

Economic instruments to improve household energy efficiency

Consultation Document

July 2002



HM TREASURY

DEFRA
Department for
Environment,
Food & Rural Affairs

Economic instruments to improve household energy efficiency: consultation document

Introduction

1. The Government is committed to reducing emissions of the greenhouse gases responsible for climate change. Under the Kyoto Protocol, the UK has a legal obligation to reduce emissions of greenhouse gases by 12.5 per cent below 1990 levels by 2012. The Government has also set its own, more demanding, goal of cutting UK carbon dioxide emissions by 20 per cent below 1990 levels by 2010.
2. The principal greenhouse gas is carbon dioxide, with emissions arising predominantly from the combustion of fossil fuels. The Government's Climate Change Programme¹ acknowledges that households, as well as businesses, contribute to the damage caused by the consumption of fossil fuels. Energy efficiency improvements by households are key to meeting the Government's climate change targets – and can also help to alleviate fuel poverty.
3. Although the number of people in fuel poverty has fallen dramatically in recent years, in 2000 around 4 million households were still unable to keep adequately warm at reasonable cost². The Government is therefore not attracted to taxing the domestic use of energy, and has reduced VAT on domestic fuel and power to the 5% minimum allowed under EU legislation. The Government has also excluded the domestic sector from the scope of the climate change levy, which applies to the business use of energy.
4. The Climate Change Programme sets out the action which is being taken in each sector of the economy to reduce emissions of greenhouse gases. This includes a range of measures to address emissions from the domestic sector. The Government believes that there may be scope for using economic instruments to further improve household energy efficiency and so deliver further important reductions in emissions of greenhouse gases, while continuing to tackle fuel poverty.
5. This consultation document seeks views on ways in which economic instruments could be used to overcome market failures which prevent improvements in household energy efficiency. Responses will help to inform the Government's policy development in this area, alongside the wider process of consultation leading up to the Energy White Paper.

¹ Climate Change Programme, DETR, November 2000,
www.defra.gov.uk/environment/climatechange/cm4913/index.htm

² Fuel Poverty Strategy, DTI/DEFRA, November 2001,
www.dti.gov.uk/energy/fuelpoverty/strategy.htm (Fuel poverty is defined as a household needing to spend more than 10% of income on fuel use in order to heat their home to an adequate standard of warmth.)

Background

6. Domestic energy consumption currently represents about 28% of UK final energy demand, and 27% of carbon dioxide emissions. While insulation and the introduction of central heating have contributed to improved energy efficiency over time, this has been more than offset by increased demand for warmth, hot water, lighting and appliances, and consumption is continuing to rise. Further information on trends in energy consumption by the domestic sector in the UK is provided at Annex B.
7. The Government has introduced a number of measures to promote energy efficiency in the domestic sector, including advice and information, incentives, regulation and partnerships with others – these are set out at in more detail at Annex C.
8. Earlier this year the Performance and Innovation Unit published its Energy Review. In response, the Government announced that it intended to set in process a period of public consultation on the PIU's key recommendations, leading up to the publication of an Energy White Paper around the end of the year. A consultation document inviting views on these recommendations has been published³, and respondents who wish to comment on wider energy issues are encouraged to respond to this document.
9. The case for economic instruments to improve household energy efficiency will be assessed against the background of the Government's wider energy policy objectives.

The case for Government intervention

10. The Government believes that well-functioning markets can deliver economically efficient outcomes. However, Government intervention may be necessary to ensure that markets function well and to correct for market failures.
11. Investments that improve energy efficiency, whether by improving the insulation of a house or by choosing a more efficient appliance, tend to yield benefits in the form of lower energy bills over a number of years – as well as reductions in emissions of greenhouse gases. However, evidence suggests that levels of household investment in energy efficiency are lower than would be expected, given these benefits. This implies that there are barriers preventing householders making the most efficient decisions on these investments. These barriers may be due to market failures, suggesting that the Government should intervene to ensure an efficient market outcome.

