

# BNXS36: Estimated UK standby electricity consumption in 2006

Version 2.5

This Briefing Note and referenced information is a public consultation document and will be used to inform Government decisions. The information and analysis form part of the Evidence Base created by Defra's Market Transformation Programme.

## 1 Summary

The figures included in this document are based on 2007 MTP estimates. This document will be revised to include 2009 MTP estimates by the end of April 2009.

This Briefing Note covers the UK standby electrical energy consumption of electronic and electrical equipment in domestic and non-domestic premises. The Briefing Note builds on the previous version of BNXS36 published in 2004. Since 2004, there have been a number of major initiatives aimed at addressing the product standby electricity power consumption issue. These include:

- Publication of IEC 62301 standard - 'Household electrical appliances – Measurement of standby power', which specifies methods of measurement of electrical power consumption in standby mode.
- Australian Ministers announce a mandatory 1-Watt standby target for all electrical appliances for Australia by 2012.
- Action 1-Watt initiative conference took place in 2005 to increase international cooperation on activities that will lead to lower standby consumption in appliances in the service and household sectors.
- In 2005, G8 leaders agreed to promote the application of the International Energy Agency's (IEA) 1-Watt initiative which aims to reduce standby requirements for all new appliances to below 1 Watt by 2010.
- European Commission (EC) Codes of Conduct covering broadband equipment (2006), external power supplies (2004), digital TV service systems (2006), which address the standby issue. An EC Code of Conduct has also been proposed for uninterruptible power supplies (UPS) which is due to be agreed in 2007.
- A preparatory study on the standby and off-mode losses of energy-using products has been conducted in 2007 as part of the EC Energy-using Products (EuP) Directive.
- Energy Star eco-label standby consumption criteria have been updated for a range of products including monitors (1 January 2006), imaging equipment (1 April 2007) and computers (1 July 2007).

The above initiatives take either a vertical or horizontal approach towards reducing the standby energy consumption of products. The vertical approach involves setting

standby consumption targets or limits for individual product groups., The horizontal approach involves setting standby limits or targets for products as a whole (often with exceptions where required). Given the large number of different product types on the market with standby functionality, it is thought that the horizontal approach is more practical (with exceptions for some products where proven necessary).

All of the above initiatives aim to tackle the issue of standby electricity consumption that, in the UK in 2006, is estimated to be at least 7.2 TWh (based on evidence for the range of products detailed in Tables 2 and 3). However, this is likely to be a low estimate as there are a number of product groups not included in this. The lack of accurate data available for these product groups means that it is difficult to make confident estimates. Dependent on the amount of time all the products in Table 5 are left on standby the range of likely values for UK standby electricity consumption is 8.1 TWh and 14.2 TWh.

Most of the estimated consumption in standby during 2006 was in the domestic sector: at least 5.2 TWh with a probable range of 6.1-12.2 TWh. This represents 5.2-10.5% of UK domestic electricity consumption (estimated 2006 figure)<sup>1</sup> and between 0.90 and 1.81 million tonnes of carbon (MtC) (based on carbon conversion factor for 2006 found in MTP Briefing Note [BNXS01](#)).

Considering domestic and non-domestic standby use and taking the conservative figure of 7.2 TWh, this represents 2.1% of overall electricity consumption in the UK and 1.06 MtC.

Table 1 below illustrates the full range of estimated electricity use and carbon emissions from standby.

**Table 1 Estimated standby consumption 2006**

	MTP Model Figure	Estimated Range	
		Min	Max
<b>Domestic Standby (TWh/year)</b>	5.2	6.1	12.2
<b>Non Domestic Standby (TWh/year)</b>	2.0	n/a	n/a
<b>Total Standby (TWh/year)</b>	7.2	8.1	14.2
<b>Domestic Product Standby as % Domestic Electricity Consumption</b>	4.5	5.2	10.5
<b>Non-Domestic Product Standby as % Non-Domestic Electricity Consumption</b>	0.9	n/a	n/a
<b>Total Standby as % All Electricity Consumption</b>	2.1	2.4	4.2
<b>Domestic Product Standby Emissions (MtC)</b>	0.8	0.9	1.8
<b>Non-Domestic Product Standby Emissions (MtC)</b>	0.3	n/a	n/a

