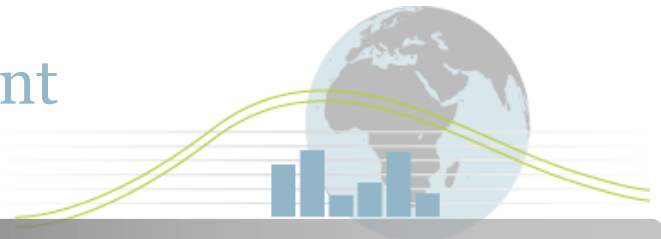


4E

Mapping Document



Country:	Japan
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 domestic (household) sector¹”

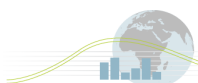
Hence data was sought (where possible) for the following lighting product types (subdivided by wattage buckets):

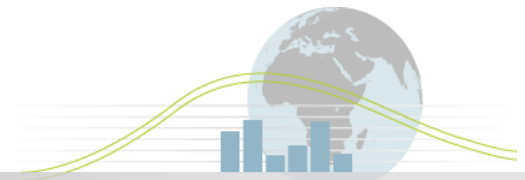
- Mains Voltage Incandescent
- Mains Voltage Halogens (Single and Double Ended)
- Low Voltage (12V) Halogen
- Pin Based and Self Ballasted CFLs
- Linear Tubes (T12, T8 and T5)²
- Retrofit LEDs
- Dedicated LEDs

A full product definition is provided at the annex website².

¹ Most 'domestic lighting' products are also used in other areas (e.g. hotels, shops, offices, etc). However, given the functionality of these products is virtually the same in all installations, and in almost all participating countries it will be impossible to separate sales to the domestic sector from sales elsewhere, all products shown will be considered as “domestic lighting” irrespective of final installation point.

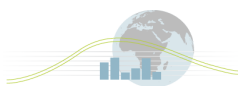
² The subsequent analysis in the associated benchmarking report² excludes linear fluorescent tubes as, for those countries submitting data, these lamps constituted a small proportion of use in the domestic sector.

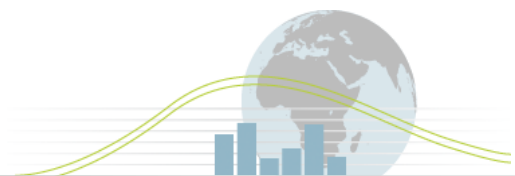




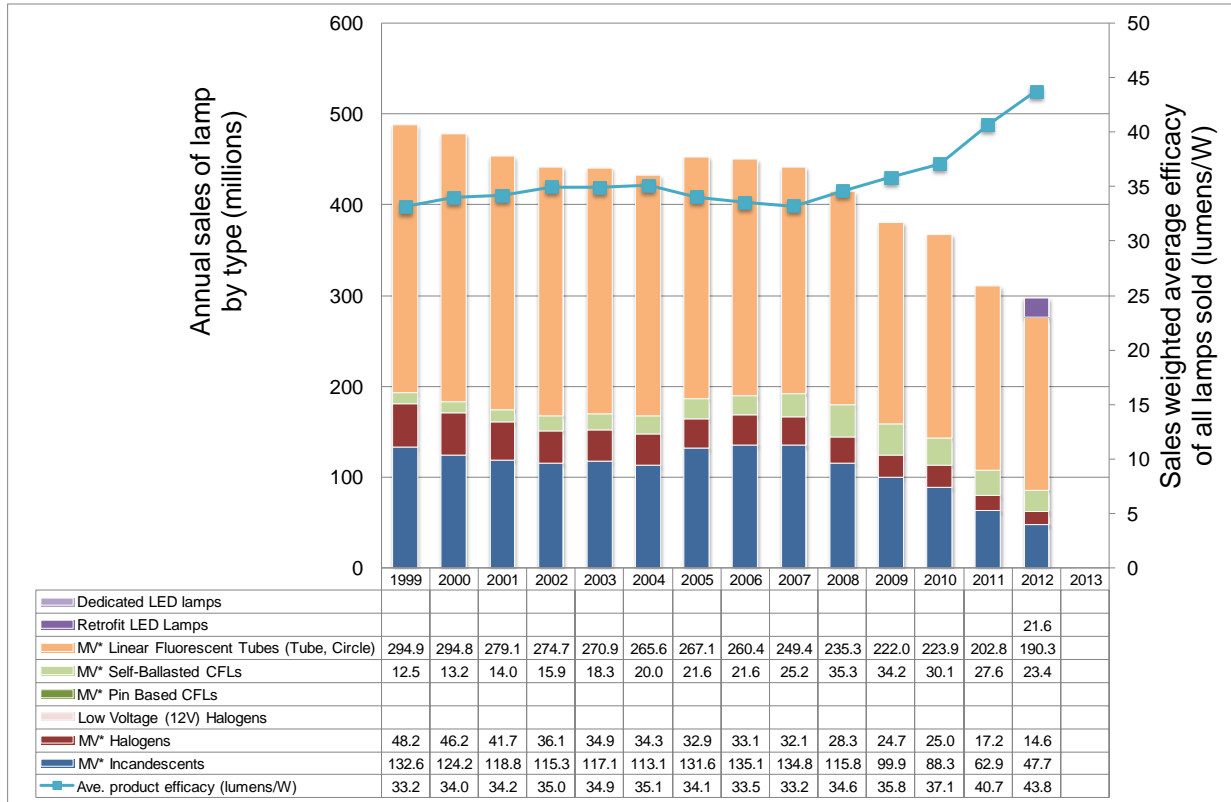
Phase out regulations for domestic lighting Japan

