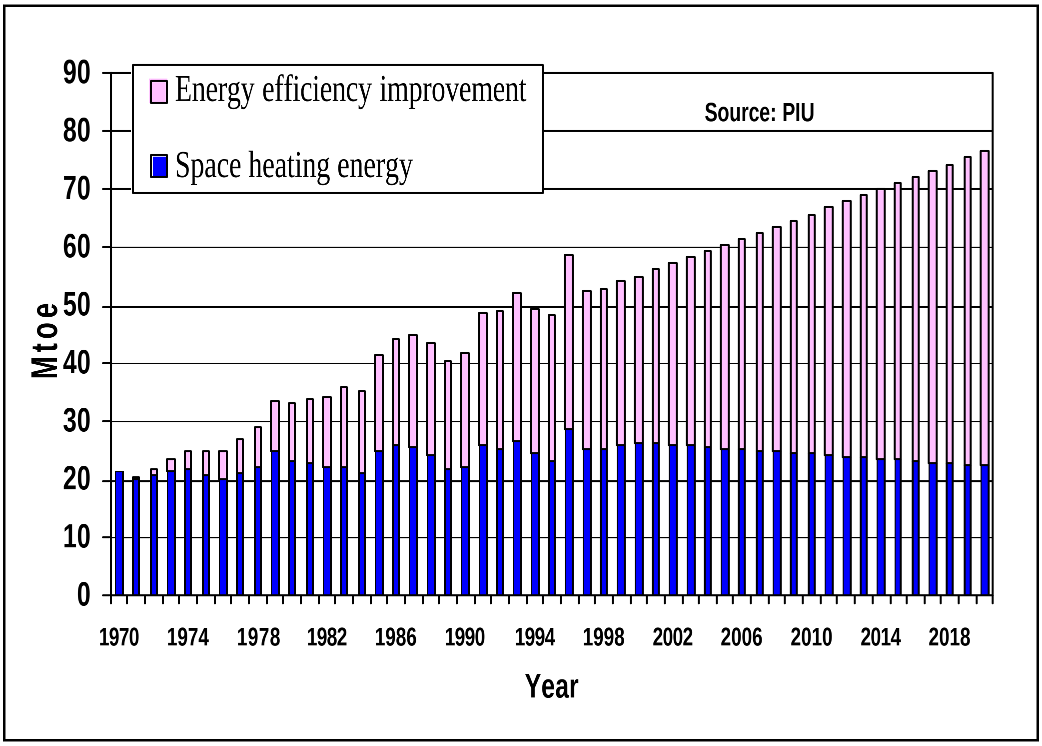
Energy efficiency is the most cost effective way of delivering carbon savings in the UK. Currently most Energy Saving Trust energy efficiency programmes deliver carbon savings at under £9/t carbon (2004/5). Since 1996, the Energy Saving Trust has delivered 13 Mt carbon savings at an average cost of £13/t carbon (on a lifetime savings basis) in the household sector. Appendix 1 provides a summary of the cost effectiveness of our individual programmes for 2004/5.

1.6 Future improvements

The key question of interest for the Stern Review is, what is the future for household energy efficiency, and what is the link with future energy intensity and GDP? It is clearly possible to continue to improve energy efficiency in homes resulting in further financial savings to householders, and lower carbon emissions. However, additional policies will be required to continue to improve energy intensity which we discuss below.

Future forecasts

Improved new-build construction standards and increased uptake of CWI should achieve a decrease in domestic space heating energy by 2020, according to background analysis by he Performance and Innovation Unit for the 2003 Energy White Paper (see chart below). If space heating energy decreases and GDP continues to grow, then this implies improved energy intensity.

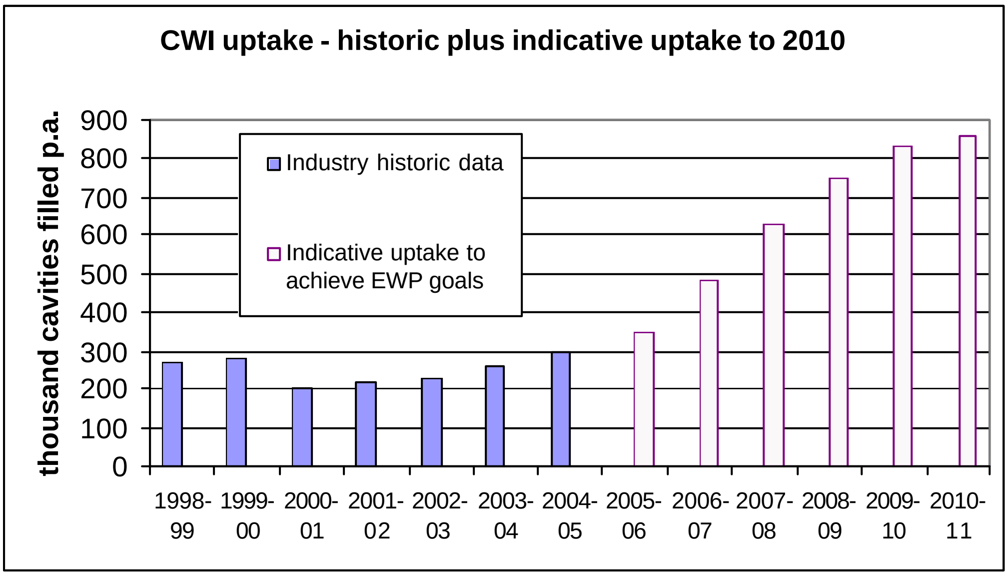


Improving energy efficiency in existing homes

To achieve the forecasted decrease in space heating energy the continued large-scale uptake of CWI will be required. There are estimated to be approximately 11 million homes in the UK with unfilled cavity walls[6], and extensive incentive and public information programmes exist to promote uptake.