³ *Energy Policy – Key Issues for Consultation*, April 2001, DTI/DEFRA/DTLR, <http://www.dti.gov.uk/energy/develop/index.shtml>

Box 1: Market failures

The Government believes that the focus of Government intervention to address environmental issues should be to correct for market failures. The nature of the market failure and the costs and benefits of intervention inform the Government's decision on the most appropriate policy in each case. Market failures may be due to:

- negative or positive external costs not being fully reflected in the price of a good (eg cost of energy not taking account of negative environmental costs from energy use),
- imperfect information (where decision-makers make decisions which are not optimal because they do not have good information - for example, on the energy-saving benefits of an investment).
- under-provision of public goods (ie facilities available to all, where one person's use does not adversely affect the enjoyment of others); or
- imperfect competition (where not all participants in a market have equal bargaining power – for example due to a small number of buyers or sellers)

12. There is not always a clear distinction between barriers to investments in energy efficiency that can be classed as market failures, and more intangible barriers that may in fact simply reflect costs faced by the consumer. For example, inertia amongst decision-makers may lead to decisions being made that appear to be economically irrational. This may be a reflection of the non-price costs (e.g. time, risk or nuisance costs) involved with making an investment, but could also be considered as a market failure due to a lack of information about the extent of the benefits associated with the investment.

13. Those barriers to investments in energy efficiency that can most clearly be identified as market failures include:

- Household decisions on energy consumption may not take account of the environmental costs associated with energy use. (While the Government is not attracted to taxing the domestic use of energy, this need not preclude introducing incentives to encourage households to take account of externalities in their decision making.)
- Householders may not be fully informed about the technical possibilities that exist to improve energy efficiency, or may not have confidence in the advice of energy suppliers or installers.
- Householders may not be aware of the long-term savings (in financial terms or in comfort benefits) that result from investments in energy

efficient products, or may be unsure of the effectiveness of particular measures.

- Benefits may not be appropriated - tenants in rented properties may be unwilling to pay higher rents to fund energy efficiency improvements. Similarly owner-occupiers intending to move in the future may not be able to recoup the cost of investing in energy efficiency through a higher sale price. This can be considered to be an information market failure as the rental or sale prices do not reflect the value of energy efficiency investments made in a property.
14. The effect of these market failures may be amplified by the fact that many people do not consider energy efficiency to be a high priority. This means that investments in energy efficiency may not even be considered, even if economically rational, and that energy efficiency tends to be a minor consideration in investment decisions and purchases that involve energy use. Householders may also have a high discount rate, and therefore place a very low value on future savings associated with investments in energy efficiency.
15. These market failures may also affect suppliers of energy efficient technologies. For example, manufacturers of electrical appliances may lack the incentive to innovate and produce more energy-efficient products that they would have if householders' investment decisions took greater account of energy efficiency, and energy suppliers might lack the incentive to offer more comprehensive energy services.

Economic instruments

16. The Government intervenes to correct for market failures in a variety of ways, including regulation, voluntary agreements, and information programmes. Intervention can also take the form of economic instruments - broadly speaking, taxes (or subsidies), charges or trading schemes, which establish direct price signals for producers and consumers in order to bring about the most efficient level of consumption.
17. Given the Government's commitment not to introduce further taxes on the domestic use of energy, the most promising applications of economic instruments may be to encourage investment in more efficient products, or to encourage work that improves the energy efficiency of housing to be carried out. Possible applications of trading to improve household energy efficiency are likely to be as part of the Energy Efficiency Commitment (EEC), or as projects under the UK emissions trading scheme.
18. These areas are briefly discussed below – however responses commenting on other applications of instruments are welcome. Examples of economic instruments used to improve household energy efficiency in other countries are provided at annex D.

Box 2: Economic instruments to address environmental issues

Examples of Government intervention using economic instruments include:

- The climate change levy (CCL) – a tax on the use of energy by business and the public sector to encourage improvements in energy-efficiency.
- The scheme of enhanced capital allowances (ECAs) for investments in designated energy-saving technologies introduced alongside the CCL. This scheme provides businesses with a tax incentive to encourage the take-up of innovative technologies with environmental benefits.
- The UK greenhouse gas emissions trading scheme launched in April 2002. Participants are able to meet emission reduction targets at lowest cost, by reducing their own emissions or, if it is cheaper, by buying emissions allowances from other participants who have found it worthwhile to beat their targets. Those firms with the lowest costs of abatement therefore make the largest contribution to meeting the emissions reduction target set for the scheme as a whole.

