

# **BN-DICT MON02: Domestic Monitors Government Standards Evidence Base 2009: Reference 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 reference scenario is a projection of what is likely to happen to energy consumption of each product if no new policies are implemented. All agreed and formally signed-off policies are included in the reference scenario.

[Note that in this round of Government Standards, any EuP measures which were passed at Regulatory Committee in March 2009 are included in the Reference scenario, although at the time of writing not all of these measures had been published in the Official Journal of the European Union].

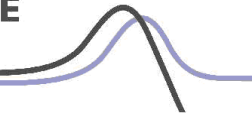
For cross-cutting policies such as CERT and Building Regulations, which are agreed but where the likely impact for specific products is unknown, assumptions are made about the impact per product, and detailed in the following sections. Where possible, separate projections of the reference line are made with and without such policies.

- This Government Standard Briefing Note (GSBN) covers 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

<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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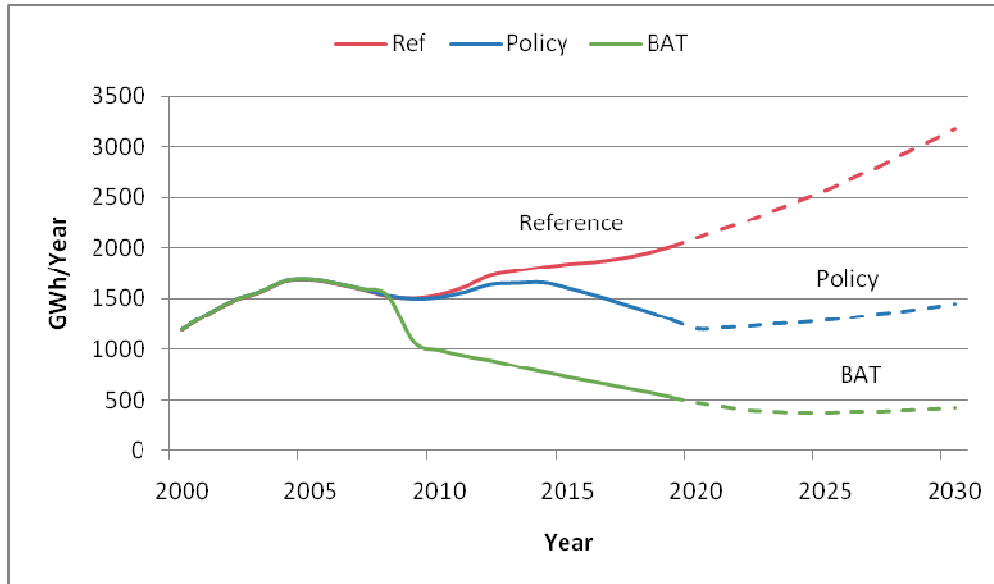
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information from a computer via one or more inputs, such as VGA, DVI, and/or IEEE 1394.

- 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.
- 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 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 Domestic Monitor Energy Consumption**

- Total domestic monitor energy consumption is expected to increase in the reference scenario into the future primarily as a result of an increase in stock.
- Total energy consumption from CRT monitors is expected to fall in the reference scenario as stock levels diminish. All three scenarios have the same line as CRT products are becoming obsolete.
- Total energy consumption from domestic monitors is expected to increase into the future in the reference scenario as a result of increasing stock offsetting any efficiency improvements.
- Total energy consumption from plasma monitors is expected to fall in the reference scenario as stock levels diminish.

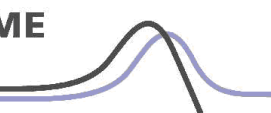
**Table 1 - Summary scenario outputs<sup>2</sup>**

Energy Consumption (GWh)	2009	2020	2030
Plasma	10	0	0
CRT	180	0	0
LCD	1320	2100	3180

<sup>2</sup> Refer to BNXS01 Carbon Dioxide Emission Factors for UK Energy Use for details on factors used.

