



Policy Analysis and Projections 2006/08

Executive summary

Sustainable Consumption and Production (SCP) is an immediate and growing priority for the Government, and energy production and consumption are at the heart of the issue. Most energy (over 90%) used in the domestic sector and a significant proportion (about 33%) of non-domestic energy use is by mass-produced products. In addition to helping the Government meet its climate change and other environmental commitments, action to improve the energy and water efficiency of key products and services will bring business and consumer benefits (eg in the form of reduced energy bills for households and businesses). Importantly, a reduction in energy consumption through energy efficiency improvements will also lead to increased security of energy supply.

In its Sustainable Products and Materials Progress Report, published July 2008, the Government set out its three-step approach to improving product sustainability across the whole supply chain - from raw materials, through manufacture, distribution and retail, use and maintenance to end of life:

1 Vision

The first step is to develop the overall vision of what we mean by sustainable. This means understanding environmental, social and economic impacts and trends, how they interact, how far and how fast we need to tackle them and products' overall contribution to these impacts.

A transition to a low-carbon economy is clearly a high priority. However, society's production and consumption of products is also associated with other environmental and social impacts – such as ecosystem degradation and unfair labour conditions. We also need to bear in mind that since many of the goods we buy are imported, products consumed in this country may well be linked to environmental, social and economic concerns elsewhere in the world.

2 Assessment

The second step is to assess the impacts – looking at both the scale of impact associated with the product in question, and the criticality of that impact in environmental or social terms. This means gathering evidence about the scale and nature of impacts associated with all stages of the supply chain, and assessing it to give a rounded picture of sustainability over the whole lifecycle. Sometimes there may be difficult questions about which impacts should take priority.

Once we have that assessment, we can use it to rate or benchmark products against agreed standards, allowing more straightforward comparisons between them. These ratings and benchmarks can then serve as the basis for a range of interventions.

3 Improvements

The third step is to put in place the improvement strategy to tackle the impacts and deliver greater sustainability. The action needed will vary enormously between products. Generally, there will need to be a range of actions to address impacts at different stages of the supply chain.

Some action will be for Government, some for business and some for consumers. Some will be local, some national and some international. In many cases there will need to be collaboration between those involved in different stages of the product lifecycle – to ensure that actions are targeted where they will have the most impact, and that improvements in one part of the supply chain are not outweighed by negative impacts in another.

Putting in place the improvement strategy includes monitoring and reviewing actions to learn what works and what does not – and to know whether we are on track to a sustainable future.

Step 1 - Vision

The Government's blueprint for tackling climate change, the draft Climate Change Bill, was published in March 2007. Against this background, and informed by Market Transformation Programme (MTP) evidence, the Energy White Paper (EWP) published in May 2007 estimated that raising product standards could reduce annual emissions by between 1 and 3 million tonnes of carbon (MtC)¹ (between 3.67 and 11 MtCO₂) by 2020. The policy landscape is set out in Section 1 and Annex F of this report.

Step 2 - Assessment

The MTP has been an important enabler of Government product policy development – providing evidence, assessment methods and standards for step 2 of the sustainable products approach. The key objective of MTP has been *“to support Government policies and work with business to reduce the whole-life environmental impacts of products, through better eco-design, in particular for water and energy consuming products”*.

MTP helps to join together the efforts of industry and other stakeholders to build an authoritative evidence base on the energy consumption of household and industrial products such as televisions, refrigerators, light bulbs and industrial motors. A network of leading industry experts collate available data/market intelligence on stock, sales, usage and resource consumption of household and industrial products to enable them to model how products are likely to evolve in the marketplace looking forward to 2020. By working closely with stakeholders, the evidence gathered by

¹ Using the Department for Business, Enterprise and Regulatory Reform figures for the carbon content of electricity.

MTP experts is commonly owned and regarded as authoritative across the stakeholder community.

Evidence and assessment methods

This publication sets out in detail MTP's evidence base at 31 March 2008.

MTP uses three standard scenarios to illustrate the potential impacts of market transformation strategies: Reference (REF), Earliest Best Practice (EBP) and P1. The P1 projection sets an average target level of ambition that the Government suggests could be delivered at a reasonable cost, taking into account such factors as current UK and global performance benchmarks, economies of scale and the capacity of the supply chain to take coherent action to deliver more energy efficient products. MTP sets its P1 targets and indicative product standards on the basis of its most recent understanding of what is necessary and deliverable. These are explained in detail in Section 1 of this report.

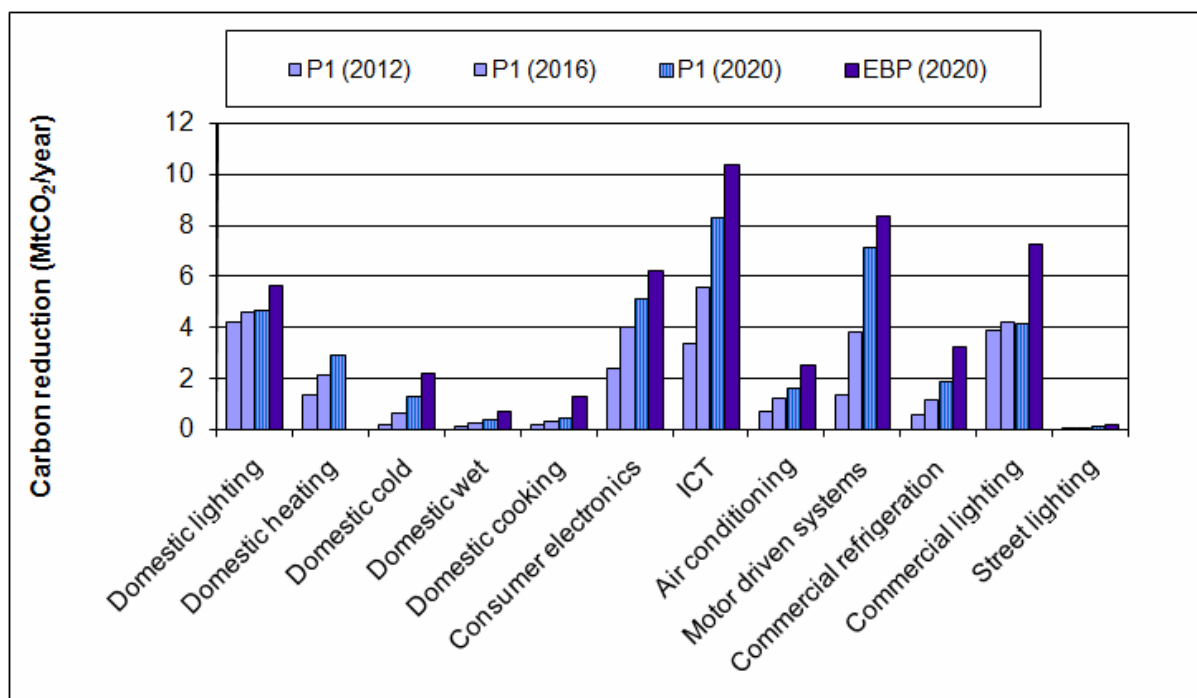
MTP's evidence base shows that there is significant potential to reduce carbon emissions through prudent product policy at zero or negative cost to society. Headlines from this report show that:

- The products covered by MTP, and in respect of which standards have been consulted upon during the recent consultation process, account for over 90% of the energy consumption in the domestic sector, and around 33% of the non-domestic energy.
- Electricity consumption by domestic products continues to rise, mainly due to an increased number of products as a result of rising household ownership, and also a growing number of households. The consumption by some white goods, such as those for domestic refrigeration, is starting to level off, as increased numbers are being offset by improved efficiency. Energy consumption in some product areas continues to rise, as product numbers increase and in some cases deliver a better or more desirable service (eg the trend towards larger televisions in domestic homes).
- Energy consumption by household boilers is projected to remain relatively constant into the future. Significant increases in household numbers are expected to be offset by the improved efficiency of new boilers and better insulation of buildings.
- Non-domestic end uses covered by MTP currently account for around 25% of UK carbon emissions.
- Energy consumption by the industrial sector, and especially large processes, is in decline owing to structural changes in the economy. However, this has been partly replaced by increases in the service and commercial sectors.
- Further increases in energy consumption for ICT equipment, data centres and air-conditioning are expected in the commercial and service sectors.
- At the point of purchase or installation it is possible to obtain a more efficient product at little or no increase in purchase cost. Even where the purchase cost is higher, this is usually repaid by lower running costs for energy from the improved efficiency. Thus, much of product policy concentrates on moving purchasers and

the supply chain towards more efficient products entering people's homes and buildings.

The carbon savings scenarios for each of the end uses resulting from the P1 and EBP analyses are set out in the chart below.

Figure ES1 Overview of the potential carbon reductions compared with Reference case



The savings suggested by the MTP evidence base for the domestic and non-domestic sectors are set out below.

Table ES1 MTP Reference (2007 and 2020) and P1 (2020) scenarios for final domestic energy consumption (GWh)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Cold	15,578	13,706	10,962	2,744
Wet	14,374	15,501	14,701	800
Lighting	17,216	19,185	8,923	10,262
Consumer electronics	18,489	34,024	22,722	11,302
ICT	11,969	14,617	7,139	7,478
Cooking – electric	13,171	13,102	12,301	801
Cooking – gas	7,509	7,365	6,908	457
Heating – gas boilers	367,004	377,048	363,910	13,138
Heating – oil boilers	35,122	37,976	36,580	1,396

Market Transformation Programme
Policy Analysis and Projections 2006/08

Table ES2 MTP Reference (2007 and 2020) and P1 (2020) scenarios for final non-domestic energy consumption (GWh)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Air-conditioning	15,390	19,952	16,493	4,424
Refrigerators	26,585	26,921	22,848	4,073
Street lighting	2,574	3,190	2,934	256
Commercial lighting	46,734	40,875	31,730	9,145
Servers	3,730	7,209	4,978	2,230
ICT	21,628	23,529	12,623	10,906
Heat pump heating	4,237	5,136	5,136	0
Motors (all-overlap)	150,466	159,333	143,529	15,804
Motors (non-overlap)	110,589	114,804	106,155	8,648
Gas boilers	104,536	106,501	98,950	7,551
Oil boilers	12,297	11221.7	10,860	362

Table ES3 MTP Reference (2007 and 2020) and P1 (2007) scenarios for estimates of carbon dioxide emissions at end use (MtCO₂)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Domestic				
Cold	8.3	5.8	4.9	0.9
Wet	7.7	6.5	6.2	0.4
Lighting	9.2	8.1	5.2	2.9
Consumer electronics	9.9	14.3	10.8	3.5
ICT	6.4	6.2	3.8	2.3
Cooking – electric	7.1	5.5	5.3	0.2
Cooking – gas	1.4	1.4	1.3	0.1
Heating – gas boilers	70.0	71.9	69.4	2.5
Heating – oil boilers	9.3	10.0	9.7	0.4
Non-domestic				
Air-conditioning	8.2	8.4	6.4	2.0
Refrigerators	14.2	11.4	9.9	1.4
Street lighting	1.4	1.3	1.2	0.1
Commercial lighting	25.0	17.2	14.8	2.5
Servers	2.0	3.0	2.0	1.0
ICT	11.6	9.9	6.8	3.1
Heat pump heating	2.3	2.2	2.2	0.0
Motors (all-overlap)	80.5	67.2	61.4	5.8
Motors (non-overlap)	59.2	48.4	45.2	3.2
Gas boilers	19.9	20.3	18.9	1.4
Oil boilers	3.2	3.0	2.9	0.1

Note: the savings take into account the heat replacement effects. Though these are the best estimates by end use, in the case of the non-domestic sector, the total estimated consumption shown here is higher than national statistics would suggest.

MTP evidence on the water and waste areas is set out in Annexes D and E.

Standards

As well as summarising the MTP evidence base, this publication makes available publicly 12 sets of average product standards in fulfilment of a commitment in the Government's Energy White Paper 2007.

The EWP committed to a consultation to test the Government's analysis of how the performance of energy using products will need to improve over the next 10–20 years, including proposals for product standards and targets to phase out the least efficient products. The product standards resulting from this consultation are published in summary form in Section 3 of this report. These standards reflect the analysis and evidence available to MTP at the time of EWP and made available to the Government during its public consultations.

The standards will be reviewed each year. New evidence, including that relating to recent market changes and the introduction of new technologies, will be considered during the development of the next round of consultation documents which are expected to be published in the fourth quarter of 2008.

Publishing dynamic long-term performance indicative standards in this way is in line with the recommendations of the Commission for Environmental Markets and Economic Performance, made in November 2007 as a means to drive investment in innovation to improve the sustainability of products. The Government's response to this recommendation can be found at:

<http://www.defra.gov.uk/environment/business/commission/index.htm>.

Step 3 - Improvements

MTP's evidence and product standards are used by the Government and others to support the mix of interventions that are necessary to improve product sustainability. This includes:

- Driving new, more sustainable options – through innovation.
- Moving the market average towards the most sustainable products – through pricing and trading, voluntary initiatives, producer responsibility, business support, procurement, labelling and information.
- Cutting out the least sustainable products – through voluntary and mandatory minimum standards.

Table of contents

1	Introduction	1
1.1	Scope of this document	1
2	Assessment of energy using products – overview	11
2.1	All energy and carbon emissions in the UK	11
2.2	Domestic overview	12
2.3	Non-domestic overview	17
2.4	Potential energy savings and carbon emissions reduction	21
3	Energy using products – Policy Brief summaries	25
3.1	Policy Brief summary for air-conditioning products	25
3.2	Policy Brief summary for commercial lighting products	28
3.3	Policy Brief summary for commercial refrigeration products	32
3.4	Policy Brief summary for consumer electronics products	35
3.5	Policy Brief summary for domestic cold appliances	38
3.6	Policy Brief summary for domestic cooking products	41
3.7	Policy Brief summary for domestic heating and hot water systems	44
3.8	Policy Brief summary for domestic lighting products	47
3.9	Policy Brief summary for domestic wet products	50
3.10	Policy Brief summary for information and communication technology products	53
3.11	Policy Brief summary for motor driven systems	56
3.12	Policy Brief summary for street lighting and traffic signals	60
Annex A	UK household and population figures	64
Annex B	UK carbon emission factors	65
Annex C	Heat replacement factors	67
Annex D	Water using products – overview	68
Annex E	Waste – overview	73
Annex F	Key policy instruments	75
Annex G	Glossary	80

1 Introduction

1.1 Scope of this document

This document sets out a summary of the consolidated evidence base available in relation to the current and projected impact of selected energy using products as a result of work undertaken by the Market Transformation Programme (MTP) at 31 March 2008. It updates and replaces *Sustainable Projects 2006: Policy Analysis and Projections* (SP06), which provided a similar snapshot at 31 March 2006.

As announced in the Energy White Paper in May 2007, the Government has over the last few months published, through MTP, a series of 12 consultation papers that set out its analysis of how the performance of some selected energy using products will need to improve between now and 2020, including proposals for product standards and targets to phase out the least efficient products.

The results of that consultation process are a set of product standards that are set out in a series of detailed product policy briefs accessible via the MTP website. The briefs are contained in summary form in Section 3 of this report. The standards will be reviewed annually. These standards will be used to guide and support Government policy relating to EU standards and labelling as well as to encourage UK retailers, manufacturers and service providers to bring forward more energy efficient products. The full product Policy Briefs can be accessed at www.mtprog.com/cms/whitepaper

1.1.1 Vision

Policy background and drivers for MTP

Sustainable Consumption and Production (SCP) is one of the four priority areas for UK action set out in the Government's *Sustainable Development Strategy – Securing the Future*, published in March 2005. SCP is about breaking the links between economic growth and environmental degradation. It has three key aims:

- Better products and services with improved environmental performance.
- Cleaner, more efficient production processes which strengthen competitiveness.
- Shifts in consumption towards goods and services with lower impacts.

This report relates mainly to the first of these aims – improving the performance of products and services.

We are dependent upon a wide range of products for everyday life. However, products cause environmental impacts throughout their lifecycle - from raw material extraction and manufacture, retail and distribution to use and maintenance, and end of life. Impacts are wide-ranging and include resource depletion, greenhouse gas

emissions, pollution, water use and waste. Their cumulative environmental impact is significant and, in light of increased consumption trends, is growing.

We need to take action to improve product sustainability and reduce these lifecycle impacts. Reducing product impacts will play a key role in achieving the UK's targets for a 60% reduction in carbon emissions by 2050 and at least a 26% reduction by 2020 – as well as a range of other environmental, social and economic targets.

If these aims are to be achieved, improving product sustainability needs to be a normal consideration for the mainstream market. This will not only be a challenge but also a huge business opportunity, and not just because the efficient use of resources will drive down costs whilst reducing environmental impacts. There are real opportunities for those businesses that can anticipate these changes and the consequent consumer behaviour, and design and market the products to meet them. There are benefits for consumers too, as improvements in the efficiency and performance of appliances will translate into reductions in household energy and water bills.

The Government outlined its overall approach to improving product sustainability (following the three key steps of vision, assessment and improvements and reported on its progress on each of these three steps in the **Progress Report on Sustainable Products and Materials**).

The Energy White Paper (EWP) in May 2007 set out clear commitments for product policy and estimated that raising product standards could reduce annual emissions by between 1 and 3 million tonnes of carbon (MtC)² (between 3.67 and 11 MtCO₂) by 2020. The EWP set out a range of measures aiming to reduce the energy consumption of products, systems and services.

1.1.2 Assessment

The Market Transformation Programme and its evidence base

The Market Transformation Programme (MTP) supports the development and implementation of UK Government policy on sustainable products by:

- **Collecting information.** Stock, sales, usage and resource consumption data are gathered on household and industrial products, such as televisions, fridges and electrical motors.
- **Building evidence.** The information gathered is used to model how products will evolve in the marketplace and to estimate future environmental impacts.

Over MTP's lifetime, an extensive evidence base of stock, environmental performance (typically energy or water consumption) and product usage has been built up for significant proportions of domestic and non-domestic energy and water

² Using the Department for Business, Enterprise and Regulatory Reform figures for the carbon content of electricity.

Market Transformation Programme
Policy Analysis and Projections 2006/08

consuming products. This is supplemented by other inputs such as product life, product sales, population, household numbers and market penetration.

The stock, product usage and resource used data provide the basis for analysis and scenario building to quantify the current and future environmental performance of products and the likely effects of various policies and market changes. This analysis allows priorities to be developed in terms of product type and suggests intervention measures applicable to particular product supply chains.

The MTP analysis looks at how the three key levers (stock, usage and resource used) contribute to the overall environmental impact and how each of these can be used to reduce the total impact. For example, to reduce the energy consumption of televisions, action can be taken to reduce the stock of televisions (or mix of stock of different technologies – CRT, plasma, LCD) and/or how long a television is on for and/or the energy consumption per unit of time of the television's use.

MTP's focus to date has largely been on energy efficiency. However, as targets are met, attention has focused also on user behaviour and alternative systems to deliver services to further reduce impacts. For example, new boiler sales are now almost entirely of the condensing type and little further improvement is currently projected in the products, so focus is shifting to user controls, supplemented by the increased use of renewable energy sources.

The evidence and analysis assembled by MTP is communicated to key stakeholders to ensure it is challenged (so making it more robust) and also to engage individuals in a process of changing behaviour, stimulating market responses, and influencing policy development. The robustness of this evidence and the expertise associated with its analysis and interpretation is a very important element of the programme in order to build trust and ultimately promote action.

This document presents the latest MTP analysis as at 31 March 2008. MTP develops policy strategies that improve the resource efficiency of domestic and commercial products. The What-If Tool is a purpose-built, web-based application and is available free of charge at <http://whatif.mtprog.com/>. It presents headline data on the potential impacts of these market transformation strategies to:

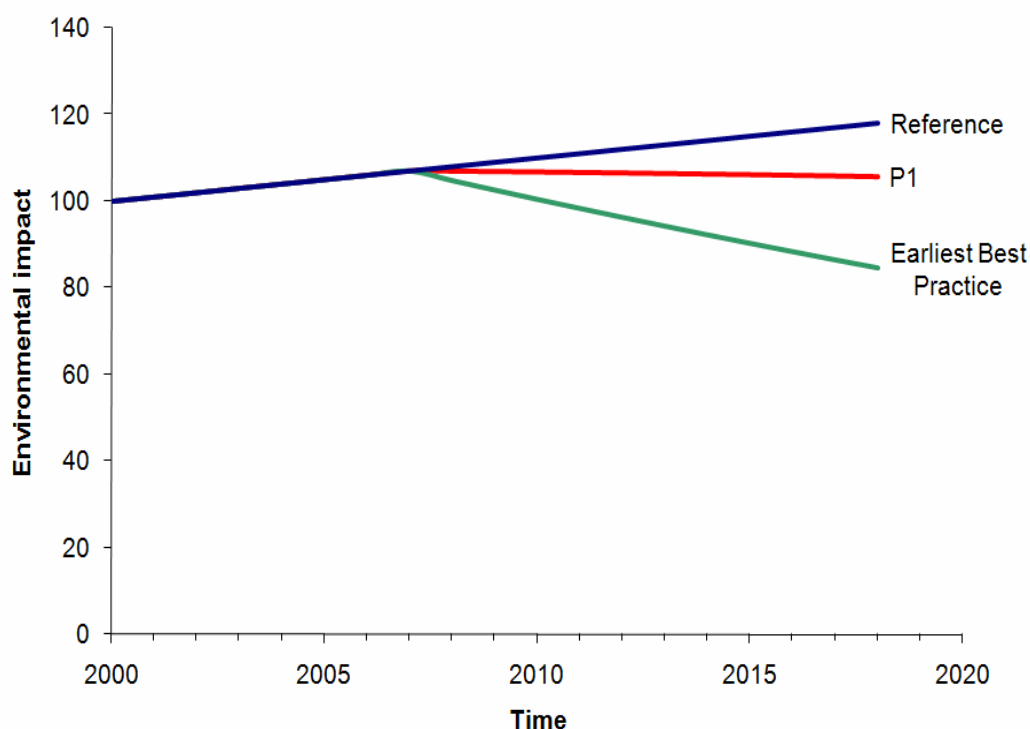
- Inform policy discussions and Government decisions.
- Facilitate the data and information exchange.
- Provide an opportunity to cross-check and challenge data and assumptions.

The data presented in this Tool should be used in conjunction with MTP's Policy Briefs and Briefing Notes, which provide further details about the three scenarios used by MTP (see below) and their underlying assumptions.

Scenarios

Government, via MTP, uses three scenarios to keep its analysis simple, encourage comment and scrutiny from stakeholders, and illustrate the potential impacts of its market transformation strategies.

Figure 1.1 The three MTP scenarios



The Reference (REF) scenario is ‘business as usual’, continuing as we are headed with the policies agreed to date, superimposed on evident market and technology trends. This provides a baseline against which the effects of future increased ambition, and the resultant market responses, can be assessed. Or, put another way, to help the Government assess the need for additional action.

Earliest Best Practice (EBP) defines a scenario in which all consumers buy one of the most efficient products available at that future time, up to the limit of performance of technologies that can be reliably forecast. This includes the future deployment of technologies whose impacts can be reliably forecast when the scenario is developed (ie in 2008), but thereafter includes only a nominal underlying rate of performance increase. Informed judgements are made as to when they will be available on the market, and so (in the EBP scenario) bought by every user/consumer. This scenario is unlikely to be cost-effective or necessarily realistic, but it provides a ‘very high efficiency’ boundary outcome that a more feasible scenario (ie P1) can aspire towards.