Energy efficient products

19. Encouraging householders to replace appliances earlier than they would have done otherwise, and/or to choose more efficient appliances when they do so may be a possible application of economic instruments. Products which offer the most potential to deliver improvements in energy efficiency include:
 - Products used in improving insulation – materials used for cavity wall insulation, and double-glazing.
 - Efficient heating systems – including condensing boilers.
 - Efficient lighting – e.g. compact fluorescent lightbulbs.
 - White goods (refrigerators, freezers, washing machines, dishwashers). These products have mandatory energy-efficiency ratings.
 - Renewable energy heating systems – including micro-CHP, solar thermal heating, and solar panels.
20. At present a reduced rate of VAT is charged on a range of energy-efficient products installed as part of a grant scheme (see Annex C for further details). While European Union VAT directives limit the scope for using VAT reductions more widely, subsidies could potentially be provided in the form of a reduction against other forms of personal tax liability, although this would probably involve considerable administrative complexity. An alternative approach to providing tax subsidies would be to introduce additional charges on less efficient products.

21. It may be most appropriate for any instruments in this area to be narrowly focused on, for example, white goods, for which energy efficiency ratings are already available. Respondents are encouraged to consider whether a relatively narrow group of appliances would be the most suitable focus of any policy in this area – or whether a wider range of products that have implications for energy usage should be targeted.

Efficiency of housing stock

22. Economic instruments might be used to encourage householders to carry out work that leads to improvements in the energy efficiency of their dwelling. Appropriate instruments in this case might involve allowing qualifying spending to be offset against personal tax liability.
23. Such work is often carried out around the time of moving home, and it may be the case that an instrument targeted at home movers would be most effective. However, this may discriminate against those making home improvements which are not linked to moving home, and may require defining what is meant by a 'home mover'.
24. A barrier discussed earlier is the lack of incentive in the private rented sector for landlords or tenants to invest in energy efficiency – and it may be the case that an economic instrument that would allow landlords to offset the cost of energy efficiency improvements against their tax liability could help to overcome this barrier.
25. The SAP (Standard Assessment Procedure) rating is one measure of the energy efficiency of a dwelling that could provide a basis for assessing improvements to energy efficiency as a result of work that householders carry out. Schemes in other countries (see Annex D) include examples that use some form of energy audit to assess the scope for making energy efficiency improvements in a given dwelling, and a draft EU Directive which would require the regular energy auditing of buildings has recently been adopted by the Council of Ministers. However, administrative costs for the householder would need to be taken into account.
26. The types of work that lead to significant improvements in the energy efficiency of housing stock include loft insulation and cavity wall insulation. Instruments in this area could be targeted specifically at such work – or could apply more generally to any work that brings about improvements in the energy efficiency of a dwelling (eg including boilers and heating systems as well as fabric insulation).
27. An alternative approach to providing an incentive directly to householders would be to encourage those involved in the supply of energy services, or in carrying out work that leads to energy efficiency improvements, to expand supply and increase promotion of energy efficiency measures to households. This might be achieved by, for example, providing a tax incentive for the training of contractors to carry out work such as cavity wall insulation.

28. Improvements might also be possible by providing incentives for energy service providers to promote energy efficiency to households through the provision of energy packages.

Trading schemes

29. The UK Emissions Trading Scheme went live in April 2002. The future development of the scheme will include the launch of a project entry route into the scheme, whereby parties in eligible sectors can receive credit for emission reductions achieved through an approved project. While domestic energy efficiency projects are currently excluded from the scheme (due to interactions with the Energy Efficiency Commitment 2002-2005), there may be some scope for those involved in, for example, the provision of energy services to set up projects and respondents are encouraged to consider ways in which this might be possible.
30. An alternative application of trading would be through the Energy Efficiency Commitment (EEC), where energy suppliers are able to trade with each other their obligations to helping domestic customers to achieve energy efficiency improvements, or potentially to sell into the wider trading scheme carbon savings surplus to their EEC obligations. Again, respondents are encouraged to suggest ways to realise further improvements in household energy efficiency through trading in this way - perhaps by developing linkages between any future EEC and the broader emissions trading scheme.
31. A number of practical considerations are involved in using trading schemes to deliver emission reductions, including how to set baselines against which improvements can be measured, and how to quantify which savings are additional to 'business as usual'. These issues would need to be addressed if trading were to be used to bring about improvements in household energy efficiency. Further information about the UK emissions trading scheme is available on the Department of the Environment, Food and Rural Affairs internet site⁴.