[6] Defra, 2004, Energy Efficiency: The Government's Plan for Action

Relevant Government policies are the Energy Efficiency Commitment (EEC), fuel poverty schemes (e.g. Warm Front), the Decent Homes programme and equivalent programmes in the devolved administrations. Increased EEC targets, which took effect from April 2005, will help drive further growth. However a key barrier that Energy Saving Trust is seeking to address is customer apathy, inertia and lack of awareness. We believe that Energy Saving Trust activity combined with EEC and additional Government support programmes should lead to the uptake of CWI reaching 350,000 in 2005/6 (see chart below). This level of activity is capable of further increase under the right support framework.



Improving energy efficiency in new housing

In any one year, improvement of the existing housing stock will yield far greater carbon reductions than anything that can be done on newbuild. However, over successive years, emissions from the newbuild stock are cumulative. That is to say: if 200,000 homes are built every year, then that leads to 1 million homes over five years – or 4% of the total stock. Some one third of our housing stock by 2050 is yet to be built. The impact on carbon emissions of newbuild clearly cannot be ignored.

Building Regulations clearly have a significant impact on the performance of newbuild. Indeed, aside from niche developers, publicity campaigns, and demonstration projects, there is little evidence to suggest that many houses are built much above Building Regulations. They are therefore an important benchmark, and we welcome the Government's commitment to strengthening them regularly[7].

Under the last review of the Building Regulations for England and Wales, a "future thinking" paper was issued, suggesting how the regulations might look in 2010[8]. This was a very welcome development. However, we would like to see Government go further, and express a clear vision for the mainstreaming of zero-carbon homes by the middle of the next decade, which would provide sufficient time for the construction industry to prepare..

[7] Note it is now a requirement of the European Directive on the Energy Performance of Buildings to do so every five years.

[8] "Proposals for Amending Part L of the Building Regulations," *Section 6: Possible Future Performance Standards for Part L*, ODPM, July 2004

It is now important for the following to happen in relation to the Building Regulations over the next six months:

- the Building Regulations to come into force, as announced by the Minister, in April 2006, with Government committing the resources to make this happen
- the "future thinking paper" to confirm the intention to tighten by a further 25% by 2010, and to set out a vision for zero-carbon homes by the middle of the next decade
- the introduction of a Code for Sustainable Buildings in April 2006, with minimum energy performance standards significantly above the regulations, to build experience in this area
- a clearly defined technical research programme to be initiated to ensure we anticipate and resolve technical dilemmas for the next review in less than five years' time

The above is the pathway for tougher Building Regulations, but the Energy Saving Trust believes the regulatory standards approach needs to be supported by a number of other initiatives:

- Energy Performance Certificates, with recommendations, should be introduced for newbuild by June 2007.[9] These will help differentiate the housing market according to an A-G Energy Label, and help raise awareness and demand for energy efficient housing.
- A Low-Carbon Buildings Programme should be introduced in 2006 (see section on Microgeneration, below).
- An information, advice and hand-holding programme should be rolled out, ideally in conjunction with the Energy Saving Trust's existing Best Practice programme, to support the wide adoption of the Code for Sustainable Buildings. This will pave the way for tougher Building Regulations in 2010.
- A variety of fiscal incentives should be introduced, in particular: stamp duty rebates and a reduction in planning gain supplement, for newbuild (see section on Fiscal Incentives, below).
- Central guidance should be issued on planning, in particular, best practice guidance on PPS1,[10] as recommended by the Sustainable Buildings Task Group in May 2004. This would help local authorities and developers understand the opportunities for using the planning system to promote more sustainable new homes.

To finish on the subject of newbuild, it is worth acknowledging that new homes are already far more efficient than the average existing home. And it is generally more cost-effective to improve an existing home with "staple" energy efficiency measures, than to build a super-efficient new home. These arguments are valid at any one point in time, and of course, tackling the existing stock is very important. But taking a longer view – a view to 2050 – we need to think of ever better performing newbuild as part of a path to a low-carbon, more sustainable, economy. In this context, high-performance newbuild has the following roles:

- It represents high-quality construction, with increased comfort, reduced fuel bills, and minimal maintenance requirements for the occupants.
- It directly reduces carbon emissions over the lifetime of the home.
- It paves the way for successively tougher Building Regulations in future years, with the prospect of mainstreaming zero-emission homes over the next decade.

[9] Again, this is a requirement of the European Directive on the energy Performance of Buildings, and ideally it should have happened when the Diective came into force in January 2006.

[10] "Planning Policy Statement 1: Delivering Sustainable Development," ODPM, 2005, puts sustainable development at the core of the planning system, but there is no detailed guidance on the tools and methods available to achieve this.