Japan currently has no mandatory phase-out regulations.





Sales and average efficacy of all domestic lamps - Japan

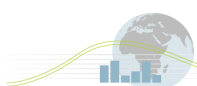


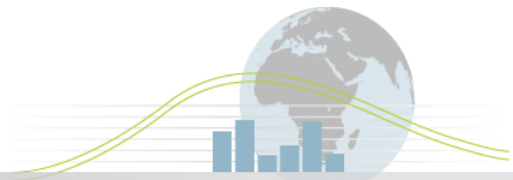
* Mains Voltage

Key notes on Graph (See notes section 2)

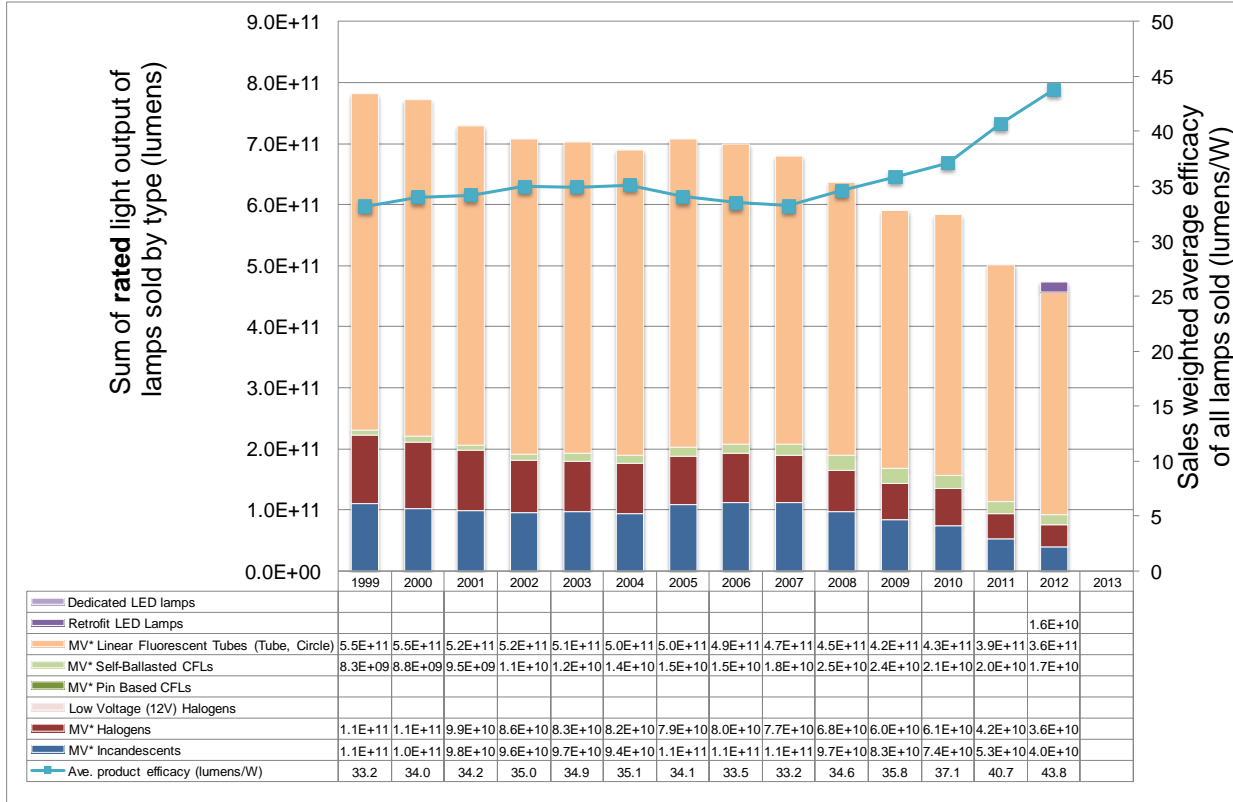
- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown. Assumptions are also made about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps. These global average efficacies are likely to be below the average efficacies of some lamps sold in Japan³ and therefore the average sales weighted efficacy shown in the above graphic is likely to underestimate the actual average efficacy of lamp sales.