Proposals

32. Respondents are invited to submit proposals for economic instruments to improve household energy efficiency by answering the questions at Annex A as fully as possible. Comments on any relevant issues not addressed by these questions are also welcome. The Government will assess proposals against its wider energy policy objectives, and against the following criteria:
- the extent to which the proposed instrument addresses a market failure that represents a barrier to improving household energy efficiency;
 - whether the proposed instrument, separately or in combination with other policy measures, is the most cost effective way of overcoming this barrier;

⁴ <http://www.defra.gov.uk/environment/climatechange/trading/index.htm>

- whether an economic instrument would be more effective than other Government policies such as regulation or spending programmes in overcoming the barrier in question.

Annex A: questions for respondents

1. Do you agree that the market failures set out above are barriers to improvements in domestic energy efficiency? Are there any other market failures that you believe constrain investment in this area?
2. Which of these barriers do you consider are not fully addressed by existing Government support for domestic energy efficiency?
3. Do you wish to comment on any of the examples of economic instruments given at Annex D?
4. Do you propose any specific economic instrument(s) to improve domestic energy efficiency, consistent with the Government's commitment not to introduce new taxes on domestic energy? If so, please indicate how each instrument would help to overcome the market failures above.
5. How would the proposed economic instrument relate to existing policy measures? Are there any synergies or overlaps? Would the instrument be consistent with the aims of existing measures or would they involve potential conflicts? If there are conflicts, how might these be addressed?
6. Where the proposal is to encourage the take-up of particular appliances or equipment, what is the wider environmental impact of the product in question? Are there other environmental issues around the production or use of the product?
7. What would be the likely impact of the proposed instrument in changing behaviour? Would it act as a reward or a penalty and what are the merits of this approach?
8. What would be the likely costs – whether financial, social, or environmental – to (a) business and (b) consumers?
9. What would be the distributional impact of the proposed instrument? Would there be an effect on prices of products, dwellings, or fuels?
10. Any other features of the proposed instrument that should be taken into account – eg administrative costs, EU state aid issues, consistency with other legislation eg VAT Directives?

Comments on relevant issues not addressed by the questions above are also welcome.

How to respond

Responses should be sent by **8 October 2002**, in writing to:

Household Energy Efficiency consultation
Environmental and Transport Taxes
HM Treasury
1 Parliament Street
SW1P 3AG