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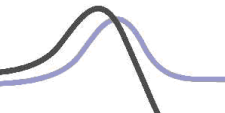


<b>TOTAL</b>	1510	2110	3180
<b>CO<sub>2</sub> Emissions (MtCO<sub>2</sub>)</b>			
Plasma	0.00	0.00	0.00
CRT	0.07	0.00	0.00
LCD	0.49	0.79	1.20
<b>TOTAL</b>	<b>0.56</b>	<b>0.79</b>	<b>1.20</b>

## 3 Current policy & measures

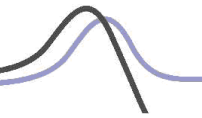
- ENERGY STAR is the dominant energy efficiency policy covering ICT products. The ENERGY STAR label is led by the US Environmental Protection Agency (EPA) but the European Commission has an agreement with the US Government to coordinate the energy labelling of office equipment through an EU ENERGY STAR programme. ENERGY STAR aims to qualify around the top performing 25 per cent of products at the time of specification (usually around nine months to one year prior to a specification coming into effect). Due to the complexity of the programme, it is not possible to revise the criteria as frequently as ICT product development moves. This means that compliance rates to ENERGY STAR can be high at the end of a specification cycle. The ENERGY STAR Version 4.1 monitor tier II specification (covering CRT, LCD and Plasma monitors as defined in this briefing note) was implemented on the 1<sup>st</sup> January 2006<sup>3</sup>. Version 5.0 of the ENERGY STAR Display specification was finalised in March 2009 with tier I requirements to be implemented in October 2009 and tier II requirements implemented in October 2011.
- The European Commission has published a set of mandatory implementing measures covering the standby and off-modes of electrical and electronic household and office equipment (although office equipment needs to be intended for use in the domestic premises). The Energy Using Products (EuP) Standby Implementing Measures are due to come into force January 2010 with a second tier of requirements due to be enforced January 2013. It is assumed that the Standby Implementing measures will apply to the off-mode of monitors.
- The Energy Saving Trust endorse a range of energy efficient ICT products under their Energy Saving Recommended (ESR) label. ESR is designed to cover the top 20% of energy efficient products on the market. Current uptake of the label by ICT manufacturers remains low.

<sup>3</sup> ENERGY STAR® Program Requirements for Computer Monitors Eligibility Criteria (Version 4.1) available from <http://www.eu-energystar.org/en/254.shtml#20041222>