³ e.g. average Linear and Circular Fluorescent Lamp Efficacies in Japan are potentially significantly higher as shown in the supporting document *Japanese HF fluorescent lamp efficacies - IEA 4E* at: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>





Total instantaneous light output of all domestic lamps sales - Japan

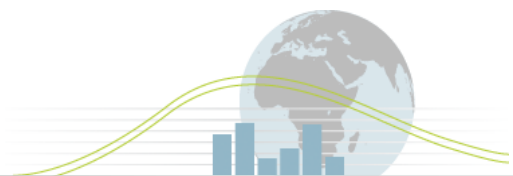


* Mains Voltage

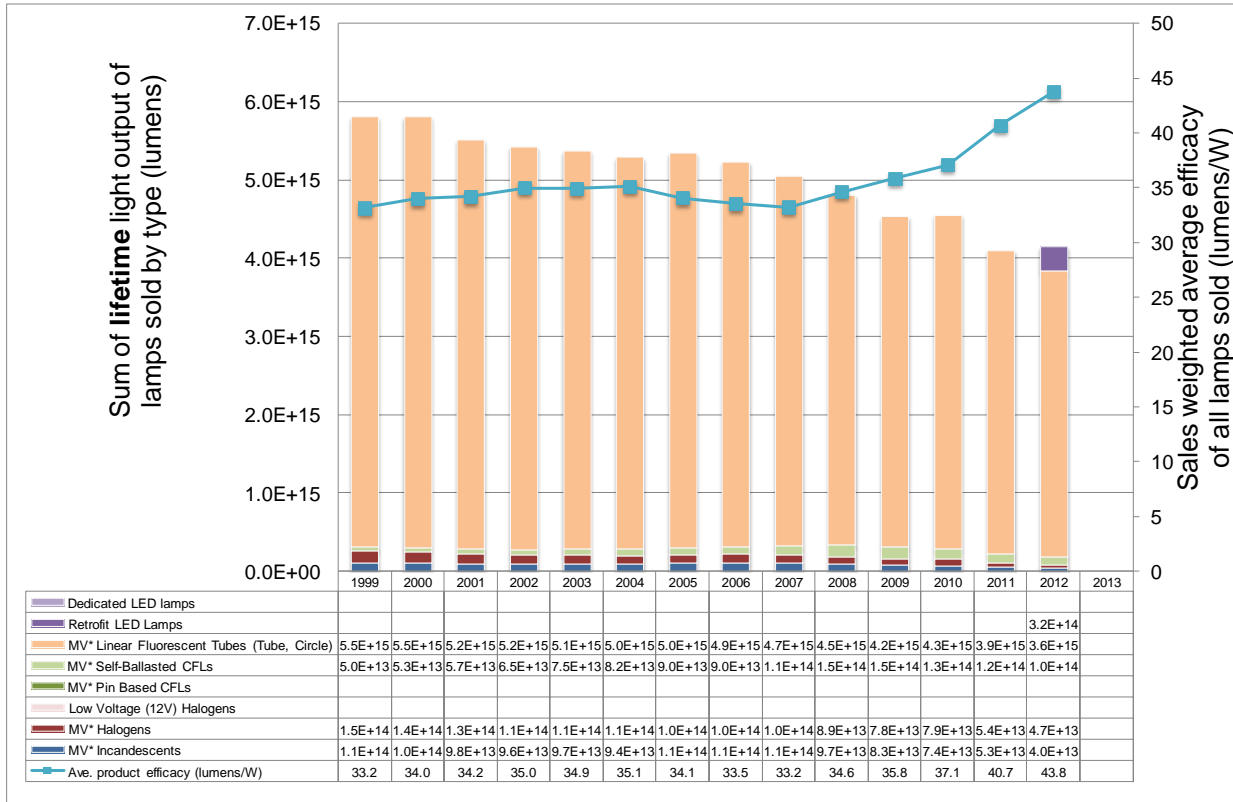
Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown. Assumptions are also made about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps. These global average efficacies are likely to be below the average efficacies of some lamps sold in Japan⁴ and therefore the average sales weighted efficacy shown in the above graphic is likely to underestimate the actual average efficacy of lamp sales.
- Instantaneous light output calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps
- Instantaneous light output is for lamps sold in each year only, *not* all installed stock