<sup>1</sup> All UK 2006 electricity figures are estimated. They are based on 2006 figures published in DUKES see [http://stats.berr.gov.uk/energystats/dukes1\\_1-1\\_3.xls](http://stats.berr.gov.uk/energystats/dukes1_1-1_3.xls)

<b>Total Standby Emissions (MtC)</b>	1.1	1.2	2.1
--------------------------------------	-----	-----	-----

Generally, kitchen appliances have lower standby electricity consumptions than the high-growth consumer electronics sector (which includes televisions, VCRs, cable and satellite set-top boxes, video games and DVD products). Therefore, consumer electronics remain a priority area for activity. Table 3 shows that some kitchen appliances have high overall standby consumption patterns.

## 2 Definitions

For the purpose of measuring standby, standby power consumption can be defined as 'the lowest power consumption which cannot be switched off (influenced) by the user and may persist for an indefinite time when an appliance is connected to the main electricity supply'. This definition stems from the 'IEC 62301: Household electrical appliances- Measurement of standby power' international standard.

The terminology used to signify the standby power consumption of each product can vary. The common standby terminologies used in this report are:

1. Standby
2. Off-mode
3. Sleep/off
4. Active-standby
5. Passive-standby
6. No-load

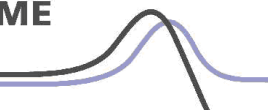
The EC has recognised the need for harmonization of the various terminologies used to describe the 'standby' power mode of products. As part of the preparatory studies behind the EuP Directive, the EC has commissioned some investigatory work into the different definitions used for the standby modes of electronic and electrical products. The aim of the work is to identify the current standby terminologies used for different products and to develop harmonised definitions. A draft document of their recommendations can be found here:

<http://www.ecostandby.org/docs/20060830%20Lot%206%20Task%201%20%28Public%29.pdf>

## 3 Standby electricity consumption estimates

This Briefing Note presents four sets of estimates of electricity consumption in standby mode:

1. Standby consumption, included in MTP models and the What-if Tool, where there is significant confidence in the estimates (see Table 2 and Table 3).
2. Additional standby consumption where there is some confidence in the estimates (see Table 4).
3. Additional standby consumption where there is little confidence in the estimates (see Table 5).
4. Expected standby consumption between 2006 – 2010 for products in MTP models and the What-if Tool (see Table 6).



**Table 2 Estimated standby consumption by non-domestic appliances, 2006 (included in MTP models)**

Appliance category	Standby power (Watts) <sup>2</sup> mean	Stock (million units)	Standby time (hours/day)	Energy use (GWh)	Cost (£ million)	Emissions (ktC)	PM Def **	Source
<b>Desktop PC</b>	3.1	23	14.5	369	23.6	54.6	1	MTP Model 2007
<b>Laptop</b>	1.1	12	8.7	41	2.6	6.0	1	MTP Model 2007
<b>PC monitors:</b>								
CRT	2.1	9	14.5	106	6.8	15.7	1	MTP Model 2007
LCD	1.1	17	14.5	108	6.9	16.0	1	MTP Model 2007
Plasma	4.0	0.2	18.7	5	0.3	0.7	1	MTP Model 2007
<b>Printers:</b>								
Ink	1.5	2	19.7	20	1.3	3.0	1	MTP Model 2007
Laser	14.2	13	18.3	1208	77.3	178.8	2	MTP Model 2007
<b>MFD:***</b>								
MFD Ink	4.1	0.2	20.1	8	0.5	1.2	1	MTP Model 2007
MFD Laser	10.0	2	17.0	103	6.6	15.2	2	MTP Model 2007
<b>Photocopier</b>	3.3	1	15.1	18	1.2	2.7	2	MTP Model 2007
<b>TOTAL</b>		<b>79</b>		<b>1,986</b>	<b>127.1</b>	<b>294</b>		