- It sets standards that will be adopted in the refurbishment market, thus multiplying the carbon savings.

What, then, of existing homes? There are already a number of extremely cost-effective initiatives in place to address these. Yet the potential for improvement is large, and more is needed – especially given the UK's difficulties in making progress towards its 2010 climate change targets. Policies that are needed in this area include:

- The introduction of a requirement for "consequential improvements" when extending living space. The proposition is that, when a householder asks for planning permission for, say, an extension, they will be required to install all cost-effective energy efficiency measures in their existing home. This is fair on the basis that, if a householder wishes to increase their carbon footprint, then taking mitigating measures in the rest of their home is appropriate.[11] Such a requirement was included in the proposals for the Building Regulations 2006, but was dropped at the last minute.
- The introduction of the Energy Performance Certificates, with recommendations, as part of the Home Information Pack due in June 2007. – This means that, when a home exchanges hands, an independent, authoritative energy report will be available for the purchaser to consider. Again, this measure is required under European law, and ideally should have happened when the Directive came into force in January 2006.
- The introduction of a "Decent Homes Plus" target for social housing beyond 2010. The Government's Decent Homes target sets rather low energy performance standards. Some local authorities are wishing to go beyond these, or are planning their refurbishment programmes for beyond 2010, but there is no Government guidance to help them with this.
- Explicit inclusion of climate change, or more specifically, sustainable energy, in the Continuous Performance Assessment (CPA) monitoring regime for local authorities. Experience tells us that local authorities will, in the main, tend to focus on activities for which they are held to account by Government under this regime.

These measures would need to complement the initiatives already in place.

Fiscal Measures

Recent research undertaken by the Energy Saving Trust[12] indicates that linking incentives for the installation of energy efficiency measures to existing fiscal mechanisms could act as a trigger to action, and effectively stimulate demand for insulation measures in existing properties. These findings are backed up by the experience of Braintree District Council who, in conjunction with British Gas, is offering council tax rebates of £100 for the installation of Cavity Insulation (CWI). The Council have reported a doubling of the rate of CWI in the district since the rebates have been available.

The conclusions outlined in the Energy Saving Trust's report are based upon detailed policy analysis, underpinned by in-depth interviews with consumers, and include:

- Council tax and Stamp Duty Land Tax (SDLT) rebates (of between £50 and £90) are the tax incentives most likely to encourage consumer action in existing properties.
- While both options have distinct advantages and disadvantages, there was a clear consumer preference for incentives linked to council tax.

[11] Note also that these measures are an investment, and will save the householder money year on year.

[12] *Changing climate, changing behaviour: Delivering household energy saving through fiscal incentives*' (see: http://www.est.org.uk/uploads/documents/aboutest/fiscalupdate.pdf)

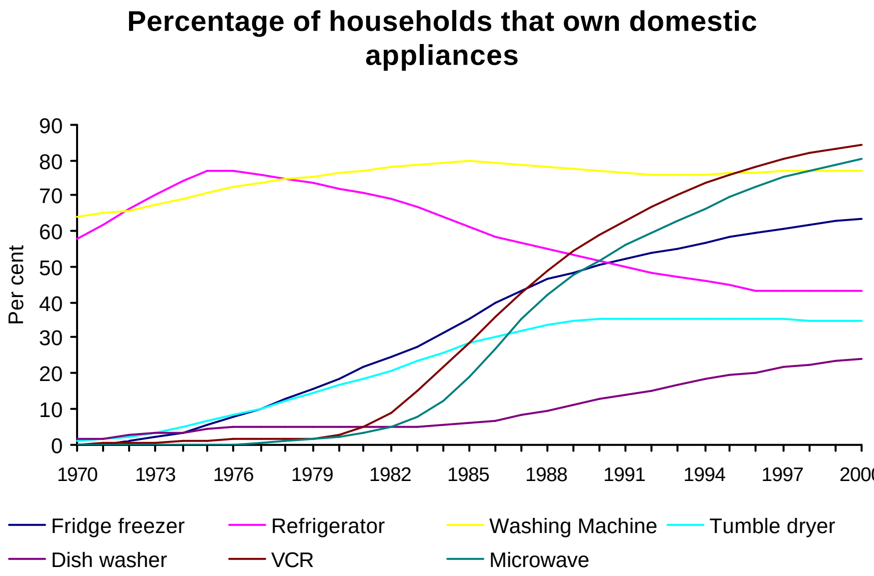
The report estimates that approximately 8% of all households in Great Britain paying council tax, some 1.64 million homes would take up such a measure. This would result in carbon savings of 0.29MtC per year in 2010, and lifetime energy bill savings of £3,142 million. Such a scheme, introduced and funded centrally, would cost HM Treasury approximately £111.1 million over the lifetime of the scheme.

Market based mechanisms
Finally, we would also point out the opportunity of Energy efficiency or *"white certificate" trading*. Currently a non-energy supplier, e.g. insulation provider, white goods manufacturer etc, can only extract value from delivering EEC through a prior arrangement with an energy supplier under an Ofgem approved programme. Direct accreditation of third party schemes by Ofgem would allow a more diverse range of participants with additional cost effective energy efficiency projects. Accredited third party activity would require a standard format to allow trading with suppliers and demonstrate compliance with EEC, i.e. a 'white certificate'. This approach should improve cost-effectiveness and the range of projects by increasing market liquidity although a range of issues would need to be considered including the legal basis, property rights, accreditation, transaction costs, costs to consumers, impact on priority group, supplier market power, settlement periods, market deadweight. This approach is already being progressed in France and Italy.

