

# BN-DICT IM01: Domestic Imaging Government Standards Evidence Base 2009: Key Inputs

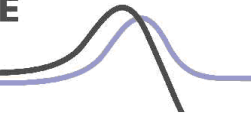
Version 1.0

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 aim of this Briefing Note is to provide details and reference sources of the underlying data in the model, along with the key assumptions used in the model.
- There are three main sections to this Briefing Note, corresponding to the main variables of the MTP modelling approach:
  - Ownership & stock
  - Sales
  - Usage & lifespan
- Each section also includes an indication of the overall confidence in the dataset, to provide a sense of the robustness of the model.
- This Government Standard Briefing Note (GSBN) covers domestic imaging equipment. The following definitions of imaging equipment types are adapted from the EuP Preparatory study on imaging equipment<sup>1</sup>.
- **Office Imaging Equipment** is a commercially available product which was designed for the main purpose of producing a printed image (paper document or photo) from a digital image (provided by a network/card interface) through a marking process. Office Imaging Equipment is also a commercially available product which was designed for the main purpose of producing a digital image from a hard copy through a scanning/copying process. The definition covers products which are marketed as printers, photocopiers and multifunction devices (MFDs). For the purposes of this

<sup>1</sup> European Commission DG TREN EuP Preparatory Studies "Imaging Equipment" (LOT 4) Draft Final Report on Task 1

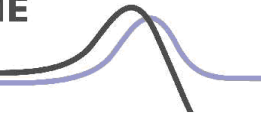


GSBN, “Office Imaging Equipment” is also used to cover imaging products used in a domestic environment.

- **Printer** is a commercially available imaging product that serves as a hard copy output device, and is capable of receiving information from single-user or networked computers, or other input devices (e.g. digital cameras). The unit must be capable of being powered from a wall outlet or from a data or network connection. The following products covered in this GSBN fall under this category; Laser printers, inkjet printers and photo printers.
- **Multifunction Devices (MFD)** is a commercially available imaging product which is a physically integrated device or a combination of functionally-integrated components combining two or more of the core functions of copying, printing, scanning, or faxing. The copy functionality as addressed in this definition is considered to be distinct from single sheet convenience copying offered by fax machines. The unit must be capable of being powered from a wall outlet or from a data or network connection. The following products covered in this GSBN fall under this category; Laser MFDs and Inkjet MFDs.
- Each type of imaging product detailed above can employ one or more of the following marketing technologies:
- **Electro Photographic (EP):** EP is a marking technology characterized by illumination of a charged organic photoconductor drum in a pattern representing the desired hard copy image via a light source (typically a Laser or LED). The image is created with particles of (dry) toner using the latent image on the photoconductor to define the presence or absence of toner at a given location. The toner is transferred to the final hard copy medium (typically paper or foil) and cured in a thermal fusing process while applying pressure to cause the desired hard copy to become durable. The process allows a very fast throughput and creation of hardcopy images. EP marking technology is normally applied in medium to high speed printers and copies. Products using EP marking technologies are defined as “thermal” imaging products due to the use of heat in the process. The following products covered in this GSBN fall under this category; Laser printers and Laser MFDs.
- **Ink Jet (IJ):** Inkjet (IJ) is a marking technology where images are formed by depositing (jet) colorant (liquid ink) in small drops directly to the print media in a matrix manner. The print head of the inkjet printer scans the page in horizontal strips, using a motor to move it back and forth, as another motor rolls the paper in vertical steps. The following products covered in this GSBN utilise inkjet marking technologies; inkjet printers, inkjet MFDs and some photo printers.
- **Dye Sublimation:** A marking technology where images are formed by depositing (subliming) dye onto the print media based upon the amount of energy delivered by

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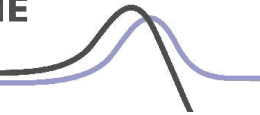


the heating elements. Photo printers are the only product covered in this GSBN which employ dye sublimation marking technologies<sup>2</sup>.

- Products using EP or dye sublimation marking technologies are defined as “thermal” imaging products due to the use of heat in the process. Conversely, products using inkjet marking technologies are normally defined as “non-thermal” imaging products as no heating is required.