**Table 3 Estimated standby consumption by domestic appliances, 2006 (included in MTP models)**

Appliance category	Standby power (Watts) <sup>2</sup> mean	Stock (million units)	Standby time (hours/day)	Energy use (GWh)	Cost (£ million)	Emissions (ktC)	PM Def **	Source
<b>Desktops</b>	3.4	23	13.7	392	39	58.0	1	MTP Model 2007
<b>Laptops</b>	1.3	4	14.3	32	3	4.7	1	MTP Model 2007
<b>PC monitors:</b>								
CRT	2.1	8	13.7	91	9	13.4	1	MTP Model 2007
LCD	1.1	15	13.7	90	9	13.3	1	MTP Model 2007
Plasma	4.0	0.1	13.7	3	0.3	0.4	1	MTP Model 2007
<b>MFD:***</b>								MTP Model 2007
MFD Inkjet	4.1	4	18.0	106	11	15.7	1	

<sup>2</sup> Standby power listed in these tables is the mean of all new products in stock. Total stock will consist of a combination of new products and historically purchased products still in use, such as secondary TVs (for example, 90% of CRTs in stock in 2006 were purchased prior to 2006, and 93% of VCRs). Products purchased in previous years that are still in stock may have higher power consumption than new products. For example, for a DVD player purchased in 2000, the What-If tool ([www.http://whatif.mtprog.com/](http://whatif.mtprog.com/)) shows that standby consumption is around 6W, whilst one purchased in 2006 would consume around 2W. VCRs from 2000 ≈ 6W, from 2006 ≈ 4W. CRT TVs from 2000 ≈ 5W, from 2006 ≈ 3W.

Total standby energy consumption calculations are based on the mean performance of products in stock, including products purchased in previous years but still in use. In order to calculate the % stock in 2006 which can be attributed to historic sales, please refer to figures on [www.http://whatif.mtprog.com/](http://whatif.mtprog.com/), and use: (2006 stock – 2006 sales) divided by total 2006 stock.

# MARKET TRANSFORMATION PROGRAMME

Supporting UK Government policy on sustainable products

Appliance category	Standby power (Watts) mean <sup>2</sup>	Stock (million units)	Standby time (hours/day)	Energy use (GWh)	Cost (£ million)	Emissions (ktC)	PM Def **	Source
MFD Laser	10.0	0.1	18.0	6	1	0.9	2	
<b>Printers:</b>								
Ink	1.5	9	19.1	102	10	15.0	1	MTP Model 2007
Laser	14.2	2	13.1	161	16	23.9	2	MTP Model 2007
Photo	1.9	2	11.6	16	2	2.4	1	MTP Model 2007
<b>Televisions:</b>								
CRT primary	2.6	21	10.5	320	32	47.3	3	MTP Model 2007
CRT secondary	2.6	32	12.9	583	58	86.3	3	MTP Model 2007
LCD Primary	2.7	2	10.5	24	2	3.5	3	MTP Model 2007
LCD secondary	1.8	4	12.9	32	3	4.7	3	MTP Model 2007
Plasma Primary	4.0	3	10.5	46	5	6.8	3	MTP Model 2007
Projection primary	1.8	2	10.5	10	1	1.5	3	MTP Model 2007
<b>DVD Player</b>	1.9	23	9.1	491	49	72.6	3	MTP Model 2007
<b>DVD recorder</b>	9.4	2	9.1	78	8	11.5	3	MTP Model 2007
<b>VCR</b>	4.0	19	9.1	324	32	48.0	3	MTP Model 2007
<b>DTR</b>	6.2	0.1	9.1	2	0.2	0.3	3	MTP Model 2007
<b>Mobile phone charger:</b>								
3.5W	3.5	10	10.0	123	12	18.2	4	MTP Model 2007
1W	1.0	60	10.0	220	22	32.6	4	MTP Model 2007
<b>External PSU****:</b>								
External PSU 3.5W	3.5	109	2.0	278	28	41.1	4	MTP Model 2007
External PSU 1W	1.0	29	2.0	21	2	3.1	4	MTP Model 2007
External PSU 0.75 W	0.8	2	2.0	1	0.1	0.2	4	MTP Model 2007
External PSU 0.5 W	0.5	1	2.0	0.4	0.0	0.1	4	MTP Model 2007
<b>Set-top boxes:</b>								
Cable	15.2	2	7.0	124	12	18.3	5	MTP Model 2007
Satellite	15.0	8	7.0	412	41	60.9	5	MTP Model 2007
Terrestrial	6.4	8	7.2	194	19	28.7	3	MTP Model 2007
<b>Dishwashers</b>	0.2	7	24.0	3	0.3	0.4	6	MTP Model 2007
<b>Washing machines</b>	0.5	20	24.0	43	4	6.4	6	MTP Model 2007
<b>Washer driers</b>	0.5	4	24.0	9	1	1.3	6	MTP Model 2007
<b>Electric Oven</b>	3.0	16	24.0	275	27	40.6	6	MTP Model 2007
<b>Electric hob</b>	0.6	12	24.0	15	2	2.2	6	MTP Model 2007
<b>Gas oven</b>	3.0	10	24.0	175	18	25.9	6	MTP Model 2007
<b>Gas Hob</b>	0.2	12	24.0	4	0.4	0.6	6	MTP Model 2007
<b>Microwave</b>	2.3	22	24.0	383	38	56.6	6	MTP Model 2007
<b>TOTAL</b>		<b>506</b>		<b>5,188</b>	<b>519</b>	<b>768</b>		