Fax: 020 7270 4801

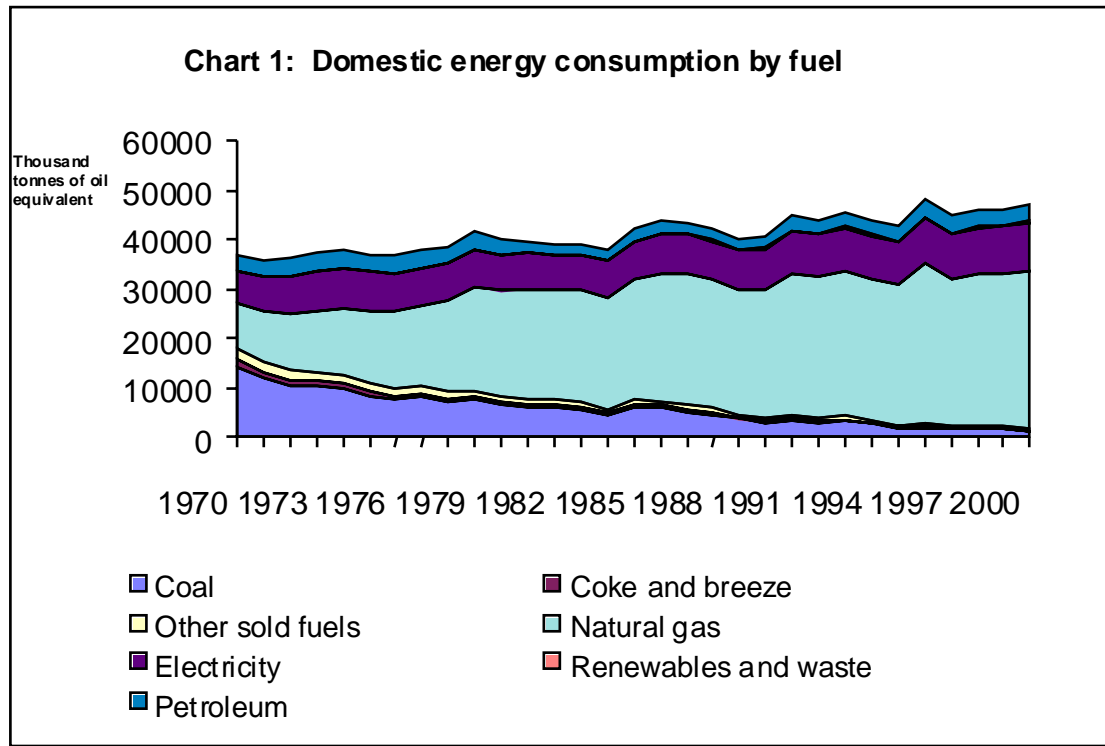
Alternatively responses can be e-mailed to:

david.kemp@hm-treasury.gov.uk

Please note that:

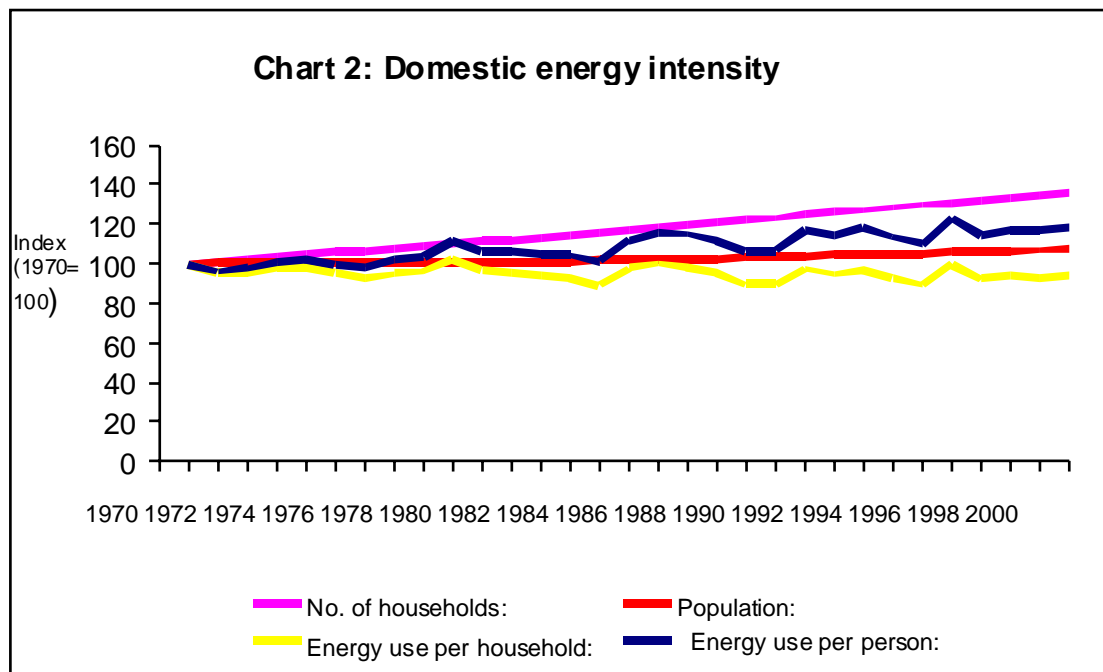
- Although all responses to this document will be considered carefully, we cannot normally respond to any points made in individual responses
- Responses, and the names of respondents, may be quoted and be made available to the public unless you clearly state that you wish your response to remain confidential.