The P1 scenario projects the result if a defined and highly feasible set of product policies to save carbon are implemented that have a zero marginal net cost impact on the UK economy. P1 takes into account current UK and global performance

Market Transformation Programme Policy Analysis and Projections 2006/08

benchmarks, economies of scale, and the capacity of the supply chain to take coherent action to deliver more energy efficient products. It also takes into account the agreement and implementation of UK, EU and international policies to drive further improvement over and above the REF scenario. In terms of its level of ambition, P1 should usually achieve higher energy savings than the 'Minimum Life Cycle Cost' option, since cost savings to consumers and/or the economy can be reinvested to maximise savings at zero net cost.

The effectiveness of market transformation policy, taken as a whole, may be assessed as the extent to which it modifies the Reference scenario at each update of the projections (setting aside changes to Reference for other reasons such as improved understanding of energy usage etc).

Together, the Reference and EBP scenarios define an envelope within which a reasonable target outcome (P1) can be set. And the relative ambition level of that target can be judged with respect to very feasible, higher and technically possible lower carbon outcomes.

MTP sets its P1 targets and indicative product standards on the basis of its most recent understanding of what a set of policies and technologies can deliver. That analysis may change over time, for example, if new efficient technologies enter the market faster than expected, or if consumer trends change, or through international or EU action, or through policies on carbon emissions reduction more generally.

The Energy White Paper set out predicted future UK energy consumption by sector and by fuel type (referenced as Updated Energy Projections, UEP-28). These projections were made by employing top-down econometric models at sector level; they were not disaggregated to the product level. MTP is primarily used to appraise and subsequently evaluate product-specific policy approaches. It therefore uses bottom-up models instead of econometric models. It is unusual to have high-quality measured energy consumption data. Reliance is therefore placed on stock models to provide estimates of end-use consumption. MTP stock models describe the stock and the age profile of particular product types used in UK businesses or households. They contain historical information on demographic, technical, ownership and usage data to estimate energy consumption and emissions. These are extrapolated to provide energy projections up to the year 2020. The estimated consumption figures for each product type can be summed to give the total energy consumption by all end uses within the UK.

These bottom-up models allow analysis of the effects of new products entering the stock and old products leaving. These models are therefore useful for analysing the effect of changes in technology, usage or ownership through time and for evaluating the effect of policy options on energy consumption. By changing the input variables to represent the effects of market transformation policy or other market changes, it is possible to run different scenarios such as MTP's P1 and EBP scenarios.

Once the bottom-up models have been created, they are cross-checked with any measured data available and, more importantly, compared with sector total figures

given in the Digest of UK Energy Statistics. For domestic electricity, several iterations of these bottom-up models have been undertaken, and the difference is explained by expected statistical confidence intervals and missing miscellaneous products. For domestic gas, the heating models are forced to match the total gas consumption. For the non-domestic sector electricity consumption, it appears that the bottom-up models overestimate energy consumption. For any overview analysis of the non-domestic electricity sector, MTP scales down the estimates proportionately.

Using the same approach, MTP has developed bottom-up models to estimate water consumption by end-use equipment. In addition, stock models may be used to estimate the volume and age distribution of products entering the waste streams.

Development of the evidence base since SP06

Since the publication of SP06, MTP's product coverage has expanded to include non-domestic heating, enterprise servers and broadband equipment. These, and each of the previously included product areas, have been reviewed and updates of information are, where possible, included in this document.

The evidence presented in this document includes an update in the number of households used in the MTP models, to reflect changes in numbers generated by the Department for Communities and Local Government (BNXS25). In addition, there has been a change to the emission factors used by MTP (BNXS01) to reflect the changes set out in the Energy White Paper. The updated factors for electricity are higher owing to the increase in coal-generated electricity over the last few years.

Some sectors have been updated to better reflect efficiency metrics that are used to define product performance. For example, the efficiency of televisions is given in terms of a function of screen size (watts per screen size), rather than a simple average power for all sold. Similarly, all non-domestic refrigeration appliances have had improved metrics applied to them.

1.1.3 Improvements

Within any product group, and at any point in time, there is likely to be a range of products on the market with varying degrees of sustainability. Most products are somewhere in the middle of the range, with a few more sustainable than average and a few less sustainable than average. The range of product interventions needs to include action across the whole sustainability range to:

- Encourage the development of new products that are more sustainable than all of the current options.
- Drive the market average towards the most sustainable of what is available.
- Cut out the least sustainable products.

Figure 1.2 Product interventions – overall approach

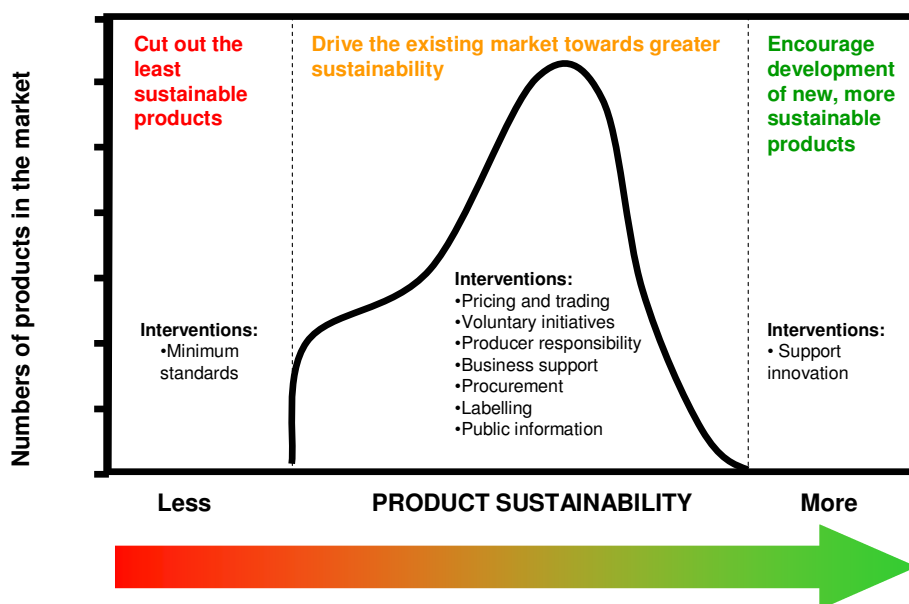
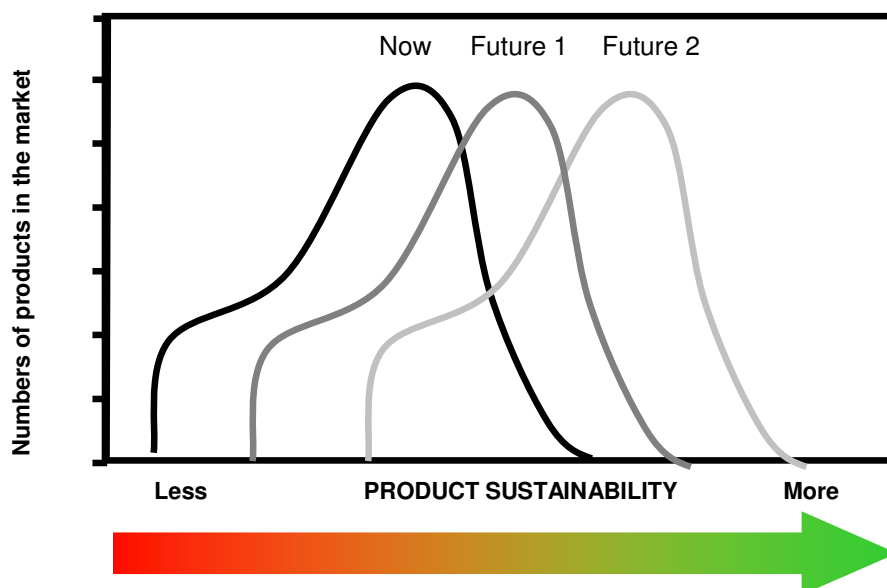


Figure 1.3 Product interventions – market change over time



There have been many important developments in policy intervention since the publication of SP06. These include:

- **Driving new, more sustainable options - through innovation**
 - The scale of the new business opportunities of moving to a low-carbon and more sustainable economy were reflected in the final report of the Commission

on Environmental Markets and Economic Performance (CEMEP) in November 2007. The Government's response to CEMEP's findings was published in May 2008, recognising the need to set clear medium to long-term signals to the supply chain.

- **Moving the market average towards the most sustainable products - through pricing and trading, voluntary initiatives, producer responsibility, business support, procurement, labelling and information**
 - There is growing interest in the efficient use of water, demonstrated by the establishment of the ministerially led Water Saving Group, which focuses on domestic water efficiency and the **Government's new water strategy for England, *Future Water***, published on 7 February 2008.
 - The announcement in the 2007 Budget by the then Chancellor, Gordon Brown, of the UK's aim to be one of the first countries to **phase out inefficient light bulbs** ahead of possible actions by the EU to remove incandescent lamps from the EU market. This initiative is supported by the major high street retailers and by the energy suppliers as part of their commitments to increase energy efficiency.
 - Active involvement by Defra in the development of **ENERGY STAR[®]** specifications on a European and international level. Innovative and demanding energy efficiency criteria have been included in the **EU-US ENERGY STAR agreement** for office equipment.
 - The Government's commitment to optimise social, economic and environmental benefits from the billions of pounds that local government and the health sector spend each year on buying goods and services, through the work of the **Sustainable Procurement Task Force**.
 - The launch of the **International Task Force for Sustainable Products (ITFSP)** in November 2005 and the launch of **Global Sustainable Product Networks (GSPNs)** which now cover lighting, electric motors, compliance monitoring, home entertainment products and computers/e-waste.
 - The development by the International Energy Agency (IEA) of an **Energy Efficiency Implementing Agreement** that will provide a mechanism to develop and benefit from globally harmonised approaches to product policy.

- **Cutting out the least sustainable products - through voluntary and mandatory minimum standards**
 - The Government's blueprint for tackling climate change, the draft **Climate Change Bill**, was published in March 2007. The draft, the first of its kind in any country, and accompanying strategy, set out a framework for moving the UK to a low-carbon economy. It demonstrates the UK's leadership as progress continues towards establishing a post-Kyoto global emissions agreement. The Bill includes a series of clear targets for reducing carbon emissions – including making the UK's targets for a 60% reduction by 2050 and at least a 26% reduction by 2020 legally binding. A new system of legally binding five-year 'carbon budgets', set at least 15 years ahead, will be implemented to provide

clarity on the UK's pathway towards its key targets and increase the certainty that businesses and individuals need to invest in low-carbon technologies.

- The Framework **Directive for the Eco-design of Energy-using Products (EuP Directive)**, which aims to reduce the environmental impact of energy using products by setting environmental performance limits for specific products. The Government is also encouraging the European Commission to bring forward new proposals under the **Energy Labelling Directive**, with the aim of widening its scope to new products, uplifting the performance levels and introducing refinements to testing and evaluation methods.
- Defra has lead responsibility for implementing the **EC Directive on Energy End Use Efficiency and Energy Services**. The Directive was introduced to enhance the cost-effective improvement of energy end-use efficiency in Member States.

Key MTP achievements 2006/08

MTP works with industry and other stakeholders to deliver improvements. A common understanding is reached on how impacts can be mitigated; action plans are agreed and the measures implemented.

A full summary of MTP's achievements from 2002 to 2008 will be set out in a companion report to be published later this year. Highlights from the period covered by this document include uses of MTP evidence and assessments to support the following actions to improve product sustainability:

- **Contribution to the EWP** *Meeting the energy challenge*, published on 23 May 2007, contained the Government's international and domestic energy strategy. The EWP set the strategic direction for MTP's work and introduced the requirement to publish energy performance standards. In the EWP it was recognised that the work of MTP to deliver more energy efficient products could contribute to reducing projected annual emissions by between 1 and 3 million tonnes of carbon (MtC) (between 3.67 and 11 MtCO₂) by 2020.
- **Supply chain initiatives**, supported by MTP, can provide a significant opportunity to embed product standards into the procurement process. In its 2006 Budget, the Government announced a voluntary initiative with major retailers and the Energy Saving Trust to encourage the purchase of more energy efficient consumer electronics. Following consultation with retailers, a tool was developed (the '**Red/Green Calculator**') to help retailers determine if individual products or their sales-weighted product mix would meet current or future Government efficiency targets.
- Supported by MTP, **Defra launched the International Task Force for Sustainable Products (ITFSP)** in November 2005. ITFSP's vision is, by encouraging innovation and competition, to create strong markets for environmentally sustainable and energy efficient products, while ensuring markets do not persist (and are not created) for obsolete technologies and wasteful products, particularly in developing countries with rapidly expanding economies.
- The Motors GSPN launched the Standards for Energy Efficiency of Electric Motor Systems (SEEEM) initiative in June 2006. SEEEM is aimed at developing a

Market Transformation Programme
Policy Analysis and Projections 2006/08

comprehensive market transformation strategy to promote efficient industrial electric motor systems worldwide, through harmonisation of test standards, introducing mandatory minimum performance standards and sharing international best practice.

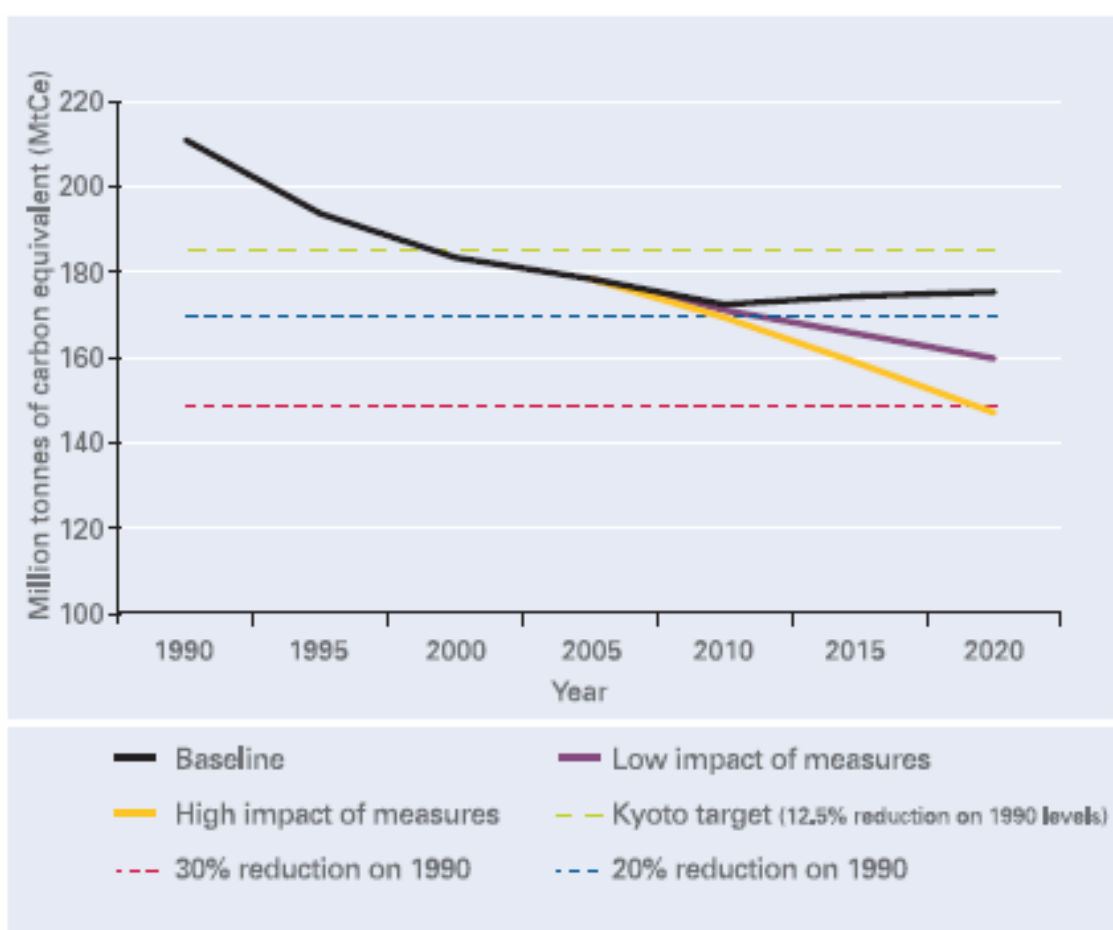
2 Assessment of energy using products – overview

This Section describes how energy is used by products in the UK based on an analysis of MTP's evidence base at 31 March 2008. It first describes the overall UK context before considering separate analyses for the domestic and non-domestic sectors. It then sets out the potential for reducing this energy consumption through the introduction of more efficient products, appliances and technologies. The potential savings are based on reaching the Government's P1 standards (as defined in Section 1 above).

2.1 All energy and carbon emissions in the UK

Carbon emissions projections given in the 2007 Energy White Paper suggest that total UK greenhouse gas (GHG) emissions will be between 147 and 159 million tonnes of carbon equivalent (MtCe) in 2020 (ie 25-31% lower than 1990 levels).

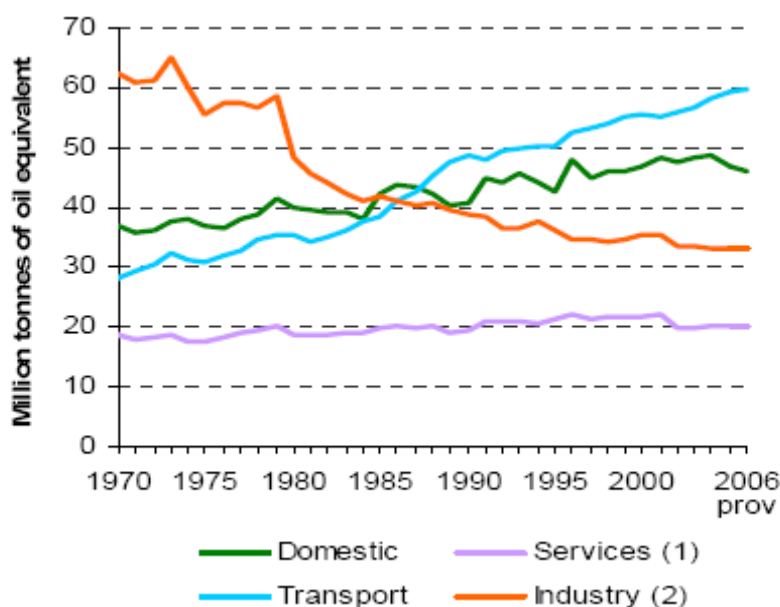
Figure 2.1 Projected UK carbon emissions



Source: Energy White Paper 2007

MTP supports the UK Government on energy efficiency measures for mass-produced energy using products. These energy using products account for most (over 90%) of the energy used in the domestic sector (which represents 29% of total final energy consumption), a significant proportion of the industrial sector (representing 21% of final energy consumption) and most of the service and commercial sector (representing 13% of final energy consumption).

Figure 2.2 Energy consumption by main sectors, 2007



Source: DTI UK energy indicators report (2007), page 331³

(1) Services include the commercial sector, public administration and agriculture.

(2) Industry includes construction.

Through implementing energy efficiency measures at the point of purchase or installation it is possible to significantly reduce the final energy demand and carbon emissions in the UK. The energy savings that would result from the achievement of the standards listed in this document will have a significant impact on three of the key sectors shown above, namely the domestic, service and industrial sectors.

The products covered by MTP, and in respect of which standards have been consulted upon during the recent consultation process, account for over 90% of the energy consumption in the domestic sector, and around 33% of the non-domestic energy.

2.2 Domestic overview

The domestic sector accounts for around 25% of UK carbon emissions. By making use of bottom-up models, an analysis of where energy is used and potential

³ Available at <http://www.berr.gov.uk/files/file39511.pdf>

Market Transformation Programme
Policy Analysis and Projections 2006/08

reductions by end-use measures can be assessed. By 2008, MTP had examined the following in detail:

- Cold appliances (chest freezers, upright freezers, fridge-freezers and refrigerators).
- Wet appliances (dishwashers, washing machines, tumble driers and washer-driers).
- Cooking appliances (gas and electric hobs, ovens and cookers, microwaves and kettles).
- Consumer electronics (TVs, video players and recorders, set-top boxes and external power supplies).
- Domestic internal lighting.
- Domestic heating (oil and gas-fired boilers).
- Domestic ICT (computers, monitors and printers).

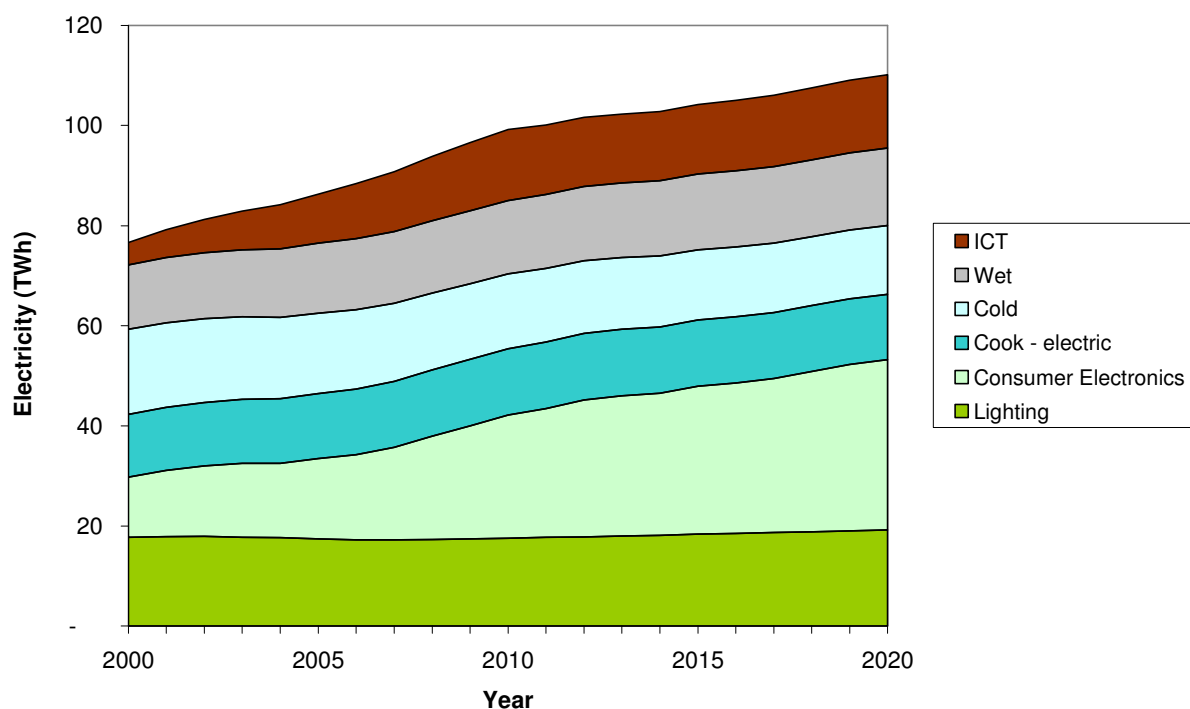
The proposed energy performance of all these products went to consultation during 2007. A revised Policy Brief setting average standards up to 2020 for each of these products is provided in Section 3.