**Table 2 Current policies & measures, Reference Scenario**

Policy name	Period in force	Description	Impact																												
ENERGY STAR	2006 – 2009 (Version 4.1 Tier II) and 2009-2013 (Version 5.0 Tier I)	<p>Applies energy efficiency criteria for all monitor types covered in this GSBN:</p> <p style="text-align: center;"><b>ENERGY STAR Version 4.1 Tier II</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>On-Mode</th> <th>Sleep (W)</th> <th>Off (W)</th> </tr> </thead> <tbody> <tr> <td>X &lt; 1 megapixel, then Y = 23; if X &gt; 1 megapixel, then Y = 28X</td> <td>2.00</td> <td>1.00</td> </tr> </tbody> </table> <p style="text-align: center;">(X = number of megapixels and Y = Wattage limit)</p> <p style="text-align: center;"><b>ENERGY STAR Version 5.0 Tier I</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Display Category</th> <th>Maximum On Mode Power Consumption (W)</th> <th>Sleep (W)</th> <th>Off (W)</th> </tr> </thead> <tbody> <tr> <td>Diagonal Screen Size &lt; 30 inches Screen Resolution ≤ 1.1 MP</td> <td>PO = 6*(MP) + 0.05*(A) + 3</td> <td rowspan="2">2.00</td> <td rowspan="2">1.00</td> </tr> <tr> <td>Diagonal Screen Size &lt; 30 inches Screen Resolution ≥ 1.1 MP</td> <td>PO = 9*(MP) + 0.05*(A) + 3</td> </tr> </tbody> </table> <p style="text-align: center;">MP = Display Resolution (megapixels) A = Viewable Screen Area (square inches)</p>	On-Mode	Sleep (W)	Off (W)	X < 1 megapixel, then Y = 23; if X > 1 megapixel, then Y = 28X	2.00	1.00	Display Category	Maximum On Mode Power Consumption (W)	Sleep (W)	Off (W)	Diagonal Screen Size < 30 inches Screen Resolution ≤ 1.1 MP	PO = 6*(MP) + 0.05*(A) + 3	2.00	1.00	Diagonal Screen Size < 30 inches Screen Resolution ≥ 1.1 MP	PO = 9*(MP) + 0.05*(A) + 3	<p>The ENERGY STAR specifications are set to represent approximately the top 25% of energy performing products on the market. MTP assumed ENERGY STAR specifications for 2009 (averaged across all monitor sizes):</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>On-Mode (W)</th> <th>Sleep (W)</th> <th>Off (W)</th> </tr> </thead> <tbody> <tr> <td>CRT</td> <td>19.98</td> <td>2.00</td> <td>1.00</td> </tr> <tr> <td>LCD</td> <td>26.35</td> <td>2.00</td> <td>1.00</td> </tr> </tbody> </table> <p>The CRT on-mode (W) value is lower than the LCD on-mode (W) value due to the small screen size of CRT monitors on the market.</p> <p>LCD monitor compliance is assumed to increase over time to 71% by 2013. It is further assumed that less than 1% of CRT monitors will be able to meet the ENERGY STAR specifications.</p>		On-Mode (W)	Sleep (W)	Off (W)	CRT	19.98	2.00	1.00	LCD	26.35	2.00	1.00
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EuP Standby Implementing Measures	2010 and 2014	Applies maximum power consumption figures for off-mode of all monitors.	EuP levels of 1W off-mode by 2010 moving to 0.5W off-mode by 2013. Will remove worst performing products in off-mode from the EU market.																												
Energy Saving Recommended (ESR)	2009-2010	Voluntary label. Applies maximum power levels for the on-active (formula), sleep and off modes of computer displays.	ESR attempts to represent the top 20% of the market in terms of energy efficiency. Current market uptake very low.																												



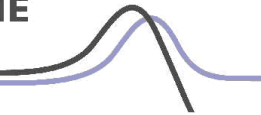
**Table 3a Test Standards**

Test Standard name	Date in force	Description	Comments
ENERGY STAR® Program Requirements for Monitors Version 4.1	Jan 2005	Provides methodology for identifying the on-mode, sleep mode and off-mode of monitors	Soon to be revised.
ENERGY STAR® Program Requirements for Displays Version 5.0	2009	Provides methodology for identifying the on-mode, sleep mode and off-mode of monitors	Includes reference to other test methodologies
IEC 62301	2005	Provides a measurement method for standby/off-mode power (W)	In the process of being revised.

### 3.1 Policy timeline

- The following policy timeline identifies when policies come into effect, including future revisions that are formally signed off:

Policy name	Current specification in force	2009	2010	2011	2012	2013	2014	2015	2016-2020
ENERGY STAR	Jan 2006	V5.0 Tier I in force October		V5.0 Tier II in force October					
ESR	Not included due to no take up by suppliers		ESR 2010 defined in 2007						
EuP Standby Implementing Measures	N/A		Jan (1W standby / off)				Jan (0.5W standby / off)		



## 4 Efficiency

### 4.1 Summary

- This section provides details of the efficiency inputs assumed (for new sales i.e. not stock average)
- The main efficiency metric for monitors is on-active power (W). ENERGY STAR on-active specifications include a maximum power consumption value in watts expressed as formulae. The ENERGY STAR V4.1 on-active specifications are based on monitor resolution whereas the ENERGY STAR V5.0 on-active specifications are based on both resolution and screen size.
- The EuP Standby Implementing Measures are also expressed in units of power (W).