Non-thermal			Thermal	
Photo Printer	Inkjet Printer	MFD Inkjet	Laser Printer	MFD Laser

<sup>2</sup> Taken from ENERGY STAR® Program Requirements for Imaging Equipment Version 1.1 available from <http://www.energystar.org/en/253.shtml#20081001>



## 2 Ownership & stock

### 2.1 Summary

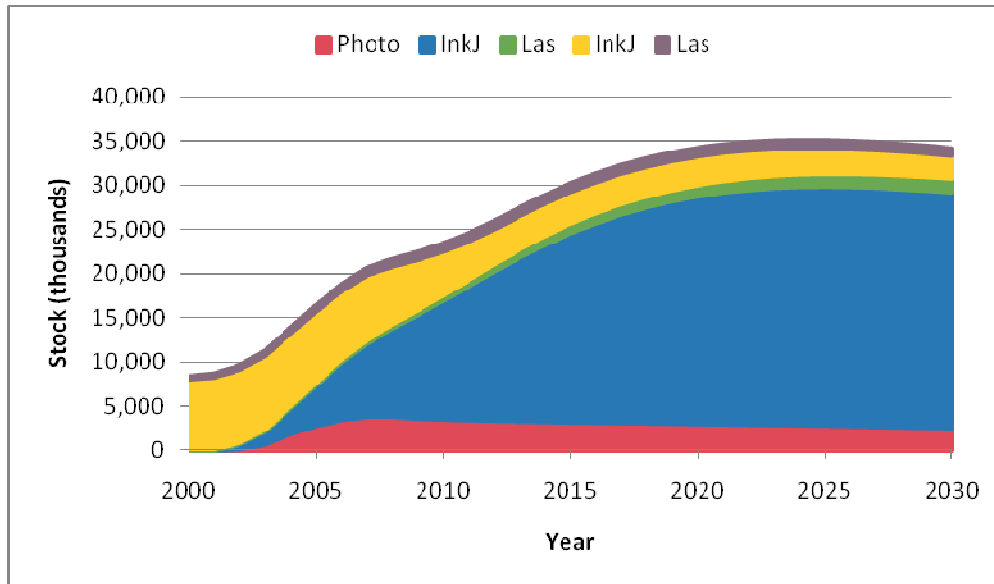
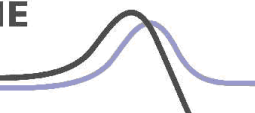


Figure 1 Total Domestic Imaging Product Stock

Table 1 Total Domestic Imaging Product Stock

Year	Non-Thermal				Thermal			Total Imaging
	Inkjet Printer	Photo Printer	MFD Inkjet	Total Non-Thermal	Laser Printer	MFD Laser	Total Thermal	
	Stock ('000)	Stock ('000)	Stock ('000)	Stock ('000)	Stock ('000)	Stock ('000)	Stock ('000)	
2009	5,667	3,660	11,708	21,034	859	495	1,355	22,389
2010	4,918	3,525	13,424	21,868	879	586	1,465	23,333
2020	3,151	3,018	25,765	31,934	931	1,289	2,219	34,154
2030	2,485	2,569	26,657	31,710	804	1,581	2,385	34,095

- Total stock of domestic imaging products is expected to continue to rise into the future until around 2024 when it is assumed a saturation point will be reached.



- Multi-functional products will continue to grow in popularity over single function products will continue into the future.
- Thermal imaging products are expected to grow in popularity in the domestic environment as they can offer speed, economy per page and print quality advantages.

## 2.2 Data sources – ownership & stock

**Table 2 - Ownership & stock data sources**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
1960-2030	No Reference	2008	MTP Technical Expert	Models are sales based. No appropriate stock data available.	Low

## 2.3 Methodology & key assumptions – ownership & stock

- This model is a sales-based model, which calculates stock automatically using the sales projection and the product lifetime. Real stock data is put in as a check only, to help evaluate the output stock calculated from the model. This data series is usually incomplete. The stock shown in the previous charts and tables were to illustrate the full generated (rather than input) stock data series.

### 2.3.1 Historic data

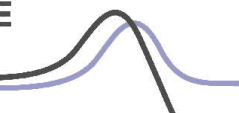
**Table 3 Interpolation & background calculations – stock data**

Year	Methodology & assumptions
2000 - 2008	The MTP model is a sales-based model, which calculates stock automatically using a sales projection, the product lifetime and a stock churn calculation to account for products purchased in previous years gradually leaving stock. Real stock data is put in as a check only, to help evaluate the output stock from the model. This data series is usually incomplete.

### 2.3.2 Future analysis

**Table 4 Extrapolation & background calculations – stock data**

Year	Methodology & assumptions
2009 -2030	The MTP model is a sales-based model, which calculates stock automatically using a sales projection, the product lifetime and a stock churn calculation to account for products purchased in previous years gradually leaving stock. Real stock data is put in as a check only, to help evaluate the output stock from the model. This data series is usually incomplete.