In addition, a small amount of analysis has been undertaken on some new products (eg broadband equipment) and the standby consumption of a range of products.

When summed, it can be seen that the electricity consumption by all of these domestic products is still rising. The number of products in the domestic sector continues to increase, due to continued increasing ownership per household and continuing growth in the number of households. Significant product policy savings have come from standards and labels on most white goods, which now show consumption levelling off; increases in the number of these products are being offset by improved efficiency. The rising consumption from all products and expected future increases overall are mostly due to new technologies for consumer electronics and ICT, in terms of increased numbers and, in some cases, because individual products are more energy consuming (eg larger televisions).

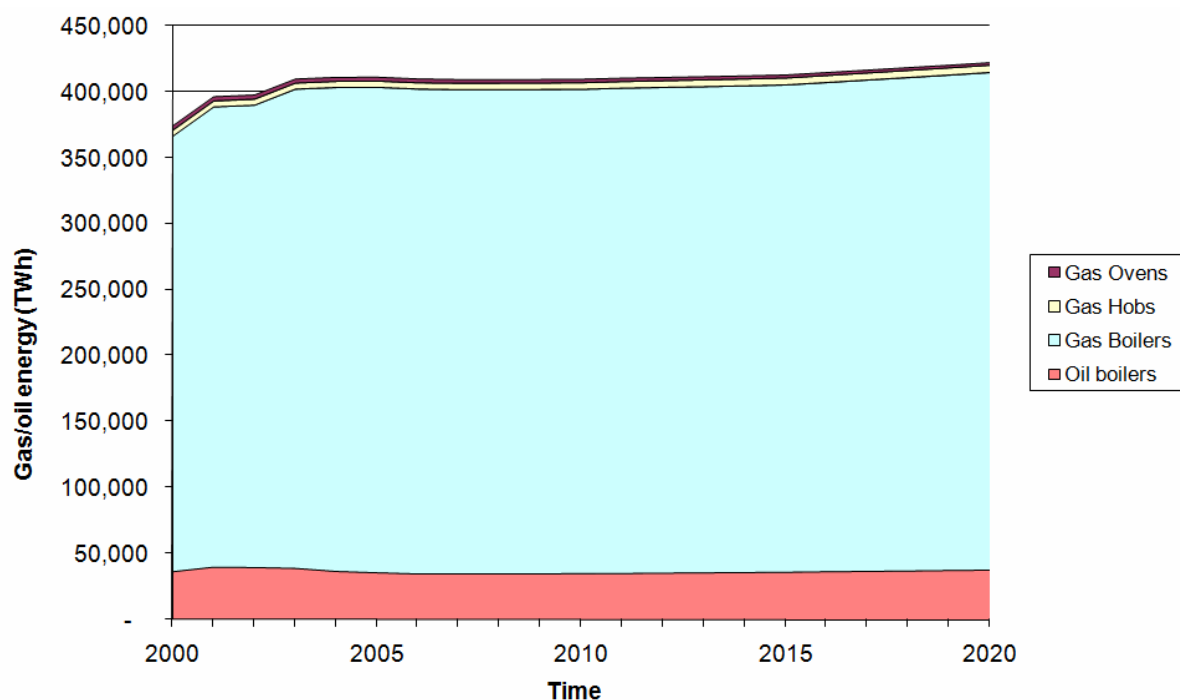
Overall, total domestic electricity consumption appears to have levelled off in the last few years. This will, in part, be due to a fall in the use of electricity to heat space and water, along with some successful product policies, such as the Energy Efficiency Commitment (EEC) measures, offsetting the increased number of products.

Figure 2.3 Aggregate MTP Reference scenario for domestic electricity consumption



Gas and oil consumption is predominantly used for space and water heating through the use of individual household boilers. Energy consumption by these products has been relatively constant, and is projected to remain constant into the future. Significant increases in household numbers are expected to be offset by the improved efficiency of new boilers replacing older, less efficient ones, and buildings becoming more energy efficient.

Figure 2.4 Aggregate MTP Reference scenario for domestic gas and oil consumption



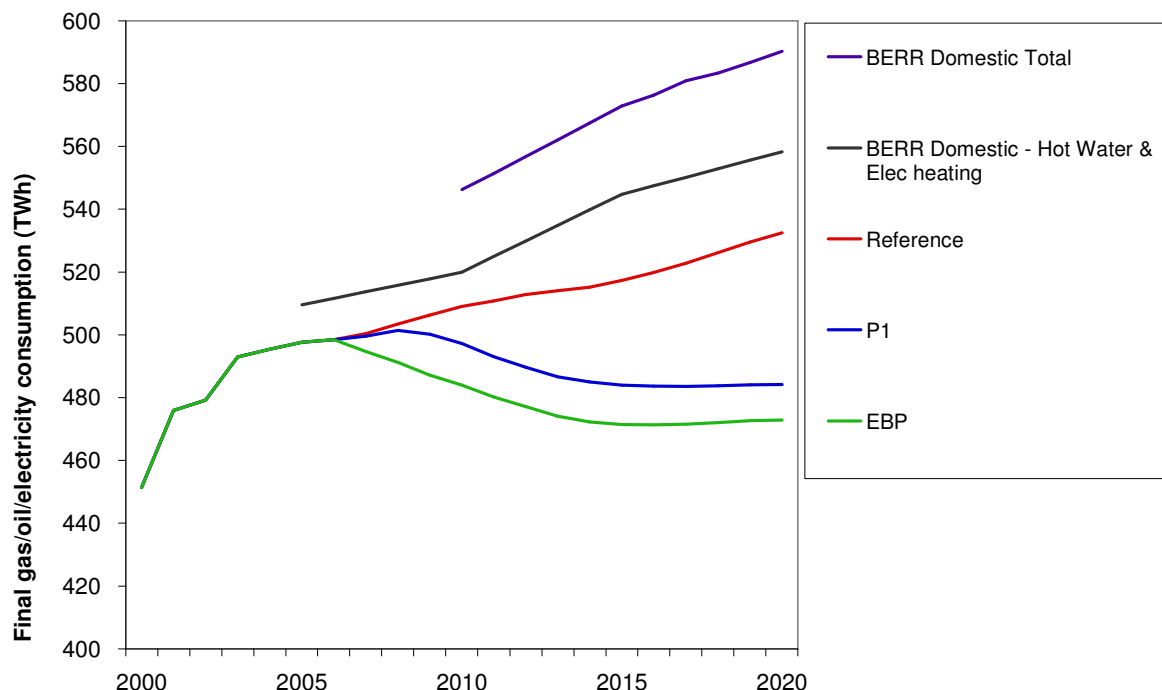
Through the uptake of more efficient products at the point of purchase or installation at normal replacement rates, it is possible to reduce the energy consumption by these products at marginal cost. The P1 scenario shows the impact of sales/installations at the Government target values.

Table 2.1 MTP Reference (2007 and 2020) and P1 (2020) scenarios for domestic energy consumption (GWh)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Cold	15,578	13,706	10,962	2,744
Wet	14,374	15,501	14,701	800
Lighting	17,216	19,185	8,923	10,262
Consumer electronics	18,489	34,024	22,722	11,302
ICT	11,969	14,617	7,139	7,478
Cooking – electric	13,171	13,102	12,301	801
Cooking – gas	7,509	7,365	6,908	457
Heating – gas boilers	367,004	377,048	363,910	13,138
Heating – oil boilers	35,122	37,976	36,580	1,396

The following graph shows consumption by all fuels in the domestic sector and MTP’s coverage. It also shows the potential reduction under the two energy saving scenarios.

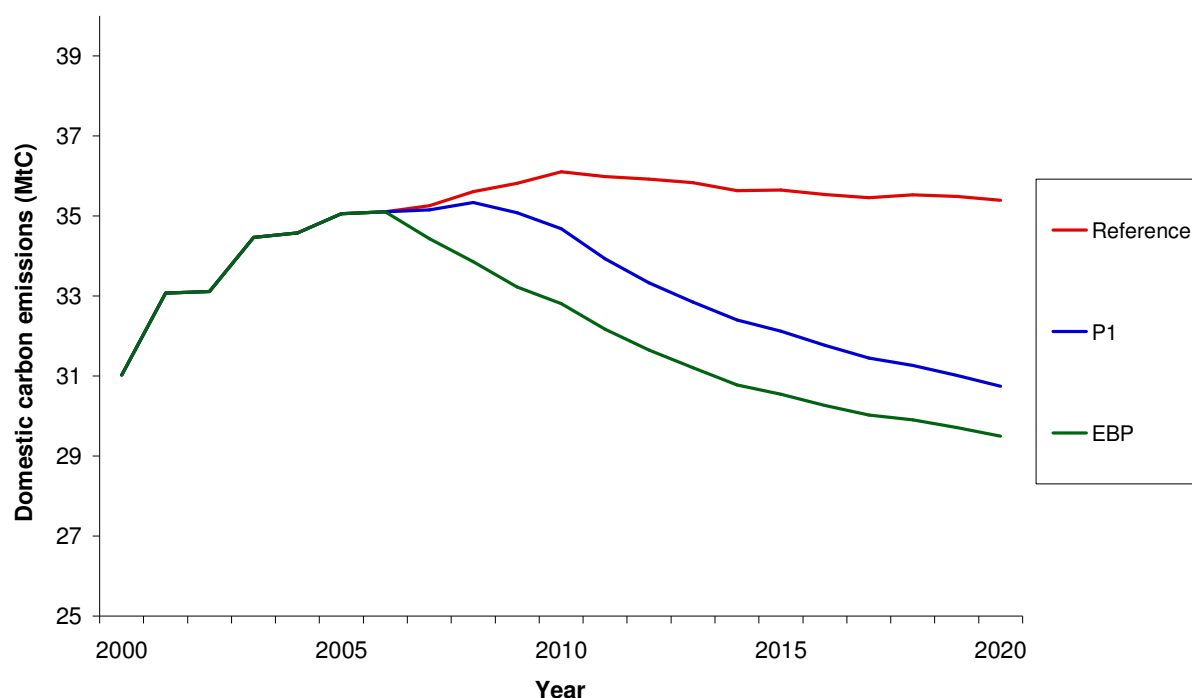
Figure 2.5 MTP Reference, P1 and EBP scenarios for delivered domestic energy, compared with BERR projections (with and without electric heating)



The energy consumption shown above is the final delivered energy. Using standard conversion factors (see Annex B) it is possible to present the scenarios in terms of CO₂ emissions. The emissions for the electrical appliances are at the power stations, while the emissions for gas appliances will be in the household. The emissions for the domestic lights and appliances covered by MTP are shown in the figure below.

For the products covered it is possible to reduce carbon emissions by almost 4 million tonnes for the products themselves. However, some of the energy saved will mean less of this wasted energy is used for space heating. This 'lost' heating has to be replaced by the heating system, and is not included in the figure below. Annex C provides a fuller explanation of this so-called 'heat replacement effect'.

Figure 2.6 Domestic carbon emissions for Reference, P1 and EBP scenarios



Note: MTP products only: electric space and water heating and miscellaneous uses are excluded.

All of the savings identified above can be delivered through appropriate product policy. All of these reductions will come at a lower cost to consumers and UK society. However, not all of these savings should be attributed to product policy (as covered by MTP which delivers standards and labelling). Other Government policy may deliver some of these identified savings (eg building regulations and the EEC (or its successors)). For the 2007 Energy White Paper an estimate of this potential overlap was made. It suggested that up to around 40% of the potential P1 energy savings identified here could be realised by successful implementation of these other two policies, meaning the remainder was available to product policy (such as minimum energy performance standards and labels).

2.3 Non-domestic overview

The non-domestic end uses covered by MTP currently account for around 25% of UK carbon emissions.

By 2008, MTP had product information on the most important end uses in the non-domestic sector. The following product areas also had Government standards that went to consultation:

- Information and communication technology (PCs, laptops, monitors, printers, photocopiers and multi-function devices).
- Motor-driven systems (motors, drives, pumps and fans).

Market Transformation Programme Policy Analysis and Projections 2006/08

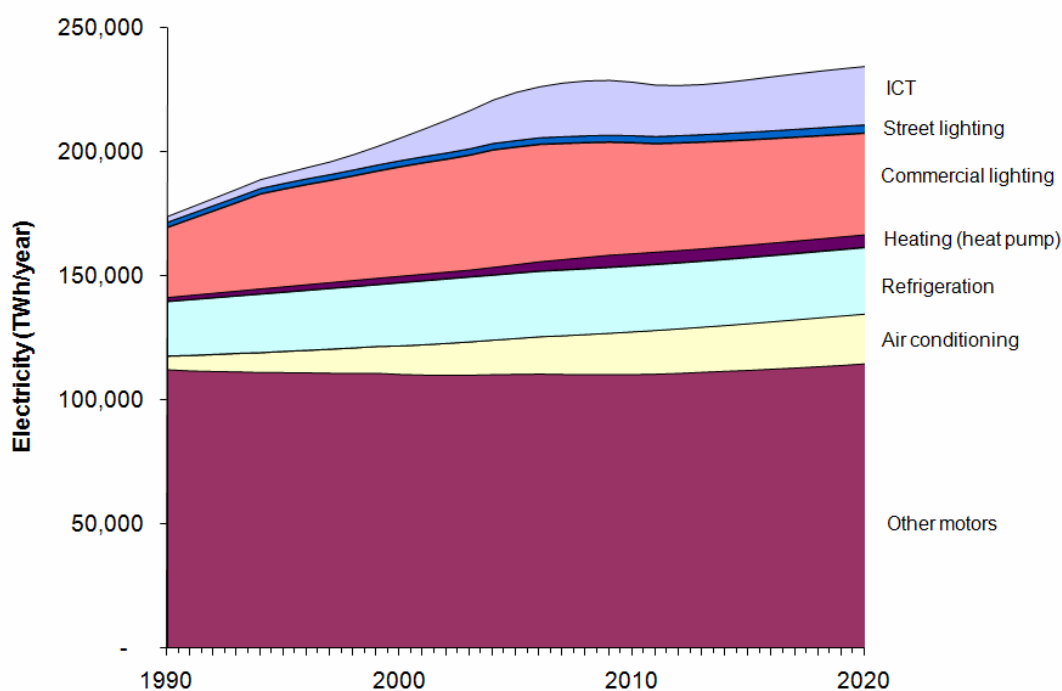
- Non-domestic lighting.
- Commercial refrigeration (liquid chillers, refrigerated display cases, service cabinets, cold rooms, cellar cooling equipment, ice-making machines and refrigerated vending machines).
- Air-conditioning systems (comfort cooling, plant and systems for all non-domestic premises).

In addition to these non-domestic products, the following have also been examined by MTP, though these are new areas and there has been insufficient robust evidence to date to allow consultation as Government targets:

- Non-domestic heating.
- Servers and data centres (which includes air-conditioners and uninterruptible power supplies).

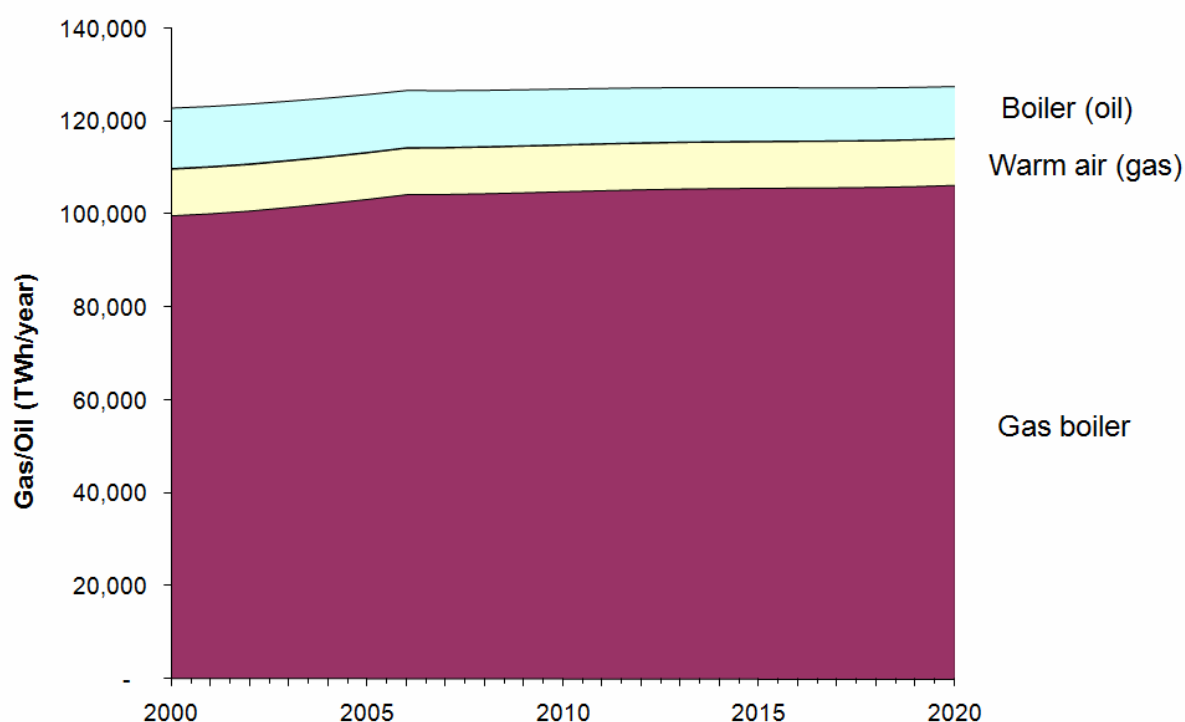
By summing the best estimate of consumption for each product it is possible to see the relative importance of each end use and product. Figure 2.7 shows the estimated aggregate consumption for non-domestic electric products covered by MTP. In the case of motors, some of these are also components in other end uses, primarily refrigeration and air-conditioning equipment. An estimate has been made of the overlap and this has been removed from the total energy consumption by motors. The remaining non-overlapping, and therefore additional, use is listed as 'other motors'.

Figure 2.7 Aggregate MTP Reference scenario for non-domestic electricity consumption



Similarly, it is possible to add the energy consumption by other gas and oil using products, which are primarily used for heating purposes (see Figure 2.8). Other uses of gas and oil, such as process heating, are not included in the MTP analysis.

Figure 2.8 Aggregate MTP Reference scenario for non-domestic gas and oil consumption and BERR projection



An analysis of each end use suggests the following savings can be made if the Government P1 targets are met⁴.

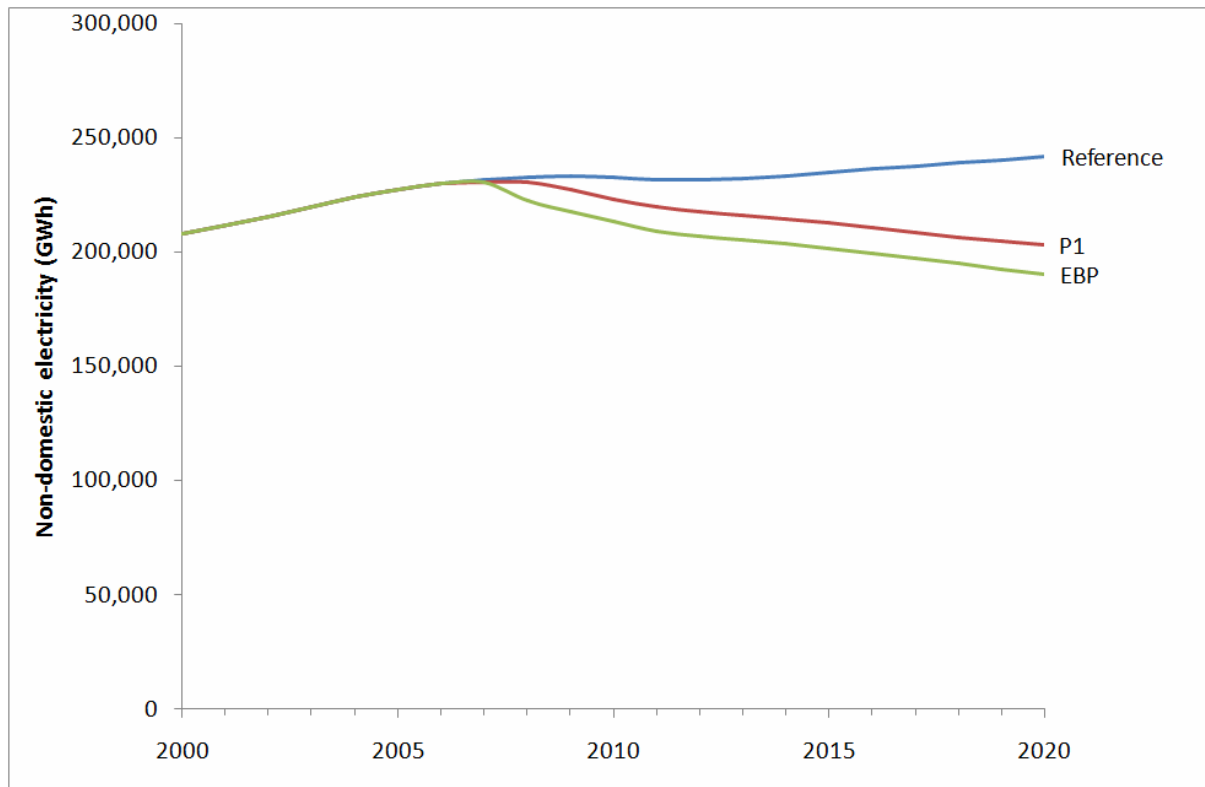
Table 2.2 MTP Reference (2007 and 2020) and P1 (2020) scenarios for non-domestic energy consumption (GWh)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Air-conditioning	15,390	19,952	16,493	4,424
Refrigerators	26,585	26,921	22,848	4,073
Street lighting	2,574	3,190	2,934	256
Commercial lighting	46,734	40,875	31,730	9,145
Servers	3,730	7,209	4,978	2,230
ICT	21,628	23,529	12,623	10,906
Heat pump heating	4,237	5,136	5,136	0
Motors (all-overlap)	150,466	159,333	143,529	15,804
Motors (non-overlap)	110,589	114,804	106,155	8,648
Gas boilers	104,536	106,501	98,950	7,551
Oil boilers	12,297	11,221.7	10,860	362

⁴ NB -non-domestic heating products have not been through a consultation exercise.