<b>** Power Mode (PM) Definitions</b>	
1	Off-mode
2	Sleep/off
3	Passive-standby
4	No-load
5	Active-standby
6	Standby

\*\*\* Multi-functional device

\*\*\*\* Power supply unit

**Table 4 Estimated standby consumption by appliance, 2006 (not yet in MTP models)<sup>3</sup>**

Appliance category	Standby power (W) mean	Standby power (W) max.	Standby power (W) min.	Stock (million units)	Standby time (hours)	Energy use (GWh)	Cost (£ million)	Carbon emissions (ktC)
Gas boiler	5.0			18	11.7	383	38	56.7
Clock radio	1.5	4.0	0.6	17	24.0	218	22	32.3
Garage door opener	3.5	5.4	1.4	1	23.9	15	2	2.2
<b>TOTAL</b>				<b>36</b>		<b>616</b>	<b>62</b>	<b>91</b>

**Table 5 Estimated standby consumption by appliance, 2004/06 (not yet in MTP models and large uncertainty on usage)<sup>4</sup>**

Appliance category	Standby power (Watts) mean	Standby power (watts) max	Standby power (Watts) min	Stock (million units)	Energy consumption (GWh) assuming 1 hour standby/day	Energy consumption (GWh) assuming 24-hour standby/day
Compact hi-fi	9.4	46.6	0.1	20	69	1,663
Video games	13.5	60.6	0.0	12	60	1,431
Cordless electric jug kettle	1.2	3.0	1.0	1	0.4	11
Home security system	9.6	22.0	1.0	15	51	1,228
Small kitchen appliance	1.8	2.9	0.9	40	26	631
Low voltage halogen lamp	3.0	3.0	3.0	10	11	263
Modem	5.1	18.8	1.0	10	19	456
Coffee maker	0.8	4.3	0.0	24	7	169
Home theatre system	2.1	54.4	0.0	2	2	44
Hand-held vacuum cleaner	3.7	39.6	1.0	4	5	120
Amplifier	9.8	45.5	0.0	1	4	103
Toothbrush	1.8	3.0	0.9	5	3	79
Speakers	3.3	6.8	0.0	3	4	87
Breadmaker	1.7	2.1	0.4	2	1	30
Ricemaker	1.8	2.5	1.5	2	1	24

<sup>3</sup> All assumed to be domestic

<sup>4</sup> All assumed to be domestic

Tuner	4.2	14.6	0.0	1	1	22
CD player	4.1	8.0	0.0	1	1	22
Baby monitor	1.6	3.0	0.7	1	1	14
Cassette player	2.0	6.6	0.0	1	0.4	11
Air-conditioning	1.8	2.7	0.0	2	1	32
Vinyl disc player	1.0	1.0	1.0	1	0.2	5
<b>TOTAL</b>				<b>156</b>	<b>268</b>	<b>6442</b>

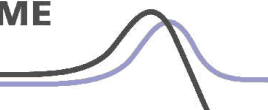
Table 5 shows the estimated standby energy consumption for a range of appliances. The figures are derived from assuming only one hour of standby time per day, using the average power demand figure. This is an indicative amount and actual standby energy consumption may be significantly higher from some products. The table also gives indicative energy consumption figures, assuming an appliance is in standby mode for 24 hours per day. MTP is currently in the process of securing additional data for the products contained in Table 5. The energy use associated with these products and will be provided in future updates of this Briefing Note.

