



# **BNDH EWH02: Domestic Electric Water Heaters 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**

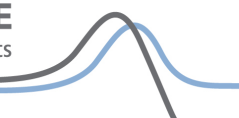
- The Reference Scenario is a projection of what is likely to happen to energy consumption of each product if no new policies are implemented. All agreed and formally signed-off policies are included in the Reference Scenario.
- For cross-cutting policies such as CERT and Building Regulations, which 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 it is possible, separate projections of the reference line are made with and without such policies.

### **1.1 Product definition**

- Products covered by this briefing note are **Dedicated Domestic Electric Water Heaters**, which are defined in the ErP<sup>1</sup> Working Document on possible Eco-design Energy labelling and Installation requirements for Water Heaters<sup>2</sup> as a “**product that is connected to a given external supply of drinking water and is equipped to generate heat and transfer this drinking water to desired temperature levels and at desired quantities, flow rates and intervals.**”

<sup>1</sup> The Energy related Products Directive, in this paper referring to the documents for Lot 2, Water heaters.

<sup>2</sup> July 2008 revision, page 5.



- Dedicated domestic water heaters can be distinguished by fuel (gas, electricity, solar, etc.) and functionality (storage and instantaneous). This briefing note covers instantaneous and storage electric water heaters and includes:
  1. Electric storage (kitchen heaters or small showers) water heaters [ES]
  2. Electric instantaneous water heaters and electric boiling water appliances (electronic) [EI]
  3. Electric showers (instantaneous hydraulic) [EIH].
- This brief does not include combination units for space and water heating, which are covered by the Domestic Boilers model described in BNDH B01: Domestic Boilers Government Standards Evidence Base 2009: Key Inputs.

## 1.1.1 Dedicated Domestic Electric Storage [ES] Water Heaters

- The **Dedicated Domestic Electric Storage [ES] Water Heaters** that have been modelled can be classified as follow:
  - Single point/non-pressurised with a capacity of less than 15 litres
  - Multi point/pressurised with a capacity of less than 15 litres
  - Large vented with a capacity bigger than 15 litres.
- **Single point/non-pressurised:** these are also named “displacement” or “point of use” water heaters (e.g. hand wash appliances) and have an open outlet. To displace the hot water they rely on the opening of a tap or a valve on the inlet side in the heater with incoming cold water. The open outlet ensures that any excess pressure in the heater is vented.<sup>3</sup>
- **Multi point/pressurised:** these are supplied directly from the mains under pressure and can deliver hot water to two or more outlets simultaneously.
- **Large vented:** these have a storage capacity that is above 15 litres and are mainly applied to supply multiple consumer points where supply from a cold-water storage tank is impractical.<sup>4</sup> A vent pipe allows a safe route for excess pressure, air bubbles and steam should the system overheat; it runs from the top of the cylinder back up to the cold-water storage header tank where its open vent is located just above the water level.<sup>5</sup>

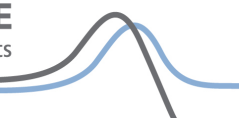
## 1.1.2 Dedicated Domestic Electric Instantaneous Water Heaters

- The instantaneous types of Dedicated Domestic Electric Water heaters are mainly used as point-of-use water heaters and are characterised by a number of elements: flow rate at a particular outlet temperature, flow rate control and water heater pressure.

<sup>3</sup> BSRIA, March 2008, World heating 2007 – United Kingdom Water Heating – Report 50851/17

<sup>4</sup> BSRIA, March 2008, World heating 2007 – United Kingdom Water Heating – Report 50851/17