Annex B: domestic energy use in the UK



(Source: Digest of UK Energy Statistics (DTI))

The continuing upward trend in UK domestic energy consumption is shown in Chart 1, which also illustrates the major shift from solid fuel to natural gas since 1970. Chart 2 shows that consumption per person continues to rise by around 0.5% a year. Energy efficiency has improved by over 30% during this period, mainly due to insulation and introduction of central heating, but it has been more than offset by the increase in demand for warmth, hot water, lighting, and appliances. At the same time, reductions in average household size mean that consumption per household has been falling steadily by around 0.3% a year. These population and household trends are expected to continue for the next 20 years.



(Source DTI: data from BRE Domestic Energy Fact File)

The corresponding carbon dioxide emissions remained almost level between 1970 and 1985 at around 45 MtC a year, but have subsequently fallen to 40 MtC in 2000, due both to the change in domestic fuel mix, and more recently the reductions in the carbon intensity of power generation. In 1970, power generation accounted for about 45% of domestic emissions, but this fraction has now fallen to 36% even though electricity use is still rising relative to other energy sources.

The breakdown of consumption by end use, shown in Chart 3, illustrates the major increase since 1970 for lights and appliances, which is only partly offset by reduced energy use for cooking. Charts 4 and 5 give the current breakdown of energy and emissions.