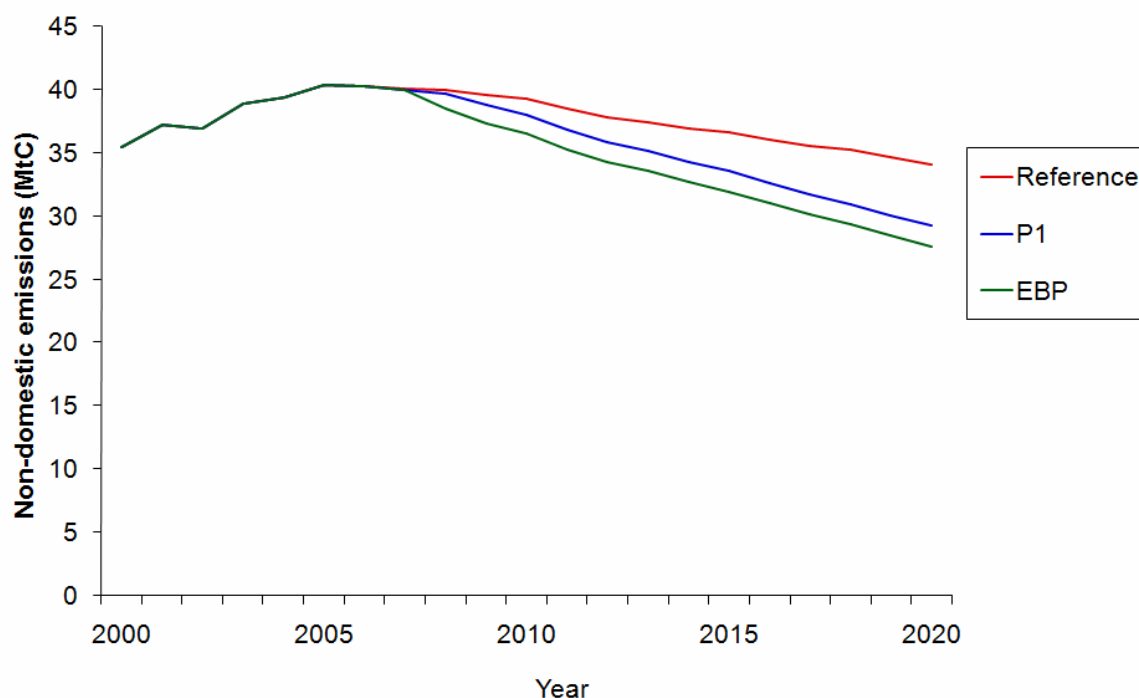
It appears that the energy consumption of non-domestic electric products has been overestimated (using this bottom-up approach). To ensure compatibility with BERR totals, the sum of the savings should be scaled downwards.

Figure 2.9 MTP Reference, P1 and EBP scenarios for non-domestic electricity consumption



Using standard fuel to carbon conversion factors it is possible to estimate the carbon emissions attributable to non-domestic products covered by MTP (Figure 2.10). Note that the effect of lost heating due to more efficient products is not included in this chart (see Annex C)

Figure 2.10 MTP Reference, P1 and EBP scenarios for non-domestic carbon emissions



All of these savings identified can be delivered through appropriate product policy, at a level that is cost-effective to UK society.

In terms of delivering these savings, other non-product related Government policy will play a significant part. For the analysis in the 2007 Energy White Paper, the following policies were specifically identified to deliver some of these savings:

- Building Regulations.
- Energy Performance of Buildings Directive.

2.4 Potential energy savings and carbon emissions reduction

The Government has been working to realise some of the potential savings, as outlined in the Energy White Paper, including:

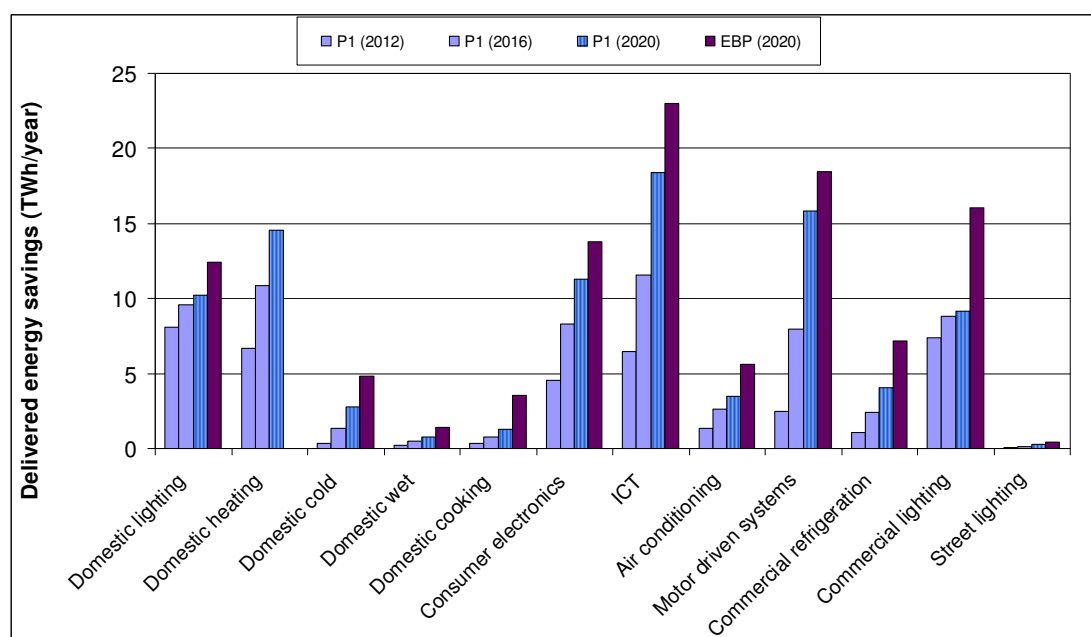
- Working with product supply chains to remove the most inefficient products that come onto the market by stimulating competition and enhancing markets for more cost-effective and efficient goods and services. The Government recently announced a voluntary initiative to phase out inefficient light bulbs, led by UK retailers and energy suppliers.
- Securing EU legislation, especially under the EU Framework Directive for the Eco-design of Energy-using Products (EuP) that will deliver product-specific mandatory

standards on energy efficiency, and for which the UK continues to press for rapid delivery.

- Working internationally - for example, through its work with the ITSFP and the IEA to promote international cooperation on labelling and standards.
- Working to promote the best products for consumers - for example, through working with the Energy Saving Trust and the Carbon Trust to improve consumer and business information and awareness (eg through the Energy Saving Recommended labelling scheme).
- Using public-sector procurement to drive the market for energy efficient products, as reaffirmed in the Government's Sustainable Development Action Plan (March 2007).

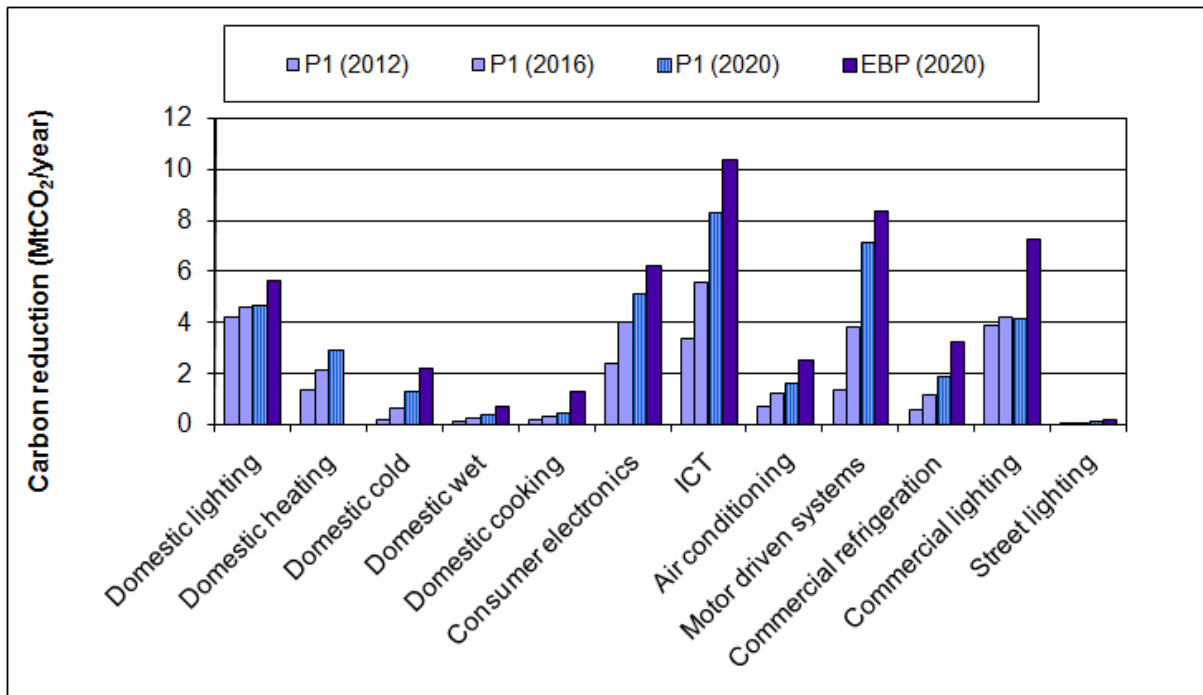
From the analysis above, it is possible to compare products where the largest energy and carbon savings are likely to be made, and also the timing required to make these savings.

Figure 2.11 Overview of the potential energy reductions, compared with Reference scenario



From this overview analysis, it appears that larger savings can be made in the non-domestic sector. This is partly due to poorer understanding of these products, and the fact that little product policy has been undertaken in this area.

Figure 2.12 Overview of the potential carbon reductions, compared with Reference case



These savings by end use are summarised in Table 2.3.

Table 2.3 MTP Reference (2007 and 2020) and P1 (2020) scenarios for estimates of carbon dioxide emissions at end use (MtCO₂)

	REF (2007)	REF (2020)	P1 (2020)	Savings (2020)
Domestic				
Cold	8.3	5.8	4.9	0.9
Wet	7.7	6.5	6.2	0.4
Lighting	9.2	8.1	5.2	2.9
Consumer electronics	9.9	14.3	10.8	3.5
ICT	6.4	6.2	3.8	2.3
Cooking – electric	7.1	5.5	5.3	0.2
Cooking – gas	1.4	1.4	1.3	0.1
Heating – gas boilers	70.0	71.9	69.4	2.5
Heating – oil boilers	9.3	10.0	9.7	0.4
Non-domestic				
Air-conditioning	8.2	8.4	6.4	2.0
Refrigerators	14.2	11.4	9.9	1.4
Street lighting	1.4	1.3	1.2	0.1
Commercial lighting	25.0	17.2	14.8	2.5
Servers	2.0	3.0	2.0	1.0
ICT	11.6	9.9	6.8	3.1
Heat pump heating	2.3	2.2	2.2	0.0
Motors (all-overlap)	80.5	67.2	61.4	5.8
Motors (non-overlap)	59.2	48.4	45.2	3.2
Gas boilers	19.9	20.3	18.9	1.4
Oil boilers	3.2	3.0	2.9	0.1

Note: the savings take into account the heat replacement effects. Though these are the best estimates by end use, in the case of the non-domestic sector, the total estimated consumption shown here is higher than national statistics would suggest.

Further information on these end uses, and the relevant Government standards, is given in the following Section.

3 Energy using products – Policy Brief summaries

This Section contains summaries of 12 detailed product Policy Briefs that are the result of the recent consultation process carried out by Defra via MTP in fulfilment of a commitment set out in the Energy White Paper. The full Policy Briefs can be accessed at www.mtprog.com/cms/whitepaper

3.1 Policy Brief summary for air-conditioning products

3.1.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic and non-domestic air-conditioning products. These include:

- Packaged air-conditioning (eg wall and roof-top units, portable and indoor units).
- Central plant air-conditioning equipment (eg air, water and absorption chillers, air handling units and fan coil units).

The UK Government has set standards for air-conditioning products as guidance for all involved parties about required improvements in the energy efficiency of these products.

3.1.2 Rationale for intervention

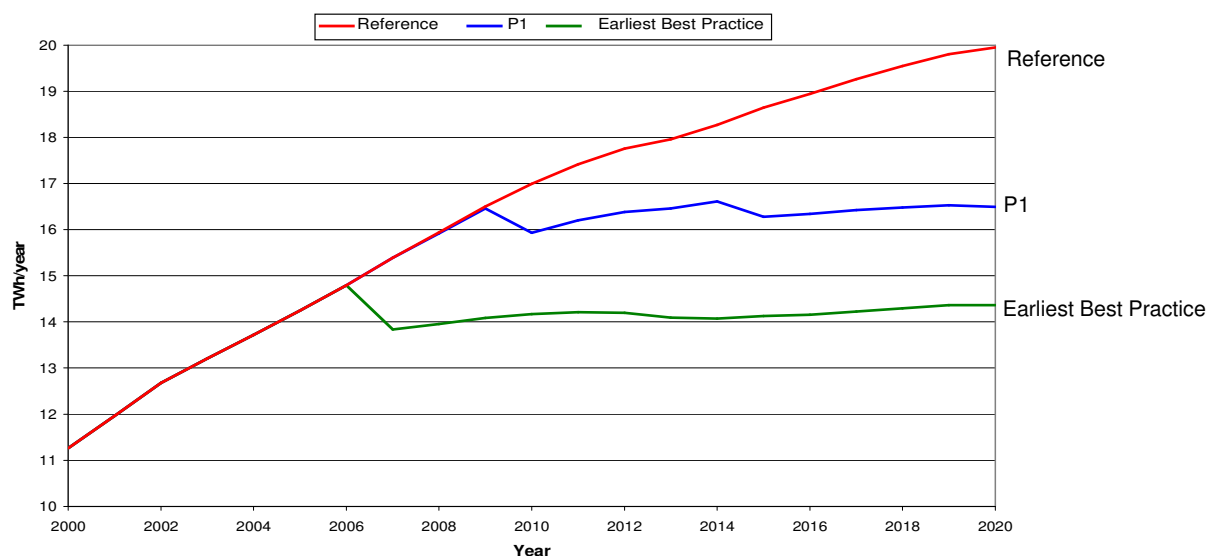
There are a number of reasons why the UK should look to improve the performance of air-conditioning products:

- Air-conditioning electricity consumption accounts for 14.8 TWh per year which is equivalent to 2% of domestic and non-domestic energy use.
- Energy demand from air-conditioning is forecast to rise substantially under the 'business-as-usual' scenario – about 30% by 2020.
- There is significant scope to improve energy efficiency – for example models of mini-split air-conditioners (the most common in the UK) available in the UK can save 25% of energy compared with those required by current Building Regulations and the best available worldwide could save 50% of energy.

3.1.3 Potential for savings

The Government has developed projections for the future energy use of installed air-conditioning products in the UK. There are three scenarios: a Reference scenario or business-as-usual scenario; the Government's P1 scenario and the EBP scenario (representing immediate installation of the best technology available on the market).

Figure 3.1 UK air-conditioning energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the *average* efficiency standards which new air-conditioning products would need to achieve are:

- 2010: new packaged chillers sold meet, on average, the 2007 minimum Enhanced Capital Allowance (ECA) Energy Efficiency Ratio (EER) criteria.
- 2010: 50% of new packaged air-conditioners meet, on average, the minimum criteria for Energy Label class A.
- 2015: all new packaged air-conditioners meet, on average, the minimum criteria for Energy Label class A.

The proposed P1 scenario would result in energy use from air-conditioning products falling to 16.5 TWh by 2020, representing a gross energy saving of 17% or 3.4 TWh (0.4 MtC (1.5 Mt CO₂)) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.1.4 Existing and future interventions

There are a number of policies and initiatives that are expected to help achieve the P1 scenario.

Existing

- At the European level, air-conditioners rated <12 kW and made available for retail sale are subject to mandatory energy efficiency labelling requirements.
- For products not covered under the mandatory energy labels, ASERCOM and Eurovent voluntary certification schemes exist for measuring, certifying, benchmarking and classifying some products.

- Under one aspect of the Energy Performance of Buildings Directive (EPBD), the UK requires energy performance certificates for buildings (all new buildings and existing when sold or rented) and regular inspection of air-conditioning systems >12 kW at least every 5 years.
- The Government's Enhanced Capital Allowance Scheme (ECA) scheme is available for certain Energy Technology List (ETL) products, providing enhanced tax allowances for more efficient products, including some air-conditioning products. The performance criterion for eligibility for chillers could be raised.
- The F-Gas Regulations include obligations to contain and recover certain fluorinated refrigerants which are greenhouse gases.
- The International Task Force on Sustainable Products (ITFSP) has a Global Sustainable Product network (GSPN) that aims to promote efficient industrial electric motor⁵ systems worldwide through harmonisation of test standards, introducing mandatory minimum performance standards and sharing international best practice.
- Climate Change Agreements (CCAs) provide an incentive for specific energy intensive sectors to improve their energy use. The Carbon Reduction Commitment will provide a financial incentive for most UK organisations to reduce their greenhouse gas emissions.

Future initiatives

- Mandatory minimum performance standards for air-conditioning products will be proposed under the Framework Directive on the Eco-design of Energy-using Products (EuP), which would be harmonised across the European Union; the UK will press for ambitious standards. A preparatory study for five types of product and components is underway, which will inform the setting of these standards.
- Revised Government public procurement standards are scheduled to be announced in 2008. These standards currently do not contain requirements for air-conditioning equipment.
- The Building Regulations (Part L) will be revised in 2010 to deliver a further 25% reduction in carbon emissions from new buildings. These could reduce cooling loads and raise minimum equipment performance levels for air-conditioning products.

Other broader policies with the potential to have an impact on the efficiency of air-conditioning products include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign, etc.

3.1.5 Risks

Possible risks that may impact on the ability to achieve the P1 scenario include:

- The market for air-conditioning products may not develop as predicted (eg growth in demand could be higher than predicted).

⁵ Motors account for up to 95% of the energy consumed by air-conditioning products so improvements in motor performance could have major benefits for air-conditioning.

- The scope of EuP, initially, will be limited to small mini-split and moveable domestic air-conditioners.
- The introduction of EuP initiatives may be delayed or may not be accepted.
- The mandatory EU labelling scheme for air-conditioning systems only covers small domestic air-conditioners at present. For other products, consumers have to rely on information from voluntary schemes, which have had low take-up to date.
- Product performance and usage under 'real-life' conditions may differ from estimates included in the scenario projections, resulting in lower-than-expected energy savings.
- Revisions to Part L of the Buildings Regulations (and their enforcement) may not be sufficiently ambitious to effect change.

3.1.6 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient air-conditioning products, although lack of reliable information on lifecycle costs is likely to be a barrier to the take-up of products.
- Business: improved sales of energy efficient equipment.
- Pollution: use of 'natural refrigerants' over current common refrigerants will result in emissions with low or zero global warming potential.
- Health: the use of alternative refrigerants over traditional refrigerants may require some additional design features to minimise safety risks.

3.2 Policy Brief summary for commercial lighting products

3.2.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including commercial (non-domestic) lighting products. These include all internal and external, fixed to building lighting for all commercial premises including offices, retail, hotels, public service buildings, industrial and warehousing units. The UK Government has set standards for commercial lighting products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.2.2 Rationale for intervention

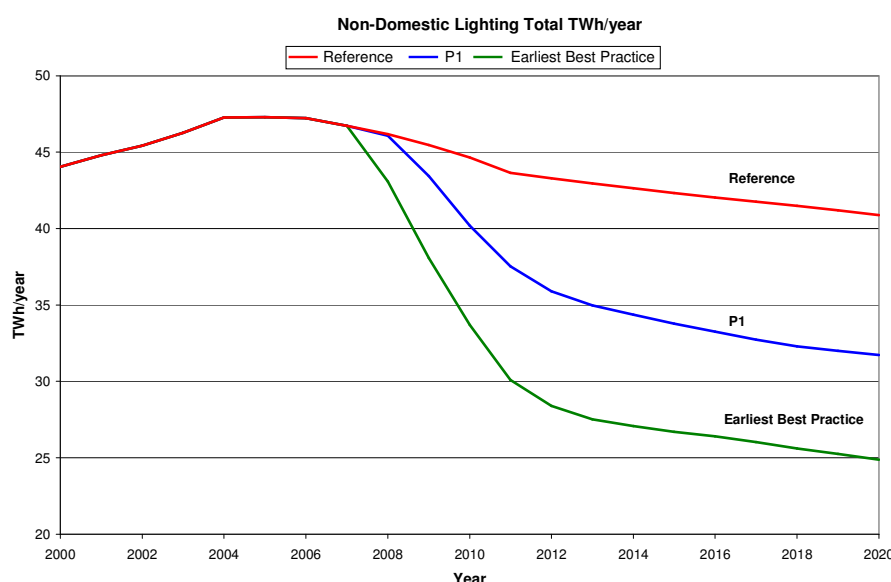
There are a number of reasons why the UK should look to improve the performance of commercial lighting products.

- Inefficient tungsten-filament general lighting service (GLS) lamps are still widely used to create a ‘homely’ feel in restaurants and pubs. These lamps have low energy efficiencies and unnecessarily high running costs.
- More efficient technologies, notably CFLs, are available that can reduce the environmental impact of lighting and the running cost to consumers. These are beginning to replace GLS lamps in some applications.
- Tungsten halogen lamps are used extensively in retail premises. These lamps also have low efficiencies. More efficient infrared versions are available but have not yet achieved significant market penetration.
- In the longer term, light emitting diode (LED) technologies are expected to provide a more cost-effective energy efficient alternative to CFLs and halogen lamps, provided all parties involved promote the development and use of these lamp technologies.

3.2.3 Potential for savings

The Government has developed projections for the future energy use of installed commercial lighting products in the UK (Figure 3.2): a Reference scenario or ‘business as usual’ scenario; the Government’s target scenario, known as ‘P1’; and the Earliest Best Practice scenario⁶ (representing immediate installation of the best technology available on the market).

Figure 3.2 UK commercial lighting energy use to 2020 under Reference, P1 and EBP scenarios



⁶ Refinement of the forward looking model has led to a change in the EBP line compared with that in the consultation document.

Under the P1 scenario, *average* sales of commercial lighting products would need to achieve efficiencies of:

- 50.8 lumens/W by 2010.
- 54.7 lumens/W by 2015.
- 76.7 lumens/W by 2020.

compared with a 2007 average of 31.4 lumens/W.

This would result in energy use from commercial lighting products falling to 31.7 TWh by 2020, representing a gross energy saving of 9.1TWh (1.1 MtC, 4.1 MtCO₂) compared with the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the EWP in May 2007.

3.2.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- An international CFL harmonisation initiative, which the UK participates in via the International Task Force on Sustainable Products (ITFSP), is calling for the harmonisation of international measurement and performance standards for CFLs and LEDs.
- The Building Regulations includes lighting in the assessment of overall emissions from buildings. For refurbishment of general lighting systems a minimum standard of 45 luminaire-lumens per circuit watt is recommended. The Regulations will be reviewed in 2010.
- The Government's Enhanced Capital Allowance Scheme (ECA) encourages businesses to invest in energy saving lighting by providing 100% first year tax relief on their qualifying capital expenditure. This covers: lamps, lighting controls and lighting fittings. LEDs (for accent and display applications) are expected to be added in future revisions.

Future initiatives

- Mandatory minimum performance standards for lighting products will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.
- Implementation of the UK's Government Sustainable Procurement Action Plan will help drive the market for energy efficient lighting. In particular, the Government may use the 'Forward Commitment Procurement Model' to encourage the early uptake of high efficiency LEDs in office and hospital locations.
- Climate Change Agreements (CCAs) provide an incentive for specific energy intensive sectors to improve their energy use. The Carbon Reduction Commitment

will provide a financial incentive for most UK organisations to reduce their greenhouse gas emissions.

Other broader policies with the potential to have an impact on the efficiency of commercial lighting products include possible reduced VAT rates on efficient products, smart metering, etc.

3.2.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for commercial lighting products may not develop as projected (eg rapid growth in demand for CFLs could lead to inferior quality products entering the market, demand for efficient products could outstrip product supply).
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- The energy sections of the Building Regulations are not updated frequently and may fail to keep abreast of new technology developments.
- Delays in adding new products to the qualifying list under the ECA scheme may limit the effectiveness of this initiative in improving lighting efficiency.
- The introduction of EuP initiatives may be delayed or rejected.
- Internationally harmonised standards may be delayed or may not materialise.

