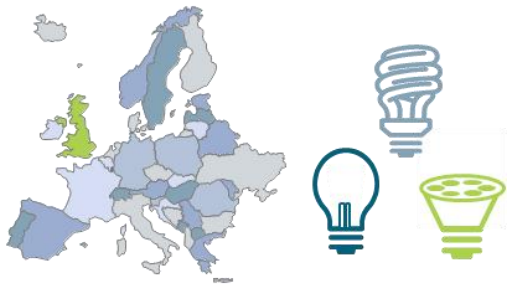
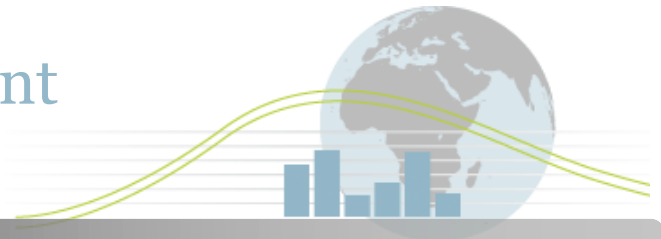


4E

Mapping Document



Country: United Kingdom

Technology: Domestic Lighting

Sub Category: All domestic lamps

Introduction

The first stage in the Mapping and Benchmarking process is the definition of the products, i.e. clearly setting the boundaries that define the products for use in data collection and analysis. The definition ensures that comparisons between the participating countries are performed against a specific and consistent set of products/criteria.

The summary definition for this product is:

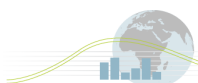
“Lighting products that perform the vast majority of illumination applications within the Hence data was sought (where possible) for the following lighting product types (subdivided by wattage buckets):

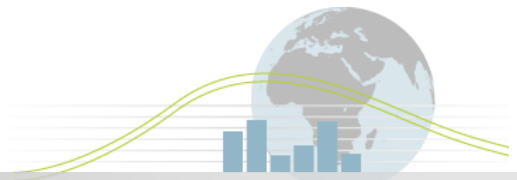
- Mains Voltage Incandescent
- Mains Voltage Halogens (Single and Double Ended)
- Low Voltage (12V) Halogen
- Pin Based and Self Ballasted CFLs
- Linear Tubes (T12, T8 and T5) *
- Retrofit LEDs
- Dedicated LEDs

** NOTE: The subsequent analysis in the associated benchmarking report¹ excludes linear fluorescent tubes as, for those countries submitting data, these lamps constituted a small proportion of use in the domestic sector.*

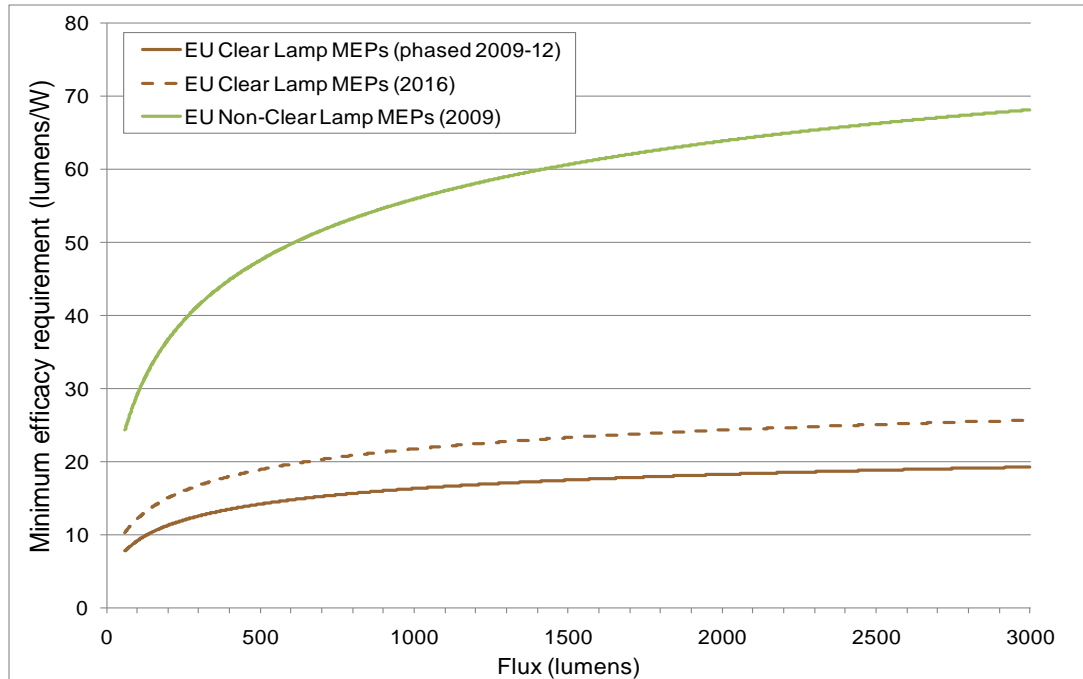
A full product definition is provided at the annex website².

¹ see <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>





Phase out regulations for domestic lighting – UK



Key notes on Graph (see notes section 1)

National regulations based on pan EU requirement as follows:

- At the time of preparation, regulations for “domestic lighting” covered only non-directional lighting. Proposals for the regulation of directional lighting are well underway and announcements are expected in the near future.
- Each Ecodesign requirement shall apply in accordance with the following stages (with some exceptions)²:

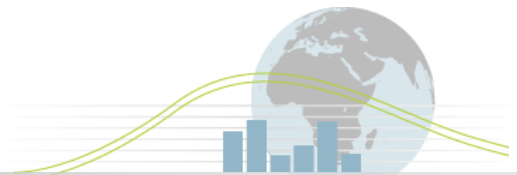
	Stage	Date	Range	Equivalent to lamps below EU Energy Class
Clear Lamps	1	01. Sept. 2009	>950lm (~80W GLS) <950lm (Energy Class F&G)	C F&G
	2	01. Sept 2010	>725lm (~65W GLS)	C
	3	01. Sept 2011	>450lm (~45W GLS)	C
	4	01. Sept 2012	>60lm (~7W GLS)	C
	5	01. Sept 2013	2013 Increased quality requirements ³	C
	Anticipated Review 2014			
	6	01. Sept. 2016	>60lm	B ⁴
Non clear (frosted) lamps ⁵		01. Sept. 2009	All Lamps	A

² Table derived from European Lamp Federation summary information (http://www.elcfd.org/documents/Questions%20and%20answers%20on%20the%20EU%20decision%20to%20phase%20out%20incandescent%20lamps_external_20090318_final.pdf)