<sup>5</sup> <http://www.plumbingpages.com/featurepages/HWopenvented.cfm>



- For the purpose of this study the **Dedicated Domestic Electric Instantaneous Water Heaters** have been split into groups:
  - Instantaneous water heating devices with “electronic” flow rate control **[EI]**, including non-pressurised single point ‘hand-wash’ units and pressurised in-line units (12 kW or less) which deliver heated water to multiple taps or showers. These products can maintain a set temperature throughout a range of flow rates and sometimes allow the user to preset temperature and/or flow rate through the electronic control. This group also includes instantaneous electric boiling water appliances<sup>6</sup> which are water heaters designed to produce water up to the boiling point. For example these are used to supply hot water for consumption: tea, soup, etc.
  - Instantaneous water heating devices with “hydraulic” flow rate control **[EIH]**. This product type includes mainly electric showers and is controlled by a simple heating on/off switch dependant on the water pressure, but with a temperature limit override. Electric showers are fed with cold water only, which is heated instantaneously as the water flows. Flow rates are relatively low at about 4-9 litres per minute, depending on power rating and required temperature rise. These rates can also be affected by low mains pressure at peak times, diminishing performance. Electric showers typically use about 300 kWh per household per year. Running costs and associated CO<sub>2</sub> emissions of electric showers are much higher than mixer showers using water heated by gas.<sup>7</sup>

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<sup>6</sup> ErP Preparatory Study on Eco-design of Water Heaters – Task 4 Report Final, VHK, September 2007, p.145 <http://www.ecohotwater.org/>

<sup>7</sup> Domestic heating and hot water – choice of fuel and system type - Good Practice Guide - GPG 301, Building Research Energy Conservation Support Unit, 2002



Figure 1 Example of a typical Electric Instantaneous Water Heater (Vaillant) and Electric Shower <sup>8</sup>

## 2 Scenario outputs

### 2.1 Summary

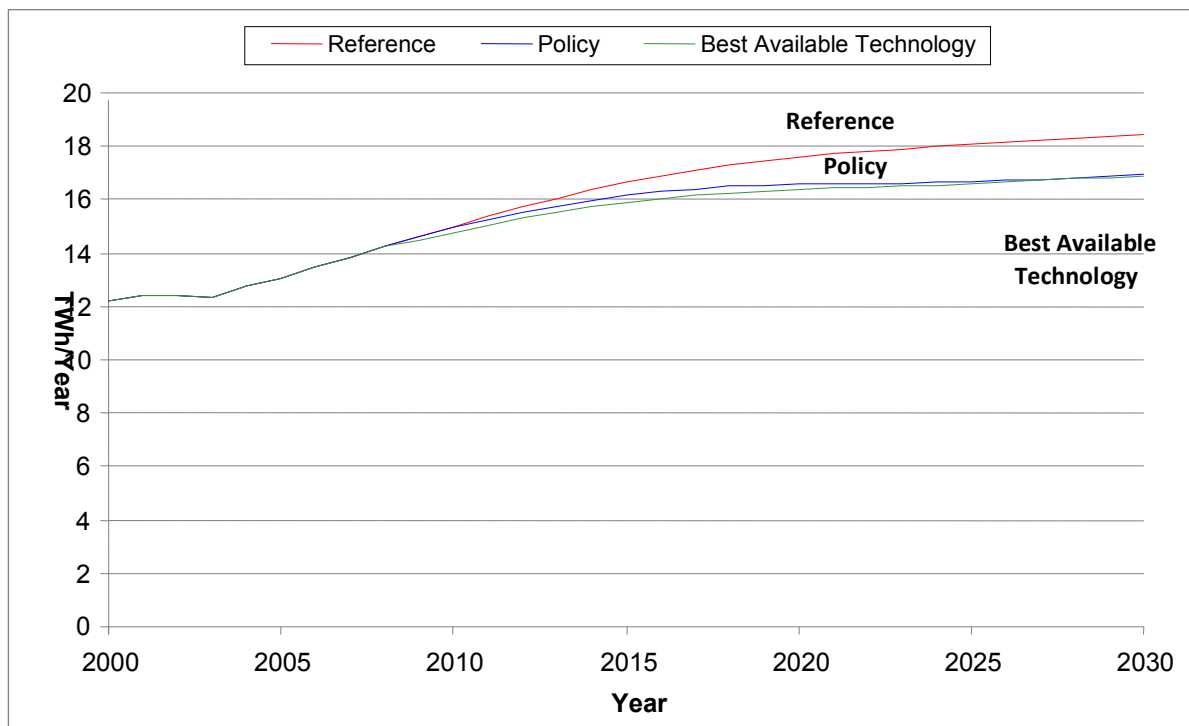


Figure 2 Dedicated Domestic Water Heaters (Electric) - Energy Consumption

<sup>8</sup> [www.plumword.co.uk](http://www.plumword.co.uk)