3.2.6 Other issues

A substantial change in consumer culture towards the adoption of CFLs as the common light bulb and increased investment from lamp manufacturers for the production of more efficient products is required. There is also a need for Government and industry policies to accelerate the development and use of innovative technologies such as LEDs, induction and plasma lighting.

3.2.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Business (consumers): substantial life-time cost benefits from switching to energy efficient lighting products in almost all cases;
- Business (manufacturers): additional investment in production facilities may be required in order to ensure an adequate supply of good quality CFLs to meet predicted demand;
- Waste: composition of the lamp waste stream and waste collection will change;
- Health: possible health impacts of CFLs with regard to some neurological conditions. This is being discussed with health professionals.

3.3 Policy Brief summary for commercial refrigeration products

3.3.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of energy using products including commercial refrigeration products. These include: chillers; retail display cabinets; catering service cabinets; cellar cooling; refrigerated vending machines; walk-in cold stores and ice machines. The UK Government has set standards for commercial refrigeration products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.3.2 Rationale for intervention

There are a number of reasons why the UK should look to improve the performance of commercial refrigeration products.

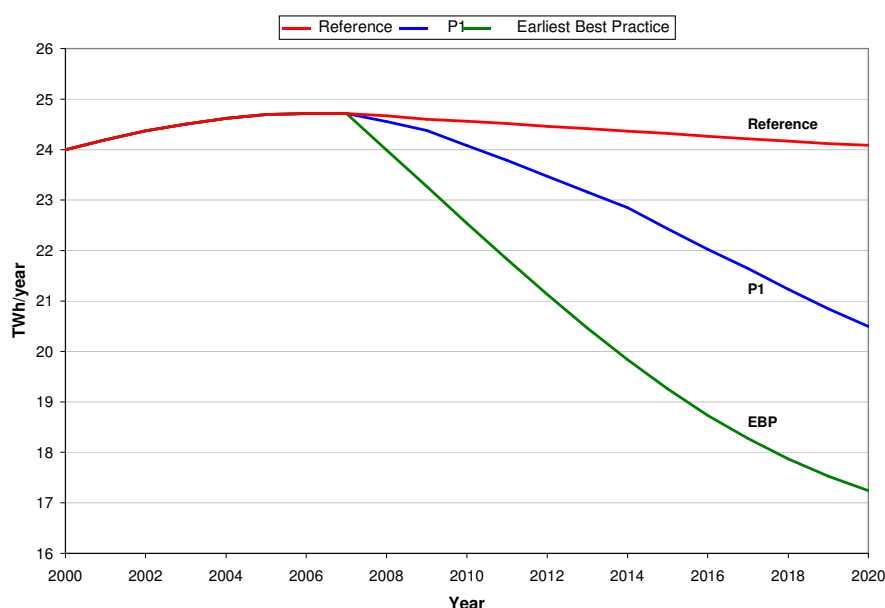
- There are over 1.6 million commercial refrigeration products installed in the UK, of which half are retail display cabinets, resulting in considerable energy use.
- In food retail outlets, such as supermarkets and convenience stores, energy used for refrigeration often exceeds 50% of total energy use. Improved efficiency would therefore result in significant energy and cost savings.
- Energy savings can be achieved through adopting more efficient components such as compressors, lighting or fans, the use of intelligent controls, larger heat exchanges, thicker insulation and improved refrigeration system design.
- Electric motors are used to drive the compressors and fans in commercial refrigeration products and account for up to 95% of the energy consumed by refrigeration products. Improving motor efficiency would therefore have benefits for commercial refrigeration energy use⁷.

3.3.3 Potential for savings

The Government has developed projections for the future energy use of installed commercial refrigeration products in the UK (Figure 3.3): a Reference scenario or 'business as usual' scenario; the Government's P1 and the EBP scenario (representing immediate installation of the best technology available on the market).

⁷ Motor driven systems are dealt with in a separate policy brief but there will be some overlap in the energy savings projections.

Figure 3.3 UK commercial refrigeration energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the *average* efficiency standards that new products would need to achieve by 2020 are:

- Refrigerated retail display cabinets: 10 kWh/m²/day (chilled) and 23.5 kWh/m²/day (frozen).
- Integral retail display cabinets: 12 kWh/m²/day (chilled) and 19 kWh/m²/day (frozen).
- Refrigerated commercial service cabinets (single door): 12.5 kWh/m²/day (chilled) and 32 kWh/m²/day (frozen).

The proposed P1 scenario would result in energy use from commercial refrigeration products falling to 20.5 TWh by 2020, representing a gross energy saving of 3.6 TWh (0.4 MtC, 1.6 Mt CO₂) compared with the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.3.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- The International Task Force on Sustainable Products (ITFSP) has a Global Sustainable Product Network (GSPN) which aims to promote efficient industrial electric motor systems worldwide through harmonisation of test standards,

introducing mandatory minimum performance standards and sharing international best practice⁸.

- The F-Gas Regulations include obligations to contain and recover certain fluorinated refrigerants which are greenhouse gases.
- ASERCOM and Eurovent voluntary certification schemes exist for measuring, certifying, benchmarking and classifying certain refrigeration products.
- The Government's Enhanced Capital Allowance Scheme (ECA) is available for certain Energy Technology List (ETL) products providing enhanced tax allowances for more efficient products, including some 14 refrigeration related sub-technologies. The performance thresholds for liquid chilling packages, refrigeration compressors and refrigerated service cabinets could be raised.

Future initiatives

- Mandatory minimum performance standards for commercial refrigeration products will be proposed under the EuP Directive and energy labels under the Energy Labelling Framework Directive, which would be harmonised across the European Union; the UK will press for ambitious standards. Preparatory studies for five types of products covering remote retail display cabinets (vertical open multi-deck and horizontal frozen island types); integral retail display cabinets (beverage coolers and ice-cream freezers) and refrigerated vending machines (spiral type with glass front) have been completed and will inform the setting of these standards.
- Voluntary initiatives to improve energy efficiency, such as the Institute of Refrigeration's (IoR) system efficiency index, may influence the design of new products and provide life cycle cost information for procurement purposes. The Carbon Reduction Commitment will provide a financial incentive for most UK organisations to reduce their greenhouse gas emissions.

Other broader policies with the potential to have an impact on the efficiency of commercial refrigeration products include possible lower VAT rates on efficient products, smart metering etc.

3.3.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for commercial refrigeration products may not develop as projected.
- Product performance and usage under 'real life' conditions (eg under part-load conditions), may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- The voluntary industry initiatives could fail to deliver the efficiencies predicted.
- Lack of an EU-wide mandatory energy labelling for this product group means that consumers have to rely on voluntary schemes, which have only partial take-up.

⁸ Motors account for up to 95% of the energy consumed by commercial refrigeration products so improvements in motor performance could have benefits for commercial refrigeration.

- The introduction of EuP initiatives may be delayed or rejected.

3.3.6 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Business (consumers): substantial life-time cost benefits from switching to energy efficient refrigeration appliances.
- Business: additional investment in production facilities may be required to ensure an adequate supply of more efficient new technologies.
- Pollution: use of 'natural refrigerants' over current common refrigerants will result in emissions with low or zero global warming potential.
- Health: there are no specific health impacts resulting from the proposals.

3.4 Policy Brief summary for consumer electronics products

3.4.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including consumer electronics products. These include televisions, video recorders/players, digital TV adapters (set-top boxes) and external power supplies/battery chargers. The UK Government has set indicative standards for consumer electronics products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.4.2 Rationale for intervention

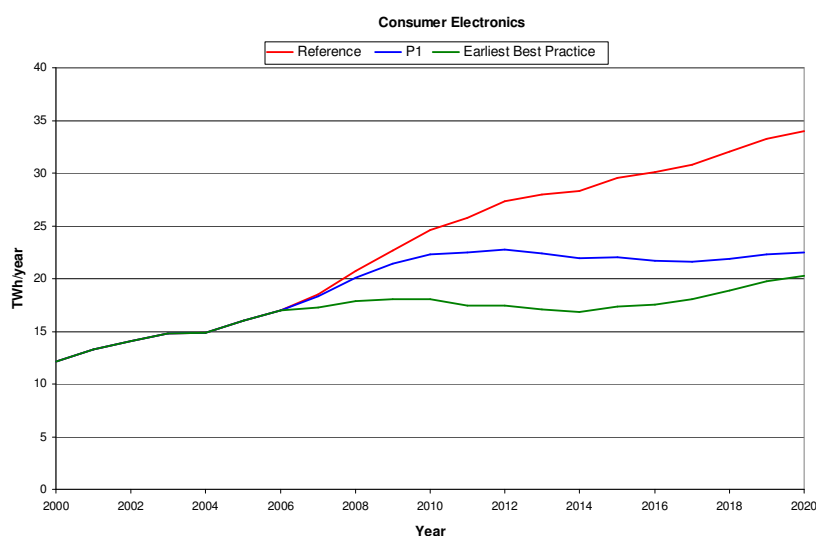
There are a number of reasons why the UK should look to improve the performance of consumer electronics products.

- Most in-use energy in this sector is consumed by the four product groups listed above, accounting for 19% of domestic electricity consumption and representing an area where significant energy savings are available.
- The trend towards larger television screens is leading to an average increase in energy consumption in this area. However, there is good potential to improve the energy performance of these appliances.
- As more recording functions are delivered through set-top boxes (STBs) and PC-based home entertainment systems, there is greater scope for energy savings relating to standby performance and power management.
- There has been a substantial rise in the number of devices powered by external power supply units (ePSUs), increasing the need to improve the efficiency of these products.

3.4.3 Potential for savings

The Government has developed projections for the future energy use of consumer electronics products in the UK (Figure 3.4): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'⁹; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.4 UK consumer electronics energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, targets for the *average* efficiency standards for new products would result in an energy consumption of 22.3 TWh by 2010 and 22.5 TWh by 2020, representing a gross energy saving of 11.5 TWh (1.4 MtC, 5.3 Mt CO₂) compared to the Reference scenario in 2020. This is a real challenge given the expected increased demand for these products.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.4.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient products. The scheme covers integrated digital TVs and simple STBs, and standards have been set for digital television recorders.

⁹ A number of changes to the P1 projection were adopted as a result of the consultation.

- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient consumer electronics products.
- There are a number of industry-led voluntary agreements and codes of conduct covering STBs and ePSUs.

Future initiatives

- The UK Government will invite major UK manufacturers and retailers to supply consumer electronics products in line with the P1 scenario.
- The UK Government is considering whether to include Reference to efficiency standards in line with the P1 scenario in the procurement of consumer electronics products.
- Mandatory minimum performance standards for TVs, power suppliers/battery chargers, simple set-top boxes and standby power will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.
- At the international level, the International Task Force on Sustainable Products (ITFSP) has established Global Sustainable Product Networks (GSPNs) for televisions, 'simple' and 'complex' set-top boxes. They are developing test standards (where needed) and a set of harmonised product performance standards.

Other broader policies with the potential to have an impact on the efficiency of consumer electronics include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign etc.

3.4.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for consumer electronics may not develop as projected, particularly given the uncertainties regarding characteristics of converged electronic products in the future.
- Test methods may not keep abreast with changes in the market or represent typical appliance 'use' patterns or characteristics.
- The introduction of EuP and international initiatives may be delayed or rejected.
- The lack of effective consumer information, especially on the running costs of appliances, could prevent consumers making an informed choice and prevent effective competition on energy efficiency issues.

3.4.6 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient consumer electronics products.
- Business: additional investment may be required for the design, development and promotion of more efficient technologies.

3.5 Policy Brief summary for domestic cold appliances

3.5.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic cold appliances. These include refrigerators, fridge-freezers, upright freezers and chest freezers. The UK Government has set standards for domestic cold appliances to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.5.2 Rationale for intervention

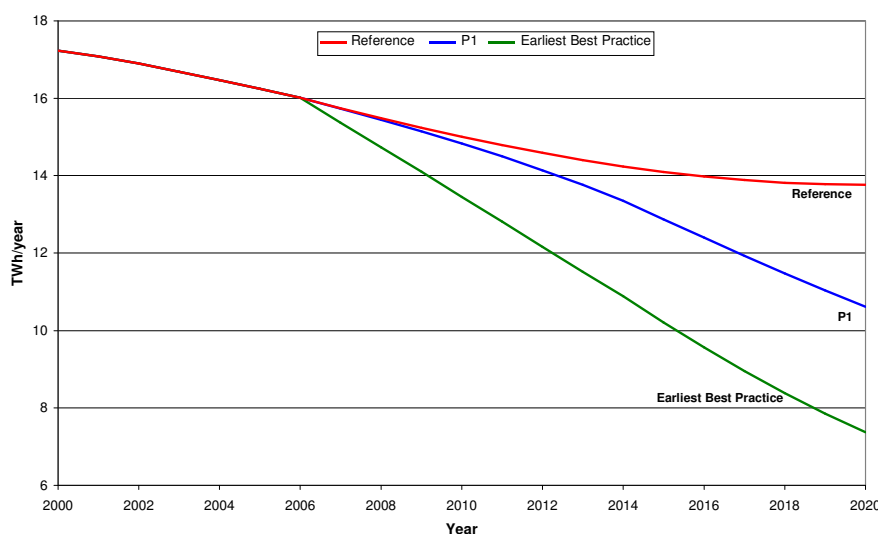
There are a number of reasons why the UK should look to improve the performance of domestic cold appliances.

- Cold appliances accounted for 19% of UK domestic electricity use in 2005, with the majority of households owning at least one refrigerated appliance, representing an area where significant energy savings are available.
- Sales of the higher efficiency A+ and A++ rated products are still low, so there is potential to access further savings.
- More efficient technologies, notably vacuum insulated panels (VIPs), are available that can reduce the energy consumption of cold appliances by around 50% and lower the running cost to consumers.

3.5.3 Potential for savings

The Government has developed projections for the future energy use of installed domestic lighting products in the UK (Figure 3.5): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.5 UK domestic cold appliance energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the *average* efficiency standards which new products would need to achieve are:

- 2010: 100% of sales of cold appliances are EU energy label A-rated or better.
- 2015: 100% of sales of cold appliances are A+ rated or better.
- 2020: Over 80% of sales for all cold appliances are A++ rated.

This would result in energy use from domestic cold appliances falling to around 10.6 TWh by 2020, representing a gross energy saving of 3.1TWh (0.4 MtC, 1.4 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.5.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- Domestic cold appliances are subject to mandatory European efficiency labelling requirements and minimum energy performance requirements.
- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient domestic cold products.
- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient domestic cold products.

- The European Committee of Household Appliance Manufacturers (CECED) updated their voluntary Industrial Commitment in 2004 to enable distinctions between the top performing cold appliances (ie A, A+ and A++ rated products).

Future initiatives

- The UK Government will invite major UK manufacturers and retailers to supply domestic cold products in line with the P1 scenario.
- The UK Government is considering whether to include Reference to efficiency standards in line with the P1 scenario in the procurement of domestic cold products.
- Work is underway to review the mandatory EU energy labelling regime and new proposals are expected in 2008.
- Mandatory minimum performance standards for cold appliances will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.

Other broader policies with the potential to have an impact on the efficiency of domestic cold appliances include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign, etc.

3.5.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for domestic cold appliances may not develop as projected.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.

3.5.6 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient cold appliances.
- Business: additional investment in production facilities may be required in order to ensure an adequate supply of new technologies such as VIPs.

3.6 Policy Brief summary for domestic cooking products

3.6.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic cooking appliances. These include electric and gas ovens and hobs, microwave ovens and kettles. The UK Government has set standards for domestic cooking appliances to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.6.2 Rationale for intervention

There are a number of reasons why the UK should look to improve the performance of domestic cooking products.

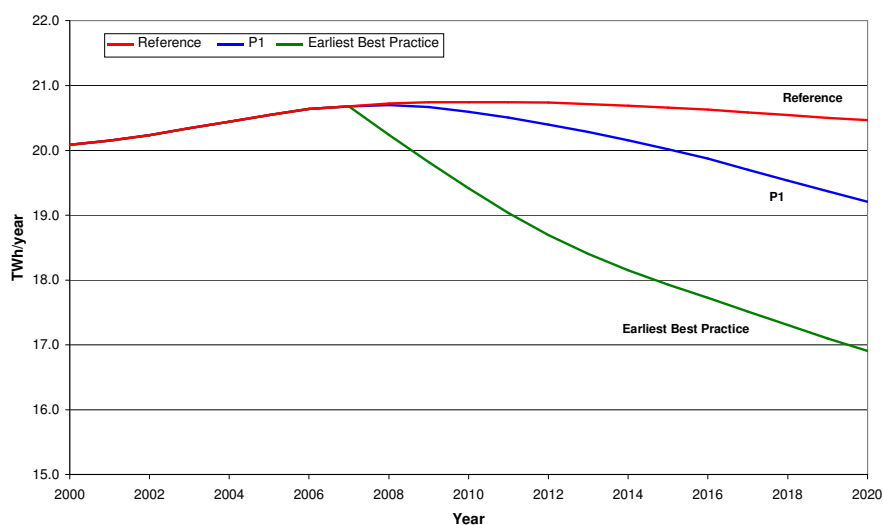
- Domestic cooking appliances (ovens, hobs, microwave ovens and kettles) accounted for 20.8 TWh of delivered energy in 2007, representing an area where significant energy savings are available.
- The mandatory EU energy labelling for electric ovens has already resulted in the energy efficiency of products on the market improving, providing a strong foundation for extending the label to other cooking products and accessing further savings in this area.

3.6.3 Potential for savings

The Government has developed projections for the future energy use of installed domestic cooking products in the UK (Figure 3.6): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'¹⁰; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

¹⁰ The model has changed compared to that in the consultation document due to refinement of the model to include a lower standby level for gas ovens.

Figure 3.6 UK domestic cooking appliance energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the *average* efficiency standards which a 'basket' of new products would need to achieve by 2020 are, for example, 99 kWh/year for electric ovens, with individual standby power on microwaves and electric ovens reduced to 1W and standby power on gas ovens being phased out completely.

The proposed P1 scenario would result in energy use from domestic cooking products falling to below 19.2 TWh by 2020, representing a gross energy saving of 1.3 TWh (0.1 MtC, 0.4 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.6.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- Electric ovens are subject to mandatory European efficiency labelling requirements.
- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient domestic cooking products. The scheme is being extended to cover electric and microwave ovens in 2008.
- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient domestic cooking products.

Future initiatives

- The UK Government will invite major UK manufacturers and retailers to supply domestic cooking products in line with the P1 scenario.
- The UK Government is considering whether to include reference to efficiency standards in line with the P1 scenario, in the procurement of domestic cooking products.
- Work is underway to review the mandatory EU energy labelling regime on electric ovens and new proposals are expected in 2008.
- Domestic cooking products will be considered for future implementing measures under the EuP Directive and mandatory minimum performance standards on standby, which will impact on cooking products, are proposed under the EuP Directive: the UK will press for ambitious standards.

Other broader policies with the potential to have an impact on the efficiency of domestic cooking products include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign, etc.

3.6.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for domestic cooking products may not develop as projected.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- Test methods may not keep abreast with changes in the market (eg the current method does not cover halogen or other types of combination ovens) or represent typical appliance 'use' patterns or characteristics.
- Labelling initiatives are currently restricted to electric ovens and may not be sufficiently comprehensive or precise to guide consumer behaviour effectively nor keep pace with technological change.
- The CERT and ESR schemes may not be as effective in promoting sales of higher efficiency cooking products as expected.
- The introduction of EuP implementing measures may be delayed or rejected.

3.6.6 Other issues

The Building Regulations and Code for Sustainable Homes could include domestic cooking appliances in their scope.

3.6.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient cooking appliances.
- Business: additional investment may be required if energy performance standards and/or labels are developed for gas ovens and gas/electric hobs to ensure products comply with these standards.

3.7 Policy Brief summary for domestic heating and hot water systems

3.7.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic heating and hot water systems. These include gas or oil-fired boiler systems, which may incorporate solar hot water systems. The UK Government has set standards for these products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.7.2 Rationale for intervention

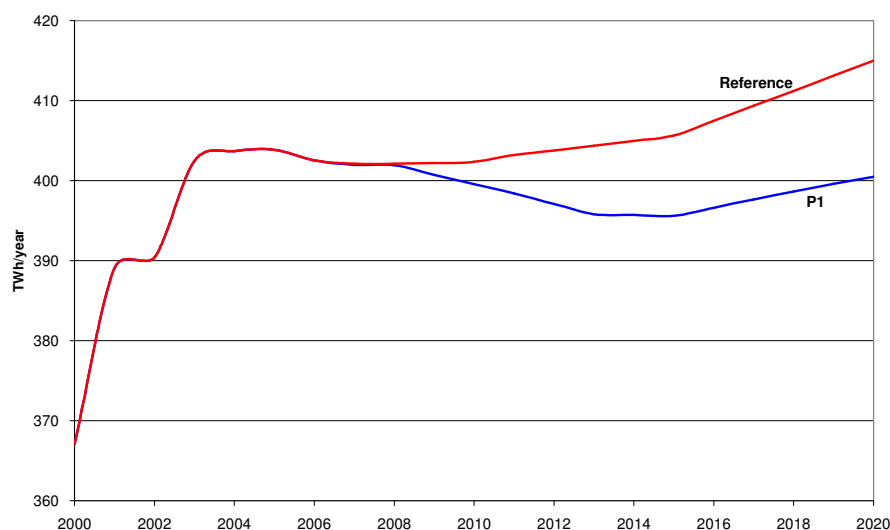
There are a number of reasons why the UK should look to improve the performance of domestic heating and hot water systems.

- Domestic heating and hot water systems currently account for 25% of the UK's total energy demand, with conventional systems being installed in 83% of the housing stock, representing an area where significant energy savings are available.
- In an average home with a boiler, heating and hot water far outweigh other domestic energy uses, accounting for 84% of delivered energy, 68% of the carbon emissions, and 50% of energy costs of households. Energy efficiency improvements would therefore have a major impact on household energy use and running costs.

3.7.3 Potential for savings

The Government has developed projections for the future energy use of installed conventional domestic heating and hot water products in the UK (Figure 3.7): a Reference scenario or 'business as usual' scenario and the Government's target scenario, known as 'P1'.

Figure 3.7 UK domestic heating and hot water systems energy use to 2020 under Reference and P1 scenarios



The P1 scenario sets a target level for the average efficiency standards which new products would need to achieve. For example:

- 2013: 75% of homes with standard heating controls have them set and used correctly.
- 2020: 50% of homes with boilers have advanced heating controls.
- 2020: 2.5% of homes have solar water heating.

The proposed P1 scenario would result in energy use from conventional domestic heating and hot water systems falling to 400.5 TWh by 2020, representing a gross energy saving of 14.5 TWh (0.8 MtC, 2.9 Mt CO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.7.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- Changes to the Building Regulations (Part L) for England and Wales require new and replacement gas and oil boilers to be condensing.
- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient domestic heating and water systems. The endorsement criteria are due to be reviewed.

- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient domestic heating and hot water systems.