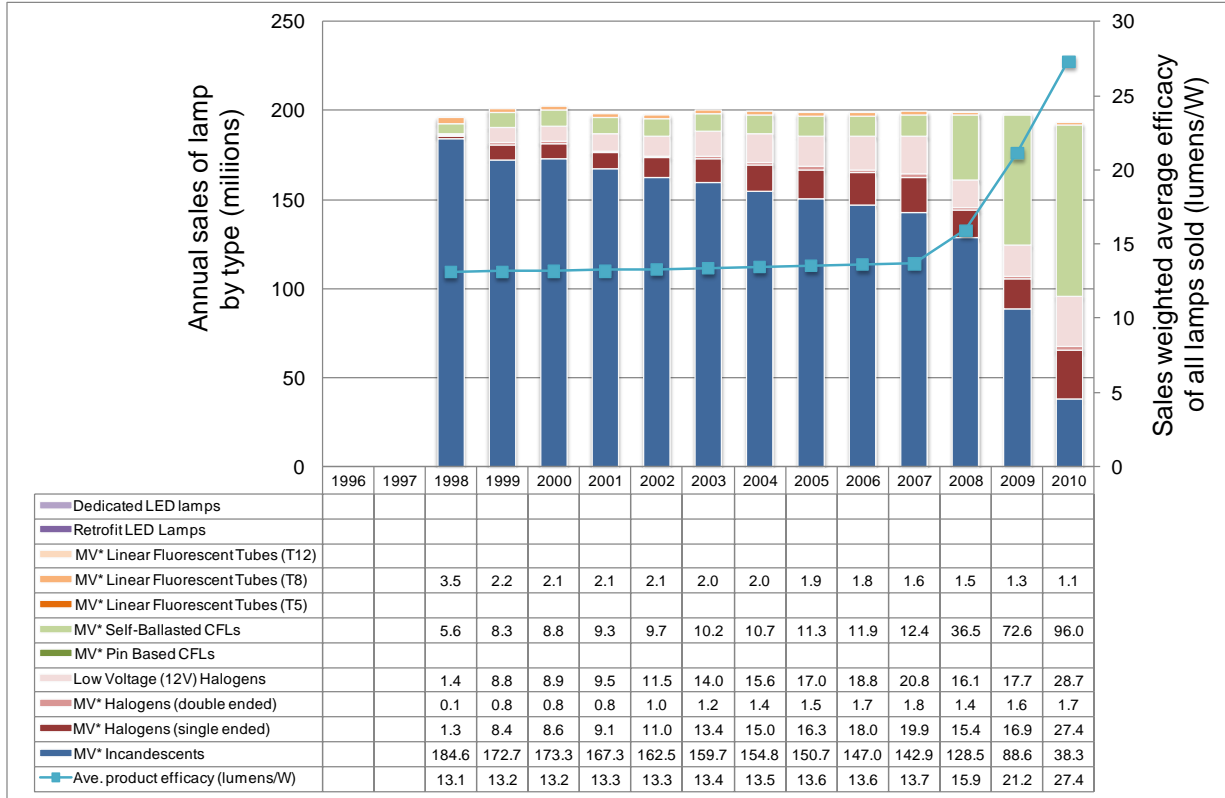
³ Incandescent lamps with S14, S15 or S19 caps are included in stage 5 & 6

⁴ Except for clear lamps with G9/R7s caps: EEL C

⁵ The curve shown is for non-clear lamps. Lamps with a second envelope, eg covered CFLs, have an efficacy requirements 5% lower than this general non-clear requirement. Section 2c of Regulation 244/2009 formally defines second envelope lamps as: “Second lamp envelope” is a second outer lamp envelope which is not required for the production of light, such as an external sleeve for preventing mercury and glass release into the environment in case of lamp breakage, for protecting from ultraviolet radiation or for serving as a light diffuser”.

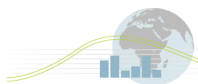


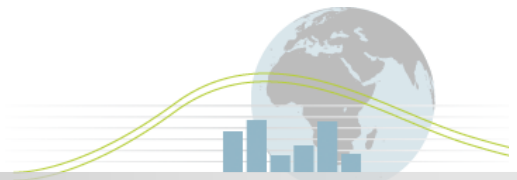
Sales and average efficacy of all domestic lamps - UK



Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps



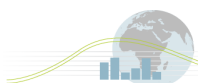


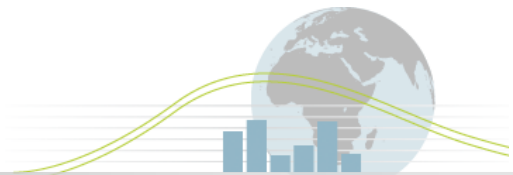
Total instantaneous light output of all domestic lamps sales - UK



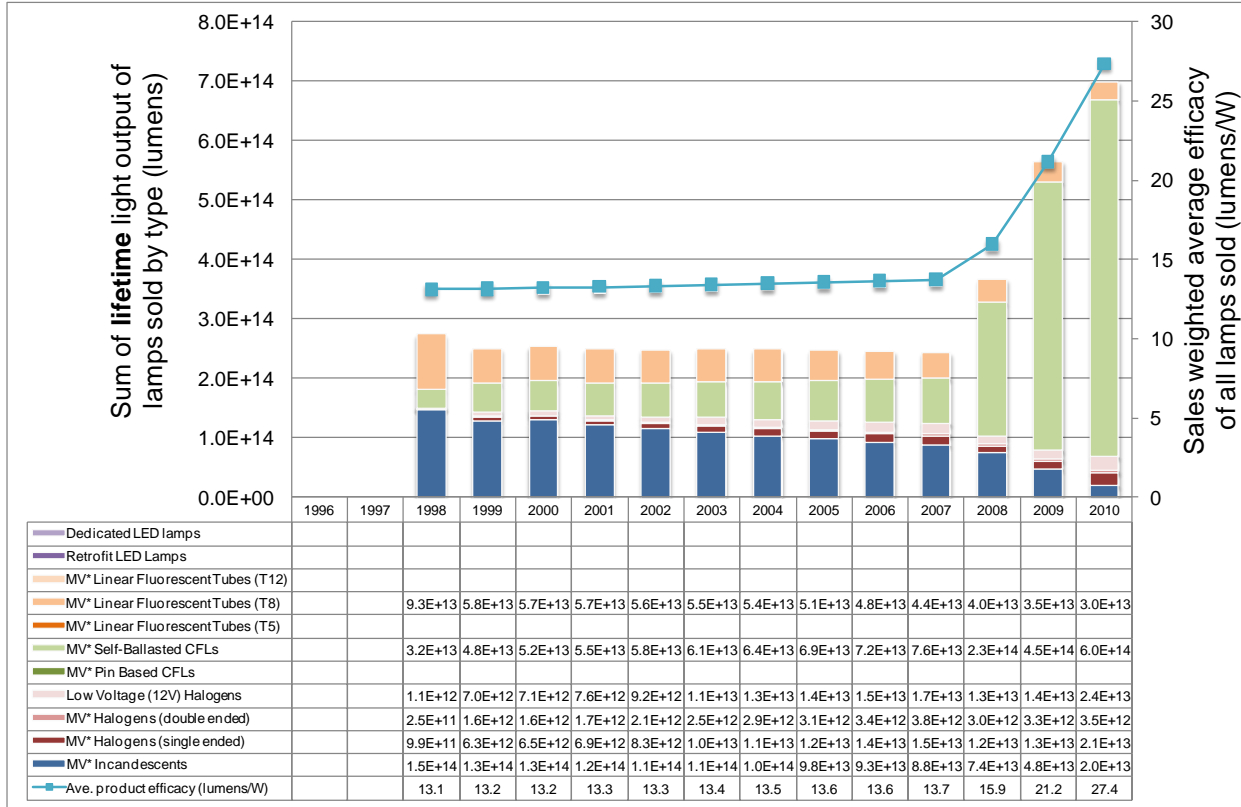
Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Instantaneous light output calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps
- Instantaneous light output is for lamps sold in each year only, *not* all installed stock