## 2.4 Data issues – ownership & stock

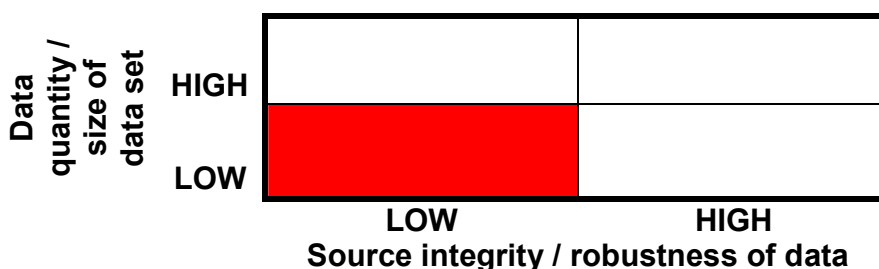
- This section flags any areas of uncertainty, both in general and for specific data points, along with a description of how this has been dealt with in the model.

**Table 5 Data issues – ownership & stock**

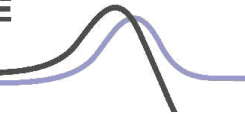
Issue/risk	Approach taken/rationale
Future stock of imaging products could change rapidly if other imaging technologies such as “electronic paper” come to market. Electronic paper, otherwise known as “e-paper”, is an electronic imaging product which mimics the appearance of ink or toner on traditional copy paper.	MTP has assumed that the current imaging products will remain in stock into the future. MTP will continually review the market.
Future stock of MFD lasers could increase further if consumers begin to favour these products over MFD inkjets.	MTP has assumed that MFD inkjet products will continue to dominate the domestic MFD market into the future. MTP will continually review the market for any changes.

## 2.5 Confidence level – ownership & stock

- This section provides an indication of overall confidence in the data set (i.e. data points, calculations, interpolation and projections).
- MTP has sourced an extensive set of sales figures for the imaging products covered in this GSBN. The stock of the imaging products is then calculated by the models based on sales inputs and expected life spans of the products. The stock data is therefore sensitive to both sales and life span inputs.



**Figure 2 Confidence indicator for ownership data**



## 3 Sales

### 3.1 Summary

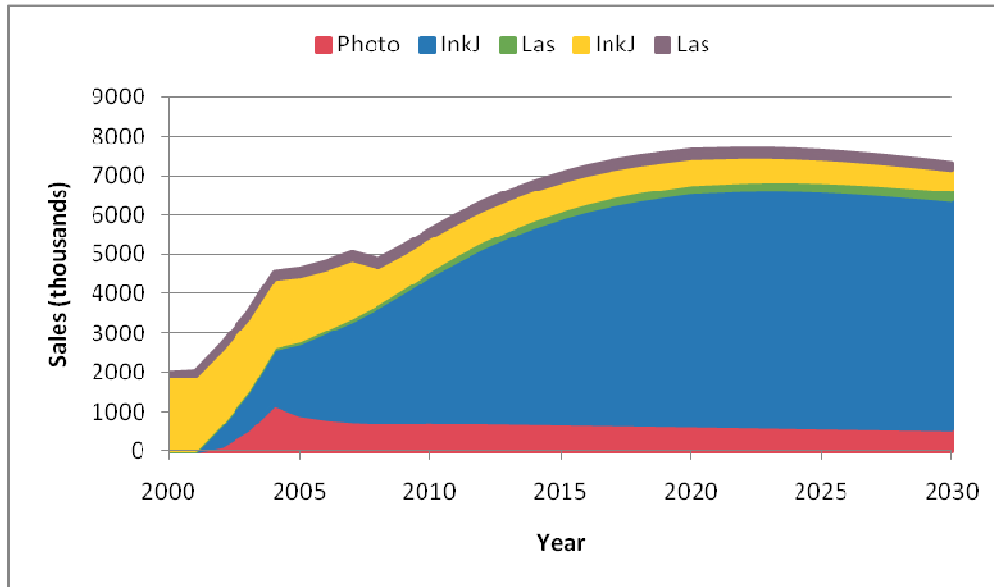


Figure 3 Total Domestic Imaging Product Sales


Table 6 Total Domestic Imaging Product Sales

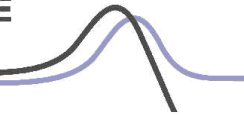
Year	Non-Thermal				Thermal			Total Imaging Sales ('000)
	Inkjet Printer	Photo Printer	MFD Inkjet	Total Non-Thermal	Laser Printer	MFD Laser	Total Thermal	
	Sales ('000)	Sales ('000)	Sales ('000)	Sales ('000)	Sales ('000)	Sales ('000)	Sales ('000)	
2009	872	758	3,308	4,938	180	113	292	5,230
2010	838	771	3,711	5,320	182	139	320	5,640
2020	672	652	5,943	7,267	184	211	395	7,662
2030	522	552	5,845	6,919	153	256	409	7,328

- Total sales of domestic imaging products is expected to continue to rise into the future until around 2020 when sales begin to slow due to market saturation.
- The uneven line in the sales graph is largely caused by varying sales volumes of the different imaging products.