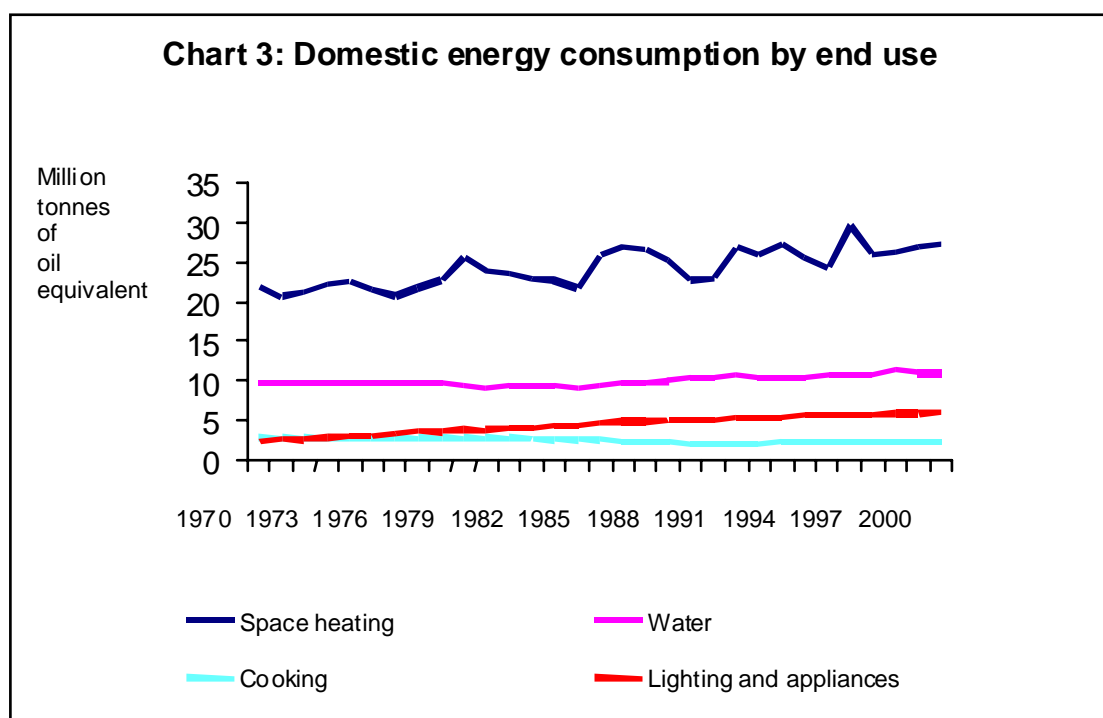


Chart 4: Energy consumption by end use

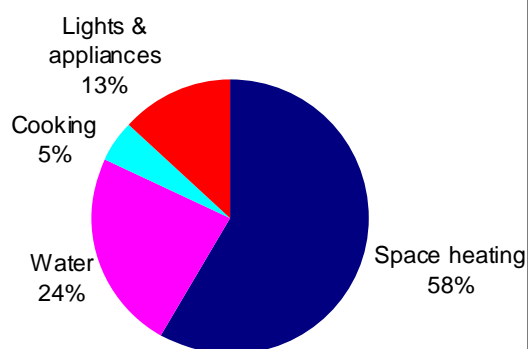
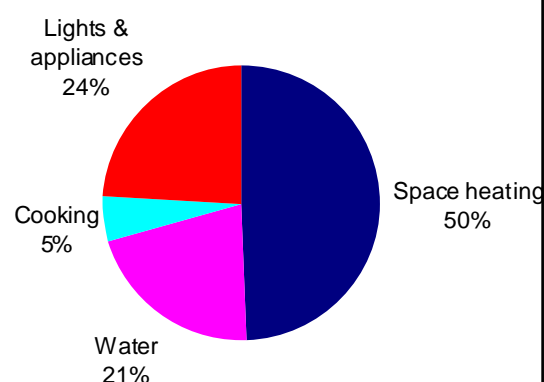


Chart 5: Carbon emissions by end use



(Source: BRE data)

New dwellings consume on average only about half of the average for the whole domestic stock. Currently around 140,000 new homes are built each year, as compared with a total UK stock of about 25 million, so at this rate new build only contributes around 0.3% a year to the overall efficiency. In comparison, improvements to existing buildings (better insulation, double glazing, higher efficiency boilers, lights and appliances) have been enhancing overall efficiency by around 1% a year. The scope for increasing this rate of improvement is governed by several factors. Boilers and cold appliances have lifetimes typically of 15 - 20 years, and premature replacement is uneconomic. Insulation, on the other hand, can be installed cost-effectively at any stage, and the limitation is the capacity of the supply and installation industries. Installation capacity is also limiting for condensing boilers at the present time.

Looking ahead, there is the potential for demographic and lifestyle changes to impact on energy consumption. For example, demand for new types of appliances and technologies might lead to additional demand for energy.⁵

⁵ Discussion documents on issues around future demand for domestic appliances and products are maintained by the Market Transformation Programme, and are available to view and for consultation at www.mtprog.com

Annex C: existing measures to support household energy efficiency in the UK

The Government has introduced a number of measures to promote energy efficiency improvements in the domestic sector. Some of these are aimed specifically at those on low incomes. These include:

- **Energy Efficiency Commitment:** requires gas and electricity suppliers to encourage and help their domestic customers to reduce energy consumption and to meet targets for quantified energy savings (expressed as an average saving per customer). Suppliers can decide which technologies to promote, within the full range of insulation, efficient boilers, lighting, appliances, etc, subject to scheme approval by Ofgem. It is a combined social and environmental programme, with at least half of the energy cost savings going to households in receipt of benefits. The current phase of the scheme runs from 2002-2005, and is funded via a charge of up to £3.60 per customer bill, with an expected programme expenditure of around £150 million p/a.
- **Home Energy Efficiency Scheme:** grant funding for qualifying households helps to overcome financial constraints to improving energy efficiency. Now operating under the name 'Warm Front', it is targeted at vulnerable households in the private rented and owner-occupied sectors, with special provision for over-60s households in receipt of an income-based benefit, and includes installation of central heating systems as well as insulation, etc. Government expenditure of about £600 million has been allocated for the four year period 2000-2004. In Scotland, grant support for energy efficiency measures is provided by the comparable 'Warm Deal' scheme, and the Central Heating Programme provides free efficient central heating systems to elderly householders in the private sector and to tenants of social landlords.
- **Affordable Warmth Programme:** lease finance to encourage the installation of high-efficiency gas central heating and energy efficiency measures. This allows programmes run by DEFRA, the Devolved Administrations, and social housing landlords to take advantage of enhanced capital allowances on heating systems via a seven-year leasing arrangement. Transco are underwriting the residual value of the equipment at the end of the lease period. Authorisation currently exists for a limit of one million homes by 2007.
- **Building regulations:** new energy efficiency requirements within the building regulations (England and Wales) since 1 April 2002, set minimum standards for energy efficiency for new homes. This is expected to reduce the energy requirements by around 25% relative to recently built homes. The regulations also apply to existing homes for the first time, introducing higher minimum efficiency standards for replacement boilers, windows and hot water tanks. Similar requirements in the Scottish building standards regulations came into force on 4 March 2002.
- **Appliance performance standards:** mandatory EU-wide energy labelling scheme provides information and minimum standards on energy efficiency for lighting and for "white" goods such as refrigerators, washing machines,