Future initiatives

- Mandatory minimum performance standards for domestic heating and hot water products will be proposed under the EuP Directive and energy labels under the Energy Labelling Framework Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.
- The UK Government is considering whether to include reference to efficiency standards in line with the P1 scenario, in the procurement of domestic heating and hot water products.

Other broader policies with the potential to have an impact on the efficiency of domestic heating and hot water systems include possible lower VAT rates on efficient products, smart metering, the 'Act on CO2' campaign etc.

3.7.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for domestic heating products may not develop as projected.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- Labelling initiatives may not be sufficiently comprehensive or precise to guide consumer behaviour effectively and may not keep pace with technological change.
- The perception that modern boilers have a shorter lifetime may mean consumers retain older, less-efficient boilers for as long as possible, slowing down the efficiency improvement in the housing stock.
- The CERT and ESR schemes may not be as effective in promoting sales of higher efficiency heating products as expected.
- The introduction of EuP initiatives may be delayed or rejected.

3.7.6 Other issues

A substantial change in consumer culture towards the adoption of new heating technologies and systems and increased investment from heating and hot water manufacturers in the production of more efficient products is required.

3.7.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from fitting and using heating controls appropriately.
- Business: additional investment may be required for the design, development and promotion of solar hot water systems and advanced controls for boiler systems.
- Waste: discarded conventional boiler systems will result in metal-rich wastes which are likely to be recycled.
- Health: the trend towards room-sealed boilers reduces the risk of carbon monoxide poisoning.

3.8 Policy Brief summary for domestic lighting products

3.8.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic lighting products. These include tungsten filament and halogen lamps; compact fluorescent lamps (CFLs); linear fluorescent lamps; external security lighting affixed to homes; and light emitting diodes (LEDs). The UK Government has set standards for domestic lighting to provide guidance to all involved parties on the required improvements in energy efficiency for these products.

3.8.2 Rationale for intervention

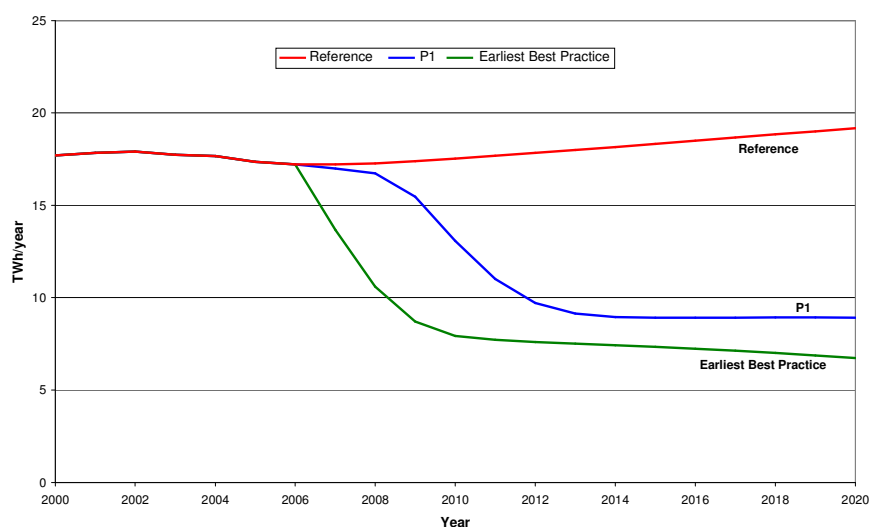
There are a number of reasons why the UK should look to improve the performance of domestic lighting products.

- Around 60% of lamps currently in use are inefficient tungsten filament lamps. These lamps have low energy efficiencies and unnecessarily high running costs.
- More efficient technologies, notably CFLs, are available that can reduce the environmental impact of lighting and the running cost to consumers.
- In the longer term, LED technologies are expected to provide a more cost-effective energy efficient alternative to CFLs and halogen lamps, provided all parties involved promote the development and use of these lamp technologies.

3.8.3 Potential for savings

The Government has developed projections for the future energy use of installed domestic lighting products in the UK (Figure 3.8) a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.8 UK domestic lighting energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, *average* sales of domestic lighting products would need to achieve efficiencies of:

- 35.6 lumens/W by 2010.
- 28.9 lumens/W by 2015¹¹.
- 35.7 lumens/W by 2020.

compared with a 2007 average of 17.7 lumens/W.

This would result in domestic lighting energy use falling to 8.9 TWh by 2020, representing a gross energy saving of 10.3 TWh (1.3 MtC, 4.6 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms (including expected changes in the market for different types of lamps) and the supporting policies outlined in the Energy White Paper in May 2007.

3.8.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- Light bulbs are subject to mandatory European efficiency labelling requirements.

¹¹ This drop in efficiency in 2015 is due to the replacement of large amounts of incandescent lamps by CFLs in earlier years. As CFLs last longer than incandescent lamps, their sales volume would consequently drop and reduce the average efficiency of lamps sold, without reducing the average efficiency of installed lamps.

- The UK Building Regulations require the installation of light fittings specifically for energy efficient lamps in new dwellings or during re-wiring or extension works of existing buildings.
- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient lighting products.
- A voluntary initiative to phase GLS bulbs out of the UK market by 2011 is being led by a sizeable proportion of UK retailers and energy suppliers.
- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient domestic lighting products.

Future initiatives

- The UK Government is considering whether to include reference to standards for efficient lamps, in line with the P1 scenario, in the procurement of domestic lighting products.
- Mandatory minimum performance standards for lighting products will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.
- An international CFL harmonisation initiative, which the UK participates in via the International Task Force on Sustainable Products (ITFSP), is calling for the harmonisation of international test and performance standards for CFLs and LEDs.

Other broader policies with the potential to have an impact on the efficiency of domestic lighting products include possible lower VAT rates on efficient products, smart metering etc.

3.8.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for domestic lighting products may not develop as projected (eg rapid growth in demand for CFLs could lead to inferior quality products entering the market, demand for efficient products could outstrip product supply).
- Labelling initiatives may not be sufficiently comprehensive or precise to guide consumer behaviour effectively.
- The CERT and ESR schemes may not be as effective in promoting CFL sales as expected.
- The voluntary industry initiative by retailers and energy suppliers could fail to deliver the efficiencies predicted.
- The introduction of EuP initiatives may be delayed or rejected.
- Internationally harmonised standards may be delayed or may not materialise.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.

3.8.6 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient lighting products in almost all cases.
- Business: additional investment in production facilities may be required in order to ensure an adequate supply of good quality CFLs to meet predicted demand.
- Waste: composition of the lamp waste stream and waste collection will change.
- Health: possible health impacts of CFLs with regard to some neurological conditions. This is being discussed with health professionals.

3.9 Policy Brief summary for domestic wet products

3.9.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including domestic wet appliances. These include washing machines and washer dryers, tumble dryers and dishwashers. The UK Government has set standards for domestic wet appliances to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.9.2 Rationale for intervention

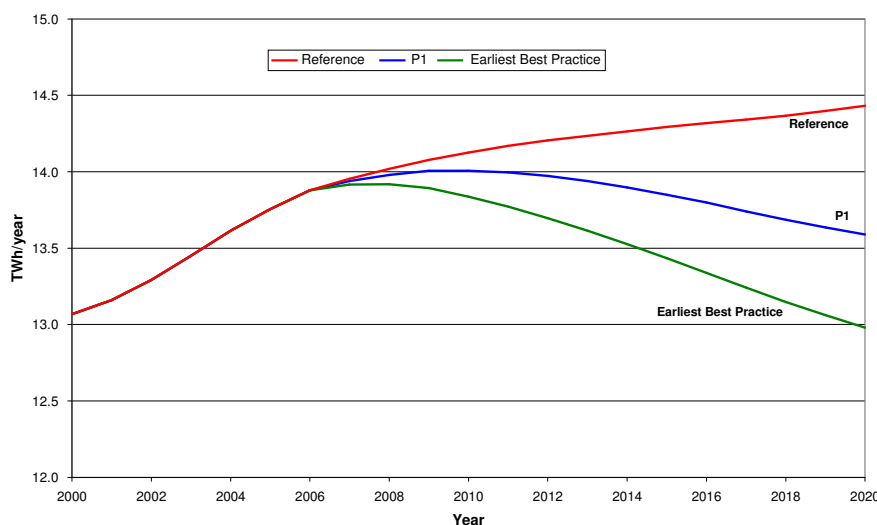
There are a number of reasons why the UK should look to improve the performance of domestic wet products.

- Wet appliances accounted for 16% of UK domestic electricity use in 2005, representing an area where significant energy savings are available.
- Ownership levels are high, with 94% of UK households owning a washing machine or washer dryer, 42% owning a tumble dryer and around 28% owning a dishwasher. Both tumble dryer and dishwasher ownership are expected to increase by around 3% in the next 12-14 years, leading to further increases in energy consumption.
- The mandatory EU energy labelling for wet appliances has already resulted in the energy efficiency of products on the market improving, providing a strong foundation for accessing further savings in this area.

3.9.3 Potential for savings

The Government has developed projections for the future energy use of installed domestic wet products in the UK (Figure 3.9): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.9 UK domestic wet appliance energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the *average* efficiency standards which new products would need to achieve are:

- 2010: 50% of washing machine sales are A+ rated¹², 25% of tumble dryer sales use heat pumps or similarly efficient technology and over 95% of dishwasher sales are A-rated.
- 2020: 100% of washing machine sales are A+ rated, 75% of tumble dryer sales use heat pumps or similarly efficient technology. Dishwashers using 15% less energy than the current A-rated products account for 70% of sales.

This would result in energy use from domestic wet products falling below 13.6 TWh by 2020, representing a gross energy saving of 0.8 TWh (0.1 MtC, 0.4 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.9.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario:

Existing

- The Energy Saving Trust's Energy Saving Recommended (ESR) programme provides consumers with information about product performance and endorses the most efficient domestic wet products.

¹² The A+ rating is equivalent to 0.17 kWh/kg and is being used as a marketing claim by manufacturers but is not an official Energy Label class.

- Wider energy efficiency programmes such as the Carbon Emissions Reduction Target (CERT) support the purchase of energy efficient domestic wet products.
- The European Committee of Household Appliance Manufacturers (CECED) has established a voluntary target for the sales-weighted average energy efficiency for washing machines.

Future initiatives

- The UK Government will invite major UK manufacturers and retailers to supply domestic wet products in line with the P1 target. Several retailers already have voluntary initiatives to only sell products with very high energy efficiency ratings.
- The UK Government is considering whether to include reference to efficiency standards in line with the P1 scenario, in the procurement of domestic wet products.
- Work is underway to review the mandatory EU energy labelling regime and new proposals are expected in 2008.
- Mandatory minimum performance standards for wet products will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards.

Other broader policies with the potential to have an impact on the efficiency of domestic wet products include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign etc.

3.9.5 Risks

Possible risks which may impact on the ability to achieve the P1 scenario include:

- The market for domestic wet products may not develop as projected.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- Test methods may not keep abreast with changes in the market or represent typical appliance 'use' patterns or characteristics.
- Labelling initiatives may not be sufficiently comprehensive or precise to guide consumer behaviour effectively and may not keep pace with technological change.
- The CERT and ESR schemes may not be as effective in promoting sales of higher efficiency wet products as expected.
- The introduction of EuP initiatives may be delayed or rejected.

3.9.6 Other issues

Significant innovation in the design of wet appliances (eg waterless clothes washing systems, heat transfer systems) could improve the efficiency of these products. The Building Regulations and Code for Sustainable Homes could include domestic wet appliances in their scope.

3.9.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: some life-time cost benefits from switching to energy efficient wet appliances.
- Business: product design changes may have an impact on the detergent industry, requiring detergents that are effective under a wider range of operating cycles.
- Health: possible health and hygiene impacts as a result of lower temperature washing and reduced water consumption.

3.10 Policy Brief summary for information and communication technology products

3.10.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including information and communication technology (ICT) products. These include monitors, desktop PCs, laptop PCs, printers, multi-functional devices (MFDs) and photocopiers. The UK Government has set indicative standards for ICT products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.10.2 Rationale for intervention

There are a number of reasons why the UK should look to improve the performance of these ICT products.

- Overall there is strong demand for ICT products and development rates are fast, with ICT products accounting for 11% of domestic electricity consumption. Most in-use energy in the sector is consumed by desktop PCs and imaging equipment, representing areas where significant energy savings can be made.
- Imaging equipment ownership is expected to grow at a lesser rate than PCs. However, the high energy consumption of this equipment, particularly multi-functional devices (MFDs), and their prevalence in the non-domestic sector means they are expected to have a strong impact on non-domestic energy consumption.

3.10.3 Potential for savings

The Government has developed projections for the future energy use of non-domestic (Figure 3.10) and domestic (Figure 3.11) ICT products in the UK: a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.10 UK non-domestic ICT energy use to 2020 under Reference, P1 and EBP scenarios

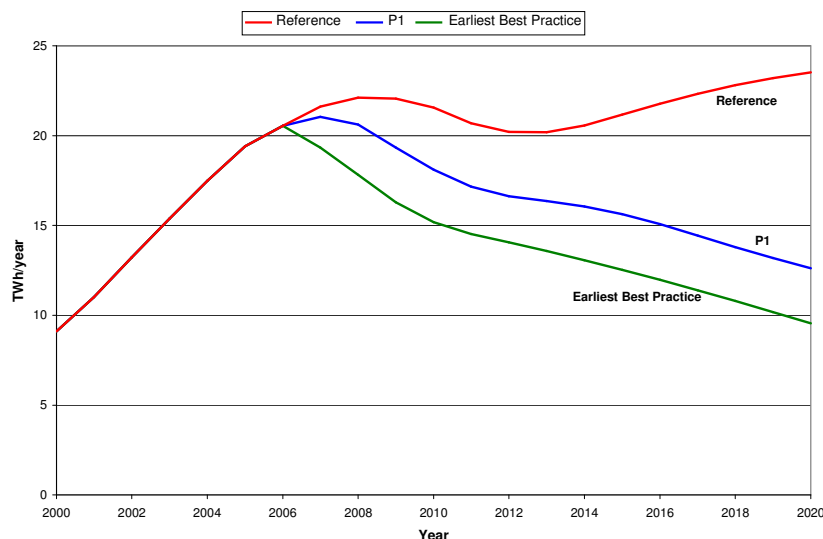
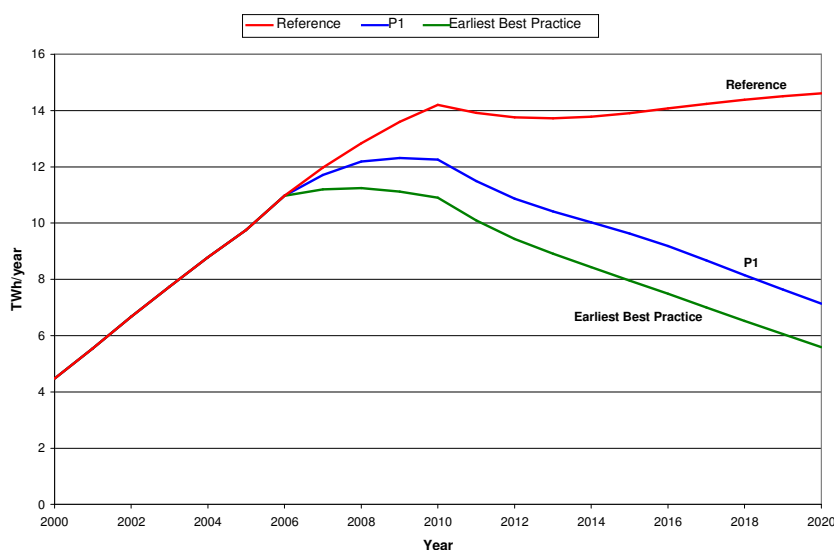


Figure 3.11 UK domestic ICT energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, targets for the *average* efficiency standards for new products would result in an energy consumption of 12.6TWh for the non-domestic sector and 7.1 TWh for the domestic sector by 2020, representing a gross energy saving of 10.9 TWh (1.4 MtC, 4.9MtCO₂) non-domestic and 7.5 TWh (0.9 MtC, 3.4 MtCO₂) domestic, compared to the Reference scenario.

The P1 scenarios are achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.10.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- The main mechanism for labelling the energy efficiency of ICT products is the voluntary ENERGY STAR label. Specifications exist for computers, imaging equipment and monitors. These are currently being reviewed with the expectation that new, more demanding standards will be in place in 2009.
- The Energy Saving Trust's (EST) Energy Saving Recommended (ESR) programme provides consumer information about product performance and endorses the most efficient products. EST has built on the ENERGY STAR specifications to develop an ESR label for desktops, laptops, imaging equipment and monitors.
- There is an industry-led code of conduct for external power supply units (ePSUs), requiring a minimum of 80% efficiency.
- Some local authorities and central Government departments have implemented projects to improve the power management of ICT equipment.

Future initiatives

- Mandatory minimum performance standards for ICT products will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards. Preparatory studies on computers and monitors, imaging equipment and standby power function are all complete.
- The UK Government is considering whether to include reference to standards for efficient ICT products, in line with the P1 scenario, in the procurement of ICT products.

Other broader policies with the potential to have an impact on the efficiency of ICT products include possible lower VAT rates on efficient products, smart metering, the 'Act on CO₂' campaign etc.

3.10.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for ICT products may not develop as projected, particularly given the uncertainties regarding characteristics of converged electronic products in the future.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected, especially if power management practices do not improve.

- Test methods may not keep abreast with changes in the market or represent typical appliance 'use' patterns or characteristics.
- The introduction of EuP initiatives may be delayed or rejected.
- The revision of ENERGY STAR specifications may be delayed or may not be sufficiently ambitious or robust to meet UK targets.

3.10.6 Other issues

Innovation in the ICT sector is key, but can sometimes result in a negative, rather than positive, impact on energy efficiency. Examples include the positive move towards ePSUs operating at 80% efficiencies and the negative impact of more high intensity printing technologies (laser or LED based products).

3.10.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: substantial life-time cost benefits from switching to energy efficient ICT products.
- Business: additional investment may be required for the design, development and promotion of more efficient technologies.
- Waste: the potential impacts of waste ICT products will be dealt with through 'E-waste' or WEEE initiatives.

3.11 Policy Brief summary for motor driven systems

3.11.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including motor driven systems. These include: electric motors (in industrial and commercial applications in sizes up to 400kW), variable speed drives, pumps (centrifugal, in clean water applications), pumping systems (industrial and commercial applications), fans and fan systems (industrial and commercial applications). The UK Government has set standards for motor driven systems to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.11.2 Rationale for intervention

There are a number of reasons why the UK should look to improve the performance of motor driven systems.

- Over 2.1 million electric motors and associated equipment are supplied to industrial and commercial markets in the UK each year for use in numerous products, including fans, pumps, air compressors, refrigeration and air

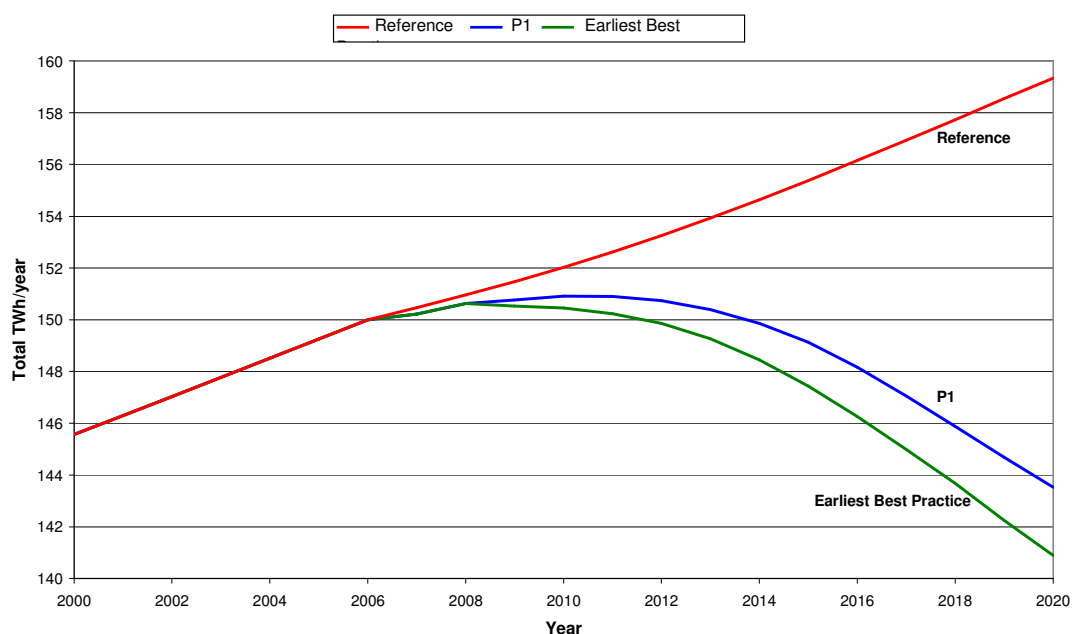
conditioning compressors, lifts, conveyors and machine tools, resulting in significant energy consumption.

- Variable speed drives may be used as controls to realise energy savings in a number of these applications.
- Air conditioning and refrigeration products use electric motors as components to drive compressors and fans, with motors estimated to account for up to 95% of the energy consumed in these products.
- Therefore, improving motor efficiency will have wide-ranging impacts on energy consumption across a number of applications.
- Substantial savings in energy and running costs can be achieved by using the latest generation of high efficiency induction motors and encouraging a greater uptake of alternative motor technologies.

3.11.3 Potential for savings

The Government has developed projections for the future energy use of motor driven systems in the UK (Figure 3.12): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario (representing immediate installation of the best technology available on the market).

Figure 3.12 UK motor driven systems energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, the average efficiency standards which new products would need to achieve are:

- 2010: Induction motors meet 'high efficiency' levels (equivalent to the 'EFF1' label), with further increases in efficiency of between 1-3% (depending on motor size) by 2020.
- 2010: Minimum energy performance levels of ventilation systems in buildings (Specific Fan Power), new pumping systems in buildings and other industrial or process applications (such as in the water or chemicals industries) are set at levels consistent with current best practice.
- 2020: Pump efficiencies increase by 5-6% over 2006 levels.

The proposed P1 scenario would result in energy use from motor driven systems falling to 143.5 TWh by 2020, representing a gross energy saving of 15.8 TWh (1.9 MtC, 7.1 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.11.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- The International Task Force on Sustainable Products (ITFSP) has a Global Sustainable Product Network (GSPN) which aims to promote efficient industrial electric motor systems worldwide through harmonisation of test standards, introducing mandatory minimum performance standards and sharing international best practice.
- The Government's Enhanced Capital Allowances (ECA) scheme is available for certain Energy Technology List (ETL) products, providing enhanced tax allowances for more efficient products, including single speed motors (induction), variable speed drives, switched reluctance drives and integrated motor drive units (induction). There is scope to make the performance measures for the scheme more demanding for these products.
- A voluntary energy efficiency label for induction motors is available via the EU/CEMEP (European Committee of Manufacturers of Electrical Machines and Power Electronics) scheme.
- Europump, the European pump manufacturers association, launched a voluntary labelling scheme in January 2005 for circulating pumps sized up to 2.5 kW.
- UK Building Regulations specify the minimum efficiency performance of mechanical ventilation systems in buildings, which includes the performance of some fans. The requirements could be extended to cover the performance of pumping systems within buildings.

