

# **BN-NDICT MON04: Non-Domestic Monitors Government Standards Evidence Base 2009: Best Available Technology Scenario**

**Version 1.0**

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

## **1 Introduction**

- The Best Available Technology (BAT) Scenario is a hypothetical projection of what would happen if the best available technologies on the (current and future) market were bought or installed from now on.
- The best available technologies are defined as the most efficient, or lowest energy consuming technologies available on the market, or those which are close to market (where the development stage is completed, but it is not necessary available as a designed product).
- This Government Standard Briefing Note (GSBN) covers non-domestic monitors. The following definition of monitors is adapted from the EuP Preparatory study on PCs and monitors<sup>1</sup>:
- A commercially-available, electronic product with a display screen and its associated electronics encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA, DVI, and/or IEEE 1394. The monitor usually relies upon a liquid crystal display (LCD) or less frequently cathode-ray tube (CRT) or other display devices such as plasma. This definition is intended primarily to cover standard monitors designed for use with personal computers.

<sup>1</sup> European Commission DG TREN Preparatory studies for Eco-design Requirements of EuPs (Contract TREN/D1/40-2005/LOT3/S07.56313) Lot 3 Personal Computers (desktops and laptops) and Computer Monitors Final Report (Task 1-8)

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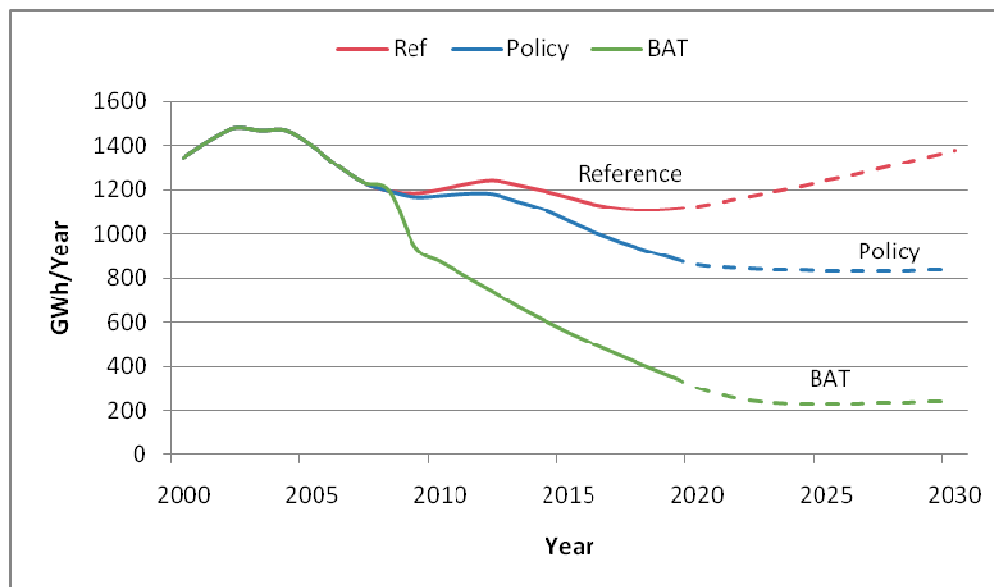
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- The computer monitors included in this definition must have a viewable diagonal screen size greater than 9 inches and must be capable of being powered by a separate AC wall outlet or a battery unit that is sold with an AC adapter.
- Computer monitors with a tuner/receiver may be covered by this study as long as they are marketed and sold to consumers as computer monitors (i.e. focusing on computer monitor as the primary function) or as dual-function computer monitors and televisions. However, products with a tuner/receiver and computer capability that are marketed and sold as televisions are not included in the scope of this definition.

## 2 Scenario outputs

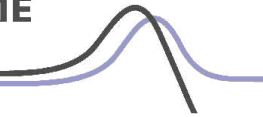


**Figure 1 Total Non-Domestic Monitor Energy Consumption**

- Total non-domestic monitor energy consumption is expected to fall under the BAT scenario. This reduction in energy is almost entirely due to the reduced power consumption of monitors.
- Total CRT monitor energy consumption is expected to fall under the BAT scenario as a result of falling stock. All three scenarios follow the same line as CRT products are becoming obsolete.
- Total LCD monitor energy consumption is expected to fall under the BAT scenario.
- Total plasma monitor energy consumption is expected to fall under the BAT scenario as a result of falling stock.