dishwashers etc. In addition to these standards, the Market Transformation Programme focuses on the development and delivery of integrated regulatory and voluntary policy measures to reduce energy consumption of traded goods and services: including ranking methodologies, listings and procurement specifications, voluntary industry agreements on targets for efficiency improvements of washing machines, TVs and digital TV services.

- Reduced rate of VAT: for installation of insulation materials, draught stripping, hot water and central heating system controls by contractors. The 5% reduced rate also applies to the grant-funded installation of central heating systems, heating appliances, factory-insulated hot water tanks, micro CHP and renewable energy heating systems.

Annex D: examples of economic instruments to improve household energy efficiency in other countries

- **Belgium**: “premium” paid to purchasers of A-rated fridges and freezers between 1996 and 1998, similar incentive for installation of solar collectors and compact fluorescent lights. A range of incentives are available for the retro-fitting of buildings, including a tax deduction of 15-40% of the cost of replacing boilers, installing solar boilers and photovoltaic systems, installing double glazing and installing roof insulation. The maximum amount that can be claimed is limited to €500 each year per household.⁶
- **Denmark**: the Danish Government has proposed to use tax incentives to encourage sales of energy efficient cold appliances and double glazed windows. The proposal involves additional taxes being levied on “traditional” double-glazing, and on inefficient cold appliances, with revenues being recycled to consumers in the form of subsidies for more efficient products. Specific new taxes were considered more practical than variable VAT rates.⁷
- **France**: a tax reduction worth 15% of expenditure (up to €8,000 per household) for the sale of insulation materials, heating control equipment and insulated windows was introduced in the 2002 Budget. Tax reductions for heating insulation improvements, heating controls, replacement of boilers or installation of a wood stove in houses built before 1982. This reduction is valid for work carried out by professional contractors.⁸
- **Germany**: the ‘eco-bonus’ scheme includes an allowance of 2% of purchase costs for installation of heat pumps, solar units and heat recovery units. Grants are also available for new buildings conforming to low-energy standards.⁹
- **Netherlands**: voluntary scheme of energy audits – householders implementing the recommendations of the audit are eligible for a 25% capital subsidy (up to €158).¹⁰ Proposals for financial premiums (to be administered by energy companies) for consumers buying appliances meeting the highest levels of energy efficiency under the EU labelling system.¹¹
- **USA**: a range of tax incentives exist at state level, including sales tax exemptions for Energy Star (a voluntary labelling scheme) appliances and other energy-efficient products, income tax credits for investments in renewable energy technologies, income tax deductions for buyers or sellers of

⁶ IEA Energy Efficiency Update, May 2002 (<http://www.iea.org/pubs/newslett/eneeff/be.pdf>)

⁷ Environment Daily, 5 November 2001

⁸ IEA Energy Efficiency Update, July 2000 (<http://www.iea.org/pubs/newslett/eneeff/de.pdf>)

⁹ IEA Energy Efficiency Update, Jan 2002 (<http://www.iea.org/pubs/newslett/eneeff/fr.pdf>)

¹⁰ Towards an Energy Efficient Strategy for Households to 2020: Supplementary Submission to the PIU Energy Policy Review, EST 2001, p17

¹¹ Environmental Signals 2000, European Environment Agency (<http://reports.eea.eu.int/signals-2000/en/page016.html>)

houses with improved energy efficiency. Tax credits for efficient appliances and efficient new homes also proposed at federal level¹².

¹² *Tax Credits for Energy Efficiency and Green Buildings: Opportunities for State Action* (Brown, Quinlan, Sachs, Williams), American Council for an Energy-Efficient Economy (www.aceee.org), March 2002