**Table 1 – Summary Energy Consumption - Dedicated Domestic Water Heaters (Electric) Reference Scenario (GWh/year)**

Product	2010	2020	2030
Water Heaters (Electric Storage - ES)	2,570	2,700	2,790
Water Heaters (Electric Instantaneous - EI)	1,070	1,190	1,230
Water Heaters (Electric Showers - EIH)	11,300	13,700	14,400
<b>Total</b>	<b>14,940</b>	<b>17,590</b>	<b>18,420</b>

**Table 2 – Summary CO<sub>2</sub> Emissions - Dedicated Domestic Water Heaters (Electric) Reference Scenario (MtCO<sub>2</sub>/year)**

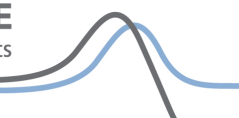
Product	2010	2020	2030
Water Heaters (Electric Storage - ES)	1.11	1.12	1.20
Water Heaters (Electric Instantaneous - EI)	0.46	0.51	0.53
Water Heaters (Electric Showers - EIH)	4.88	5.89	6.20
<b>Total</b>	<b>6.44</b>	<b>7.56</b>	<b>7.93</b>

## 3 Current policy & measures

### 3.1 Brief description of policies & measures

- The Reference Scenario includes all policies approved and formally signed off by 2008.
- The policies and measures taken into account in the Reference Scenario are:
  - The Water Byelaws (1989)
  - CECED voluntary Commitment (1999)
  - The control of Legionella bacteria in water systems (2001).
  - Building Regulations - Part L Conservation of fuel and power (2006)
  - Code for Sustainable Homes (2008)<sup>9</sup>

<sup>9</sup> On the 27 February 2008 the Government confirmed a mandatory rating against the Code would be implemented for new homes from 1 May 2008.



## 3.1.1 The Water Byelaws (1989)

- This is only relevant to electric storage water heaters.
- Until 1989, to ensure the safety of the water supply, UK Water Byelaws forbade the storage of more than 15 litres of hot water under direct main pressure.
- Current legislation<sup>10</sup> permits storage of hot water volumes greater than 15 litres under mains pressure provided that some allowance is made for expansion (normally by means of an expansion vessel) and to prevent back flow (normally by means of a check valve upstream of the expansion vessel)<sup>11</sup>.
- This measure was introduced to prevent waste, (byelaws required that there should be no operational discharge to waste from the system) and support water conservation, permitting in the UK for the first time the sale of pressurised storage water heaters. Prevention of waste hot water will inevitably lead to the saving of energy, although the effect is relatively small.
- The Water Byelaws were replaced by new Water Regulations in July 1999. The new legislation still required an expansion vessel in unvented water storage appliances of >15 litres. Continental manufacturers are not able to import their water heaters into the UK without modification.

## 3.1.2 CECED voluntary Commitment (1999)

- In November 1999 the European Committee of Domestic Equipment Manufacturers (CECED) presented a commitment to reducing standing losses of domestic electric storage water heaters (DESWH). By signing the voluntary commitment, participants committed to reducing the total energy consumption of storage water heaters they manufactured. Heatrae Sadia<sup>12</sup>, which signed the commitment in 2000, was the only UK representative member; the other nine manufacturers are from France, Italy, Spain, Sweden, and Germany<sup>13</sup>. The members have been acting in the spirit of the commitment since the first targets were developed in 1998 and their products comply with the agreement.
- The commitment combines three elements<sup>14</sup>:
  1. Voluntary standing loss declaration in the form of additional and clearly visible data.
  2. Phase-out of less efficient appliances based on maximum allowable standing loss values.