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**Table 1 – Non-Domestic Monitor energy consumption<sup>2</sup> and savings and CO<sub>2</sub> emissions<sup>3</sup> and savings**

Energy Consumption (GWh)	2009	2020	2030
<b>Plas</b>	10	0	0
<b>CRT</b>	70	0	0
<b>LCD</b>	870	300	240
<b>TOTAL</b>	940	300	240
<b>Energy Savings (GWh)</b>			
Plasma	0	0	0
CRT	0	0	0
LCD	0	820	1140
<b>TOTAL</b>	0	820	1140
<b>CO<sub>2</sub> Emissions (MtCO<sub>2</sub>)</b>			
Plasma	0.00	0.00	0.00
CRT	0.02	0.00	0.00
LCD	0.30	0.11	0.09
<b>TOTAL</b>	0.33	0.11	0.09
<b>CO<sub>2</sub> Emissions Savings (MtCO<sub>2</sub>)</b>			
Plasma	0.00	0.00	0.00
CRT	0.00	0.00	0.00
LCD	0.08	0.29	0.41
<b>TOTAL</b>	0.08	0.29	0.41

<sup>2</sup> Energy consumption figures for the non-domestic sector in the 2009/2010 Consultation Document 'Saving energy through better products and appliances' were scaled down to match DECC projections for overall energy demand ([www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx](http://www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx)).

MTP data represents the best currently available information based on a bottom-up modelling approach. MTP's data is the basis for detailed energy calculations in the 2009/2010 Consultation Document. However, DECC projections indicate that overall energy demand in the non-domestic sector is lower than projected by MTP's detailed models. MTP has assumed that the differences between the DECC overall projections and its detailed bottom-up projections are due to incomplete data on the following inputs for some of its non-domestic products:

- existing product stock;
- existing product efficiency;
- product usage.

The energy consumption figures in these GSBNs have **not** been scaled down, in order to enable constructive stakeholder comment on the MTP input data, and therefore differ from the ones presented in the 2009/2010 Consultation Document.

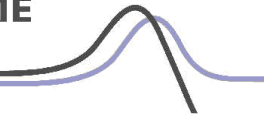
<sup>3</sup> Refer to BNXS01 Carbon Dioxide Emission Factors for UK Energy Use for details on factors used.

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## 3 Efficiency

### 3.1 Summary

- This section provides details of the efficiency inputs assumed (for new sales i.e. not stock average)
- The Reference scenario GSBN provides a full description of the metrics used.

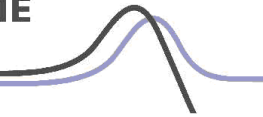
**Table 2 - Monitor product power consumption**

Year	On-Active (W)		
	CRT	LCD	Plasma
2010	63.7	22.0	228.0
2020	19.0	6.5	145.9
2030	19.0	6.5	145.9

### 3.2 Data sources – efficiency

**Table 3 Monitor Efficiency data source**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2009, 2013, 2015, 2030	Expert Assumptions	2009	MTP Technical Expert	Required expert assumptions to collate power (CRT Monitors)	Medium
2009, 2015, 2020, 2030	Expert Assumptions	2009	MTP Technical Expert	Required expert assumptions to collate power (LCD monitors)	Medium
2009	MTP Television policy briefing note BNCE TV03 (plasma TV details)	2009	Various	Best Data Available (Plasma monitors)	High
2009	Expert Assumption	2009	MTP Technical Expert	Required expert assumptions to reduce TV tuner add on (Plasma monitors)	Medium



### 3.3 Methodology & key assumptions – efficiency

- This section describes what has been done with the data listed in Table 3 along with a rationale for any key assumptions (in particular any expert judgements listed in Table 3) and detail of any background calculations behind the data points
- Methodology & key assumptions for historic data are included in BN-DICT02 – Reference Scenario

#### 3.3.1 Future analysis

**Table 4 Extrapolation & background calculations – Monitor efficiency**

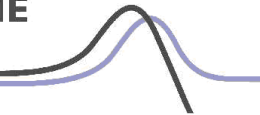
Year	Methodology & assumptions
2009	CRT and LCD monitors – best practice power figures for all are based on a top performing percentage of products found in all referenced datasets. The level at which this percentage figure is set varies depending on the range of products' performances found in each dataset. It is typically set at between 10-20%. Class leading products are defined as the single most efficient product over all datasets (per product group).
2009	CRT and LCD monitor (all power modes) - uses best practice figure
2010-2012	CRT monitor (on-active mode) - based on a straight line interpolation between the 2009 and 2013 values
2013	CRT monitor (on-active mode) - moves from best practice level to class leader level by 2013
2014-2030	CRT monitor (on-active mode) - uses class leader value from 2011.
2010-2019	LCD monitor (on-active mode) - based on a straight line interpolation between the 2009 and 2020 values
2020	LCD monitor (on-active mode) - moves from best practice level to class leader level by 2020
2021 - 2030	LCD monitor (on-active mode) - uses class leader value from 2020.
2010-2029	CRT and LCD monitors (sleep mode) - based on a straight line interpolation between the 2009 and 2030 values
2030	CRT and LCD monitors (sleep mode) - moves from best practice level to class leader level by 2030
2010-2014	CRT and LCD monitor (off mode) - based on a straight line interpolation between the 2009 and 2015 values
2015	CRT and LCD monitor (off mode) - moves from best practice level to class leader level by 2015
2016-2030	CRT and LCD monitor (off mode) - uses class leader value from 2015.
2009-2030	Plasma monitor – BAT scenario is taken from the MTP plasma television model with 50% of the TV tuner power removed in each year.