1.7 Home appliances and energy use

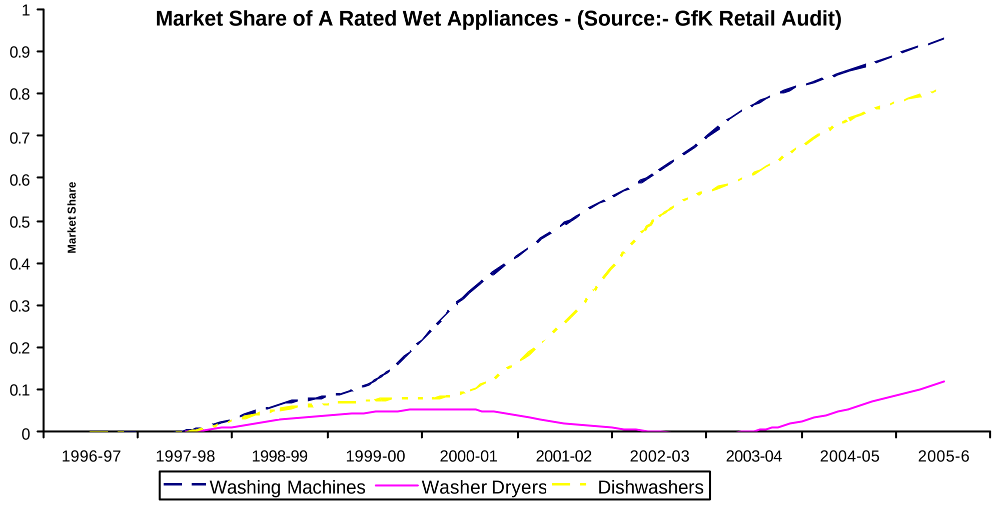
The amount of energy used by appliances has increased by 9 per cent since 1990 (DTI, 2005). The table below lists the type of appliances available now compared to the 1970s, and the chart below shows the actual uptake.

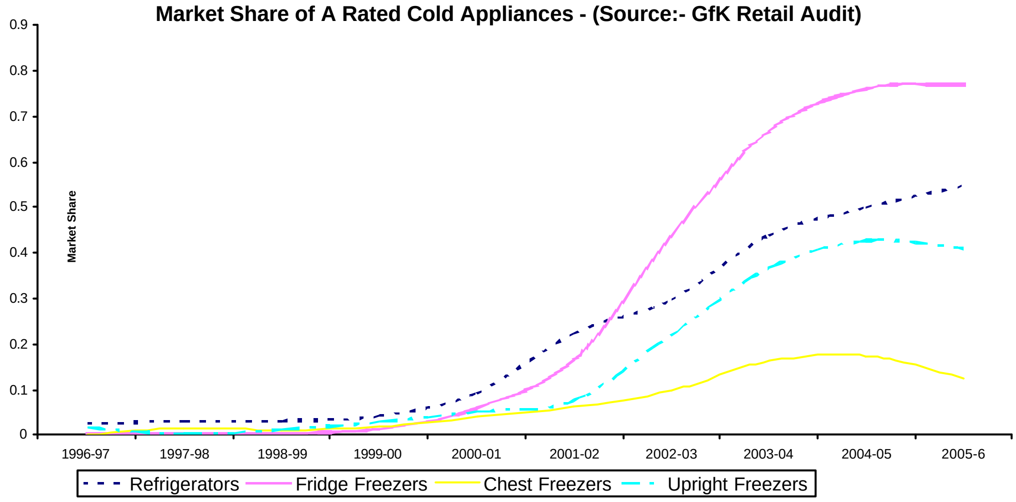
Appliances in a typical 1970s home:		
- 1 TV - 1 Hi-Fi music system - 1 washing machine - 1 radio - 1 cassette player - 1 toaster	- 1 vacuum cleaner - 1 bar electric heaters - 1 hairdryer - 1 electric kettle - 1 iron - 1 electric blanket	- 1 sewing machine - 1 cooker - 1 fridge - 1 DIY appliance - 5 lamps
Appliances available for a household in 2005:		
- 4 TVs (1 plasma/LCD, 1 CRT, 2 portables) - 1 microwave - 2 video players - 1 electric oven - 1 DVD player /recorder - 1 electric hob - 2 portable music players (walkman/iPod, etc) - 1 extractor fan - 5 mobile phones (2 work, 2 personal, 1 child) - 1 large fridge/freezer - 2 hairdryers - 1 drinks cooler - 1 hair irons - 1 portable fan - 2 electric toothbrushes	- 1 vacuum cleaner - 1 Wireless Telephone/answering machine - 1 PC computer - 2 slave portable phone handsets - 1 monitor - 1 electric kettle - 1 printer - 1 smoothie maker - 1 scanner/fax - 1 magimix - 1 digital camera - 1 ice-cream maker - 1 lap top computer - 1 digital radio - 1 set-top box - 2 mini hi-fi systems	- 1 electric shaver - 1 washing machine - 1 steam iron - 1 tumble dryer - 1 juicer - 1 dishwasher - Home security system - 1 playstation/games consol - 1 broadband connection - 1 cappuccino maker - 20 halogen bulb light fittings - 2 digital clock/radios - 1 personal care product - 1 electric lawnmower - 3 power tools - 1 strimmer - 1 electric blanket
Source: Owen, Paula, "*Energy Efficiency in Consumer Products – A Review*", DEFRA Market Transformation Programme, 2005		