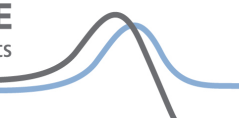
<sup>10</sup> The Water Supply (Water Fittings) Regulations 1999 (for England and Wales) and the Water (Scotland) Act 1980. Equivalent legislation is not yet applicable in Northern Ireland

<sup>11</sup> Source <http://www.plumbingpages.com/featurepages/HWHRdischarge1.cfm>

<sup>12</sup> About 57% UK market share for electric storage water heaters in 2007

<sup>13</sup> Atlantic (France), Baxi (Germany), Bosch Siemens (Germany), Electrolux (Sweden), Fabor (Spain), Heatrae Sadia (United Kingdom), Lorenzo Vasco (Italy), Merloni Termosanitari (Italy), State France (France), Stiebel Eltron (Germany), Technotherm (Germany), Vaillant (Germany).

<sup>14</sup> CECED Voluntary Commitment on reducing standing losses of household storage water heaters Second annual report to the Commission of the European Communities Brussels, April 2003



### 3. Reduction in energy consumption of the European Domestic Electric Storage Water Heaters fleet. .

- The effect of this commitment was to incentivise the consumer to buy more efficient products and, in manufacture, to promote insulation and technical developments to reduce standing losses.

#### 3.1.3 The control of Legionella bacteria in water systems (2001)

- HSC L8 (2000) Control of legionella Bacteria in Water Systems is the Approved Code of Practice and Guidance for the control of Legionella bacteria in water systems and sets out the statutory requirement for dealing with this risk<sup>15</sup>.
- Although this regulation applies directly to storage water heaters in the workplace, it is assumed that its effects are also felt in the domestic sector, as manufacturers set their default settings to comply with the regulation, and it is unlikely that installers then alter them.
- Because of the risk of Legionella bacteria, the temperature of hot water in storage water heaters is maintained at 60°C, even though actual water temperature required for use is usually around 45°C. Higher water temperatures can cause unnecessary heat losses.

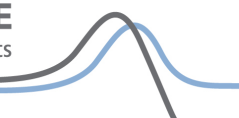
#### 3.1.4 Building Regulations - Part L Conservation of fuel and power (2006) (England and Wales, and equivalent in Scotland and Northern Ireland)

- Part L Building regulations apply to all primary storage systems, therefore ES (electric storage) are subject to Part L:
- These Regulations apply to *both* instantaneous and storage water heaters as: reasonable provision shall be made for the conservation of fuel and power in buildings by:
  - limiting heat gains and losses from pipes, ducts and vessels used for hot water services;<sup>16</sup>
  - providing and commissioning energy efficient fixed building services (in this case for Domestic Electric Water Heaters) with effective controls; i.e. compliance with the Domestic Heating Compliance Guide<sup>17</sup>.
  - providing to the owner sufficient information about the building and the fixed building services (in this case for Domestic Electric Water Heaters) and their maintenance requirements so that the building can be operated in such a

<sup>15</sup> Control of Substances Hazardous to Health Regulations 1999, Regulation 6; Management of Health and Safety at Work Regulations 1999, Regulation 3; Health and Safety at Work etc. Act 1974, Sections 2, 3 and 4. See HSE: Legionnaires' disease The control of legionella bacteria in water systems Approved Code of Practice and guidance Page 12 -13.

<sup>16</sup> Energy efficiency requirements from the Building regulations 2000 (as amended by SI 2001/335 and SI 2006/652).

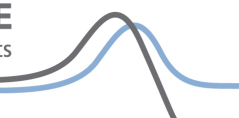
<sup>17</sup> Compliance with the Domestic heating compliance guide – Table 13 p.35 - ODPM, 2006



manner as to use no more fuel and power than is reasonable in the circumstances.

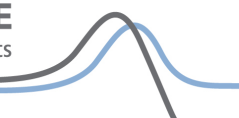
### 3.1.5 Code for Sustainable Homes (2008)

- The Code for Sustainable Homes (CfSH) is a standard for key elements of design and construction which affect the sustainability of a new home. It is the single national standard in England for sustainable homes, used by home designers and builders as a guide to development, and by homebuyers to assist in their choice of home.
- To comply with this guideline, new, publicly funded housing in England is required to achieve CfSH Level 3: this implies restricting the water consumption (hot and cold) to 105 litres per day per person by fitting low flow water fittings/devices and reducing the carbon emissions from each house by 25% against homes fully compliant with Building Regulations 2006. These two elements will together reduce the energy consumption for the production of hot water for homes complying with this standard.