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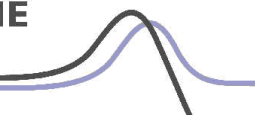
- 
- Multi-functional products will continue to grow in popularity over single function products in the future.
  - Thermal imaging products are expected to grow in popularity in the domestic environment as they can offer speed, economy per page and print quality advantages.



## 3.2 Data sources - sales

**Table 7 Sales data sources – All Imaging Products**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2002 - 2011	Gartner-Printer-Trends-Feb2008	2008	Gartner	Best Data Available	High
2006 - 2008	GfK Hitlist Data	2006 - 2008	GfK	Assumption on distribution of domestic and non-domestic sales of Laser MFDs required.	High
1960, 1982, 1983, 1984, 1994, 2003, 2006, 2007, 2008, 2030	Expert assumptions	2009	MTP Technical Expert	Expert assumptions required to collate power figures in Reference, Policy and EBP Scenarios.	Medium



## 3.3 Methodology & key assumptions - sales

- This section describes what has been done with the data listed in Table 7 along with a rationale for any key assumptions (in particular any expert judgements listed in Table 7) and detail of any background calculations behind the data points.

### 3.3.1 Historic data

**Table 8 Interpolation & background calculations – sales data – MFD Laser**

Year	Methodology & assumptions
1960	Assumed that 0% of MFD laser sales are domestic sales and 100% are non-domestic sales. MTP models start in 1960 and this year is used as the base case for splits between non-domestic and domestic sales. Not all products would have been available on the market at this time. 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.
1961 - 2005	Assumed split of domestic and non-domestic sales is a straight line interpolation between adjacent years' figures.
2006, 2007, 2008	Assumed split of domestic and non-domestic sales, calculated by dividing Gartner (covers whole imaging market) data by GfK data (covers domestic market).
1994	Assumed sales MFD laser sales started in 1994.
1995 - 2002	Straight line interpolation between adjacent years' figures.
2002 – 2008	Gartner sales data used and split into domestic and non-domestic according to assumed ratios as listed above.

### 3.3.2 Future analysis

**Table 9 Extrapolation & background calculations – sales data - MFD Laser**

Year	Methodology & assumptions
2009 - 2011	Gartner sales predictions used.
2012 - 2030	Sales based on straight line interpolation between 2011 and 2030.
2030	Assumed 2030 sales of MFD lasers are 1.5 times 2008 Gartner figures.
2009 - 2030	Assumed domestic/non-domestic sales split the same as in 2008.

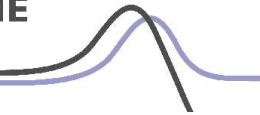
### 3.3.3 Historic data

**Table 10 Interpolation & background calculations – sales data – Laser Printer**

Year	Methodology & assumptions
1984	Assumed sales of laser printers started in 1984.
1983	Assumed that 0% of laser sales are domestic sales and 100% are non-domestic sales.
1960 - 1982	Split between domestic and non-domestic sales based on 1983 figures. MTP models start in 1960 and this year is used as the base case for splits between non-domestic and domestic sales. Not all products would have been available on the market at this time. 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.
2003	Assumed split of domestic and non-domestic sales (20% domestic and 80% non-domestic) based on expert assumption as no further data available.

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Year	Methodology & assumptions
1984 - 2002	Assumed split of domestic and non-domestic sales is a straight line interpolation between adjacent years' figures.
2004-2008	Assumed split of domestic and non-domestic sales is a straight line interpolation between 2003 and 2030 (detailed in table below).
2002 - 2008	Gartner sales data used as base data for smoothing.
1982 – 2008	Total laser printer sales data (Gartner data between 2002 and 2008) smoothed between 1982 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier) Smoothing continued into the future as described in table below.

### 3.3.4 Future analysis

**Table 11 Extrapolation & background calculations – sales data - Laser Printer**

Year	Methodology & assumptions
2009 - 2011	Gartner sales predictions used as base data for smoothing.
2009 – 2029	Total laser printer sales data smoothed between 1982 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier) (continuation of smoothing listed in previous table).
2009 - 2029	Assumed split of domestic and non-domestic sales is a straight line interpolation between 2008 and 2030.
2030	Assumed 2030 sales of laser printers are 1.5 times 2008 Gartner figures. Based on an expert assumption as no further data available.