Future initiatives

- Mandatory minimum performance standards for motor driven systems will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards. Preparatory studies for motors, pumps, circulators and fans are all complete.
- The IEC is currently developing an internationally harmonised labelling standard for induction motors, namely IEC60034-30, which is scheduled for completion in 2008.
- Industry sector agreements on product efficiency are under discussion for the water and chemicals industries for both fans and pumps.
- Climate Change Agreements (CCAs) provide an incentive for specific energy intensive sectors to improve their energy use. The Carbon Reduction Commitment will provide a financial incentive for most UK organisations to reduce their greenhouse gas emissions.

Other broader policies with the potential to have an impact on the efficiency of motor driven systems include possible lower VAT rates on efficient products, smart metering, etc.

3.11.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for motor driven systems may not develop as projected.
- Lack of reliable or effective information will prevent consumers from making an informed choice and restrict effective competition on energy efficiency issues.
- Fan and pumps systems may not be refurbished or improved for 20 years or more, resulting in little opportunity for improvement in building applications.
- Test methods may not keep abreast with changes in the market or represent typical appliance 'use' patterns or characteristics.
- The introduction of EuP and international initiatives may be delayed or rejected.

3.11.6 Other issues

Policies and test standards applied to motors need to be designed such that they are technology independent and allow for the adoption of alternative (and more efficient) motor technologies (eg those utilising permanent magnets).

3.11.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

- Consumers: considerable economic benefits from switching from standard efficiency motors, pumps or fans to high efficiency versions, with life-cycle costing indicating paybacks of 1-2 years.

- Noise: reduced noise and vibration emissions from higher efficiency motors. This is particularly relevant for fans in commercial applications, where regulations govern acceptable noise and vibration limits.

3.12 Policy Brief summary for street lighting and traffic signals

3.12.1 Scope

The work of the Market Transformation Programme (MTP) focuses on a number of products including street lighting and traffic signals. These include public street lighting, signage and traffic signals, high- and low-pressure sodium lamps, ceramic metal halide lamps, high-pressure mercury lamps, tungsten filament lamps (including halogen), compact fluorescent lamps (CFLs) and light-emitting diodes (LEDs). The UK Government has set standards for these lighting products to provide guidance for all involved parties on the required improvements in energy efficiency for these products.

3.12.2 Rationale for intervention

There are a number of reasons why the UK should look to improve the performance of street lighting and traffic signals.

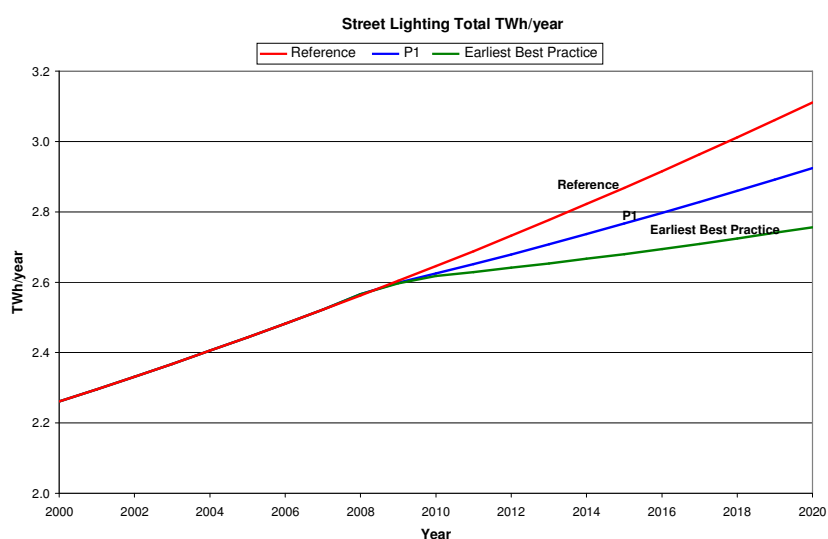
- A significant proportion of old street lighting stock is being replaced by less efficient high-pressure sodium lighting to improve lighting colour, with a negative effect on energy consumption. New technologies are available that provide better lighting quality without increasing the energy demand.
- Significant energy savings can be made by dimming street lights during low traffic flow times and using 'white light' lamps at half the standard lumen level.
- Light emitting diode (LED) technologies provide a more cost-effective energy efficient alternative to standard lamps for traffic signals.

3.12.3 Potential for savings

The Government has developed projections for the future energy use of installed street lighting products in the UK (Figure 3.13): a Reference scenario or 'business as usual' scenario; the Government's target scenario, known as 'P1'; and the Earliest Best Practice scenario¹³ (representing immediate installation of the best technology available on the market).

¹³ Refinement of the forward looking model has led to a change in the EBP line compared with that in the consultation document.

Figure 3.13 UK street lighting and traffic signal energy use to 2020 under Reference, P1 and EBP scenarios



Under the P1 scenario, *average* sales of street lighting products would need to achieve efficiencies of:

- 104.77 lumens/W by 2010.
- 103.69 lumens/W by 2015.
- 103.63 lumens/W by 2020.

compared with a 2007 average of 101.05 lumens/W.

Further, 10% of new traffic signal lamps would be LEDs by 2009, rising to 100% by 2020, and high-pressure mercury street lamps would be completely phased out by 2012.

This would result in energy use from street lighting and traffic signals rising to 2.9 TWh by 2020, representing a gross energy saving of 0.3 TWh (0.03 MtC, 0.1 MtCO₂) compared to the Reference scenario.

The P1 scenario is achievable through normal market mechanisms and the supporting policies outlined in the Energy White Paper in May 2007.

3.12.4 Existing and future interventions

There are a number of existing and future policies and initiatives which are expected to help achieve the P1 scenario.

Existing

- All local authorities have committed to sustainable development plans. In many cases, these include plans for energy efficient street lighting.
- The Highways Agency has produced a new specification for the design of street lighting for motorways and trunk roads.

- The Government has announced 'revolving loan funds' as part of the UK Energy Efficiency Action Plan. These loans could be made available for street lighting renewal projects.

Future initiatives

- The Government is exploring the potential of the Forward Commitment Procurement Model to encourage the early uptake of LED traffic signals.
- Mandatory minimum performance standards for street lighting will be proposed under the EuP Directive, which would be harmonised across the European Union; the UK will press for ambitious standards. The preparatory study for street lighting is complete.
- The Association for Street Lighting Electrical Contractors (ASLEC) and the Highways Electrical Manufacturers and Suppliers Association (HEMSA) propose to develop a carbon footprint calculator to assist in the assessment of the energy efficiency implications of individual products and systems.
- The Carbon Reduction Commitment could indirectly impact on street lighting as it will incentivise energy saving measures across 5,000 large commercial and public sector organisations. The Energy Services Directive could also impact on street lighting by requiring greater energy efficiency.

3.12.5 Risks

Possible risks which may have an impact on the ability to achieve the P1 scenario include:

- The market for street lighting and traffic signals may not develop as projected.
- Product performance and usage under 'real life' conditions may differ from estimates included in the scenario projections, resulting in lower energy savings than expected.
- The Government's commitment to reduce traffic accidents and crime could affect the provision of road lighting.
- Insufficient funding could lead to pressure to compromise product/system specifications which then fail to meet energy efficiency standards.
- The introduction of EuP initiatives may be delayed or rejected.

3.12.6 Other issues

LEDs are the most promising innovation in this sector, along with solar timers and low-level luminaires/LED markers at rural roundabouts or junctions.

3.12.7 Potential impacts

In addition to the carbon and energy savings, potential impacts of this market transformation initiative include:

Market Transformation Programme
Policy Analysis and Projections 2006/08

- Local authorities: substantial life-time cost benefits from switching to energy efficient lighting products in almost all cases;
- Business: the impact on UK lamp businesses will be minimal as most discharge lamps are manufactured outside the UK;
- Pollution: lower lighting levels and better control of luminaires can reduce sky glow and light pollution.

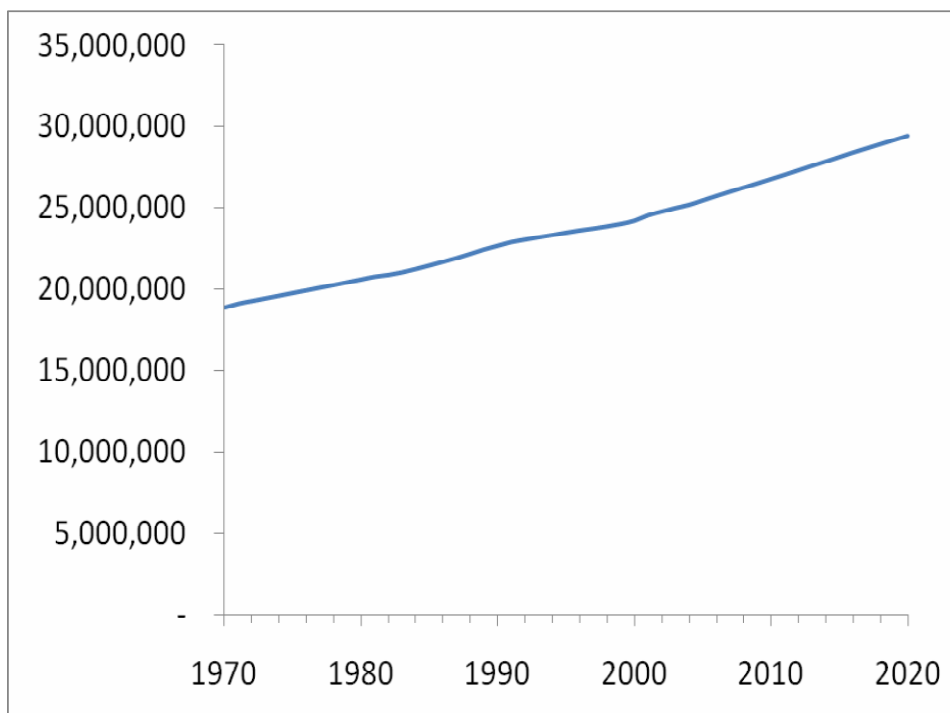
Annex A

UK household and population figures

MTP uses the same assumptions for UK household and population figures across all its scenarios for domestic appliances. The figures used are presented in the chart below. The numbers are ultimately based on census data and official projections; further details are given in Briefing Note BNXS25 (version 3.0) accessible via the MTP website at:

<http://www.mtprog.com/cms/product-strategies/subsector/cross-sector>

Figure A1 UK household numbers 1970 - 2020



Annex B

UK carbon emission factors

MTP uses the same carbon emission factors across all its work. Each unit of energy consumed by appliances or lighting will emit carbon. Where there are gas and oil burners, there is a simple standard ratio between the fuel used and the carbon emissions. Thus, to convert from gas or oil, simple conversion factors are used. For the case of electricity used it is less simple, since the emissions at the power station depend on the different types of fuel being used at the station, the efficiency of the generation plant, the loading of these plant and the efficiency of the electricity distribution system. These factors change over time, and separate analyses have been done to estimate them. Furthermore, when saving electricity some generation plant (sometimes referred to as the marginal plant) are more likely to be turned off than others (usually the fossil fuel-based plants). For further details see MTP's Briefing Note BNXS01 which can be accessed at:

<http://www.mtprog.com/cms/product-strategies/subsector/cross-sector>

The conversion factors that have been used in this report are given in the Table B1.

Table B1 Carbon emission factors for gas, oil and electricity 1970/2020

Fuel	Gas	Oil	Electricity	
Sector	All sectors	Domestic only	Consumption	Savings
Year	kgCO ₂ /kWh	kgCO ₂ /kWh	kgCO ₂ /kWh	kgCO ₂ /kWh
1970	0.19	0.26	1.07	N/A
1971	0.19	0.26	1.04	N/A
1972	0.19	0.26	1.02	N/A
1973	0.19	0.26	1.01	N/A
1974	0.19	0.26	0.97	N/A
1975	0.19	0.26	0.98	N/A
1976	0.19	0.26	0.95	N/A
1977	0.19	0.26	0.95	N/A
1978	0.19	0.26	0.91	N/A
1979	0.19	0.26	0.95	N/A
1980	0.19	0.26	0.94	N/A
1981	0.19	0.26	0.93	N/A
1982	0.19	0.26	0.89	N/A
1983	0.19	0.26	0.87	N/A
1984	0.19	0.26	0.83	N/A
1985	0.19	0.26	0.83	N/A
1986	0.19	0.26	0.83	N/A
1987	0.19	0.26	0.81	N/A
1988	0.19	0.26	0.77	N/A
1989	0.19	0.26	0.75	N/A

Market Transformation Programme
Policy Analysis and Projections 2006/08

1990	0.19	0.26	0.77	N/A
1991	0.19	0.26	0.72	N/A
1992	0.19	0.26	0.69	N/A
1993	0.19	0.26	0.61	N/A
1994	0.19	0.26	0.59	N/A
1995	0.19	0.26	0.55	N/A
1996	0.19	0.26	0.51	N/A
1997	0.19	0.26	0.51	N/A
1998	0.19	0.26	0.52	N/A
1999	0.19	0.26	0.48	N/A
2000	0.19	0.26	0.52	N/A
2001	0.19	0.26	0.54	N/A
2002	0.19	0.26	0.52	N/A
2003	0.19	0.26	0.55	N/A
2004	0.19	0.26	0.54	N/A
2005	0.19	0.26	0.55	0.61
2006	0.19	0.26	0.54	0.59
2007	0.19	0.26	0.54	0.58
2008	0.19	0.26	0.53	0.57
2009	0.19	0.26	0.52	0.56
2010	0.19	0.26	0.52	0.55
2011	0.19	0.26	0.51	0.53
2012	0.19	0.26	0.50	0.52
2013	0.19	0.26	0.49	0.51
2014	0.19	0.26	0.48	0.50
2015	0.19	0.26	0.47	0.49
2016	0.19	0.26	0.46	0.48
2017	0.19	0.26	0.45	0.47
2018	0.19	0.26	0.44	0.47
2019	0.19	0.26	0.43	0.45
2020	0.19	0.26	0.42	0.45

NOTE: To convert from carbon dioxide (kgCO₂) to carbon (kgC) multiply by a factor of 12/44. This means, 1 kg of carbon (1 kgC) is equivalent to 3.67 kg of CO₂ (3.67 kgCO₂).

Annex C

Heat replacement factors

The energy consumed by interior lighting and most electrical and some gas appliances is converted to heat and warms the building. If that is reduced by substituting more energy efficient products, then in the cold months of the year the heating system will compensate for the reduction. This effect is called heat replacement, and takes place automatically if, as is usually the case, the heating system is controlled thermostatically. Consequently, the apparent energy savings from improvements to lighting and appliances in heated living space are not fully achievable. The extent depends on a number of factors.

Further details and factors used are given in MTP's Briefing Note BNXS05, which defines the Heat Replacement Effect and looks at how it affects the savings obtained from improved lighting and appliances. Provisional factors have been developed for use in calculations that estimate net savings in energy, carbon emissions and costs. The Briefing Note can be accessed at <http://www.mtprog.com/cms/product-strategies/subsector/cross-sector>

Annex D

Water using products – overview

Water use in the UK

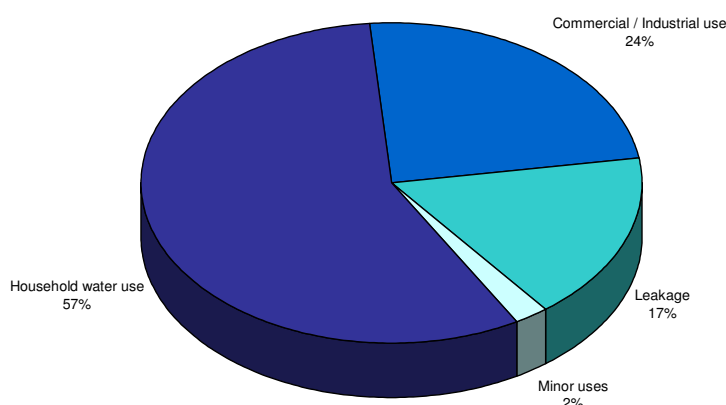
Defra's water strategy, *Future Water*, provides a vision of water use in 2030, which includes reducing per capita consumption to between 120 and 130 litres per person per day, from a current level of around 150 litres per person per day, through a combination of policy actions and behavioural change.

Generally, the UK has adequate water resources for its needs. However, there are regional areas of stress, and prolonged periods of low rainfall can put resources under pressure.

The total water put into distribution for the UK in 2006 was 18,749 Ml/day (Defra, 2006¹⁴). The consumption of the water can be broken down into domestic consumption, commercial/industrial consumption, leakage and other minor uses (such as fire fighting). MTP's work on water has focused primarily on the domestic water consumption of baths, showers, taps and WCs.

Figure D1 shows the percentage breakdown for water consumption in England and Wales (Ofwat, 2006¹⁵).

Figure D1 Water consumption in England and Wales



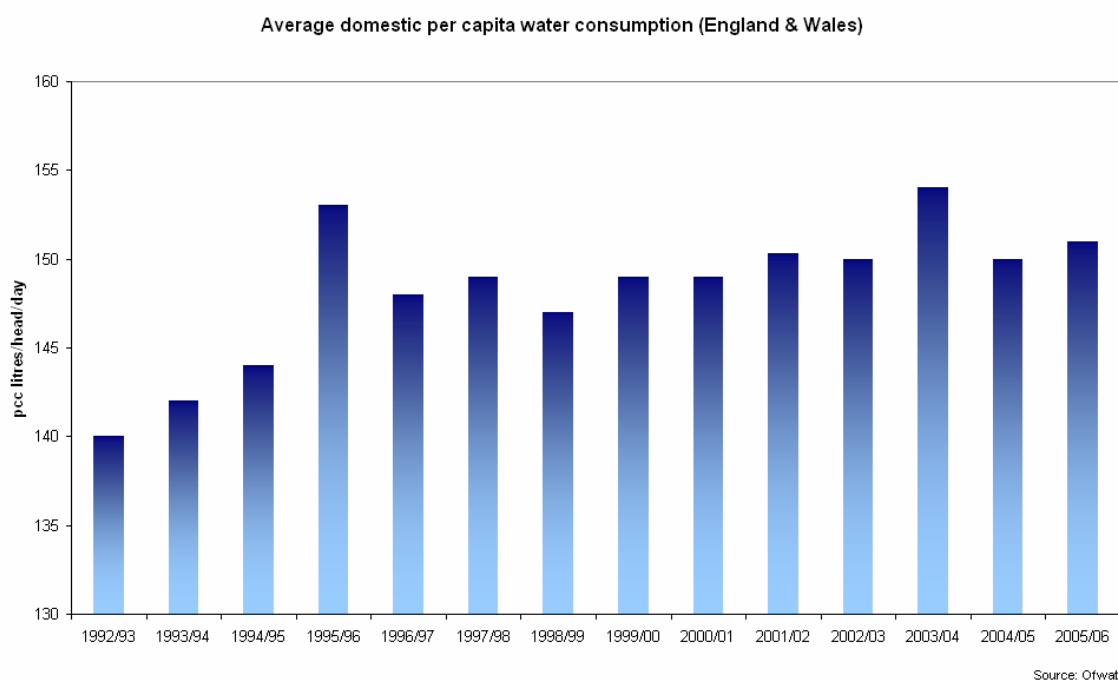
¹⁴ Defra, 2006. Sourced on www.defra.gov.uk/environment/statistics/inlwater/download/xls/iwtb25

¹⁵ Ofwat, 2006. Security of supply, leakage and the efficient use of water 2005/06

Household water usage makes up 57% of the total potable water supplied by water companies in England and Wales. Average per capita consumption is now approximately 149 litres per day, with an average household size of 2.4 persons. (Ofwat, 2007¹⁶).

Total household water consumption in the UK has risen by 70% over the past 30 years. The rise in per capita consumption over the last 15 years is shown in Figure D2.

Figure D2 Per capita consumption from 1992 to 2006



The rise in domestic water use can be attributed to a combination of factors including:

- Increasing water using appliance ownership.
- Decreasing occupancy (smaller households use more water per person (East of Scotland Water, North of Scotland Water and West of Scotland Water (2000)¹⁷, Edwards & Martin (1995)¹⁸, WRc (2005)¹⁹).
- More luxury water using appliances such as 'power showers', hot tubs and swimming pools²⁰.

¹⁶ Ofwat, 2007. Security of supply 2006-07 report.

¹⁷ East of Scotland Water, North of Scotland Water & West of Scotland Water, 2000. Using water in the home in Scotland, Domestic water consumption in 1999.

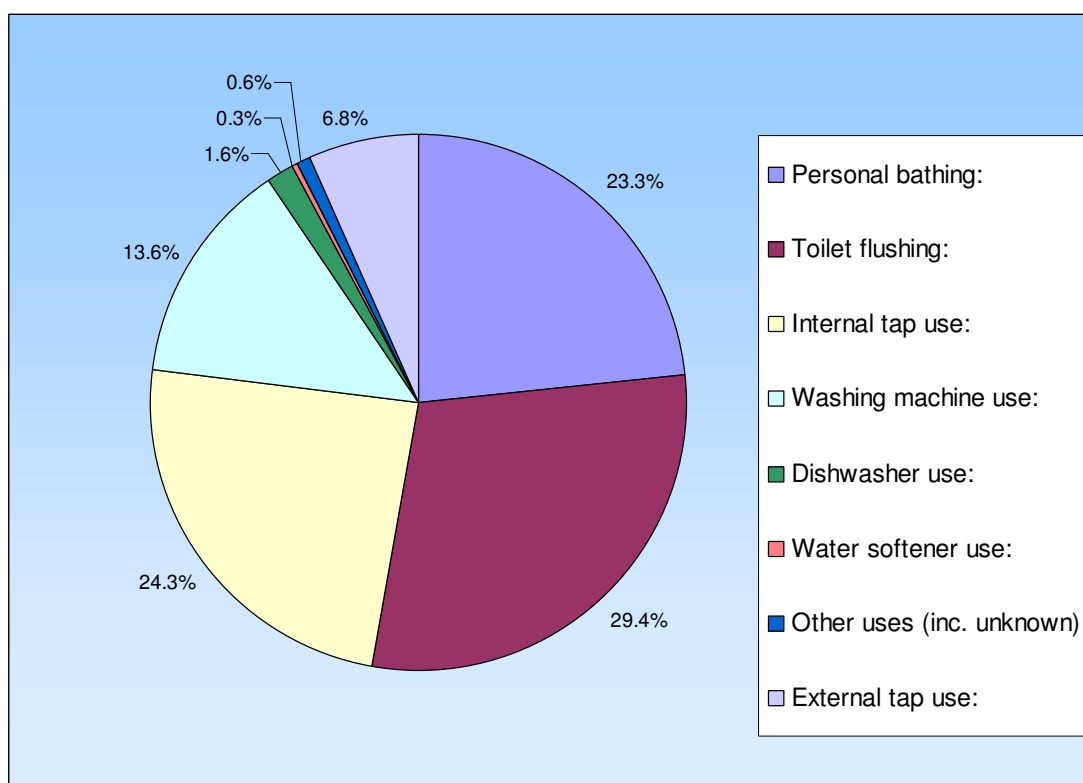
¹⁸ Edwards, K and Martin, L., 1995. A methodology for surveying domestic consumption. J. CIWEM, 9, 477-488.