**Table 3 - Domestic monitor products power consumption**

	<b>CRT</b>	<b>LCD</b>	<b>Plasma</b>
<b>Year</b>	<b>On-Active (W)</b>	<b>On-Active (W)</b>	<b>On-Active (W)</b>
2009	89.2	32.0	302.4
2010	89.0	31.6	306.8
2020	20.0	27.2	202.7
2030	20.0	29.4	202.7

- Table 3 shows the expected on-active power consumption for CRT, LCD and plasma monitors.
- CRT on-active power is assumed to fall until 2016 when it reaches a minimum of 20W. It is assumed that any CRT monitors left on the market will be small screened devices used for niche applications.
- LCD on-active power is assumed to fall until 2019. These reductions are due to assumed increased efficiency resulting from product changes such as the inclusion of LED backlights. LCD on-active power is assumed to increase after 2019 due primarily to a continued increase in screen size.
- Plasma monitor figures are taken from the consumer electronics reference scenario for plasma televisions, but with a small amount of power removed to account for the assumed lack of TV tuner in plasma display monitors.

## 4.2 Data sources – efficiency

**Table 4 CRT Monitor Efficiency data sources**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2007, 2008	Energy Star FTP <sup>4</sup> download 13.10.06	2006	ENERGY STAR	Best data	High
2007, 2008	Energy Star FTP download 20.07.06	2006	ENERGY STAR	Best data	High
2007, 2008	EU Energy Star Database 07-12-06	2006	ENERGY STAR	Best data	High
2007, 2008	EU ENERGY STAR DATABASE 14/01/08	2008	ENERGY STAR	Best data	High
2007, 2008	US ESTAR Monitor Draft Dataset V5.0 Dec 2008	2008	ENERGY STAR	Best data	High
1960 - 2030	Expert Assumptions	2009	MTP (Jonathan Wood)	Required expert assumptions to collate power	Medium

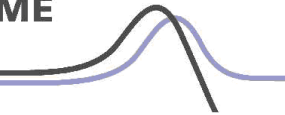
**Table 5 LCD Monitor Efficiency data sources**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2007, 2008	Energy Star FTP download 13.10.06	2006	ENERGY STAR	Best data available	High
2007, 2008	Energy Star FTP Download 20-07-06	2006	ENERGY STAR	Best data available	High
2007, 2008	EU Energy Star Website Download 07-12-06	2006	ENERGY STAR	Best data available	High
2007, 2008	Energy Star Current 27-10-06	2006	ENERGY STAR	Best data available	High
2007, 2008	Energy Star FTP Download 13-10-06	2006	ENERGY STAR	Best data available	High
2007, 2008	MTP TESTS AUGUST 2007	2007	MTP	Best data available	High
2007, 2008	EU ENERGY STAR DATABASE 14/01/08	2008	ENERGY STAR	Best data available	High
2007, 2008	Danish Energy Saving Trust Download 30-01-08	2008	Danish Energy Saving Trust	Best data available	High
2007, 2008	US Energy Star Download 01-07-07 to 01-02-08	2008	ENERGY STAR	Best data available	High
2007, 2008	US ENERGY STAR FTP Oct 2008 ftp://ftp.powweb.com/	2008	ENERGY STAR	Best data available	High

<sup>4</sup> FTP = file transfer protocol. Data is downloaded using FTP directly from the ENERGY STAR database.

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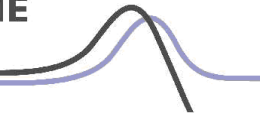
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Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2007, 2008	EU ENERGY STAR DOWNLOAD OCT-2008	2008	ENERGY STAR	Best data available	High
2007, 2008	US ESTAR Monitor Draft Dataset V5.0 Dec 2008	2008	ENERGY STAR	Best data available	High
2007, 2008	MTP Test September 2008	2008	MTP	Best data available	High
2007, 2008	Danish EST 02-2009 - <a href="http://application.sparel.dk/ItWebUI/index.aspx">http://application.sparel.dk/ItWebUI/index.aspx</a>	2009	Danish Energy Saving Trust	Best data available	High
2000, 2007, 2008	Expert Assumptions	2009	MTP Technical Expert	Required expert assumptions to collate power	Medium