Table 6 shows the estimated standby consumption of products within MTP models from the years 2006 to 2010. The table demonstrates that standby electricity consumption is expected to continue to grow over the next four years.

**Table 6 Estimated standby consumption by appliance, 2006/10 (included in MTP models)**

Appliance category	2006 (GWh)	2007 (GWh)	2008 (GWh)	2009 (GWh)	2010 (GWh)	PM Def **	Source
<b>Desktop PC (non-domestic (ND))</b>	369	381	381	370	348	1	MTP Model 2007
<b>Laptops (ND)</b>	41	45	50	54	58	1	MTP Model 2007
<b>PC monitors (ND):</b>							
CRT	106	70	42	22	10	1	MTP Model 2007
LCD	108	125	137	145	149	1	MTP Model 2007
Plasma	5	6	7	8	9	1	MTP Model 2007
<b>Photocopier (ND)</b>	18	16	12	10	7	2	MTP Model 2007
<b>MFD (ND):</b>							
MFD Inkjet	8	7	6	5	5	1	MTP Model 2007
MFD Laser	103	122	137	149	162	2	MTP Model 2007
<b>Printers (ND)</b>							
Inkjet	20	18	16	15	13	1	MTP Model 2007
Laser	1,208	1,312	1,375	1,392	1,365	2	MTP Model 2007
<b>Desktop PC (domestic (D))</b>	392	383	364	335	299	1	MTP Model 2007
<b>Laptops (D)</b>	32	35	38	41	45	1	MTP Model 2007
<b>PC monitors (D):</b>							
CRT	91	56	32	16	7	1	MTP Model 2007
LCD	90	97	100	99	95	1	MTP Model 2007
Plasma	3	4	4	4	5	1	MTP Model 2007
<b>MFD (D)</b>							
MFD Inkjet	106	125	139	146	142	1	MTP Model 2007
MFD Laser	6	10	16	21	18	2	MTP Model 2007



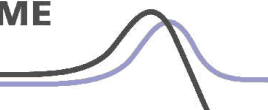


Appliance category	2006 (GWh)	2007 (GWh)	2008 (GWh)	2009 (GWh)	2010 (GWh)	PM Def **	Source
<b>Printers (D):</b>							
Ink	102	92	79	63	47	1	MTP Model 2007
Laser	161	170	171	165	154	2	MTP Model 2007
Photo	16	21	25	29	30	1	MTP Model 2007
<b>Televisions:</b>							
Primary CRT	320	280	236	192	150	3	MTP Model 2007
Secondary CRT	583	511	437	367	300	3	MTP Model 2007
Primary plasma	24	42	64	86	106	3	MTP Model 2007
Primary LCD	32	40	49	59	71	3	MTP Model 2007
Secondary LCD	46	58	72	88	103	3	MTP Model 2007
Primary projection	10	15	22	30	38	3	MTP Model 2007
<b>DVD player</b>	490	479	443	386	325	3	MTP Model 2007
<b>DVD recorder</b>	78	166	162	148	126	3	MTP Model 2007
<b>VCR</b>	324	267	215	170	129	3	MTP Model 2007
<b>DTR</b>	2	6	71	164	285	3	MTP Model 2007
<b>Mobile phone charger:</b>							
3.5 W	123	45	10	1	0.1	4	MTP Model 2007
1 W	220	243	253	255	255	4	MTP Model 2007
<b>External PSU:</b>							
External PSU 3.5 W	278	269	264	265	270	4	MTP Model 2007
External PSU 1 W	21	24	26	28	29	4	MTP Model 2007
External PSU 0.75 W	1	2	3	4	4	4	MTP Model 2007
External PSU 0.5 W	0.4	1	1	1	1	4	MTP Model 2007
<b>Set-top boxes (STBs):</b>							
Cable	124	130	174	220	281	5	MTP Model 2007
Satellite	412	419	523	543	613	5	MTP Model 2007
Terrestrial DA	194	247	302	319	307	3	MTP Model 2007
<b>Dishwashers</b>	3	4	5	7	8	6	MTP Model 2007
<b>Washing machines</b>	43	50	57	65	72	6	MTP Model 2007
<b>Washer driers</b>	9	10	11	13	14	6	MTP Model 2007
<b>Electric oven</b>	274	296	317	338	358	6	MTP Model 2007
<b>Electric hob</b>	15	18	21	24	26	6	MTP Model 2007
<b>Gas oven</b>	175	181	186	191	196	6	MTP Model 2007
<b>Gas hob</b>	4	5	6	7	8	6	MTP Model 2007
<b>Microwave</b>	383	399	415	431	447	6	MTP Model 2007
<b>TOTAL</b>	<b>7,174</b>	<b>7,302</b>	<b>7,478</b>	<b>7,489</b>	<b>7,491</b>		