### 3.3.5 Historic data

**Table 12 Interpolation & background calculations – sales data – MFD Inkjet**

Year	Methodology & assumptions
1960	Assumed that 0% of MFD inkjet sales are domestic sales and 100% are non-domestic sales. MTP models start in 1960 and this year is used as the base case for splits between non-domestic and domestic sales. Not all products would have been available on the market at this time. 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.
1961 - 2005	Assumed split of domestic and non-domestic sales is a straight line interpolation between adjacent years' figures.
2006, 2007, 2008	Assumed split of domestic and non-domestic sales calculated by dividing Gartner (covers whole imaging market) data by GfK data (covers domestic market).
1982	Assumed sales started in 1982. Based on expert assumption.
2002-2008	Gartner sales data used as base data for smoothing.
1982 – 2008	Total MFD inkjet sales data smoothed between 1982 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier). Smoothing continued into the future as described in table below.

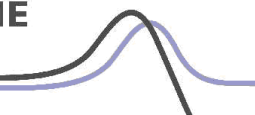
### 3.3.6 Future analysis

**Table 13 Extrapolation & background calculations – sales data - MFD Inkjet**

Year	Methodology & assumptions
2009 - 2029	Assumed split of domestic and non-domestic sales is a straight line interpolation between 2008 and 2030.
2009 - 2011	Gartner sales predictions used as base data for smoothing.

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2030	Assumed that annual sales reduce by same percentage that occurred between 2010 and 2011 in the Gartner figures.
2009 – 2030	Total MFD inkjet sales data smoothed between 1982 and 2030 using two sided exponential window, two pass (kalman filter and lagrange multiplier) (continuation of smoothing listed in previous table).
2030	Assumed that 75% of sales are domestic sales and 25% are non-domestic sales. Based on expert assumption as no further data available.

### 3.3.7 Historic data

**Table 14 Interpolation & background calculations – sales data – Inkjet Printer**

Year	Methodology & assumptions
1960	Assumed that 0% of inkjet printers are domestic sales and 100% are non-domestic sales. MTP models start in 1960 and this year is used as the base case for splits between non-domestic and domestic sales. Not all products would have been available on the market at this time. Based on an expert assumption in light of no further information being available.
1961 - 2005	Assumed split of domestic and non-domestic sales is a straight line interpolation between adjacent years' figures.
2006	Assumed split of domestic and non-domestic sales calculated by dividing Gartner (covers whole imaging market) data by GfK data (covers domestic market).
2007, 2008	Assumed split of domestic and non-domestic sales same as 2006.
2002-2008	Gartner sales data used as base data for smoothing.
1994	Assumed sales started in 1994.
1994– 2008	Total inkjet printer sales data smoothed between 1994 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier). Smoothing continued into the future as described in table below.

### 3.3.8 Future analysis

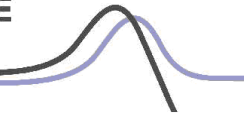
**Table 15 Extrapolation & background calculations – sales data - Inkjet Printer**

Year	Methodology & assumptions
2009 - 2011	Gartner sales predictions used as base data for smoothing.
2009 - 2029	Assumed split of domestic and non-domestic sales is a straight line interpolation between 2008 and 2030.
2009 – 2030	Total inkjet printer sales data smoothed between 1994 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier) (continuation of smoothing listed in previous table).
2030	Assumed that 75% of sales are domestic sales and 25% are non-domestic sales. Based on an expert assumption as no further data available.
2030	Assumed that annual sales are 1.4 times Gartner 2011 figures. Based on an expert assumption as no further data available.

### 3.3.9 Historic data

**Table 16 Interpolation & background calculations – sales data – Photo Printer**

Year	Methodology & assumptions
2002	Assumed sales started in 2002 and that all sales are domestic only.
2002- 2010	Gartner sales data used as base data for smoothing.
2002 – 2008	Total photo printer sales data smoothed between 1994 and 2030 (using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier)).



multiplier) (smoothing continued into the future as described in table below).
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### 3.3.10 Future analysis

**Table 17 Extrapolation & background calculations – sales data - Photo Printer**

Year	Methodology & assumptions
2009 - 2011	Gartner sales predictions used as base data for smoothing.
2009 – 2030	Total photo printer sales data smoothed between 1994 and 2030 using statistical techniques: two sided exponential window, two pass (kalman filter and lagrange multiplier)(continuation of smoothing listed in previous table).