**Table 6 - Plasma Monitor Efficiency data sources**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2008	MTP Television GSBN	2009	Various	Best data available	High
2008	Expert Assumption	2009	MTP Technical Expert	Required expert assumptions to reduce TV tuner add on	Medium



## 4.3 Methodology & key assumptions – efficiency

- This section describes what has been done with the data listed in Table 4, Table 5 and Table 6 along with a rationale for any key assumptions (in particular any expert judgements listed in these tables) and detail of any background calculations behind the data points

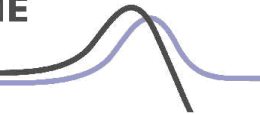
### 4.3.1 Historic data

**Table 7 Interpolation & background calculations – efficiency**

Year	Methodology & assumptions
	<b>Active mode (CRT):</b>
1960-1992	CRT on-active mode is kept the same as the 1993 figure in the absence of further information. MTP models start in 1960 and this year is used as the base year. MTP include some assumptions back to 1960 for completeness and flexibility in the models. Based on an expert assumption in light of no further information being available.
1993	CRT on-active mode of 60W is assumed. This value is an expert assumption as no other data was available for this time period.
1994-2006	CRT on-active mode power is based on a straight line interpolation between the 1993 and 2007 figures.
	<b>Active mode (LCD):</b>
1960-1999	LCD on-active mode is kept the same as the 2000 figure in the absence of further information.
2000	LCD on-active mode of 38W is assumed. This value is an expert assumption as no other data was available for this time period.
2001-2006	LCD on-active mode power is based on a straight line interpolation between the 2000 and 2007 figures.
	<b>Sleep mode (CRT):</b>
1960-1999	CRT sleep mode is kept the same as the 2000 figure in the absence of further information.
2000	CRT sleep mode of 3.5W is assumed. This value is an expert assumption as no other data was available for this time period.
2001-2006	CRT sleep mode power is based on a straight line interpolation between the 2000 and 2007 figures.
	<b>Sleep mode (LCD):</b>
1960-1999	LCD sleep mode is kept the same as the 2000 figure in the absence of further information.
2000	LCD sleep mode of 2.0W is assumed. This value is an expert assumption as no other data was available for this time period.
2001-2006	LCD sleep mode power is based on a straight line interpolation between the 2000 and 2007 figures.
	<b>Off mode (CRT):</b>
1960-1999	CRT off mode is kept the same as the 2000 figure in the absence of further information.
2000	CRT off mode of 2.5W is assumed. This value is an expert assumption as no other data was available for this time period.
2001-2006	CRT off mode power is based on a straight line interpolation between the 2000 and 2007 figures.
	<b>Off mode (LCD):</b>
1960-2003	LCD off mode is kept the same as the 2004 figure in the absence of further information.

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Year	Methodology & assumptions
2004	LCD off mode of 1.3W is assumed. This value is an expert assumption as no other data was available for this time period.
2004-2006	LCD off mode power is based on a straight line interpolation between the 2004 and 2007 figures.
	<b>All power modes:</b>
1960-2007	Plasma monitors: same approach as in 2008.
2007, 2008	CRT and LCD monitors (all power modes): Weighted power figures across all data sources (prior to 2008 for the 2007 average figure) listed in Table 4 and Table 5 above. Weighting based on confidence in data source, data year, data source, size of dataset, country of origin and relevance to domestic or non-domestic sector.
2008	Plasma monitor: power figures sourced from MTP plasma television model with 50% reduction on base load on-active mode power used for TV tuners. This reduction is based on an expert assumption in light of no further information being available.