## Notes on the data presented in Tables 2 to 6:

- The Tables include only electrical equipment, which means that, for example, the gas consumed by the pilot light in older gas boilers is not included.
- A conversion factor of 10p/kWh is used to calculate the costs of standby electricity consumption to the domestic and 6.42p/kWh to the non-domestic consumer in 2006.
- A conversion factor of 0.148kgC/kWh is used to calculate the carbon emissions resulting from standby electricity consumption (2006 figure from MTP Briefing Note [BNXS01](#)).





- Energy consumption figures in Table 2 and Table 3 are calculated on the basis of expected distributions of new and old products on the market. Therefore, it will be noticed that the GWh figures (and associated cost and carbon emissions) found in Table 2 and Table 3 do not always match 'mean standby x stock numbers x use times'.

The accuracy of the data is variable as there are only a few studies on the subject, all of which have one or more of the following weaknesses:

- Small sample size.
- Lack of data about the time the equipment spends in each mode.
- Single values of standby power consumption only, with no distinction between the different types of standby power consumption.
- Most studies are based on overseas appliances, which will have different appliance designs, supply frequencies and user behaviour.
- Some data only concern current products on sale, not the current stock.
- Data have been collected in different years, which matters with products that evolve quickly.
- Categorisation of products is done in different ways, making it difficult to correctly attribute data to particular sub-categories.
- No overall consistency in the methodology for measuring standby power.

## 4 Critical issues

The following issues with specific products have been identified as priority areas for action or further investigation (see Tables 7a and 7b). The most important issues are near the top of the list.

**Table 7a Product-related issues**

Product/technology	Issue
Set-top boxes	These are permanently energised to be able to receive updated software at any time, whether on or in standby mode.
Digital video recorders	The hard disk is kept permanently spinning at rated speed so that it can respond instantly to commands to record programmes.
Desktop computers and products with fax functionality	There are issues with network connectivity, which mean that a very low standby requirement such as 1 W may not be achievable by computers without risking impacting the ability of the PC to enter sleep mode. This could have a negative impact on the total consumption of the product. There are similar network connection requirements with fax functionality.
Mains side switching	Many of the losses relate to the magnetising current of the power transformers found in almost all of the listed items. This remains constant, irrespective of the load, and can be removed by switching the transformer on the primary (mains) side rather than the secondary side. However, this costs additional money, more so now that increasing numbers of products use 'wall pack' plug-in transformers that cannot be switched off by the equipment. At a small additional cost, the switches could be on the primary side of the transformers, removing this power loss completely. For lighting transformers alone, this represents a power loss (and potential energy saving) of up to 230 GWh per year in the UK.

Product/technology	Issue
Wireless connections	Bluetooth is enabling wireless connections between linked appliances at much lower cost. This means that the principal component can no longer supply power to other component. An example is Bluetooth-enabled hi-fi systems, where speakers require their own power supplies.
Central heating controls	Motors are sometimes continuously energised overnight although the actual operating cycle is no more than a few seconds. At some additional cost, this power loss could be overcome through redesign. Supply transformers are also often oversized therefore decreasing efficiency.

**Table 7b General issues**

Issue	Implication
There are different terminologies for defining standby power.	Lack of harmonisation in this area can lead to confusion over which power level is being discussed at any particular time.
Potential energy savings are too low to influence consumer purchasing decisions.	Effort must be made to encourage the production of more efficient goods, rather than promotion to the end user.
Some sectors of the consumer electronics market are so fast moving that it is difficult to collect standby power consumption data, agree targets and implement them within the products' life-cycle.	To be effective, it is necessary to identify new products at an early stage in their lifecycle.
Poor quality of product standby power consumption data.	Energy saving data may be inaccurate - although they may still be sufficiently adequate as the basis of making policy decisions.
Protocols for the measurement of standby power consumption are not always available.	Care must be taken in interpreting all data.
Little data on behaviour of appliance users.	There is a large variance in the estimate of the consumption in standby mode. Simple changes in user behaviour could lead to major reductions in standby power consumption.