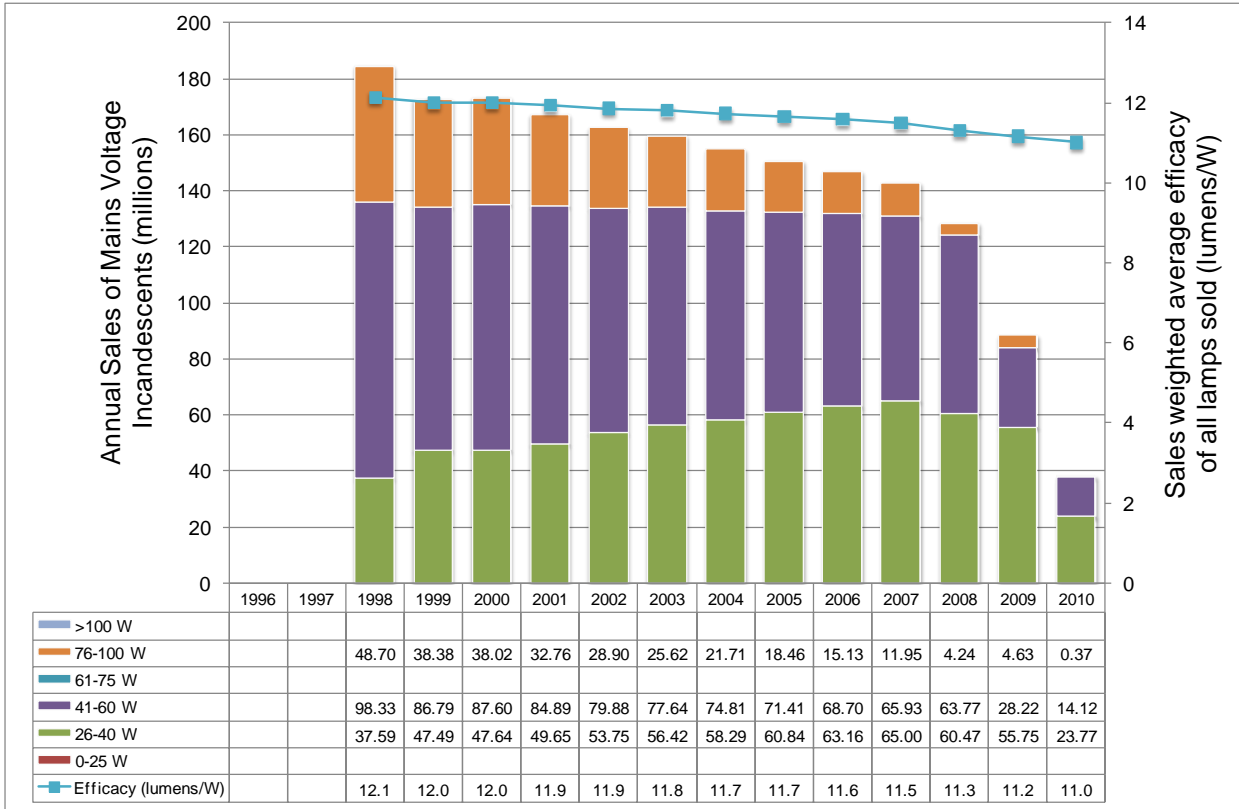
Total lifetime light output of all domestic lamps sales - UK



Key notes on Graph (See notes section 2)

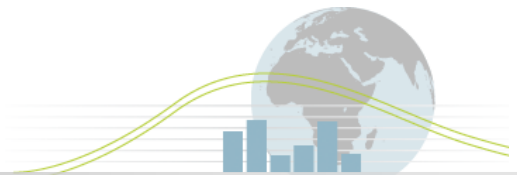
- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Lifetime light output calculated on a sales weighted basis using estimated average global efficacies and lifetimes for each lamp type and associated wattage range for 230V lamps
- Lifetime light output is for lamps sold in each year only, not all installed stock

Sales of Mains Voltage Incandescent lamps by wattage range - UK

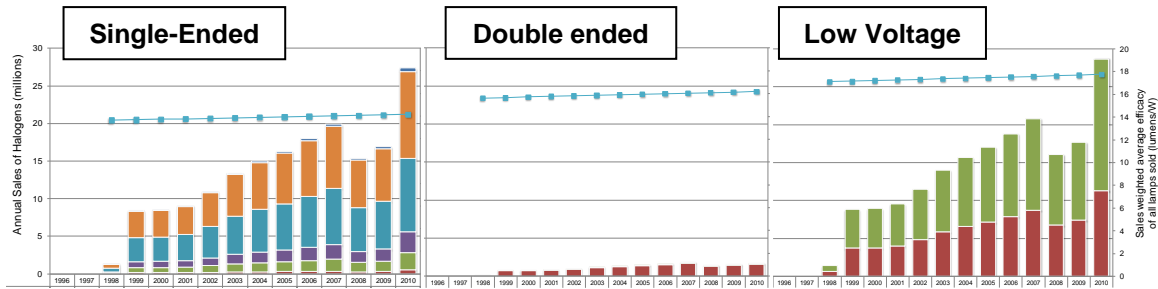
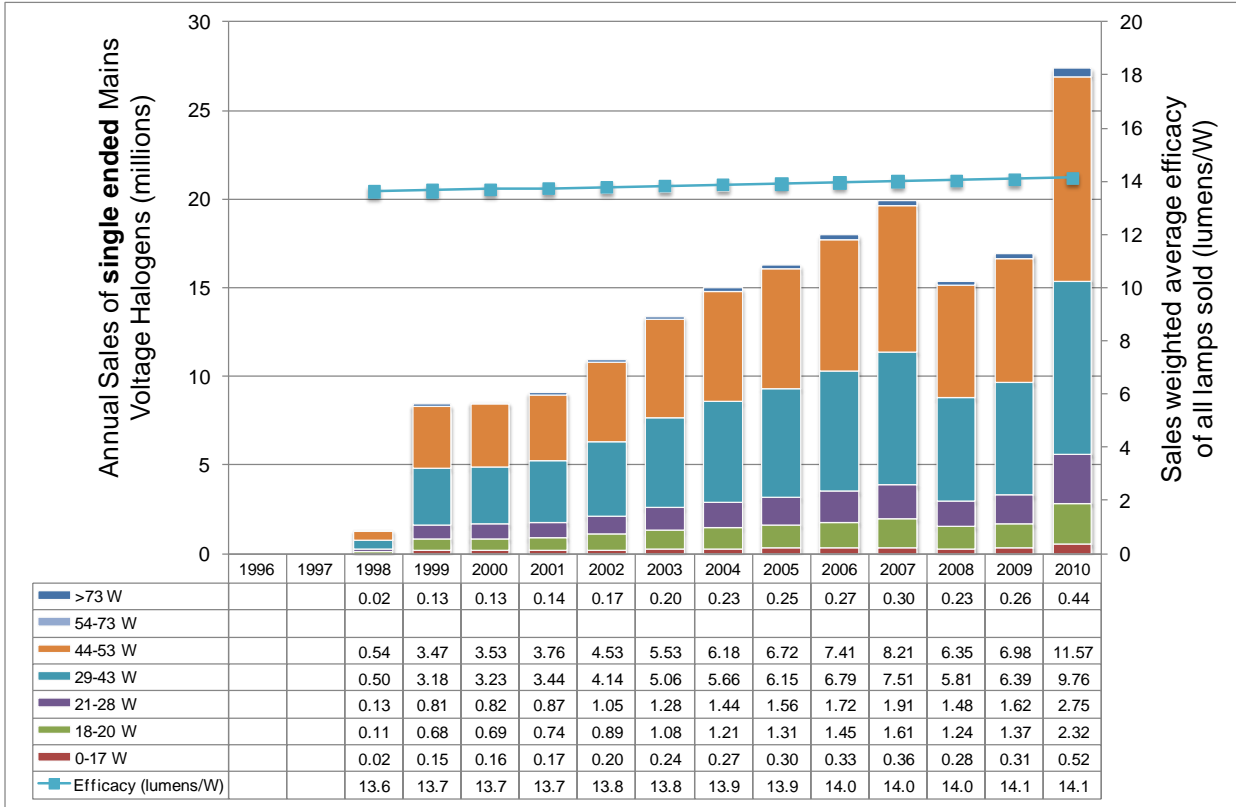


Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps

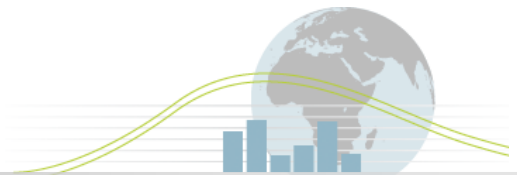


Sales of Single Ended Mains Voltage Halogen lamps by wattage range - UK

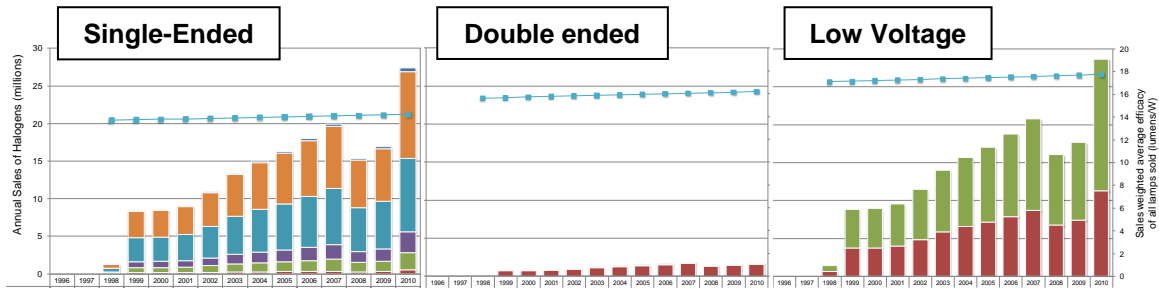
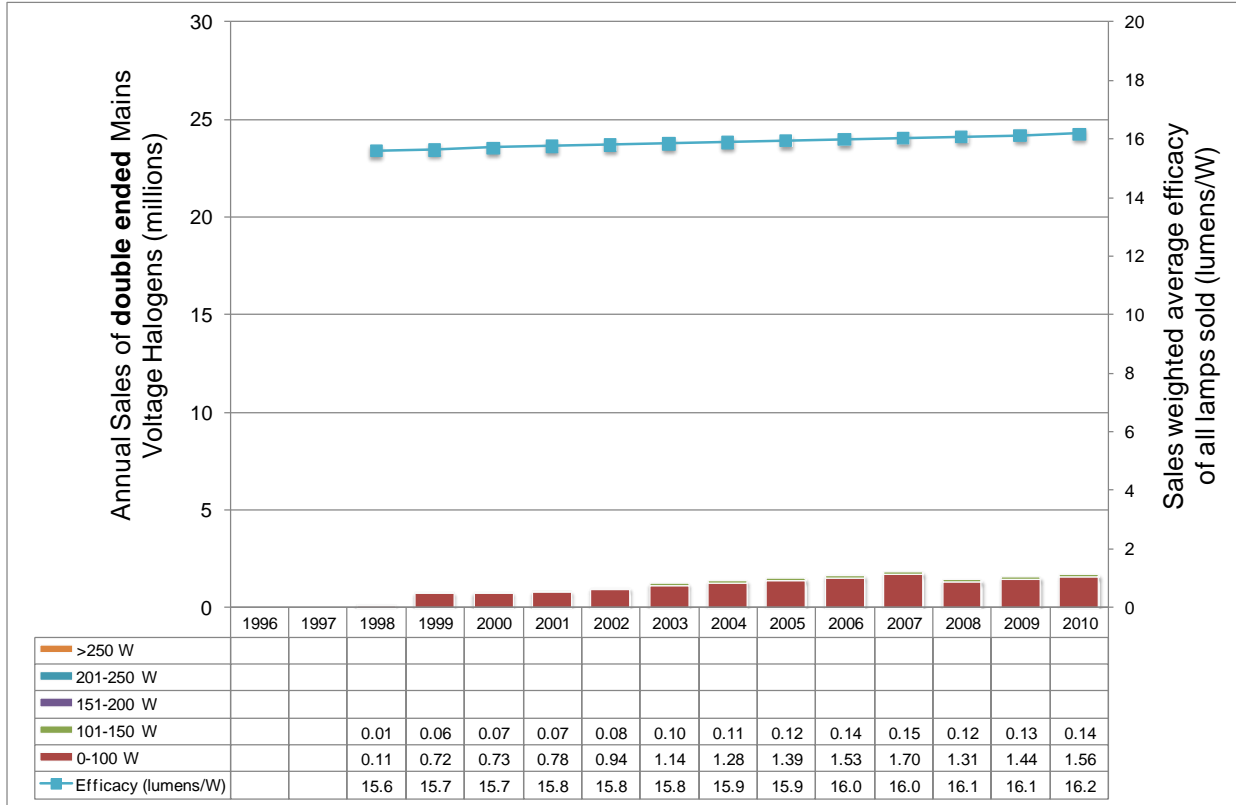


Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps



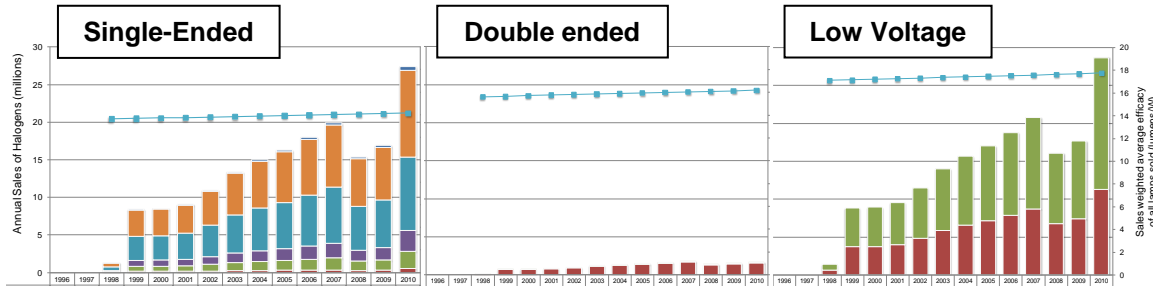
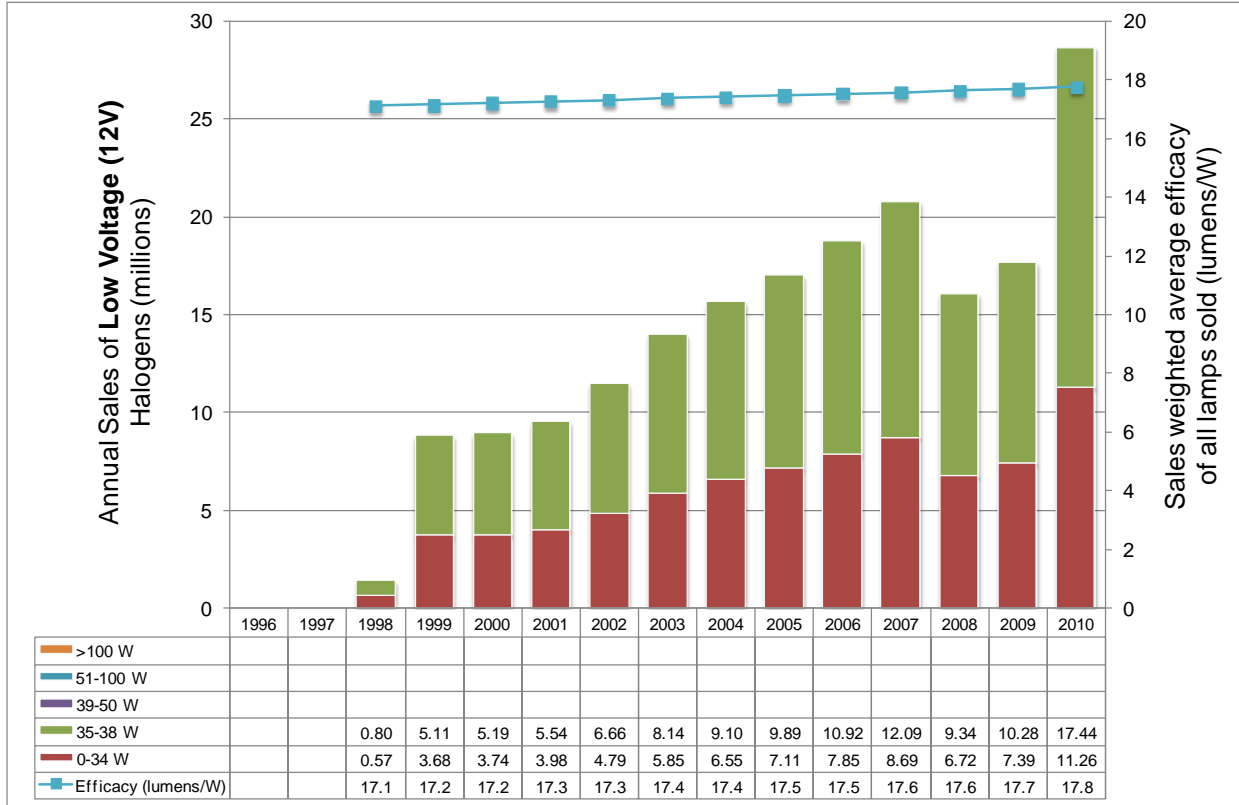
Sales of Double Ended Mains Voltage Halogen lamps by wattage range - UK



Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps

Sales of Low Voltage (12V) Halogen lamps by wattage range – UK

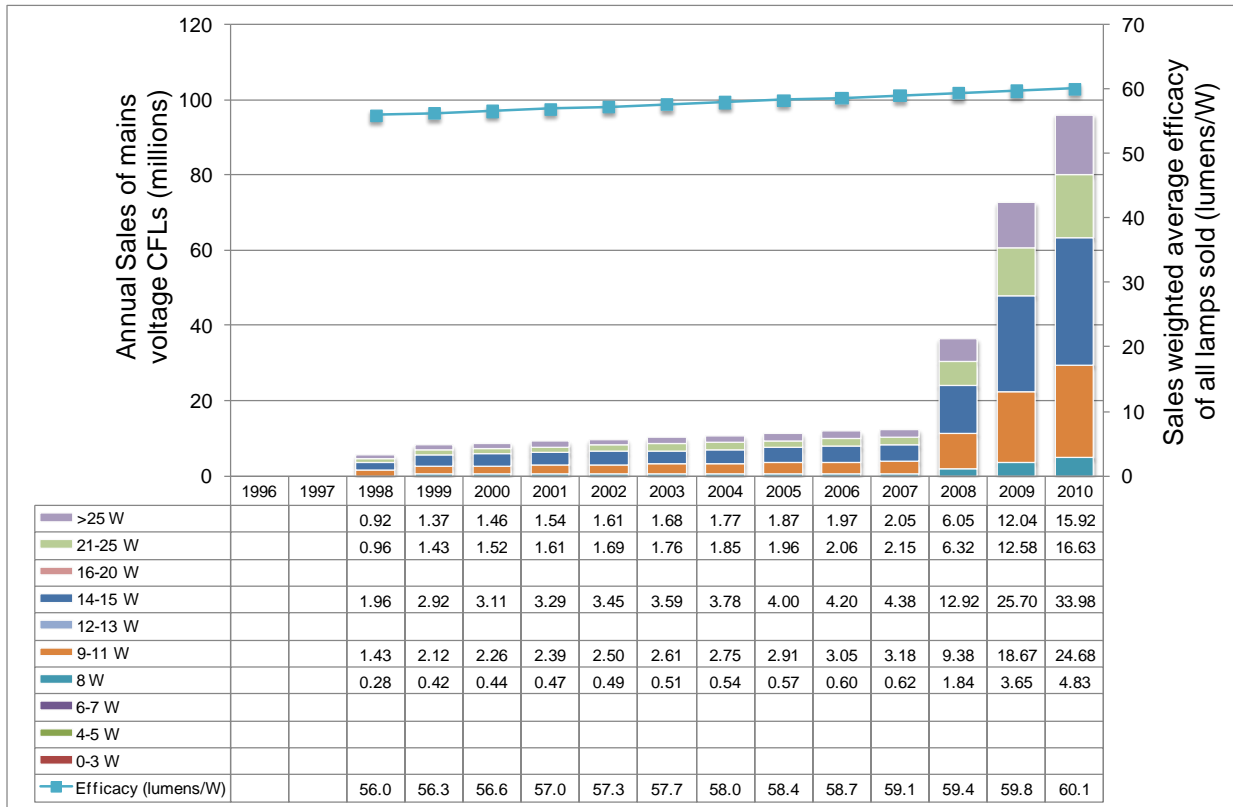


Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps

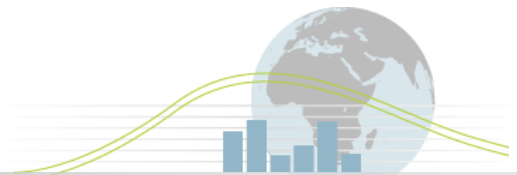
Sales of mains Voltage CFL lamps by wattage range

UK



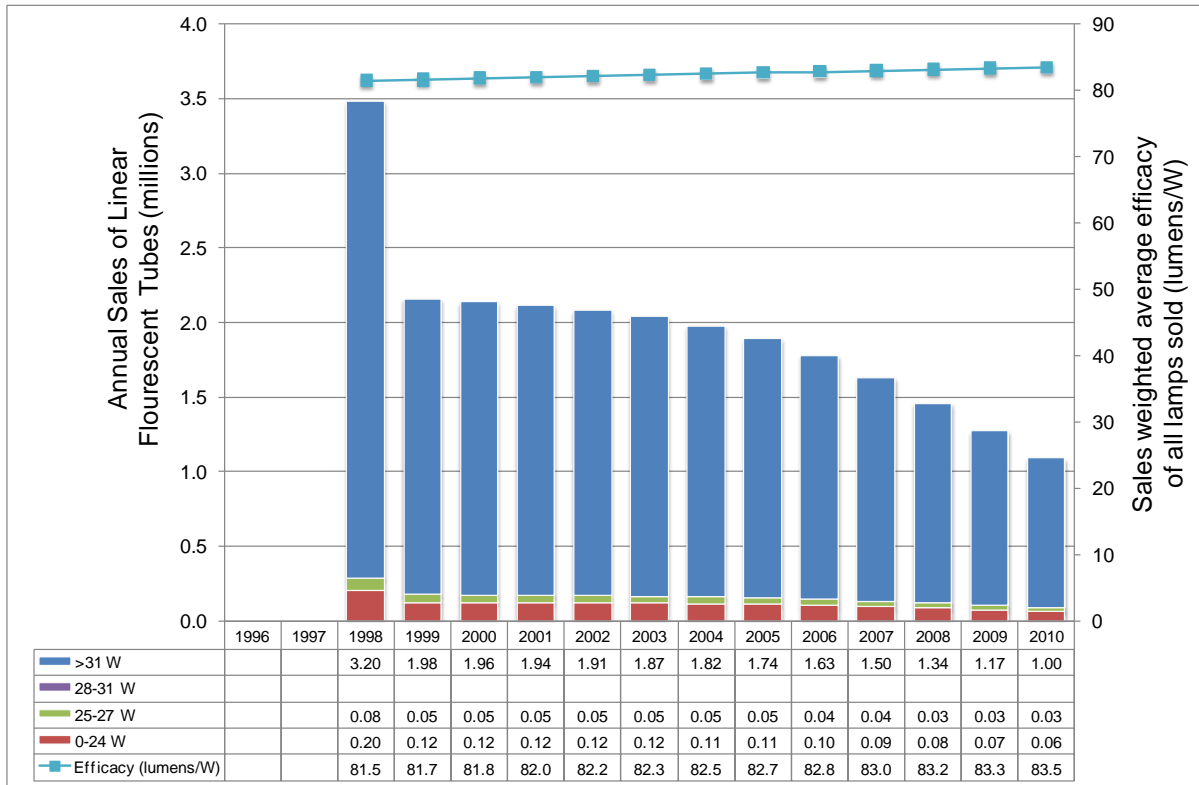
Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps
- No details of the breakdown of CFL sales between self-ballasted and pin-based lamps was available to the Annex at the time of publication. All lamps were assumed to be self-ballasted for the purpose of the analysis.



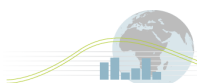
Sales of Linear Fluorescent Tubes by wattage range

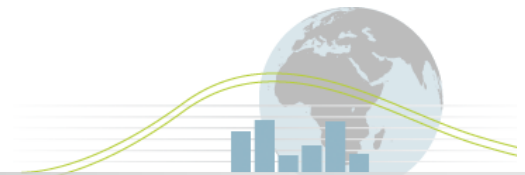
UK



Key notes on Graph (See notes section 2)

- Projections derived from annual sales values based on a modelling (although with supporting verification). Data supplier views the sales values provided as relatively robust (with some caveats) for all domestic (household) sector lamps used *in the residential sector only*
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 230V lamps
- No details of the breakdown of Linear Fluorescent Tubes sales between T5, T8 and T12 lamps was available to the Annex at the time of publication. All lamps were assumed to be T8 for the purpose of the analysis.