### 3.4 Data issues – efficiency

- This section flags any areas of uncertainty, both in general and for specific data points, along with a description of how this has been dealt with in the model

**Table 5 Data issues – efficiency**

Issue/risk	Approach taken/rationale
Product development in the ICT industry is rapid. The MTP future BAT scenario	MTP review the BAT scenario figures on an annual basis. This annual review will ensure that MTP BAT



Issue/risk	Approach taken/rationale
assumptions could change with a sudden uptake of an extremely efficient or inefficient product.	line figures reflect current best practice and class leading products.
Much of the power data sourced for LCD monitors comes from products compliant to ENERGY STAR. There is a risk that the best practice figures could be too low in relation to the "true" market best practice level which results in future values also being too ambitious.	MTP has commissioned its own testing and power figures are included in the datasets. Inclusion of these figures helps to develop realistic best practice figures, which can be reviewed on an annual basis.
On-active power of monitors is heavily dependent on the size of monitor screen. Should average screen size increase more than has been expected then the MTP figures could become too stringent.	MTP will continually review changes in screen sizes of monitors and if necessary adapt figures.

### 3.5 Confidence level – efficiency

- This section provides an indication of overall confidence in the data set (i.e. data points, calculations, interpolation and projections)
- MTP utilises their current database of product information to estimate what could happen in future years to products' energy efficiency. The fast moving nature of the ICT industry could result in these estimates needing to change considerably in future years.

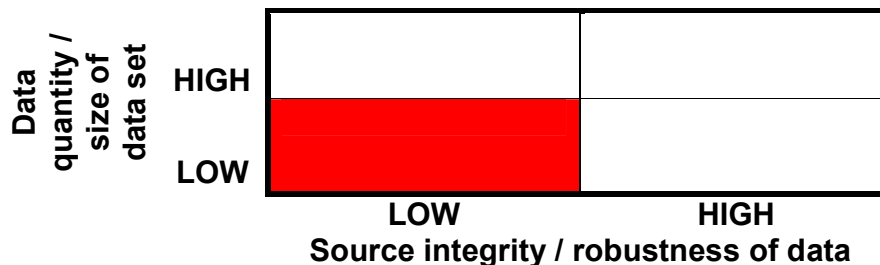
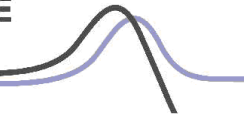


Figure 2 Confidence indicator for efficiency data



## 4 Usage

### 4.1 Summary

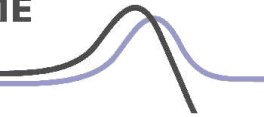
- Two sets of use profiles are developed for CRT and LCD monitors. The first use profile is based on a situation where no power management is enabled and the second where power management is enabled (see Key Inputs for profiles). An “enabling rate” is used as a weighting factor between these two use profiles to arrive at overall use profile for each product. No enabling rates are developed for plasma monitors as it is assumed that these types of monitors do not have a sleep mode.
- The table below shows average usage profiles, derived from the BAT scenario enabling rate and the power managed and non power managed profiles discussed in the Key Inputs briefing note.

**Table 6 Average Usage – CRT and LCD monitors**

CRT and LCD monitors					
BAT (Use Hours/Year)					Power Management Enabling Rates
Year	On-Active	Sleep	Off	Off-Unplugged	%
2009	1,356	684	6,431	289	100
2010	1,356	684	6,431	289	100
2020	1,356	684	6,431	289	100
2030	1,356	684	6,431	289	100

**Table 7 Average Usage – plasma monitors**

Plasma monitors					
BAT (Use Hours/Year)					Power Management Enabling Rates
Year	On-Active	Sleep	Off	Off-Unplugged	%
2009	1,920	-	6,840	-	-
2010	1,920	-	6,840	-	-
2020	1,920	-	6,840	-	-
2030	1,920	-	6,840	-	-

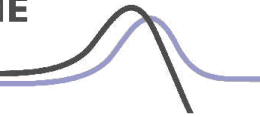


- Average non-domestic CRT and LCD monitor on-active use time is expected to remain constant in the BAT scenario due to limitations on office hours dictating maximum use times and the fact that power management enabling rates are assumed to remain constant at 100%.
- A 100% power management enabling rate is assumed in the BAT scenario as industry identifies ways of ensuring that any power management functionality does not interfere with the normal operation of products. With this potential barrier removed it is assumed that all products will be power managed as compulsory.
- Average on-active time for plasma monitors is assumed to remain constant into the future as it is assumed that no power management functionality is implemented for these products.