## 5 Key policy instruments

**Table 8 Policy instruments**

Policy type/issue	Expected impact
Limit on standby power consumption.	There are already some voluntary agreements negotiated between the EC and the consumer electronics industry: these include codes of conduct on set-top boxes, TVs/VCRs, broadband equipment and external power supplies. There are also other initiatives, such as the Action 1-Watt initiative, which aims to reduce the standby power consumption of products to 1 W.

Policy type/issue	Expected impact
International standards.	It is more cost-effective for manufacturers to comply with unified international standards than different ones for different regions. Global manufacturing of many product categories means that market transformation activities need to be coordinated internationally.
Labelling.	Where labels are considered useful - to ensure harmonisation, internationally agreed schemes should be devised (at a minimum, towards common testing methodologies and criteria levels). Also, the criteria for existing energy efficiency labels could be expanded to include standby power consumption (such as is being considered for domestic boilers).
Guidelines on new Products.	Since product evolution is fast, especially in information and communication technology and consumer electronic goods, general guidelines on standby power consumption of new products should be devised.
Stimulate R&D on new low-standby technologies.	Encouragement and support can be offered to organisations that are undertaking R&D into addressing technical or economic barriers to the reduction of standby power consumption.
Economic incentives.	The cost of financial incentives to promote sales of products with reduced standby power consumption is likely to be too high in terms of GBP/tC, compared to other energy saving initiatives.
Support for international measurement protocols.	Measurement of standby power consumption requires specialist instrumentation and test protocols to ensure that all data are comparable. The published IEC 62301 Ed. 1.0 standard, 'Household electrical appliances – Measurement of standby power', specifies methods of measurement of electrical power consumption in standby mode. It is applicable to mains powered electrical household appliances and to the mains powered parts of appliances that use other fuels such as gas or oil.
Raising consumer awareness.	Encouraging consumers to take account of standby power consumption when selecting new appliances. Encouraging consumers to switch off appliances to reduce standby power consumption.

## 6 Further opportunities to reduce standby losses

Table 9 shows sources of standby energy loss not included in the analysis in this paper that require further investigation.

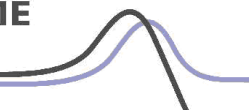
**Table 9 Further opportunities to reduce standby energy consumption**

Issue	Opportunity
Sub-components.	Many devices use similar circuits and components which represent generic energy saving opportunities. One example is the electromechanical relay, which is a sub-component widely used in domestic and commercial applications. It has an operating power of typically 0.3 W. There are two very low power alternatives available: solid-state relays and latching relays. With only minor circuit modifications, these can be used in many applications. More work needs to be done to explore this opportunity that will impact many sectors.
Refrigeration crankcase heating elements.	Heating elements up to 50 W are used to ensure that sufficient refrigerant vapour is present when the compressor motor starts. These elements are

Issue	Opportunity
	wired such that they are energised whenever the compressor is off. This leads to a heat loss estimated at 25 GWh/year and represents an additional load on the refrigeration system. Consideration should be given to these being thermostatically controlled.
Emergency lighting.	The battery packs are required to be fully recharged within 24 hours, after which time the charger still operates in the normal mode. The energy supplied to the battery during this time is lost as heat. Consideration should be given to the use of more intelligent charging circuits.
Mains/battery trade-off.	Where there is an alternative, it is questionable whether to use battery or mains supplies. For low current drain applications, batteries might be environmentally 'superior', but no work has been found on this to date.