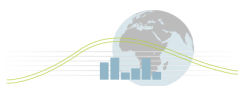




Sales of LED lamps by wattage range

UK

No data on the sales of dedicated or retrofit LED lamps in the UK was available to the Annex at the time of publication.



Major Policy Interventions (See notes Section 3)

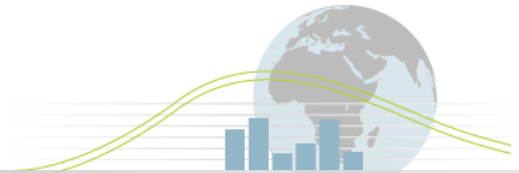
Policies actions fall into 2 categories, pan-EU member requirements and national interventions.

Pan-EU requirements:

- 1) **Mandatory MEPS:** As summarised above and described in notes section 1
- 2) **Mandatory Product Labelling:** From the 1 July 1999 (with exclusions until 31 December 2000), lighting products within the EU have been required to carry compulsory energy A-G labels (the packaging/labelling requirement is extended by the MEPS noted above)

National Level Interventions

- 3) **Building Code Requirements:** Requirements for the inclusion of efficient lighting within new residential properties have been in place since 2002 and have been incrementally strengthened.
- 4) **Voluntary Retailer Commitment:** Prior to the EU announcement of “phase-out” and subsequent regulations, the UK Government and major UK retailers had negotiated a voluntary commitment to incrementally remove inefficient lighting (the majority of incandescent lamps) between 2007 and 2010.
- 5) **Energy Efficiency Commitment (2002-2008) and Carbon Emissions Reduction Target (2008-2011):** Under these regulations, utility companies have been required to implement efficiency actions for user groups. As a result, large numbers of CFLs have been distributed (often free of charge). This has led to particularly high “sales” figures for CFLs between 2007-2009. However, an unknown number of these lamps are thought not yet to be *installed* in sockets.

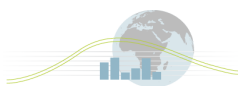


Cultural Issues (See Notes Section 4)

The primary “cultural” feature relevant is there has been a trend for replacing fluorescent tubes or GLS lamp in kitchens and bathrooms (and other living rooms) with multiple tungsten halogen reflector lamps since 1998.

Of additional interest:

- Total installed stock of lamps in the UK residential sector is estimated by the Market Transformation Programme to be 555 million in 1998 (23.9 million households), rising to 692 million in 2010 (26 million households).



Notes on data

Section 1: Notes on Phase out regulations

1.1 Overview

The European Union announced their intention to “phase-out inefficient lighting” in April 2007.

At the time of preparation, regulations for “domestic lighting” covered only *non-directional lighting*. Proposals for the regulation of *directional lighting* are well underway and announcements are expected in the near future. Separate provisions are in place for street lighting and commercial lighting.

Implementation of regulations is required to occur at the national level (ie individual EU member states) by inclusion in their relevant regulatory process within the timescales defined by the European Union.

1.1.1 Regulatory Requirements for Non-Directional Lighting

The Regulation was adopted and published in the EU Commission Official Journal on 18 March 2009 as Commission Regulation (EC) No 244/2009 (attached). It becomes law 20 days after publication in the Official Journal. Key items within this text are as follows⁶:

1.1.1.1 Overall requirement

(5) Products subject to this Regulation are designed essentially for the full or partial illumination of a household room, by replacing or complementing natural light with artificial light, in order to enhance visibility within that space. Special purpose lamps designed essentially for other types of applications (such as traffic signals, terrarium lighting, or household appliances) and clearly indicated as such on accompanying product information should not be subject to the ecodesign requirements set out in this Regulation.

(6) New technologies emerging on the market such as light emitting diodes should be subject to this Regulation.

(7) The environmental aspects of the products covered that are identified as significant for the purposes of this Regulation are energy in the use phase as well as mercury content and mercury emissions.

(9) Although the mercury content of compact fluorescent lamps is considered to be a significant environmental aspect, it is appropriate to regulate it under Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

⁶ While the official journal reference may be followed, interested parties are recommended to visit the http://www.lightingassociation.com/pdf/EUP_DIM1_FAQ.pdf. The link is to the UK Lighting Associations webpage which reproduces the legislative requirement, but also provides and interpretation of the legislation and associated other material.

(14) ... requirements should not affect functionality from the user's perspective and should not negatively affect health, safety or the environment. In particular, the benefits of reducing the electricity consumption during the use phase should overcompensate potential, if any, additional environmental impacts during the production phase of products subject to this Regulation.

(15) A staged entry into force of the ecodesign requirements should provide a sufficient timeframe for manufacturers to re-design products subject to this Regulation as appropriate.

(20) A review of this measure should take particular note of the evolution of sales of special purpose lamp types so as to verify that they are not used for general lighting purposes, of the development of new technologies such as LEDs and of the feasibility of establishing energy efficiency requirements at the 'A' class level as defined in Commission Directive 98/11/EC of 27 January 1998 implementing Council Directive 92/75 with regard to energy labelling of household lamps

(21) The requirements contained in this measure allow halogen lamps of socket G9 and R7s to remain on the market for a limited period of time, recognising the need to service the existing luminaire stock, to prevent undue costs on consumers and to give time to manufacturers to develop luminaires dedicated to more efficient lighting technologies.

1.1.1.2 *Subject matter and scope (within Article 1)*

... requirements for the placing on the market of non-directional household lamps, including when they are marketed for non-household use or when they are integrated into other products.

1.1.1.3 *Timings (within Article 3)*

Defined within Article 3:

Each ecodesign requirement shall apply in accordance with the following stages:

- Stage 1: 1 September 2009,
- Stage 2: 1 September 2010,
- Stage 3: 1 September 2011,
- Stage 4: 1 September 2012,
- Stage 5: 1 September 2013,
- Stage 6: 1 September 2016.

Defined within Annex II:

Incandescent lamps with S14, S15 or S19 caps shall be exempted from the efficacy requirements of Stages 1 to 4 as defined in Article 3 of this Regulation, but not from Stages 5 and 6

1.1.1.4 *Technical Requirements (Annex 1)*

Defined within Annex II:

The maximum rated power (P_{max}) for a given rated luminous flux (Φ) is provided in Table 1.

The exceptions to these requirements are listed in Table 2 and the correction factors applicable to the maximum rated power are in Table 3.

Table 1

Application date	Maximum rated power (P_{max}) for a given rated luminous flux (Φ) (W)	
	Clear lamps	Non-clear lamps
Stages 1 to 5	$0,8 * (0,88\sqrt{\Phi}+0,049\Phi)$	$0,24\sqrt{\Phi}+0,0103\Phi$
Stage 6	$0,6 * (0,88\sqrt{\Phi}+0,049\Phi)$	$0,24\sqrt{\Phi}+0,0103\Phi$

Table 2

Exceptions

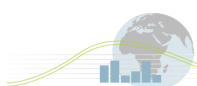
Scope of the exception	Maximum rated power (W)
Clear lamps $60 \text{ lm} \leq \Phi \leq 950 \text{ lm}$ in Stage 1	$P_{max} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps $60 \text{ lm} \leq \Phi \leq 725 \text{ lm}$ in Stage 2	$P_{max} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps $60 \text{ lm} \leq \Phi \leq 450 \text{ lm}$ in Stage 3	$P_{max} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps with G9 or R7s cap in Stage 6	$P_{max} = 0,8 * (0,88\sqrt{\Phi}+0,049\Phi)$

The correction factors in Table 3 are cumulative where appropriate and also applicable to the products covered by the exceptions of Table 2.