### 3.4 Data issues - sales

- 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 18 Data issues - sales**

Issue/risk	Approach taken/rationale
Future sales of imaging products could change rapidly if other imaging technologies such as “electronic paper” come to market. Electronic paper, otherwise known as “e-paper”, is an electronic imaging product which mimics the appearance of ink or toner on traditional copy paper.	MTP have assumed that the current imaging products will remain in sales into the future. MTP will continually review the market.
MTP has sourced market leading data which details the sales volumes of imaging products in the UK. The sourced data does not distinguish between domestic and non-domestic sales meaning that MTP has had to make assumptions in this area.	MTP has made a number of assumptions about the past, current and future split of non-domestic and domestic sales volumes of all imaging products. These assumptions will be reviewed on an annual basis.

### 3.5 Confidence level

- This section provides an indication of overall confidence in the data set (i.e. data points, interpolation and projections).
- Confidence in total imaging product sales data/predictions to 2011 is high as it is primarily based on purchased data from leading industry sources. The split between domestic and non-domestic markets is less certain as two separate sources of data had to be compared or expert assumptions were required. Confidence in sales data reduces further into the future.

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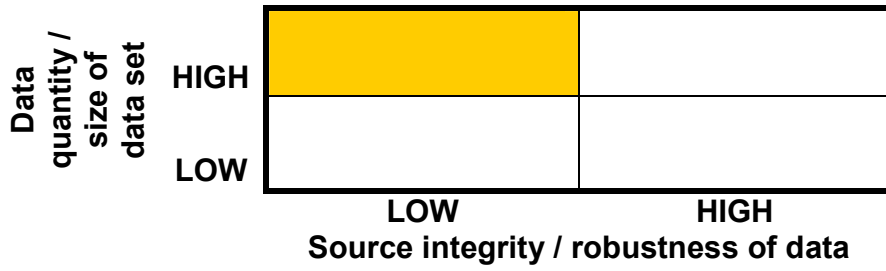
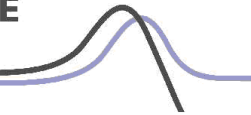


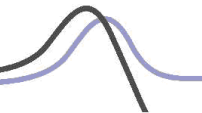
Figure 4 Confidence indicator for sales data



## 4 Usage & lifespan

### 4.1 Summary

- This section of the GSBN details the usage assumptions included for non-thermal imaging products. There are no individually modelled use profiles modelled for thermal products. The Typical Energy Consumption (TEC) approach under ENERGY STAR for thermal imaging products is based on an expected use profile (based on speed and colour) across all power modes for a week's usage given in kWh/week. The TEC use profile under ENERGY STAR reflects an assumed usage in a non-domestic environment. MTP has adapted the TEC use profile to better reflect assumed usage of thermal imaging products in the domestic environment (assumed to be approximately 1/5<sup>th</sup> of the non-domestic time).
- The MTP models include use profile data for each imaging product. The use profiles for each product type detail how much time on average is spent in each relevant power mode over the course of a year.
- The power modes addressed for non-thermal imaging products include:
  - On-ready mode (exists when the product is not producing output, has reached operating conditions, has not yet entered into any lower-power modes, and can enter active mode with minimal delay).
  - Sleep mode – (the reduced power state that the product enters automatically after a period of inactivity).
  - Off-mode – (the power state that the product enters when it has been manually or automatically switched off but is still plugged in and connected to the mains).
  - Off-unplugged – (where a product is unplugged from the mains or switched off at the mains).
- The on-active power mode (where the product is connected to a power source and is actively producing output) is not considered for non-thermal products as it is assumed minimal time will be spent in this power mode.
- Two use profiles are developed for each product (except for non-thermal based imaging products); a power managed enabled profile (representing a product with power management functionality installed and enabled) and a non-power managed enabled profile (representing a product where power management is either not installed or not enabled).
- An “enabling rate” is used as a weighting factor between these two use profiles to arrive at overall use profile for each product in each scenario. Details about the enabling rates for each scenario are explained in the relevant scenario GSBN.
- Table 19 below shows the **fully power managed** use profiles for non-thermal imaging products (i.e. what 100% enabling would look like). The non-power managed use profile is calculated by adding the sleep mode time to the on-ready time.

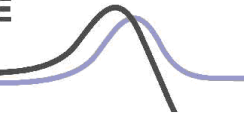


**Table 19 Power Managed Use Profile Assumptions – Non-thermal Printers**

Year	Inkjet Printer				MFD Inkjet				Photo Printers			
	(Use Hours/Year)				(Use Hours/Year)				(Use Hours/Year)			
	On-Ready	Sleep	Off	Off-Unplugged	On-Ready	Sleep	Off	Off-Unplugged	On-Ready	Sleep	Off	Off-Unplugged
2008	278	180	6,742	1,560	278	180	6,855	1,447	139	90	6,971	1,560
2010	278	180	6,742	1,560	278	180	6,855	1,447	139	90	6,971	1,560
2020	278	180	6,742	1,560	278	180	6,855	1,447	139	90	6,971	1,560
2030	278	180	6,742	1,560	278	180	6,855	1,447	139	90	6,971	1,560