¹⁹ WRc, 2005. Increasing the value of domestic water use data for demand management. CP187, P6832, WRc. March 2005.

²⁰ For more information on MTP modelling work and the data sources behind it please see BNDWBath, BNDWShower and BNDWWC at www.mtprog.com

- Consumer behaviour (people now bath or shower more often)²¹.
- Warmer weather with drier summers (Defra, 2003²², HM Government, 2006²³).
- Figure D3 shows typical household water use by activity according to a survey of nearly 400 households across England²⁴.

Figure D3 Domestic consumption broken down by water use²⁵



The potential for saving water

MTP evidence has helped to predict potential water savings due to a variety of policy measures relating to baths, showers, taps and WCs (over 75% of domestic water use). The cumulative potential savings relating to these products are presented in Figure 4 (see Section 1 for a description of the scenarios used).

²¹ Traces of Water Workshop Report 2: Water practices and everyday life at http://www.lec.lancs.ac.uk/cswwm/download/tww2_report1.pdf

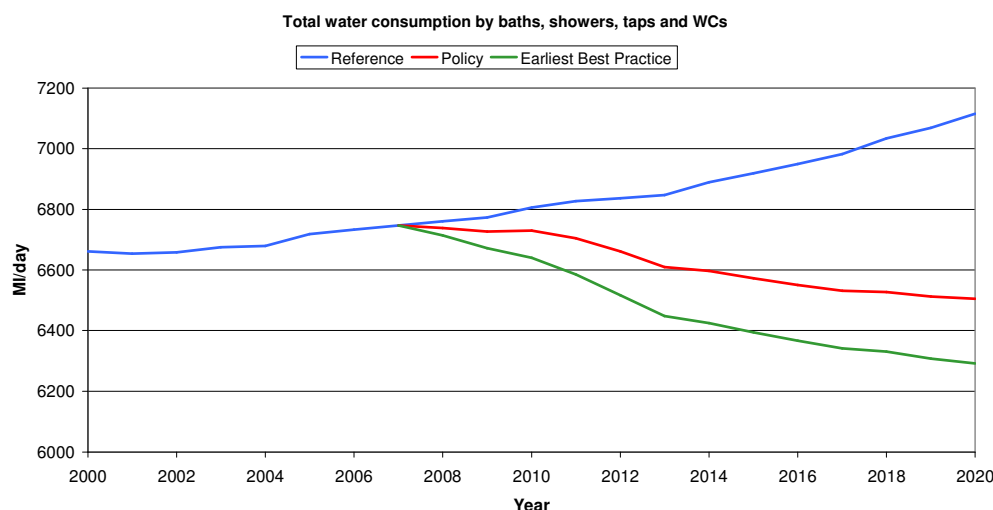
²² Defra, Review of UK Climate Change Indicators, June 2003 (Revised January 2004).

²³ HM Government, Climate Change: The UK Programme 2006.

²⁴ These percentage breakdowns are comparable with values in 'East of Scotland Water, North of Scotland Water & West of Scotland Water, 2000. Using water in the home in Scotland, Domestic water consumption in 1999' for Scotland.

²⁵ Note, the external tap consumption is related to peak day use, and hence will vary year on year depending on the proportion of peak days to non-peak days in any year.

Figure D4 Projections for total water used by WCs, baths and showers



Future Water sets out the Government’s plans for water in the future and the practical steps that need to be taken to ensure that clean water is available for people, businesses and nature. It outlines the Government’s evolving priorities and focuses water policy through a climate change lens. The overall vision is for continuous adaptation to climate change and other pressures embedded across the water sector, resulting in sustainable delivery of secure water supplies, and an improved and protected water environment. Key to achieving the vision is constant improvement in the efficiency of water using appliances and the increasing availability of efficient appliances in the marketplace.

The Water Saving Group (WSG) plays a significant role in establishing policy on water efficiency and has published consultations on defining areas of water stress and on compulsory domestic metering in areas of water stress. The development of the Code for Sustainable Homes (CSH) and the recent consultation on water efficiency in new buildings, together with the development of a new Government Water Strategy, underline the need for commitment from the Government to improve the water efficiency of the UK housing stock. In addition, local and regional governments have been developing specific housing strategies which have a water remit (eg the London Development Plan and Water Strategy from the Greater London Authority, the Kent plan, the Thames Gateway project and the Three Regions Climate Change Retrofit Project which looks at, inter alia, water efficiency retrofit measures).

All of the policy drivers will on the one hand help to drive market transformation, but on the other hand require market transformation in order to be more readily achievable. It is essential that manufacturers of bathroom fittings and white goods are able to manufacture products that enable developers to meet the targets set or proposed by the new policy instruments.

Dishwashers and washing machines

Manufacturers of dishwashers and washing machines have made considerable efforts over the last decade to reduce the water consumption of these products.

Water consumption in dishwashers typically fell by around 20% between 1997 and 2005, from an average of 19 litres to 15 litres per cycle²⁶. Household penetration of dishwashers in the UK has grown slightly in this period from 21.4% to 27%. There is some further potential for growth but it is unlikely that ownership will grow rapidly; MTP estimates growth to 30.8% by 2020. Dishwasher appliance water consumption can be three to four times less than washing the same amount of crockery and cutlery by hand²⁷. There is some limited potential to further reduce the average amount of water used by dishwashers. The forthcoming EuP Directive implementing measure for dishwashers may include a maximum consumption figure for water, but firm proposals are not expected until later in 2008.

Water consumption per kg of load declared on the washing machine energy label fell by at least 30% between 1997 and 2005, from an average of 13.9 to 9.6 litres per cycle. More machines also employ technology to adjust the water used according to the load being washed, but in use these may not deliver a pro-rata reduction as the load is reduced²⁸. For example, a washing machine may claim water consumption of around 10.5 litres per kg of cotton wash load (52.5 litres for a 5 kg load), but when filled with a load that is 60% of the declared weight (3 kg in the example) the volume of water overall will be less (48 litres), but the volume per kg of wash load may increase to around 16 litres per kg. Water consumption has been reduced in an effort to decrease energy consumption, so the focus has been on reducing water in the wash cycle. There may be some further scope for reducing water used during the rinse cycles, but this should not be encouraged without including rinsing performance requirements. There may be health issues associated with poor rinsing such as irritation from detergent residues and infections if bacteria are not fully removed. The forthcoming EuP Directive implementing measure for washing machines may include a maximum consumption figure for water, but firm proposals are not expected until later in 2008.

Household penetration of washing machines has grown, with around 94% of homes having either a washing machine or washer-drier; this figure is expected to increase to 95% by 2020. Washer-driers account for 15% of the stock. The wash cycle is assumed to be the same as for washing machines. The drying cycle of washer-driers consumes water to create a cool surface to condense the water that is removed from the wash load. In the UK there is considerable variation in the efficiency of water use in the drying cycles of washer-driers, and models are available that use between 5 and 20 litres per kg of load.

²⁶ EUP Preliminary Study Task 2 Document http://www.ecowet-domestic.org/index.php?option=com_docman&task=doc_download&gid=76

²⁷ MTP Briefing Note BNW16: A comparison of manual washing up with using a domestic dishwasher see <http://www.mtprog.com/cms/product-strategies/subsector/wet-appliances>

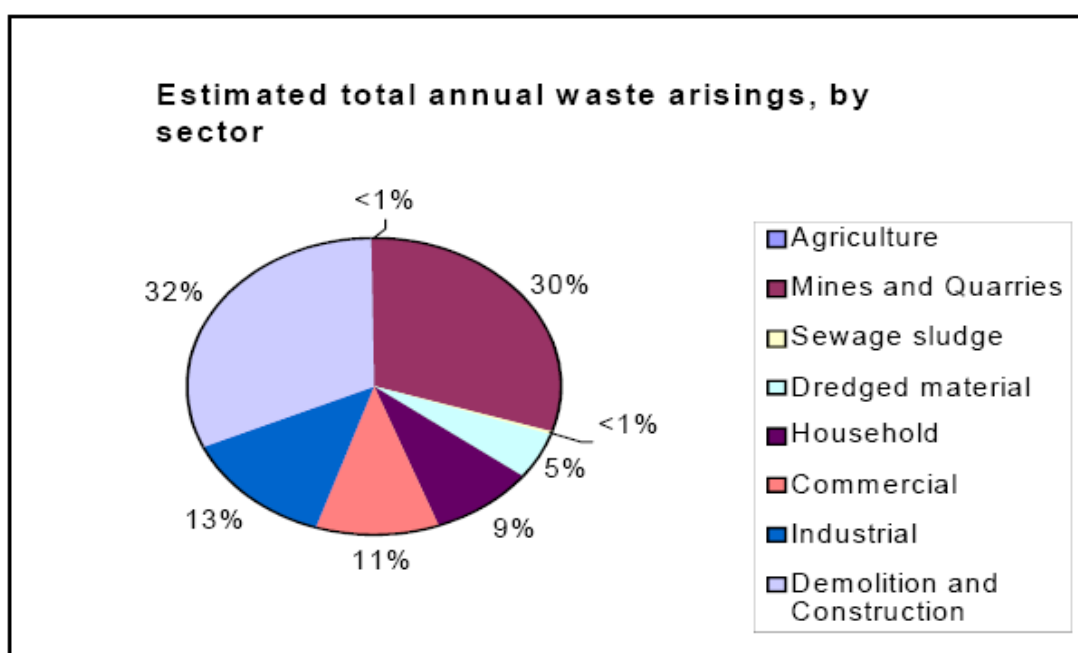
²⁸ Intertek, 2004. Washing machine 'Real use' Performance Report 62014.

Annex E

Waste – overview

The annual waste tonnage for England alone is nearly 280 million tonnes. Contributions of specific waste streams to this total are shown below.

Figure E1 Estimated total annual waste arisings, by sector in England 2002/03



Sources: Defra, Environment Agency, Water UK, ODPM including Review of England's Waste Strategy: A Consultation Document. Annexes. Defra, February 2006

In consultation with Defra, WRAP and the Environment Agency, in 2005 MTP began to investigate the end-of-life waste arisings for a number of priority products including compact fluorescent lamps, electric motors, linear fluorescent lamps, mattresses, mercury discharge lamps, plasterboard, variable speed drives and window systems. In addition, MTP gathered data on end-of-life waste arisings for a number of other product groups. In consultation with stakeholders, MTP investigated the scope for enhanced resource efficiency. This work informed the development of policy action plans to help implement product eco-design options. Inter alia, MTP's work suggested that:

- End-of-life wet appliances would contribute some 180,000 tonnes to the waste stream in 2006, rising to 210,000 tonnes in 2020, and the sale of new wet appliances in 2006 would result in 14,000 tonnes of packaging waste.
- End-of-life cold appliances would contribute some 104,000 tonnes to the waste stream in 2006, rising to 122,000 tonnes in 2020. The sale of new cold appliances

was expected to contribute around 10,000 tonnes of packaging materials to the waste stream in 2006.

- Of cold appliances, 83% by weight is recycled at end-of-life. Re-use accounts for 5% by weight. Most of the remaining products are sent for final disposal; very few are exported. There could be potential for improved sustainability if cold appliances bearing an EU Energy Label D to G are recycled rather than re-used.
- Super-bright LEDs (SBLEDs) could replace more conventional lamp technologies in the medium term. Such lamps offer improved energy efficiency and a longer lifetime without using hazardous materials.
- The use of plasterboard products is increasing annually at 3-4%. Linked to the growth rate of dwelling completions estimated for the next 15 years, consumption is expected to roughly double by 2020 to 6.9 million tonnes. If current trends in wastage continue, plasterboard waste from new-build constructions could be around 829,000 tonnes in 2020. Plasterboard manufacturers with their trade association, the Gypsum Products Development Association (GPDA), developed an agreement in 2006 to include targets for the whole plasterboard supply chain.

Recently commissioned MTP work

MTP's initial waste related work demonstrated that the MTP method could be applied successfully to waste issues. A number of scoping studies were therefore established between 2006 and 2008 to investigate new areas. These included consumer electronics and ICT, refrigeration, paints and varnishes, mattresses, chilled ready meals, waste disposal units (WDUs) and digital radios. Further details are available via the MTP website at <http://www.mtprog.com/>

Annex F

Key policy instruments

Energy related policies

Climate Change Bill

The Bill contains provisions that will set a legally binding target for reducing UK carbon emissions by at least 26% by 2020 and at least 60% by 2050, compared with 1990 levels. Further details can be found at

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

Framework Directive for the Eco-design of Energy-using Products (EuP)

This European Directive (2005/32/EC) provides a framework for setting eco-design requirements for energy using products before they can be placed on the market.

Further details can be found at <http://www.mtprog.com/cms/eup>

European Union Energy Label

In 1992, the European Commission introduced the Energy Label to inform consumers about the in-use energy consumption of products (Directive 92/75/EEC). Depending on the type of product, additional information may also be provided through the labelling system, such as water consumption, wash performance, noise levels and light output. The Framework Directive is scheduled to be revised in the summer of 2008. Further details can be found at

<http://www.defra.gov.uk/environment/consumerprod/mtp/guidance-notes.pdf>

EU ENERGY STAR

EU ENERGY STAR, led by the European Commission, aims to identify and promote energy efficient office equipment to reduce greenhouse gas emissions. It is a voluntary labelling scheme. Further details can be found at

<http://www.eu-energystar.org/en/index.html>

European Union Codes of Conduct

Since the mid-1990s, the European Commission has been developing codes of conduct with individual consumer electronics manufacturers, the EU trade association European Association of Consumer Electronics Manufacturers (EACEM) and, more recently, the European Information and Communications Technology Industry Association. These are voluntary agreements that, inter alia, limit the power

demand of digital equipment. Further details can be found at http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative.htm

Carbon Reduction Commitment

Announced in the Energy White Paper, the Carbon Reduction Commitment (CRC) scheme (formerly the Energy Performance Commitment) will require mandatory emissions trading to cut carbon emissions from large commercial and public sector organisations. It will cover around 10% of the UK economy-wide emissions, and will provide incentives for organisations to save money through energy efficiency.

Further details can be found at <http://www.defra.gov.uk/Environment/climatechange/uk/business/crc/index.htm>

Act on CO₂

The Act on CO₂ Calculator is an engaging and simple web-based tool that allows people to calculate their personal or household carbon footprint. It can be accessed via: <http://actonco2.direct.gov.uk/index.html>

Smart Meters

The EWP sets out a number of policies on energy billing and metering designed to reduce energy consumption. These include requiring the installation of smart meters for business consumers above a certain energy usage threshold where it has been proved to be cost-effective. The EWP also sets out the Government's expectation that smart metering would be introduced in the rest of the business sector and the domestic sector over the next decade. Further details can be found at

<http://www.energysavingtrust.org.uk/uploads/documents/aboutest/GB4.pdf>

Energy Saving Recommended Scheme

Developed by the Energy Saving Trust in conjunction with UK industry and the Government, the Energy Saving Recommended (ESR) Scheme endorses high-efficiency appliances. Endorsed products can use the Energy Saving Recommended logo, signalling to consumers that a product is among the most energy efficient on the market. Further details can be found at

http://www.energysavingtrust.org.uk/energy_saving_products/about_energy_saving_recommended_products

Carbon Emissions Reduction Target (CERT)

The third phase of the EEC (EEC3), now known as the Carbon Emissions Reduction Target (CERT), will run from 2008 to 2011. It requires electricity and gas supply companies in the UK to deliver energy efficiency measures to their customers.

Further details can be found at http://www.energysavingtrust.org.uk/housingbuildings/localauthorities/newsitems/cert_update/

Building Regulations

Part L on 'Conservation of fuel and power' sets out the energy performance requirements of materials and building work to comply with the requirements of the Building Regulations in England and Wales. There is equivalent legislation in Scotland and Northern Ireland. Further details can be found at <http://www.communities.gov.uk/planningandbuilding/buildingregulations/>

Code for Sustainable Homes

The CSH measures the sustainability of a new home against nine categories of sustainable design, rating the 'whole home' as a complete package. The CSH uses a 1 to 6 star rating system to communicate the overall sustainability performance of a new home and sets minimum standards for energy and water use at each level. Further details can be found at <http://www.communities.gov.uk/planningandbuilding/buildingregulations/legislation/englandwales/codesustainable/>

Energy Performance of Buildings Directive (EPBD)

The main elements of this Directive (2002/91/EC) are concerned with the effect of the integrated performance of products on the energy performance of a building. Further details can be found at <http://www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/>

Enhanced Capital Allowance (ECA) Scheme

The ECA Scheme seeks to encourage businesses to invest in energy saving technologies and products. Further details can be found at <http://www.eca.gov.uk/>

Energy Performance Certificates

Properties marketed for sale from 14 December 2007 in England and Wales are required to have a Home Information Pack (HIP). HIPs are designed to reduce the stress of both buying and selling by making accessible all essential information about the property. Further details can be found at http://www.homeinformationpacks.gov.uk/consumer/17_Energy_Performance_Certificate.html

Broader sustainability policies

European Union Eco-label

This voluntary labelling scheme seeks to encourage businesses to market products and services with reduced environmental impact. At the same time, it allows consumers to make informed purchasing decisions. Each product has to meet high

environmental performance standards for criteria that are based on a 'cradle-to-grave' view of their environmental impacts. Further details can be found at http://ec.europa.eu/environment/ecolabel/index_en.htm

Water related policies

Future Water – Water Strategy

The **new water strategy for England, *Future Water***, published on 7 February 2008, sets out the Government's long-term vision for water and the framework for water management in England. It includes a proposal to reduce water usage to 120 litres per person per day by 2030 from the current level of about 150 litres, through a combination of efficient technology, metering and tariffs. Further details can be found at <http://www.defra.gov.uk/Environment/water/strategy/>

Part G of the Building Regulations and Water Supply (Water Fittings) Regulations

The enabling Sustainable and Secure Buildings Act allows the Building Regulations to include water efficiency requirements. Further details can be found at <http://www.defra.gov.uk/Environment/water/industry/index.htm>

Code for Sustainable Homes

This voluntary Code was launched in December 2006. The Code contains several levels of water efficiency requirements for new homes. Further details can be found at <http://www.communities.gov.uk/planningandbuilding/buildingregulations/legislation/englandwales/codesustainable/>

Water Supply (Water Fittings) Regulations 1999

These Regulations set out minimum performance specifications with which any future development will have to comply. Further details can be found at <http://www.defra.gov.uk/Environment/water/industry/wsregs99/index.htm>

The Water Industry Act 1999 (WIA99)

This Act gives customers the right to have a water meter fitted free of charge where the installation is practical and not unreasonably expensive. Further details can be found at <http://www.defra.gov.uk/environment/water/industry/metering/index.htm>

Enhanced Capital Allowance (ECA) Scheme

The ECA Scheme, originally introduced for energy, has been extended to cover water efficient appliances. The scheme seeks to encourage businesses to invest in water saving technologies and products. Further details can be found at <http://www.eca.gov.uk/>

Waste related policies

Landfill Directive

This Directive (99/31/EC) seeks to ban certain waste from landfill, have all landfill sites classified as inert waste, hazardous waste or non-hazardous waste site, and reduce biodegradable municipal waste going to landfill to 35% of the 1995 level by 2020. Further details can be found at

<http://www.defra.gov.uk/environment/waste/topics/landfill-dir/>

Hazardous Waste Regulations

These regulations implement the EU Hazardous Waste Directive (91/689/EC), and make it illegal to transport hazardous waste outside OECD countries. Further details can be found at <http://www.defra.gov.uk/Environment/waste/special/index.htm>

Waste Electrical and Electronic Equipment (WEEE) Directive

This Directive (2002/96/EC) sets requirements for the collection and treatment of products, including large household appliances, small household appliances, lighting equipment, and IT and telecommunications equipment. Further details can be found at

<http://www.environment-agency.gov.uk/business/1745440/444663/1106248/>

Restriction of the Use of Certain Hazardous Substances (RoHS) Directive

The RoHS Directive (2002/95/EC) prohibits the sale in the EU of new electrical and electronic equipment containing more than agreed levels of certain metals (lead, cadmium, mercury, hexavalent chromium) and two types of flame retardant (polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)).

Further details can be found at <http://www.rohs.gov.uk/>

Producer Responsibility Obligations (Packaging Waste) Regulations 2007

The Regulations aim to minimise packaging and packaging waste, promote greater incidences of re-use of packaging items and increase the recovery and recycling of packaging waste that does arise. Further details can be found at

<http://www.defra.gov.uk/Environment/waste/topics/packaging/index.htm>

Annex G

Glossary

BERR	Department for Business, Energy and Regulatory Reform (formerly DTI)
BN	Briefing Note
BREW	Business Resource Efficiency and Waste
CECED	European Committee of Domestic Equipment Manufacturers
CEMEP	European Committee of Manufacturers of Electrical Machines and Power Electronics
CEN	Committee for European Normalisation - the body responsible for harmonising standards and test procedures across Europe
CERT	Carbon Emissions Reduction Target
CFL	Compact fluorescent lamp
CHP	Combined heat and power
CoC	Code of Conduct
CRT	Cathode ray tube
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
EBP	Earliest Best Practice scenario
ECA	Enhanced Capital Allowance
EEC	Energy Efficiency Commitment, see CERT
EICTA	European Information and Communications Technology Industry Association
EPA	Environmental Protection Agency (of the USA)
EPBD	Energy Performance of Buildings Directive
ePSU	External power supply unit

Market Transformation Programme
Policy Analysis and Projections 2006/08

ESR	Energy Saving Recommended
EuP	Energy-using Products
GHG	Greenhouse gas
GLS	General lighting service (ie 'conventional' incandescent bulbs)
GSPN	Global Sustainable Product Network
GWh	Gigawatt-hour
GWP	Global warming potential
HFC	Hydrofluorocarbon
HID	High intensity discharge
Household	This is the same as the Census definition: a group of people (who may, or may not be related) living, or staying temporarily, at the same address, who have a regular arrangement to share at least one meal daily, or share common housekeeping.
ICT	Information and communication technology
IDTV	Integrated digital TV
kWh	Kilowatt-hour
LAN	Local area network
LCD	Liquid crystal display
LED	Light emitting diode
MEPS	Minimum Energy Performance Standard
MFD	Multi-functional device
MtC	Million tonnes of carbon
MTP	Market Transformation Programme
NGO	Non-governmental organisation
ODPM	Office of the Deputy Prime Minister (now Department of Communities and Local Government)
OECD	Organisation for Economic Co-operation and Development

Market Transformation Programme
Policy Analysis and Projections 2006/08

OLED	Organic light emitting diode
P1	Government standards scenario
PBDE	Polybrominated diphenyl ethers
PSIB	Performance Standards Information Base
PBB	Polybrominated biphenyl group
PVR	Personal video recorder
Ref	Reference scenario
RoHS	Restriction of the Use of Certain Hazardous Substances (Directive)
SCP	Sustainable Consumption and Production (at Defra)
SEER	Seasonal Energy Efficiency Ratio
SPM	Sustainable Products and Materials
TWh	Terawatt-hour
VCR	Video cassette recorder
WEEE	Waste electrical and electronic equipment
WRAP	Waste and Resources Action Programme
WSR	Water Supply and Regulation (at Defra)