As the chart above shows, the largest growth has been in the number of households owning VCRs, from a small number of households in 1970 to 84 per cent in 2000, and fridge-freezers, from no households in 1970 to 63 per cent in 2000 (note- the chart does not show multiple ownership). 59 per cent of households now own 2 or more televisions and 14 per cent own 2 or more VCRs.

Energy efficiency improvements in appliances have reduced overall energy consumption from the levels that would have been experienced in their absence. Improvements have been more marked since 1994 when energy labelling was introduced. The charts below illustrate the growth of A-Rated products for selected appliances in the UK. Going forward, it is critical that measures are taken to improve the energy efficiency of household appliances, consumer electronics and lighting.





Household electronics

A recent report by the DEFRA Market Transformation Programme identifies home entertainment and educational products as the largest growth area in the domestic product sector (Owen 2005). Worryingly, there is currently no mandatory energy labelling or customer information initiative for this sector. Energy Saving Trust advocates the introduction of standards for consumer electronics as well as the tightening of standards for white label goods under the proposed EU "Framework Directive for Eco-Design of Energy using Products".

Further tightening of EU legislation limiting the use of fluorinated GHGs, including consumer products would be helpful, as would inefficiency charges on products that waste energy e.g. appliances rated C-G and incandescent bulbs. Revenue raised from such measures should be recycled through other instruments supporting the uptake of energy efficiency measures and also used to offset costs for the less able to pay. This could be significant: we estimate that a combination of reduced VAT for efficient bulbs and an inefficiency charge for inefficient ones could raise between £95m and 161.5m a year (depending on the tax applied)[13].

Lighting

The DEFRA report concludes that, although there has been much progress in the lighting area over the past years, there is still much room for improvement. Even if the policy measure of 3.2 CFLs in each household is met; by 2020 there will be an increase in the percentage of 60 watt GLS lamps from 33% in 1960 to 42.7%. Hence the energy demand for lighting will continue to increase for the next 10-15 years (Owen, 2005).

The Energy Efficiency Commitment (2002 – 2005) did a lot of work in the lighting area and is responsible in a large way for the rise in popularity of the CFL. However, because of the issue of the 'heat replacement effect', which has downgraded the amount of carbon savings for these lamps, CFLs will not be providing energy suppliers with as great a carbon saving as EEC1 did. Therefore, the Energy Suppliers will not be promoting, and discounting, CFLs as heavily as they have been. This could have an adverse effect on CFL sales as their price starts to creep back up to £5-6 as opposed to the average £3.50 that we have seen over the last three years. In addition to this price rise, the WEEE Directive[14], which is due to come into force next year, may put as much as 35p on to the price of a CFL to account for the cost of safe disposal[15] of a spent lamp.

[13] Energy Saving Trust, "*Fiscal measures and energy efficient lighting – update*", October 2005

[14] Waste Electrical and Electronic Equipment. More information on implementation can be found here: http://www.dti.gov.uk/sustainability/weee/

[15] CFLs contain a relatively large amount of mercury compared to other lamp types

Income and appliance ownership
It is worth briefly noting that there is a strong relationship between disposable income and appliance ownership: Simply, the higher the household income, the higher the level of appliances owned. In 2000, 45 per cent of households with a gross weekly income of over £500 owned a dishwasher, compared with only 12 per cent of households with an income of £100 or less.

1.8 Future Technologies: Energy Efficiency and Microgeneration

Energy Efficiency Innovation Review
As part of the Climate Change Programme Review, the Government is conducting an "Energy Efficiency Innovation Review", examining which energy efficiency technologies hold the most promise to substantially reduce carbon emissions. We are involved as a stakeholder in this review, the early conclusions of which are currently confidential. However a research paper, commissioned to inform the Review, has prioritised 23 promising technologies (out of an initial list of 125), and calculated the continued commercialisation of these 23 technologies could yield an additional emissions reduction of 17 MtCO2 per year[16]. We expect the results of the EEIR to be published in early December, and we would urge that these results be considered in the Stern Review.

Mircrogeneration
Microgeneration could deliver significant efficiency and CO2 benefits, through increased use of renewables, utilisation of "waste" heat from electricity generation or renewable heating fuels, and avoidance of losses in the electricity transmission and distribution system.

For microgeneration to have an impact on the UK electricity system, units must be installed by consumers in their millions. This will require a new highly decentralised approach to energy planning and policy. In addition a new understanding of the likely interaction between microgeneration technology and its multitude of potential end users (the general public) must be developed.