**Table 3 Current policies & measures, Reference Scenario**

Policy name	Water heaters affected	Period in force	Description	Impact
Water Byelaws	Electric storage Water heaters (ES)	1989 - 1999	Allowed the storage of more than 15 litres of water under mains pressure	By reducing the loss of hot water from vented systems, this will have a small energy saving effect
CECED voluntary Commitment	Electric Storage Water Heaters (ES)	1997-2001	Voluntary commitment to reduce standing losses of domestic electric storage water heaters (DESWH).	Reduction of energy consumed by domestic electric storage water heaters produce by CECED members
The control of Legionella bacteria in water systems	Electric Storage Water Heaters (ES)	2001	UK Approved Code of Practice and Guidance related to water heaters regarding health standards. The Code aims to prevent Legionella bacteria transmission through hot water.	Sanitary hot water in storage water heaters in the UK must be maintained at 60°C, in order to prevent the growth of Legionella bacteria.
England and Wales Building Regulations - Part L Conservation of fuel and power (2006) and equivalent in Scotland and NI	Electric Storage and Instantaneous Water Heaters (ES)	2006-2010	This Approved document deals with the energy efficiency requirement in the Building Regulation 2006.	Comply with Domestic Heating Compliance Guide regarding water heating cylinders insulation, standing heat loss and labelling.
Code for Sustainable Homes (CfSH)	All products	2007 (latest revision 2009) NB England only	Standard for key elements of design and construction which affect the sustainability of a new home including energy and CO <sub>2</sub> emissions, water, waste, etc.	Level 3 of the Code (mandatory for new, publicly funded housing) requires restriction of water consumption to 110 litres per day per person and reduction in carbon emissions of 25%. This will have a greater effect on consumption of hot water but may also lead to improved efficiency.



## 3.2 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
Water Byelaws	1989 - 1999								
CECED voluntary Commitment	1997-2001								
The control of Legionella bacteria in water systems	2001		Revised						
Building Regulations - Part L Conservation of fuel and power	2006		2010				Expected		
Code for Sustainable Homes (CfSH)	2009		110 l/p/d target expected			105 l/p/d target expected			80 l/p/d target expected


## 4 Test Standards

Test Standard name	Date in force	Description	Comments
<i>EN 50193: Closed electrical instantaneous water heaters: methods for measuring performance</i>	1997	Applies to hydraulic, closed electrical instantaneous water heaters for household and similar use. It does not apply to water heaters with electronically controlled power input. <sup>18</sup>	This standard specifies the definitions, rated power input, dimensions for connection and tests for assessing the performance characteristics. It is considered equally applicable under all scenarios

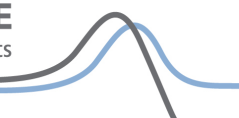
<sup>18</sup> Preparatory Study on Eco-design of Water Heaters: task 1 report (final); 2007 p28 ; Kemna *et al*

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Test Standard name	Date in force	Description	Comments
<i>EN – IEC 60379: Methods for measuring the performance of electric storage water heaters for household purposes</i>	2004	Lays down and defines the principal performance characteristics and describes the standard methods of describing these.	Does not deal with performance requirements, but with general notes on measurement
<i>HD 500 s1 (IEC)</i>	1998	Test standard for the efficiency of electric storage water heaters	



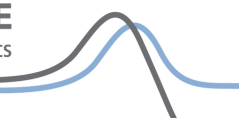
## 5 Efficiency

### 5.1 Summary

- In order to estimate the effect of efficiency requirements or technology switching on domestic energy use due to future policies a model must be used.
- In the chart below, specific efficiency (%) for each size category of each product type has been multiplied by the corresponding sales, weighted by average usage, to display efficiency improvement in terms of average demand (kWh) per annum, for each product type.
- It has been assumed that no improvement in water heater efficiency will occur in the Reference Scenario, as this efficiency in this market is thought to be driven solely by regulation.