**Table 20 Imaging Product Lifespans**

Year	Non-Thermal			Thermal	
	Inkjet Printer	Photo Printer	MFD Inkjet	Laser Printer	MFD Laser
	Years	Years	Years	Years	Years
2008	4.5	4.5	4.5	5.0	6.5
2010	4.5	4.5	4.5	5.0	6.5
2020	4.5	4.5	4.5	5.0	6.5
2030	4.5	4.5	4.5	5.0	6.5



- A constant lifespan of 4.5 years is assumed for all non-thermal imaging products.
- A constant lifespan of 5 years is assumed for all laser printers and 6.5 years for MFD lasers. Average lifespan is assumed to be less for laser printers than laser MFDs as they are assumed to be replaced more quickly in favour of MFD lasers.

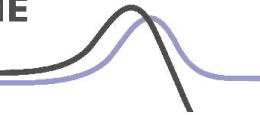
## 4.2 Data sources – usage & lifespan

**Table 21 Usage & lifespan data sources – Non-thermal Imaging Products**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2008	2003 National Appliance and Equipment Energy Efficiency Committee (NAEEEC) Australia residential inkjet	2003	NAEEEC	Best data	Medium
2008	Fraunhofer	2006	Fraunhofer	Best data	Medium
2008	Tiax	2006	Tiax	Best data	Medium
2008	EuP Preparatory Study Lot 4 (IE) Final Report Task 8 7th May 2008 ( <a href="http://www.ecoimaging.org/">http://www.ecoimaging.org/</a> )	2008	Fraunhofer IZM	Best Data Available	Medium
2008, 2021	Expert Assumptions	2009	MTP Technical Expert	Expert assumption required to develop use profiles in each year.	Medium
2009	Expert Assumptions	2009	MTP Technical Expert	Expert assumption required for lifespan in each year.	Medium

## 4.3 Methodology & key assumptions – usage & lifespan

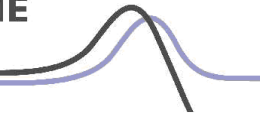
- This section describes what has been done with the data listed in Table 21 along with a rationale for any key assumptions (in particular any expert judgements listed in Table 21) and detail of any background calculations behind the data points.



## 4.3.1 Historic data

**Table 22 Interpolation & background calculations – usage & lifespan data**

Year	Methodology & assumptions
	<b>Non thermal product usage</b>
1960 - 2008	All non-thermal imaging products - 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 (for each scenario – see scenario GSBNs for details).
1960 - 2007	All non-thermal printers- non-power managed use profile is based on 2008 assumptions.
1960-2007	All non-thermal printers – annual use profiles developed in the same way as in 2008.
2008	All non-thermal printers – daily use profiles as detailed above are multiplied by 365 days to arrive at annual use profiles.
2008	All non-thermal printers- non-power managed use profile developed by adding sleep mode time to on-ready time.
	<b>Thermal product usage</b>
1960 - 2007	Thermal products – use the 2008 values.
2008	Thermal products - The use profile for thermal imaging products is included in the TEC methodology. All use profiles for domestic TEC products are assumed to be approximately 1/5 <sup>th</sup> of that for non-domestic thermal imaging products. This reduction factor for domestic products is based on an expert assumption as no further evidence was available.
	<b>Inkjet printer</b>
1960 - 2007	Inkjet printer (on-ready, sleep on off modes) – uses 2008 use hour figures
2008	Inkjet printer (on-ready and sleep mode) – use hours based on average of published data but reduced to account for 3 days use a week instead of 7 days. This reduction was used as the averaged published data figures were deemed too high as it would have resulted in a high number of printed images per day.
2008	Inkjet printer (off mode) - use hours based on average of published data.
2008	Inkjet Printer (off unplugged) - use hours based on average of published data.
	<b>MFD inkjet</b>
1960 - 2007	MFD inkjet (on-ready and sleep mode) – uses the 2008 use profile for inkjet printers.
2008	MFD inkjet (on-ready and sleep mode) – uses the inkjet printer use profile.
1960 - 2007	MFD inkjet (off-mode and off-unplugged) – uses the 2008 MFD inkjet use profiles for these power modes.
2008	MFD inkjet (off-mode and off-unplugged) – uses the inkjet printer off mode use times plus an assumed one third of the inkjet printer off unplugged time to account for fax based MFD inkjets not being unplugged as often. The one third extra off-mode time is based on an expert assumption as no further data was available.
	<b>Lifespan</b>
2008	All lifespan data based on assumptions in EuP Preparatory Study.
1960 - 2007	All lifespan data equal to the 2009 figure.