The Energy Saving Trust is the leading government funded organisation promoting mass market sustainable energy solutions across the UK. The Energy Saving Trust runs a number of national programmes which promote the uptake of microgeneration technologies. The DTI is currently developing a microgeneration strategy, with a view to launching a new Low Carbon Buildings Programme in 2006. To inform this work the Energy Saving Trust, in conjunction with Element Energy Limited, E-Connect and Cambridge University Faculty of Economics, was commissioned by the DTI to study the UK potential for microgeneration technologies up to 2050.

At time of writing, the report is currently confidential to DTI. However, we would hope that the report's conclusions could be incorporated into the Stern Review, as it offers useful analysis on the potential of microgeneration technologies to deliver cost-effective carbon reductions. We expect to be able to share the results of the report by the end of 2005.

Conclusions on Household Energy Saving
Clearly there is considerable scope to continue to improve energy intensity to the benefit of householders and ultimately the wider economy as energy savings result in increased disposable

[16] AEAT, "Assessment of Emerging Innovative Energy Efficient Technologies - Main Report", 7 June 2005

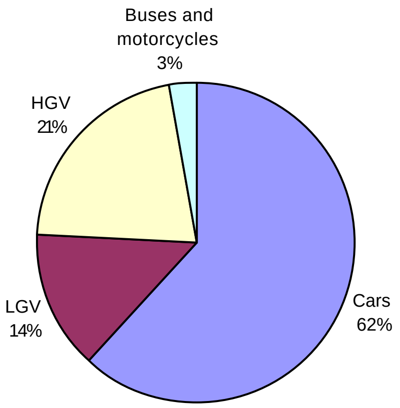
income. There is a responsibility for everyone – householders, Government, Local Authorities, energy suppliers, the construction industry and other stakeholders – to improve the energy efficiency of existing housing, and to ensure that new housing is built to the highest possible energy efficiency standards. It is also vital to improve the energy efficiency of consumer electronics, by extending the number of product types covered by efficiency standards and labelling, and by continually raising the bar on existing standards.

Delivering national and international climate change targets and improvements to energy intensity in a cost-effective manner is not just a question of large-scale supply-side, technological solutions. It is also about changes to behaviour at the household, individual and organisational level. Without additional policies to address growing energy use in household electronics, high levels of energy demand will persist, which in turn means greater fossil fuel demand, worse energy security and higher carbon emissions - all of which have negative impacts on the economy. It is highly cost-effective for Government to act to help consumers improve energy efficiency – the costs of inaction far outweigh the costs of action.

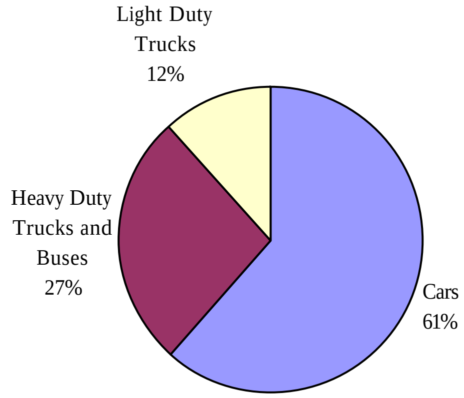
2. Road Transport

Road transport accounts for around a quarter of UK carbon emissions. The charts below illustrate fuel use and carbon emissions broken down by road vehicle type.

Road transport energy use by vehicle type (2000). Source: DTI, 2005



Road transport carbon emissions by vehicle type (2000). Source: NETCEN



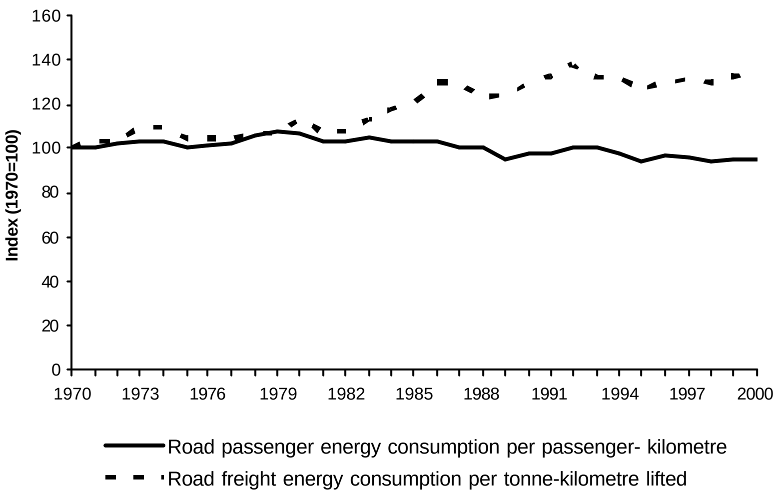
2.1 Changes in road transport energy intensity

The DTI converts data on energy use in road transport into a measure of energy intensity by calculating energy consumption per passenger-kilometre or freight tonne-kilometre. The chart below illustrates the changes in road passenger and road freight energy intensities since 1970. The key points are:

- Road freight energy intensity increased during the 1980s when energy consumption increased at a higher rate than the number of freight tonne kilometres travelled. Road freight energy intensity has increased by 4 per cent since 1990.
- In contrast, road passenger energy intensity has fallen by 2 per cent since 1990, as energy consumption has not increased in line with distances travelled due to improvements in fuel efficiencies and vehicle technology.