**Figure 3 Sales-weighted average efficiency by product type**



## 5.2 Data sources – efficiency

**Table 4 Efficiency data sources**

Year	Reference	Reference date	Author	Justification	Confidence in sources (High/Low)
2006	Ecohotwater-Water Heater Model-draft v2	9 May 2007	Rene' Kemna, Martijn van Elburg, William Li, Rob van Holsteijn	EU proposed calculation model	High
2006	Ecohotwater/ Preparatory Study on Water Heaters-Task 5 Report – (final)	30 Sept 2007	Rene' Kemna, Martijn van Elburg, William Li, Rob van Holsteijn	EU proposed method for energy efficiency calculation.	High

## 5.3 Methodology & key assumptions – efficiency

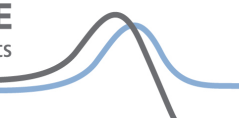
- This section describes the model that has been used and the data fed into this model in order to obtain efficiency values.
- The modelling of the energy efficiency of Domestic Dedicated Electric Water Heaters has adopted the definitions and methodology set out in the proposed ErP measure on Water Heaters (including associated Annex IV and calculation tool Ecohotwater<sup>19</sup> prepared by Van Holsteijn en Kemna (VHK) for the European Commission, DG Transport and Energy (DG TREN) to calculate the efficiency of domestic water heating systems).
- In these documents:
  - Specific Efficiency is defined in draft ErP legislation<sup>20</sup>
  - The primary efficiency is distinguished from the specific efficiency of a product. The specific efficiency<sup>21</sup> for a specific load profile is defined as the ratio of the minimum theoretical energy consumption to generate the required energy load to the actual primary energy consumption. The consumption calculation includes the impact of smart controls and adjustments for distribution losses within the building.

<sup>19</sup> Ecohotwater ---Water Heater Model--- DRAFT v.2 (9 May 2007)

[http://www.ecohotwater.org/public/ECOHOTWATER\\_Model\\_with%20ex.xls](http://www.ecohotwater.org/public/ECOHOTWATER_Model_with%20ex.xls)

<sup>20</sup> The Energy related Products Directive (ErP), in this paper referring to the documents for Lot 2, Water Heaters.

<sup>21</sup> ErP Working Document, Annex IV on Eco-design implementing measures for dedicated water heaters Draft v2 - European Commission - Brussels, (June 2008)



- Annex IV is supported by a calculation model, “Ecohotwater” which calculates the efficiency and energy consumption of Domestic Dedicated Electric Water Heaters.
- Three Dedicated Domestic Electric Water Heater types are modelled, classified according to Task 6 of the ErP Preparatory Study on Ecodesign of Water Heaters. These are:
  - Electric Storage (ES)
  - Electric Instantaneous (with electric flow rate controls - EI)
  - Electric Instantaneous (with hydraulic flow rate controls e.g. electric showers - EIH).

Ecohotwater contains 26 main input parameters and a number of derived parameters e.g. tank volume, losses, etc. The parameters that have been modelled to obtain the water heater system efficiencies and energy consumption are:

### General parameters

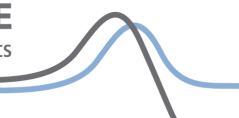
- Water heater envelope volume: litres
- Combustion air intake: room sealed, none (electric)
- Noise: dB-A
- Location: indoors or outdoors

### Generator

- Max and Min heat power: output in kilowatt
- Heat Loss off at 50°C: kilowatt
- Fuel/air mix control: atmospheric, pneumatic, ionisation, none (elec)
- Pilot-flame power: kilowatt
- Electricity at power off/max/min: kilowatt
- Water heater mass excluding the tank: kilogram
- Water content: litres
- Instant temperature control: none, hydraulic, electric.

### Storage

- Tank volume: litres
- Tank reference heat loss: watt
- Smart control factor: yes, no
- Mixing factor: this number can influence the tank size
- Heat transfer to domestic hot water: indirect (single/double coil), direct and/or direct.