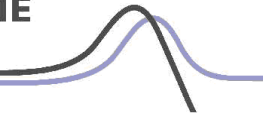
## 4.3.2 Future analysis

**Table 8 Extrapolation & background calculations – efficiency**

Year	Methodology & assumptions
2009-2011	CRT and LCD monitor (all power modes): based on a straight line interpolation between adjacent years figures.
	<b>Active mode (CRT / LCD):</b>
2012	CRT and LCD monitor: values for on-active based on a weighted percentage of products which meet the ENERGY STAR specification with the remaining percentage of products meeting the average 2009 reference line value. ENERGY STAR coverage rates are considered to be lower in the reference line than in the policy line for monitors to account for slower uptake of ENERGY STAR within the reference scenario.
2013-2015	CRT and LCD on-active – straight line interpolation between 2012 and 2016
2016	CRT and LCD on-active - assumed all products meet 2009 ENERGY STAR energy star spec level. Based on an expert assumption in light of no further information being available.
2017-2030	CRT monitors on-active power assumed to remain at the 2016 level. Assumed that no further efficiency improvements will occur in this mature technology without further policy intervention. Based on expert assumption in light of no further
2020	LCD on-active power: uses the 2016 value plus an increase based on changes in the distribution of monitor screen sizes in the ENERGY STAR database (2008) and the effect on the average power requirements of monitors meeting the 2009 ENERGY STAR specification over time.
2024, 2028, 2032	LCD on-active power: uses the same approach as in 2020 but uses 2020, 2024 and 2028 as the base year.
2017-2019 2021-2023 2025-2027 2029-2031	LCD on-active power: based on a straight line interpolation between the adjacent years' figures.
	<b>Sleep mode (CRT / LCD):</b>
2012	CRT and LCD – sleep mode - same as 2008
2013-2015	CRT – sleep mode - straight line interpolation between 2012 and 2016

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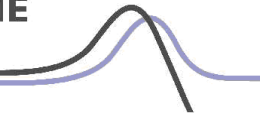
Year	Methodology & assumptions
2016	CRT and LCD sleep mode values are based on a weighted percentage of products which meet the 2009 ENERGY STAR specification with the remaining percentage of products meeting the average 2009 reference line value. The percentage of products assumed to comply with the 2009 ENERGY STAR specification is listed in the policy GSBN for monitors.
2017-2030	CRT – sleep mode uses the 2016 value as no further data available.
2020	LCD sleep mode power is assumed to match the 2012 published ENERGY STAR specification value. Based on an expert assumption as no further data available.
2021-2030	LCD sleep mode power is assumed to be the same as in 2020. Based on an expert assumption that no further changes will occur without additional policy measures in place.
	<b>Off mode (CRT / LCD):</b>
2010	CRT and LCD off mode - EuP standby implementing measures applied at 1W.
2011-2012	CRT and LCD off mode - straight line interpolation between 2010 - 2013
2013	CRT and LCD off mode - EuP standby implementing measures applied at 0.5W.
2014-2030	CRT and LCD off mode assumed to be the same as in 2013. Based on an expert assumption that no further changes will occur without additional policy measures in place.
	<b>All modes (Plasma):</b>
2009 - 2030	Plasma monitor – figures adopted from MTP consumer electronics plasma monitor GSBN. Reduction of 50% applied to intercept to account for reduced likelihood of TV tuner.

## 4.4 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 9 Data issues – efficiency**

Issue/risk	Approach taken/rationale
Much of the power data sourced for monitors comes from products compliant to ENERGY STAR. There is a risk that the average figures could be too low in relation to the “true” market average.	MTP has commissioned its own testing and power figures are included in the datasets. More testing in future of non-ENERGY STAR compliant products could be considered.
Product development in the ICT industry is rapid. The reference scenario assumptions could change with a sudden uptake of an extremely efficient /inefficient product or with a stronger than expected move towards large screen size.	MTP reviews the reference scenario figures on an annual basis. This annual review will ensure that MTP reference scenario figures reflect current product performance as closely as possible.
Alternative screen types such as organic light emitting diodes (OLEDs) are beginning to break into the television market. Rapid uptake of OLED monitors could cause a large change in reference	MTP does not currently model OLED screen monitors due to uncertainties around when they will arrive on the market in numbers. MTP expects OLED displays to first enter the television market in significant numbers and then transfer into the monitor market.