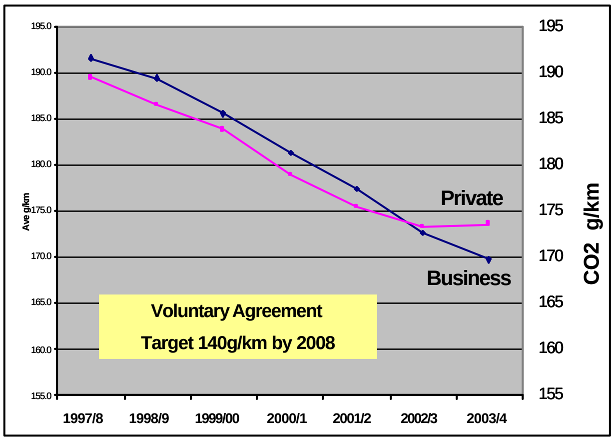
Going forward, it is unclear whether improved fuel efficiency of passenger will continue: this is examined in the next section.

Energy intensities for road passengers, road freight and air transport

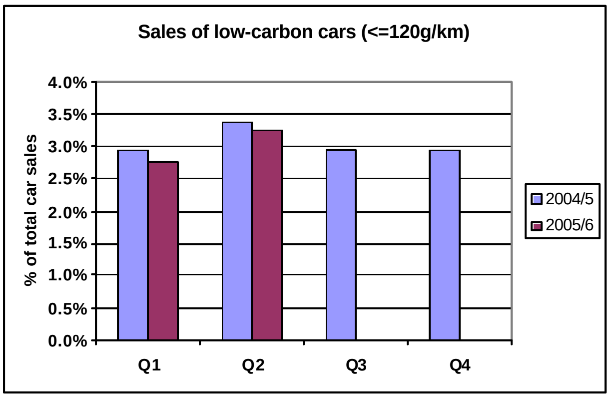


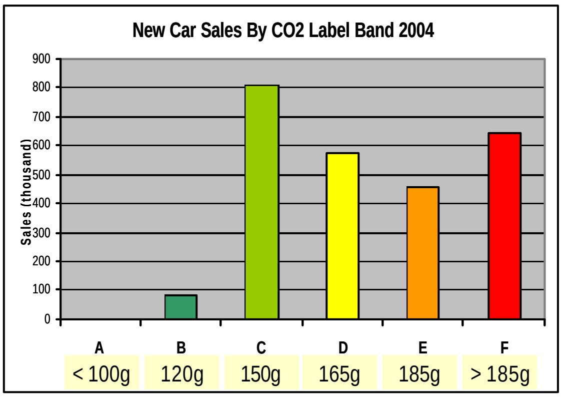
2.2 Future for Passenger Road Transport Energy Intensity

The improvements in passenger road transport energy intensity are threatened by the meagre recent improvements in new-car fuel efficiency. The average CO2 of new cars sold to the private consumer sector went up last year for the first time in over 8 years of tracking this information (see chart below)[17]. This worrying trend has been confirmed in the latest report on passenger car CO2 from the Society of Motor Manufacturers and Traders[18]



For total car sales, the first six months of this year saw the number of cars sold with CO2 emissions under 120g/km fell compared to the same quarter last year, and in 2004, less than 0.02% of new cars were "A"-rated (see charts below).





These trends in car buying, combined with the increase in car ownership (up 13% in 5 years) and annual mileage (up 9% in 5 years), will increase CO2 from private motorists. Given that private motorists account for over 90% of cars in the UK (27million cars), the overall result will have a significant impact on our ability to reduce CO2. To reverse this trend, improved fiscal measures are required, combined with advice and information services.

Fiscal reforms

Currently, Vehicle Excise Duty is having little impact on the carbon profile of the private car market - a point confirmed by research by MORI for DfT[19]. VED is failing for two reasons.

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[17] EST, 2004, "Passenger Cars: CO2 Emissions and Vehicle Excise Duty", http://www.est.org.uk/uploads/documents/aboutest/EST-IEEP_VED_Report.doc

[18] SMMT, "New car registrations by CO2 performance - 2005", p.11 http://lib.smmt.co.uk/articles/sharedfolder/Publications/CO2Report%20New.pdf

[19] Assessing the Impact of Graduated Vehicle Excise Duty - Quantitative Research, MORI, March 2004 http://www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_027589.hcsp

Firstly, the top Band (Band F) is too large. Secondly, the differentials between the bands are too low to change buying behaviour. The Energy saving Trust principles for VED reform are:

1. Very low carbon cars (Band A) should pay very low, or zero VED
2. Very high carbon cars should pay significantly higher VED than they do now
3. A new Band G should be introduced, to separate very high-carbon cars into a higher band
4. The remaining VED bands should be graduated to reward lower-carbon cars and penalise higher-carbon cars.

In addition to fiscal reform, additional purchase incentives are required. DfT has committed to launching a new Low Carbon Car Grant Programme, to provide purchase incentives for the lowest carbon cars available. This programme is currently awaiting State Aid approval.

Consumer Information on Car Purchasing

Given the poor uptake of low-carbon vehicles in the UK among the private consumer market, there is a clear need for more consumer education and advice. Recently a CO2 car label was launched for passenger cars, with broadly the same format as "traffic light" labels already available on white goods. For cars the banding is linked to Vehicle Excise Duty. While this is a positive step, it is just a first step: much more should be done, by Government, Industry and other stakeholders to bring low-carbon into the purchasing decisions made by consumers.