- For the purpose of this study water heating products are classified according to their heating load profile as defined in Annex C of the ErP Working Document, Annex IV<sup>22</sup>.
- There are nine load profiles defined<sup>23</sup> for water heaters, denominated XXS, XS, S, M, L, XL, XXL, 3XL, 4XL. Each load profile has a predefined 24h water-tapping pattern, each of which containing:
  - start time
  - minimum flow rate
  - useful hot water energy to be drawn-off; and (for some tapplings)
  - minimum peak temperature.
- “The Water Heater heating load is declared by the manufacturer and it is used to establish the primary energy efficiency of the product and comply with the minimum performance requirements posed by the selected pattern”.<sup>24</sup>
- For the electricity consumption a primary energy conversion factor of 2.5 is applied.
- The ErP sizes for Dedicated Domestic Water Heaters are listed in Table 5.
- Table 5 below and are classified by:
  - Water heater envelope volume: litres
  - Max and Min heat power: output in kilowatt
  - Heat Loss off at 50°C: kilowatt
- focuses only on domestic electric water heaters, the relevant classes have been reduced to six for ES water heaters (from XXS to XL), to four for EI (from XXS to M) and two for EIH (XXS and XS).
- For the Storage and Instantaneous Dedicated Domestic Water Heaters reference scenario, the key parameters listed above have been defined in Table 5.

**Table 5 Specification for the Reference Scenario classified by ErP size (Dedicated Domestic Electric Water heaters).**

ErP SIZE	XXS	XS	S	M	L	XL
WH Envelope volume [m <sup>3</sup> ]	0.01 - 0.02	0.02 - 0.03	0.1 - 0.05	0.05 - 0.18	0.39	0.45

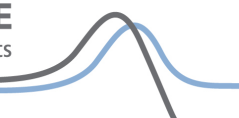
<sup>22</sup> Draft V2, European Commission, Brussels, 29/06/2008

<sup>23</sup> ErP Working Document, Annex IV on Eco-design implementing measures for dedicated water heaters Draft v2 - European Commission - Brussels, (June 2008)

<sup>24</sup> *Ibid.*

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ErP SIZE	XXS	XS	S	M	L	XL
Max heat power/kW	2 - 8	2 - 8	2.5 - 18	2.5 - 23	2.5	3
Primary Energy factor	2.5	2.5	2.5	2.5	2.5	2.5
Heat loss off at 50°C <sup>25</sup>	0.10	0.1 - 0.05	0.05 - 0.1	0.05 - 0.1	0.1	0.1
Tank Volume [litres]	10	20	30	80	120	150

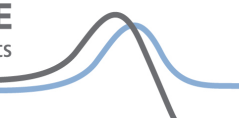
Note: For all electrical water heaters, a generation efficiency of 100% is assumed. This excludes losses from any storage tank or distribution pipework.

- The key parameters (above) have been defined for each type (ES, EI and EIH) and size (from XXS to XL) of dedicated domestic electric water heater as typical of products currently sold in the UK.
- For each typical product Ecohotwater calculated the energy efficiency and total energy consumption.
- Table 6, Table 7 and Table 8 list energy efficiency and primary energy consumption for each type of dedicated domestic electric water heaters modelled for 2008 data, split into the ErP size categories.
- From 1986 to 2012 the efficiency and energy consumption calculated for each size range has been weighted by product sales for each year.

**Table 6 Efficiency and energy consumption for each system size (ES)**

WATER HEATERS 2008	XXS	XS	S	M	L	XL
Typical storage size (litres)	<10	10-15	15-30	80	120	150
Electric storage - ES (% sales)	29.8	63.1	4.6	1.2	0.7	1.0
Specific Efficiency (%)	25	25	22	27	27	29
Energy Consumption (kWh/yr, each)	1,777	1,777	2,174	4,669	9,478	14,320

<sup>25</sup> Standby losses at 50°C average at a base temperature of 20°C ambient. This stands for the average energy loss during the cool down period.