Table 3

Correction factors

Scope of the correction	Maximum rated power (W)
filament lamp requiring external power supply	$P_{max}/1,06$
discharge lamp with cap GX53	$P_{max}/0,75$
non-clear lamp with colour rendering index ≥ 90 and $P \leq 0,5 * (0,88\sqrt{\Phi}+0,049\Phi)$	$P_{max}/0,85$
discharge lamp with colour rendering index ≥ 90 and $T_c \geq 5\,000 \text{ K}$	$P_{max}/0,76$
non-clear lamp with second envelope and $P \leq 0,5 * (0,88\sqrt{\Phi}+0,049\Phi)$	$P_{max}/0,95$
LED lamp requiring external power supply	$P_{max}/1,1$



Additional functionality requirements for CFLs (Table 4 Annex II):

Functionality parameter	Stage 1	Stage 5
Lamp survival factor at 6 000 h	≥ 0,50	≥ 0,70
Lumen maintenance	At 2 000 h: ≥ 85 % (≥ 80 % for lamps with second lamp envelope)	At 2 000 h: ≥ 88 % (≥ 83 % for lamps with second lamp envelope) At 6 000 h: ≥ 70 %
Number of switching cycles before failure	≥ half the lamp lifetime expressed in hours ≥ 10 000 if lamp starting time > 0,3 s	≥ lamp lifetime expressed in hours ≥ 30 000 if lamp starting time > 0,3 s
Starting time	< 2,0 s	< 1,5 s if P < 10 W < 1,0 s if P ≥ 10 W
Lamp warm-up time to 60 % Φ	< 60 s or < 120 s for lamps containing mercury in amalgam form	< 40 s or < 100 s for lamps containing mercury in amalgam form
Premature failure rate	≤ 2,0 % at 200 h	≤ 2,0 % at 400 h
UVA + UVB radiation	≤ 2,0 mW/klm	≤ 2,0 mW/klm
UVC radiation	≤ 0,01 mW/klm	≤ 0,01 mW/klm
Lamp power factor	≥ 0,50 if P < 25 W ≥ 0,90 if P ≥ 25 W	≥ 0,55 if P < 25 W ≥ 0,90 if P ≥ 25 W
Colour rendering (Ra)	≥ 80	≥ 80

Additional functionality requirements for lamps excluding CFLs and LEDs⁷ (Table 5 Annex II)

Functionality parameter	Stage 1	Stage 5
Rated lamp lifetime	≥ 1 000 h	≥ 2 000 h
Lumen maintenance	≥ 85 % at 75 % of rated average lifetime	≥ 85 % at 75 % of rated average lifetime
Number of switching cycles	≥ four times the rated lamp life expressed in hours	≥ four times the rated lamp life expressed in hours
Starting time	< 0,2 s	< 0,2 s
Lamp warm-up time to 60 % Φ	≤ 1,0 s	≤ 1,0 s
Premature failure rate	≤ 5,0 % at 100 h	≤ 5,0 % at 200 h
UVA + UVB radiation	≤ 2,0 mW/klm	≤ 2,0 mW/klm
UVC radiation	≤ 0,01 mW/klm	≤ 0,01 mW/klm
Lamp power factor	≥ 0,95	≥ 0,95

⁷ Where the rated lamp lifetime is higher than 2 000 h, the Stage 1 requirements for the parameters 'Rated lamp lifetime', 'Lamp Survival Factor' and 'Lumen maintenance' in Tables 4 and 5 are only applicable as from Stage 2.

1.1.1.5 Exemptions/Exclusions

Defined within Article 1:

- a) lamps having the following chromaticity coordinates x and y :
 - $x < 0,200$ or $x > 0,600$
 - $y < -2,3172 x^2 + 2,3653 x - 0,2800$ or $y > -2,3172 x^2 + 2,3653 x - 0,1000$;
- b) directional lamps;
- c) lamps having a luminous flux below 60 lumens or above 12 000 lumens;
- d) lamps having:
 - 6 % or more of total radiation of the range 250-780 nm in the range of 250-400 nm,
 - the peak of the radiation between 315-400 nm (UVA) or 280-315 nm (UVB);
- e) fluorescent lamps without integrated ballast;
- f) high-intensity discharge lamps;
- g) incandescent lamps with E14/E27/B22/B15 caps, with a voltage equal to or below 60 volts and without integrated transformer in Stages 1-5 according to Article 3.

1.1.1.6 Marking Requirements (within Article 3)

Defined within Article 1:

Starting from 1 September 2009: For special purpose lamps, the following information shall be clearly and prominently indicated on their packaging and in all forms of product information accompanying the lamp when it is placed on the market:

- a) their intended purpose; and
- b) that they are not suitable for household room illumination.

Defined within Annex 3:

For non-directional household lamps, the following information shall be provided as from Stage 2, except where otherwise stipulated.

Information to be visibly displayed prior to purchase to end-users on the packaging and on free access websites

The information does not need to be specified using the exact wording of the list below. It may be displayed using graphs, figures or symbols rather than text. These information requirements do not apply to filament lamps not fulfilling the efficacy requirements of Stage 4.

- (a) When the nominal lamp power is displayed outside the energy label in accordance with Directive 98/11/EC, the nominal luminous flux of the lamp shall also be separately

displayed in a font at least twice as large as the nominal lamp power display outside the label;

- (b) Nominal life time of the lamp in hours (not higher than the rated life time);
- (c) Number of switching cycles before premature lamp failure;
- (d) Colour temperature (also expressed as a value in Kelvins);
- (e) Warm-up time up to 60 % of the full light output (may be indicated as ‘instant full light’ if less than 1 second);
- (f) A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers;
- (g) If designed for optimal use in non-standard conditions (such as ambient temperature $T_a \neq 25 \text{ }^\circ\text{C}$), information on those conditions;
- (h) Lamp dimensions in millimetres (length and diameter);
- (i) If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1 W) shall be that corresponding in Table 6 to the luminous flux of the lamp contained in the packaging.

The intermediate values of both the luminous flux and the claimed incandescent lamp power (rounded to 1W) shall be calculated by linear interpolation between the two adjacent values.

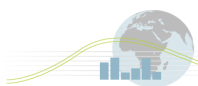
Table 6

Rated lamp luminous flux Φ [lm]			Claimed equivalent incandescent lamp power [W]
CFL	Halogen	LED and other lamps	
125	119	136	15
229	217	249	25
432	410	470	40
741	702	806	60
970	920	1 055	75
1 398	1 326	1 521	100
2 253	2 137	2 452	150
3 172	3 009	3 452	200

(j) The term ‘energy saving lamp’ or any similar product related promotional statement about lamp efficacy may only be used if the lamp complies with the efficacy requirements applicable to non-clear lamps in Stage 1 according to Tables 1, 2 and 3.

If the lamp contains mercury

- (k) Lamp mercury content as X,X mg;
- (l) Indication which website to consult in case of accidental lamp breakage to find instructions on how to clean up the lamp debris.



Information to be made publicly available on free-access websites

As a minimum, the following information shall be expressed at least as values.

- (a) The information specified in [the section above];
- (b) Rated wattage (0,1 W precision);
- (c) Rated luminous flux;
- (d) Rated lamp life time;
- (e) Lamp power factor;
- (f) Lumen maintenance factor at the end of the nominal life;
- (g) Starting time (as X,X seconds);
- (h) Colour rendering.

If the lamp contains mercury

- (i) Instructions on how to clean up the lamp debris in case of accidental lamp breakage;
- (j) Recommendations on how to dispose of the lamp at its end of life.

1.1.1.7 Review Requirements (Article 7)

A review of the regulation is required within 5 years of the date of regulation (ie March 2014).

Section 2: Notes on Sales and efficacy of all lamps, total light output And sales by product type

2.1 Data Source

Data provided is based on UK Market Transformation Programme Projections for UK Sales, ie data is model based data *for the residential sector only* (it excludes “domestic” lamps sold to the industrial and commercial sectors). Although model based:

- 1) Actual sales data sourced from GfK is available for 1998 and 2007, with a midpoint year (2002) derived from the Lighting Industry Federation (see below)
- 2) A confidential secondary data set from the Lighting Industry Federation covering 80% of all domestic and commercial lighting sales was available and broadly corroborates the modelling data supplied

Hence, data supplied if considered relatively robust with the following caveats:

- 3) “Sales” of CFLs may be high for 2007-2009 due to large utility distribution programmes where not all lamps may have been installed (in See point 6 in Notes Section 3)
- 4) Data sources appear to suggest the projected sales of halogen lamps are higher than actual sales. However, no accurate estimate is given for the level of overestimation.