Efficient Driving

A potentially very quick and effective way to improve energy intensity in road passenger transport would be for people to drive in a more energy-efficient way (so-called "Eco-Driving"). The Driving Standards Authority is building efficient driving style into the curriculum for new driving teachers, and includes efficient driving into the theory side of the driving test[20]. However, more needs to be done to re-train existing drivers and we are looking to expand our own work in this area, in partnership with the Driving Standards Authority, and other key stakeholders.

European Regulation

The single most important factor in the energy efficiency of new cars is the Voluntary Agreement on new-car CO2 agreed by the European Commission and the car industry. The agreement sets a sales-weighted CO2 target for new cars sold in the EU of 140 g/km 2008 (2009 for Japanese and Korean manufacturers). Monitored annually, the car industry is officially on track to meet the targets, although there is currently of scepticism among environmental groups about whether the industry can deliver[21,22].

There is a debate currently underway on what should follow the Voluntary Agreements themselves. The car industry is promoting an "integrated approach", where energy efficiency requirements for new cars are complemented by other measures to reduce road transport carbon emissions. These additional measures include low-carbon fuels (such as biofuels), the promotion of efficient driving techniques, and promotion of low carbon cars to consumers[23].

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[20] Information on DSA "eco-safe" initiative: http://www.dsa.gov.uk/Category.asp?cat=371

[21] Voluntary Agreement monitoring reports are available online here: http://europa.eu.int/comm/environment/co2/co2_monitoring.htm

[22] The European environmental group T&E state that 2008 target "will almost certainly be missed" – see http://t-e.nu/Article156.html

[23] A good summary of "integrated approach" is presented by ACEA, the European vehicle manufacturers association, in this presentation: http://fs9.rec.org/environment_and_transport/download_page.php?filename=efforts_to_reduce_CO2_emissions_from_passenger_cars.pdf

The Energy Saving Trust welcomes the emphasis on an integrated approach, and indeed already promotes a number of these measures through our programme work (REF). However, we also believe that it is absolutely critical to continue to promote challenging but achievable CO2 targets for new cars. The Commission has long had a longer-term aspiration that new car cars should achieve a CO2 average of 120 g/km by 2012: we would like to see this target formally set in regulation, and coupled to a trading system for CO2 emission rights per km between producers and importers of a year's fleet of newly sold passenger cars. Under this scheme, producers who sell a fleet of cars whose average CO2 emission/km exceed the target level would have to buy rights from producers of a fleet of cars with an average below the norm.

In this way the makers of inefficient cars subsidize the makers of efficient cars. Thus a system with positive and negative sanctions for car makers would be put in place from which a powerful stimulus for technological and product innovation may be expected for the car industry. In addition, the industry would have ample leeway to develop its own strategy of moving towards more efficiency across the entire range of its products.

Such a system would bear strong resemblance to the Californian system of 'fleet average and trading'[24]. It would not only reduce the climate effect of road transport, but would also reduce the growth of fuel demand.

Conclusions on Road Transport Energy Intensity

Without new policy measures, there is a real risk that the moderate gains in passenger road transport energy intensity will be lost amid growth in vehicle use and ownership, and lower performance in terms of new-car energy efficiency. It is clearly possible to improve the energy intensity of road transport to deliver fuel and cost savings. However, in order to do so Government and industry must act now through a combination of regulation, fiscal measures and consumer information.

[24] Details on the California regulations on new-car CO2 are available here: http://www.arb.ca.gov/regact/grnhsgas/grnhsgas.htm

Appendix 1: Summary of Emissions Savings from Energy Saving Trust Activities FY 2004/05[1]

Energy Efficiency	**Funding**	**Annual C Saving**	**tC lifetime**	**Policy Cost Effectiveness[2]**
	£ mill	000 tC/a	000 tC	£/tC lifetime
Consumer advice				
Energy Efficiency Advice Centres[3]	7.6	38	986	£8
Total Consumer Advice	7.6	38	986	£8
Local Authority & Housing Authority				
LA Programme	6.3	35	959	£7
Housing Managers	2.2	14	384	£6
Total LA & HA	8.5	49	1,343	£6
Trade				
Trade Measures	2.5	6	172	£15
Communities				
Community Energy[4]	33.3	15	378	£88
CAFÉ	0.2	15	436	£1
Total Communities	33.5	30	814	£41
Total Energy Efficiency	**52.1**	**123**	**3,315**	**£16**

Notes:
1. Energy Saving Trust activities interact and support other Government sector carbon reduction policies through the operation of programmes that include financial incentives, information and advice, awareness raising and promotion, facilitation and training activities. The energy savings and carbon savings are those that have been influenced through the programmes operated by Energy Saving Trust but could have been delivered through other Government supported programmes e.g. EEC.
2. The measure of "Policy Cost Effectiveness" means the funding from Government for programmes/lifetime carbon savings
3. 2004/05 results based on first 2 waves of quarterly evaluation survey in 2004; to be updated with results from further survey waves.
4. Based on funding allocated and expected savings