**Table 7 Efficiency and energy consumption for each system size (EI)**

WATER HEATERS 2008	XXS	XS	S	M
Min power <sup>26</sup> (kW)	6.3	12.5	15.7	18.8/23.3
Electric instantaneous – EI (% sales)	90.0	3.7	3.8	2.5
Specific Efficiency (%)	34	34	34	38
Energy Consumption (kWh/yr, each)	1,338	1,369	1,350	3,400

**Table 8 Efficiency and energy consumption for each system size (EIH)**

WATER HEATERS 2008	XXS	XS
Min power (kW)	6.3	12.5
Electric instantaneous <sup>27</sup> – EIH (% sales)	90	10
Specific Efficiency (%)	30	34
Energy Consumption (kWh/yr, each)	1,513	1,348

### 5.3.1 Historic data

- Annual average efficiency has been weighted (by product size) using 2006 sales data from BRG Consult<sup>28</sup>, for each of the product categories defined above.

### 5.3.2 Future analysis

**Table 9 Extrapolation & background calculations – efficiency**

Year	Methodology & assumptions
1986 – 2005; 2007 - 2030	The same methodology (average efficiency is sales-weighted by size) applied to calculate the annual average efficiency for 2006 has been applied to the years before and after, to 2030. No change to efficiency of each product has been assumed. Changes to the split of sales by product type and size have been assumed (as described in the Key input Briefing Note)

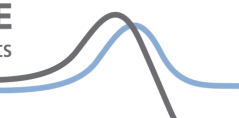
## 5.4 Data issues – efficiency

- Ecohotwater is a complex tool and it is still in draft format.

<sup>26</sup> Quoted in the ErP Working Document on possible Ecodesign Energy labelling and Installation requirements for Water Heaters (July 2008): Minimum power of 100/80% efficiency at steady state.

<sup>27</sup> Electric showers

<sup>28</sup> BRG Consult UK-5-1, July 2008, UK Heating 2008 –International market strategy – United Kingdom

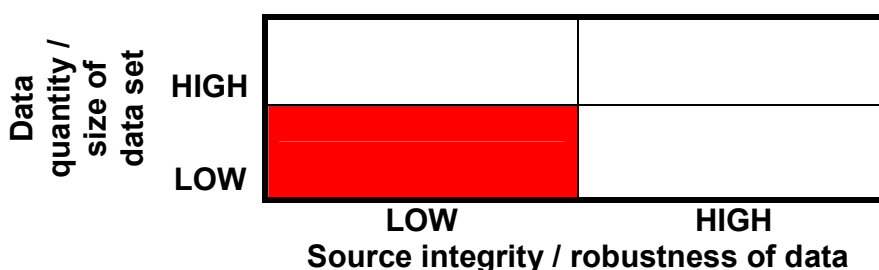


**Table 10 Data issues – efficiency**

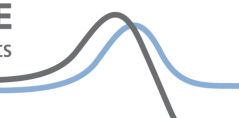
Issue/risk	Approach taken/rationale
Efficiency of typical UK water heaters is difficult to determine, due to a lack of data.	Efficiency data taken from (draft) Ecohotwater and Preparatory Study on Ecodesign of Water Heaters (2006 only); future development of efficiency methodologies and data are to be kept under review.

## 5.5 Confidence level – efficiency

- Confidence level is low due to scarcity of information about water heater size [kW] and sales breakdown related to the time line (1986-2030). Calculation of efficiency is based on a single product for each category.



**Figure 4 Confidence indicator for efficiency data**



## Related MTP information

- BNDH EWH01: Domestic Electric Water Heaters Government Standards Evidence Base 2009: Key Inputs
- BNDH EWH03: Domestic Electric Water Heaters Government Standards Evidence Base 2009: Policy Scenario
- BNDH EWH04: Domestic Electric Water Heaters Government Standards Evidence Base 2009: BAT Scenario
- BNDH KO01: Domestic Central Heating Government Standards Evidence Base 2009: Key outputs

## Changes from previous version

- None. 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 <http://efficient-products.defra.gov.uk>