Issue/risk	Approach taken/rationale
line figures.	These assumptions are reviewed on an annual basis.
There is little efficiency data available for CRT monitors due to their very small market share. Those CRT monitors that are left on the market tend to have small screen areas and are primarily used in specialist applications.	MTP will evaluate whether continued detailed modelling of CRT monitors is warranted given the very low sales figures.
There is little evidence to suggest whether future efficiency in sleep mode will increase or decrease.	Sleep mode power figures largely constant into future. MTP to re-evaluate during next modelling phase.

## 4.5 Confidence level – efficiency

- Efficiency data for LCD monitors is available from a number of different sources including government programmes and industry declarations. There are some risks that the datasets may be too heavily dependent on data sourced from ENERGY STAR as this programme offers the most comprehensive source of ICT product data. Placing too high a weighting on ENERGY STAR data could result in MTP reference line figures underestimating the average power requirement of ICT products on the market. MTP have taken some steps to minimise any excessive weighting assigned to ENERGY STAR specifications by including figures for non-ENERGY STAR compliant products in average power requirements calculations.
- ICT products can change rapidly therefore confidence in efficiency figures decreases with time.

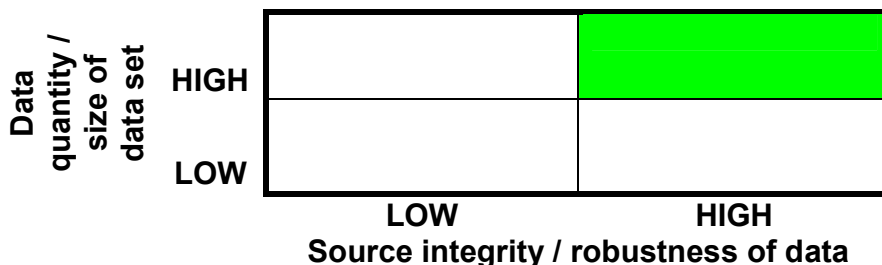
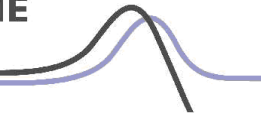


Figure 2 Confidence indicator for efficiency data

## 5 Usage

### 5.1 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 reference scenario enabling rate and the power managed and non power managed profiles discussed in the Key Inputs briefing note.

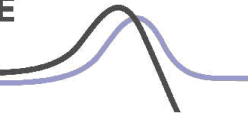
**Table 10 – Average Usage CRT and LCD monitors**

CRT and LCD Monitor					
Reference Scenario (Use Hours/Year)					Power Management Enabling Rates
Year	On-Active	Sleep	Off	Off-Unplugged	%
2008	2,310	917	5,335	199	60
2010	2,412	1,147	5,002	199	62
2020	2,805	2,583	3,173	199	70
2030	2,805	2,583	3,173	199	70

**Table 11 – Average Usage Plasma monitors**

Plasma Monitor				
Reference (Use Hours/Year)				
Year	On-Active	Sleep	Off	Off-Unplugged
2008	1,699	-	6,862	199
2010	1,699	-	6,862	199
2020	1,699	-	6,862	199
2030	1,699	-	6,862	199

- Domestic CRT and LCD monitor on-active use time is expected to increase over time within the reference scenario as internet usage increases (e.g. web-surfing, downloading music and increasingly watching television).
- Power management enabling rates under the reference scenario are expected to increase over time as awareness of this functionality increases.
- On-active time for plasma monitors is assumed to remain constant into the future for all scenarios as it is assumed that no power management functionality is implemented for these products.

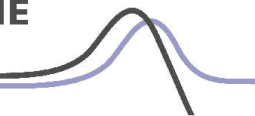


- The increasing amount of time spent in sleep mode is a result of the combination of CRT and LCD monitors being used more but with increased power management. Without the increase in power management rates the extra time seen in sleep mode would occur in on-active mode.