## 4.3.2 Future analysis

**Table 23 Extrapolation & background calculations – usage & lifespan data**

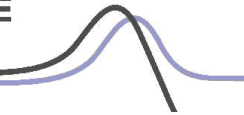
Year	Methodology & assumptions
	<b>Non thermal product usage</b>
2009 - 2030	All non-thermal printers – (Reference Scenario) use hours for all power modes based on 2008 figures.
2009-2030	All non-thermal printers – annual use profiles developed in the same way as in 2008.
	<b>Thermal product usage</b>
2009 - 2030	Thermal products – usage deemed to be the same as the 2008 values.
	<b>Lifespan</b>
2009 - 2030	All lifespan data based on the 2008 values.

## 4.4 Data issues – usage & lifespan

- 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 24 Data issues – usage & lifespan**

Issue/risk	Approach taken/rationale
Estimates of the time non-thermal imaging products spend in each power mode vary considerably from source to source. The amount of time products spend in “on-modes” has a large impact on total energy consumption calculations. Large divergences in estimates suggest that knowledge in this area needs to be improved.	MTP has collated the most widely known use profiles and applied expert assumptions to derive expected use profiles for non-thermal imaging products in the UK. Calculating straight averages from the published data resulted in nonsensical use profiles due to large variation in the data. MTP will continue to evaluate new use profile data.
Estimates of the amount of time thermal products are used within domestic premises could either be over or under estimated since the use profiles behind the ENERGY STAR TEC methodology are based on non-domestic use.	MTP has applied a “reducing factor” to the ENERGY STAR TEC use profile to account for lower use of thermal imaging products in domestic environments. MTP will review this assumption in the light of any new evidence.
The ICT industry can change rapidly. Rapid changes such as uptake of new technologies (e.g. faster, better quality imaging products) can have large impacts on the use of products as consumer take up new or altered practices.	MTP attempts to model the most likely set of use profiles to reflect current product usage and take possible future uses into consideration.
Lifetime data may vary considerably. There is a possibility that some imaging products may have a second lifetime after reaching the end of life with their first users (through being passed onto new users).	MTP recognises that some additional energy consumption may be derived from imaging products during second lifetimes. MTP assumes that use from these products will be minimal in the UK as most consumers would purchase a new product.



## 4.5 Confidence level – usage & lifespan

- This section provides an indication of overall confidence in the data set (i.e. data points, interpolation and projections).
- The amount of time non-thermal imaging products are said to spend in each power mode varies considerably between different published sources. These large divergences suggest that further work is required in this area. The use profiles for thermal products could either be over or under estimated due to a lack of data.

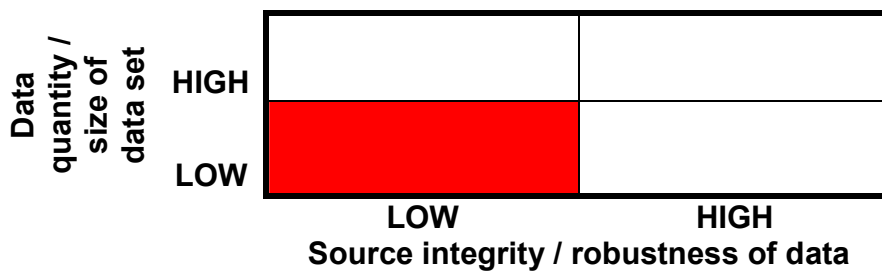
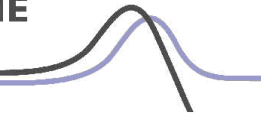


Figure 5 Confidence indicator for usage & lifespan data

### Related MTP information

- BN-DICT IM02: Government Standards Evidence Base 2009 – Reference Scenario, Domestic Imaging Products
- BN-DICT IM03: Government Standards Evidence Base 2009 – Policy Scenario, Domestic Imaging Products
- BN-DICT IM04: Government Standards Evidence Base 2009 – Best Available Technology (BAT) Scenario, Domestic Imaging Products
- BN-NDICT IM01: Government Standards Evidence Base 2009 – Key Inputs, Non Domestic Imaging Products
- BN-NDICT IM02: Government Standards Evidence Base 2009 – Reference Scenario, Non Domestic Imaging Products
- BN-NDICT IM03: Government Standards Evidence Base 2009 – Policy Scenario, Non Domestic Imaging Products
- BN-NDICT IM04: Government Standards Evidence Base 2009 – Best Available Technology (BAT) Scenario, Non Domestic Imaging Products
- 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



## 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)