## 4.2 Data sources – usage

**Table 8 – Usage data sources (power management enabling)**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2009	Expert Assumptions	2009	MTP Technical Expert	Required expert assumptions to develop power management enabling rates.	Medium



## 4.3 Methodology & key assumptions – usage

- This section describes what has been done with the data listed in Table 8 along with a rationale for any key assumptions (in particular any expert judgements listed in Table 8 ) and detail of any background calculations behind the data points.

### 4.3.1 Future analysis

**Table 9 Extrapolation & background calculations – usage data**

Year	Methodology & assumptions
2009	BAT scenario: CRT and LCD monitor power management enabling rates assumed to be 100%. The 100% rate is assumed possible as most products already have this functionality in place.
2010-2030	BAT scenario: CRT and LCD monitor power management enabling rates assumed to be 100%. The 100% rate is assumed to be possible under the BAT line by 2020 as industry identifies methods of ensuring that power management functionality does not interfere with the normal operation of products. Without power management impacting use of the product it is assumed there is no technical or user benefit to switching off power management functionality, and products have power management enabled as compulsory.
2009 - 2030	CRT, LCD and plasma monitor use profiles (all power modes) based on same approach as in 2008. Details in the Key Inputs GSBN.

## 4.4 Data issues – usage

- This section flags any areas of uncertainty, both in general and for specific data points, along with a description of how this has been dealt with in the model

**Table 10 Data issues – usage**

Issue/risk	Approach taken/rationale
Power management enabling rates can have a large impact of overall use profiles. Over or under-estimation of power management enabling rates could have a consequentially large impact on overall use hours.	MTP has included a number of expert assumptions which estimate power management enabling rates. MTP will continue to evaluate new use profile data.

## 4.5 Confidence level – usage

- This section provides an indication of overall confidence in the data set (i.e. data points, interpolation and projections).
- Confidence levels about actual base use profiles are included in the key inputs GSBN's. Confidence levels in the power management enabling rates are relatively low, especially for future years, due to the large potential for users to disable functionality.

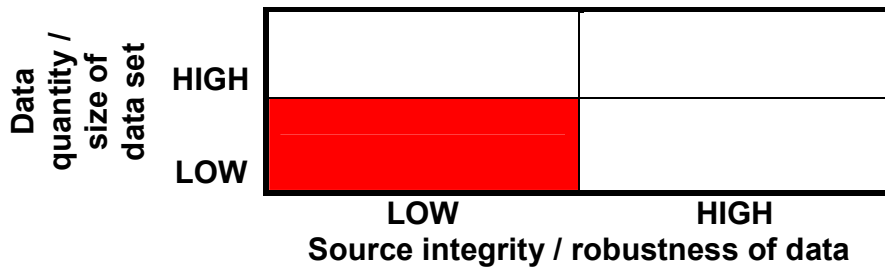


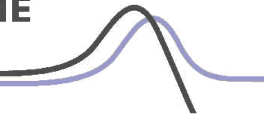
Figure 3 Confidence indicator for usage data

## 5 Other issues

- None addressed.

### Related MTP information

- BN-NDICT MON01: Government Standards Evidence Base 2009 – Key Inputs, Non Domestic Monitors
- BN-NDICT MON02: Government Standards Evidence Base 2009 – Reference Scenario, Non Domestic Monitors
- BN-NDICT MON03: Government Standards Evidence Base 2009 – Policy Scenario, Non Domestic Monitors
- BN-NDICT MON04: Government Standards Evidence Base 2009 – Best Available Technology (BAT) Scenario, Non Domestic Monitors
- BN-DICT MON01: Government Standards Evidence Base 2009 – Key Inputs, Domestic Monitors
- BN-DICT MON02: Government Standards Evidence Base 2009 – Reference Scenario, Domestic Monitors
- BN-DICT MON03: Government Standards Evidence Base 2009 – Policy Scenario, Domestic Monitors
- BN-DICT MON04: Government Standards Evidence Base 2009 – Best Available Technology (BAT) Scenario, Domestic Monitors
- BN-NDICT KO01: Government Standards Evidence Base 2009 – Key Outputs, Non Domestic ICT
- BN-DICT KO01: Government Standards Evidence Base 2009 – Key Outputs, Domestic ICT



## Changes from previous version

- No changes. This is the first published version.

## 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](mailto: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](http://www.mtprog.com)