## 5.2 Data sources – usage

Table 12 Usage data sources (enabling rates)

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2008	TIAX: US Residential IT Energy Consumption in 2005 and 2010	2006	TIAX	Includes estimated power management enabling rates	Medium
2020	Expert Assumptions	All	MTP Technical Expert	Required expert assumptions to develop power management enabling rates	Medium



## 5.3 Methodology & key assumptions – usage

- This section describes what has been done with the data listed in Table 12 along with a rationale for any key assumptions (in particular any expert judgements listed in Table 12) and detail of any background calculations behind the data points.

### 5.3.1 Historic data

**Table 13 Interpolation & background calculations – usage data**

Year	Methodology & assumptions
1960 - 2008	CRT and LCD monitors - two sets of use profiles are developed for each product type one based on a situation where no power management is enabled and the second where power management is enabled. An “enabling rate” is used as a weighting factor between these two use profiles to arrive at overall use profile for each product. Details about the use profiles can be found in <i>BN-DICT MON01: Government Standards Evidence Base 2009 – Key Inputs, Domestic Monitors</i>
1960 - 2008	Plasma monitors – one use profile is developed as it is assumed these products do not have a sleep mode. No enabling rates are therefore developed for these types of monitors. Details about the use profiles can be found in <i>BN-DICT MON01</i>
2008	CRT and LCD monitors – power management enabling rate at 60% based on data included in TIAX report.
1960-2007	CRT and LCD monitors – power management enabling rate set at the 2008 value. Based on an expert assumption as no further data available. Power management rates could have been lower in earlier years but these products would have already left stock and so the assumption has little or no impact on product group energy consumption.

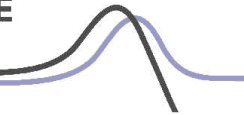
### 5.3.2 Future analysis

**Table 14 Extrapolation & background calculations – usage data**

Year	Methodology & assumptions
2009-2019	CRT and LCD monitor power management enabling rates based on a straight line interpolation between the 2008 and 2020 values.
2020	CRT and LCD monitor power management enabling rates assumed to be 70%. Based on an expert assumption as no further data available. The 70% rate is assumed as most products already have this functionality, and users are accustomed and receptive to monitor power management configuration.
2021-2030	CRT and LCD monitor power management enabling rates assumed to be the same as in 2020.

## 5.4 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.

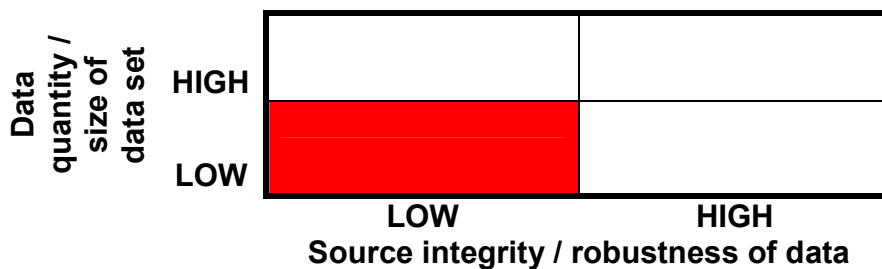


**Table 15 Data issues – usage**

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.

## 5.5 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.



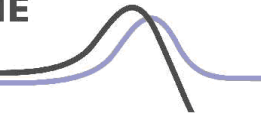
**Figure 3 Confidence indicator for usage data**

## 6 Other issues

- None

### Related MTP information

- BN-DICT MON01: Government Standards Evidence Base 2009 – Key Inputs, 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 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 KO01: Government Standards Evidence Base 2009 – Key Outputs, Domestic ICT
- BN-NDICT KO01: Government Standards Evidence Base 2009 – Key Outputs, Non Domestic ICT
- Television Briefing notes published in the consumer electronics area, beginning “BNCE TV”.

## 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)