2.2 Manipulations of Data Supplied

Minor adjustments to sales allocated to specific lamp type “wattage bins” were necessary to align data provided with “standard bins”. However, this is not thought to have materially affected outcomes.

Average efficacies calculated on a sales weighted basis by:

$$\frac{\text{Sum (sales of lamp type a sales * efficacy of lamp type a) + + Sum (sales of lamp type x sales * efficacy of lamp type x)}}{\text{Sum (all lamp sales)}}$$

Instantaneous light output calculated as sales weighted basis by:

$$\text{Sum (sales of lamp type a sales * efficacy of lamp type a * wattage of lamp type a) + + Sum (sales of lamp type x sales * efficacy of lamp type x * wattage of lamp type n)}$$

Lifetime light output calculated as sales weighted basis by:

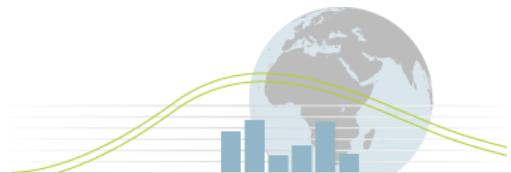
$$\text{Sum (sales of lamp type a sales * efficacy of lamp type a * wattage of lamp type a * lifetime of lamp type a) + + Sum (sales of lamp type x sales * efficacy of lamp type x * wattage of lamp type n * lifetime of lamp type n)}$$

2.2.1 Key assumptions:

Efficacies used for all calculations based on estimated average global efficacies for each lamp type and associated wattage range for 230V lamps.

Lifetimes used for all calculations based on estimated average global lamp life for each lamp type and associated wattage range for 230V lamps.

Tables for efficacy and assumed lifetimes of each lamp type/wattage range for the years 1995-2010 can be viewed in the supporting documents section of the Domestic Lighting area of the Mapping and Benchmarking website – see <http://mappingandbenchmarking.iea-4e.org/matrix>



Section 3: Notes on Policy Interventions

Policies actions fall into 2 categories, pan-EU member requirements and national interventions.

Pan-EU requirements:

- 1) **Mandatory MEPS:** As described in notes section 1
- 2) **Mandatory Product Labelling:** From the 1 July 1999 (with exclusions until 31 December 2000), lighting products within the EU have been required to carry compulsory energy labels.

Full details of the labelling requirement can be found in COMMISSION DIRECTIVE 98/11/EC of 27 January 1998 implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps⁸

However, calculation of the labelling requirement is described as follows (from Annex IV of the directive):

The energy efficiency class of a lamp shall be determined as follows:

Lamps shall be classified in class A if:

- Fluorescent lamps without integral ballast
(those requiring a ballast and/or other control gear to connect them to the mains)
 $W \leq 0,15 \sqrt{\Phi} + 0,0097 \Phi$
- Other lamps
 $W \leq 0,24 \sqrt{\Phi} + 0,0103 \Phi$
where Φ is the lumen output of the lamp
where W is the power input into the lamp in watts.

If a lamp is not classified in class A, a reference wattage W_R shall be calculated as follows:

$$W_R = \begin{cases} 0,88 \sqrt{\Phi} + 0,049 \Phi, & \text{when } \Phi > 34 \text{ lumens} \\ 0,2 \Phi, & \text{when } \Phi \leq 34 \text{ lumens} \end{cases}$$

where Φ is the lumen output of the lamp.

An energy efficiency index E_I is then set as

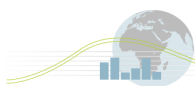
$$E_I = \frac{W}{W_R}$$

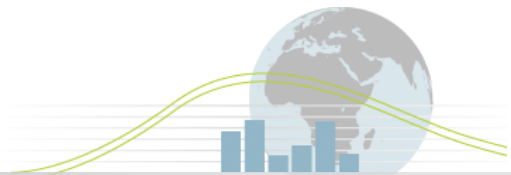
where W is the power input into the lamp in watts.

The energy efficiency classes are then set in accordance with the following table:

Energy efficiency class	Energy efficiency index E_I
B	$E_I < 60 \%$
C	$60 \% \leq E_I < 80 \%$
D	$80 \% \leq E_I < 95 \%$
E	$95 \% \leq E_I < 110 \%$
F	$110 \% \leq E_I < 130 \%$
G	$E_I \geq 130 \%$

⁸ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1998:071:0001:0008:EN:PDF>





Note the packaging/labelling requirement is extended by the MEPs noted above

National Level Interventions

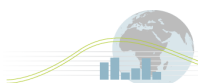
- 3) **Building Code Requirements:** Requirements for the inclusion of efficient lighting within new residential properties have been in place since 2002 and have been incrementally strengthened as outlined in the table below.

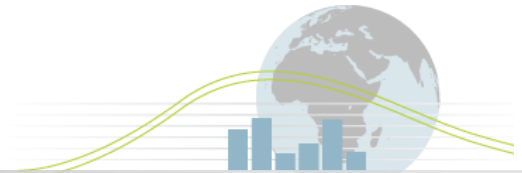
Regulation name	Announcement	In Force	Describe which lamps it applies to:	Efficacy requirement	Other requirements
<i>Building Regs Part L 2002</i>	2001	2002	<i>Minimum 3 lamps installed in new build or major refurbishments</i>	<i>40 lumen/watt</i>	<i>Dedicated socket (not BC or ES)</i>
<i>Building Regs Part L 2006</i>	2005	2006	<i>Minimum 25% of lamps installed in new build or major refurbishments</i>	<i>40 lumen/watt</i>	<i>Dedicated socket (not BC or ES)</i>
<i>Building Regs Part L 2010</i>	2009	2010	<i>Minimum 75% of lamps installed in new build or major refurbishments</i>	<i>45 lumen/watt</i>	<i>Total output > 400 lamp lumens</i>

- 4) **Voluntary Retailer Commitment:** Prior to the EU announcement of “phase-out” and subsequent regulations, the UK Government and major UK retailers had negotiated a voluntary commitment to incrementally remove inefficient lighting (the majority of incandescent lamps) between 2007 and 2011 as detailed in the table below:

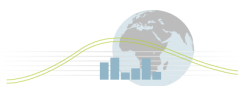
Regulation name	Announcement	In Force	Describe which lamps it applies to:	Efficacy requirement	Other requirements
<i>Supply chain commitment</i>	2007	2008	<i>By January 2008, cease replacing stock of all inefficient (General Lighting Service, GLS) A-shaped incandescent lamps of energy rating higher than 100W (predominantly 150W lamps).</i>		
			<i>By January 2009, cease selling all inefficient GLS A-shaped lamps of energy rating higher than 60W (predominantly 150W lamps, 100W lamps, plus some 75W lamps)</i>		
			<i>By January 2010, cease selling all GLS A-shaped lamps of efficacy of energy rating higher than 40W (predominantly 60W lamps)</i>		
			<i>By 31 December 2011, cease selling all remaining inefficient GLS A-shaped lamps and 60W "candle" and "golfball" lamps. (predominantly 40W and 25W A-shaped GLS bulbs, and 60W candles and golfballs).</i>		

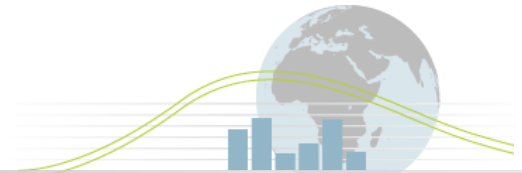
- 5) **Energy Efficiency Commitment (2002-2008) and Carbon Emissions Reduction Target (2008-2011):** Under these regulations, utility companies have been required to implement efficiency actions for user groups. As a result, large numbers of CFLs have been distributed (often free of charge). This has led to particularly high “sales” figures for





CFLs between 2007-2009. However, an unknown number of these lamps are thought not yet to be *installed* in sockets.





Section 4: Notes on Cultural Issues

Installed stock of lamps is derived from the same model as sales data (refer to notes section 2)