## 7 Useful references

- *Things That Go Blip in the Night. Standby Power and How to Limit it.* International Energy Agency, 2001.  
<<http://www.iea.org/textbase/nppdf/free/2000/blipinthenight01.pdf>>
- *Whole-House Measurement of Standby Power Consumption.* J.P.Ross & Alan Meier. Proc. 2nd International Conference on Energy Efficiency in Household Appliances, September 2000. Also published as LBNL-45967.
- *Energy Use of Home Audio Products in the US.* Karen Rosen & Alan Meier. LBNL-43468. December 1999.  
<<http://www.eere.energy.gov/buildings/info/documents/pdfs/lbnl-43468.pdf>>
- *Global Implications of Standby Power Use.* B. Lebot (IEA), Alan Meier (LBNL), Alain Anglade (ADEME), July 2000. Proc. ACEEE Summer Study on Energy Efficiency in Buildings (2000). Also published as LBNL-46019.  
<<http://eetd.lbl.gov/EA/Reports/46019.pdf>>
- *Energy Use of Televisions and Videocassette Recorders in the US.* Karen Rosen & Alan Meier. LBNL-42393. March 1999.  
<<http://eetd.lbl.gov/EA/Reports/42393/42393.pdf>>
- *Electricity Used by Office Equipment and Network Equipment in the US: Detailed Report and Appendices.* Kawamoto et al. LBNL-45917. February 2001.  
<<http://enduse.lbl.gov/Info/LBNL-45917b.pdf>>
- *Qualified Imaging Equipment Revised Terminology and Definitions.* Energy Star ([www.energystar.gov](http://www.energystar.gov)), 12<sup>th</sup> March 2005.
- Energy Rating, Standby Power - Product Profiles  
<<http://www.energyrating.gov.au/standby-profiles.html>>
- Federal Energy Management Program (FEMP), Standby Power Database,  
<[http://oahu.lbl.gov/cgi-bin/search\\_data.pl](http://oahu.lbl.gov/cgi-bin/search_data.pl)>
- Australian Minister for the Environment and Heritage Senator the Hon. Ian Campbell & Minister for Industry, Tourism and Resources, The Hon Ian Macfarlane, MP, Joint Media Release, 'Standby' for greenhouse action, 8 November 2006 <<http://www.deh.gov.au/minister/env/2006/mr08nov06.html>>



- Action on 1 Watt: A Meeting on Standby Power (Copenhagen),  
<<http://action1watt.dk>>
- European Commission, Code of Conduct on Energy Consumption of Broadband Equipment, 19 July 2006, <<http://re.jrc.ec.europa.eu/energyefficiency/index.htm>>
- European Commission, Code of Conduct on Energy Efficiency of Digital TV Service Systems, 10 March 2006, <[http://www.apec-es.org/settopbox/www/dynamic\\_folder/lib\\_files/131\\_214.pdf](http://www.apec-es.org/settopbox/www/dynamic_folder/lib_files/131_214.pdf)>
- European Commission, Code of Conduct on Energy Efficiency of External Power Supplies, 24 November 2004,  
<http://re.jrc.ec.europa.eu/energyefficiency/index.htm>.
- Energy Saving Trust, Energy saving recommended label,  
<[http://www.energysavingtrust.org.uk/energy\\_saving\\_products/about\\_energy\\_saving\\_recommended\\_products](http://www.energysavingtrust.org.uk/energy_saving_products/about_energy_saving_recommended_products)>
- EU Energy Star <<http://www.eu-energystar.org/en/index.html>>
- European Commission, European Commission, Environmentally-Friendly Design Of Energy-Using Products: Framework Directive For Setting Eco-Design Requirements For Energy-Using Products (Eup)  
<[http://ec.europa.eu/enterprise/eco\\_design/index\\_en.htm](http://ec.europa.eu/enterprise/eco_design/index_en.htm)>
- International Task Force for Sustainable Products,  
<<http://www.mtprog.com/Marrakech.aspx>>

## Related MTP information

- Briefing Note BNXS01: Carbon Emission Factors for UK Energy Use  
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=150>
- Briefing Note BNXS03: Framework Directive for the Ecodesign of Energy Using Products (EuP Directive)  
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=389> Briefing Note
- BNXS15: Standby power consumption - domestic appliances.  
<http://www.mtprog.com/ApprovedBriefingNotes/pdf.aspx?intBriefingNoteID=199>

## Changes from version 2.4

- Minor edit to note under table 2 to clarify how figures for standby consumption should be interpreted.

## Consultation and further information

Stakeholders are encouraged to review this document and provide suggestions that may improve the quality of information provided, email **info@mtprog.com** quoting the document reference, or call the MTP enquiry line on +44 (0) 845 600 8951.

For further information on related issues visit **www.mtprog.com**