⁴ e.g. average Linear and Circular Fluorescent Lamp Efficacies in Japan are potentially significantly higher as shown in the supporting document *Japanese HF fluorescent lamp efficacies - IEA 4E at:* <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>



Total lifetime light output of all domestic lamps sales - Japan



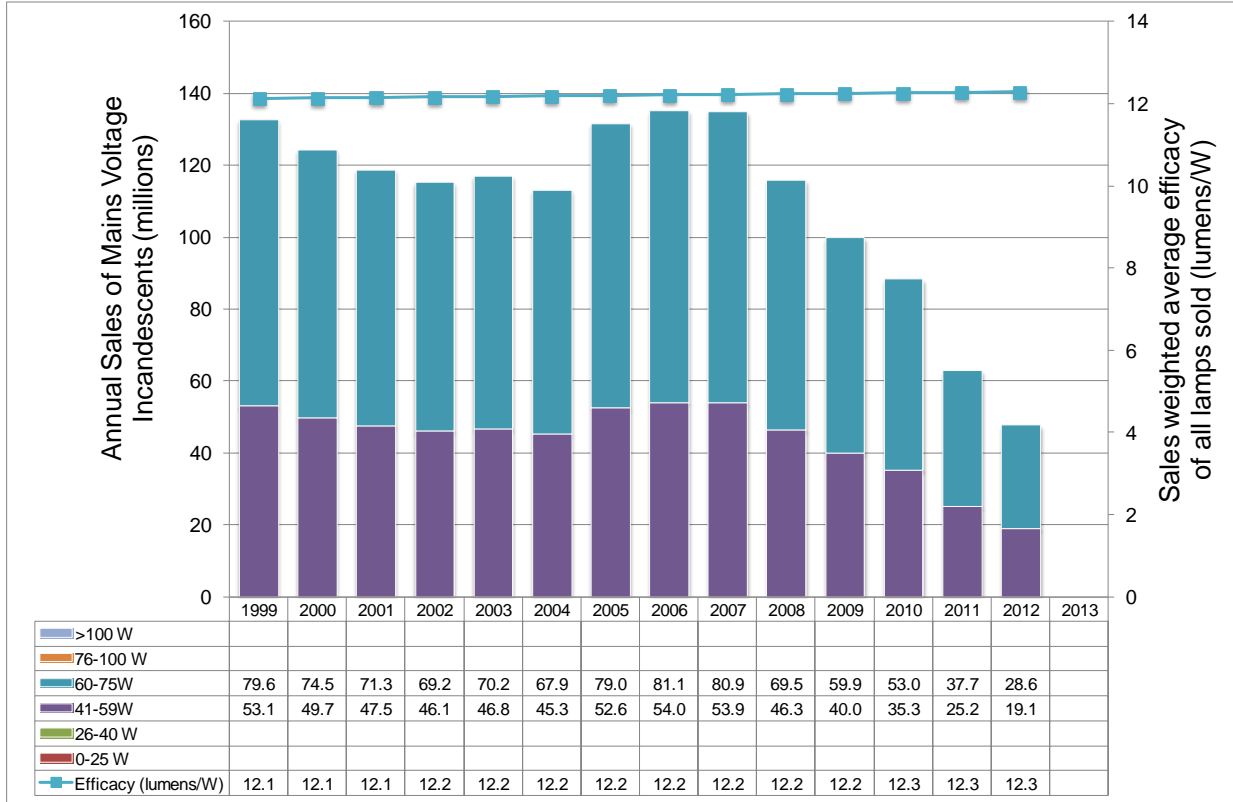
* Mains Voltage

Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown. Assumptions are also made about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps. These global average efficacies are likely to be below the average efficacies of some lamps sold in Japan⁵ and therefore the average sales weighted efficacy shown in the above graphic is likely to underestimate the actual average efficacy of lamp sales.
- 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 240V lamps
- Lifetime light output is for lamps sold in each year only, not all installed stock

⁵ e.g. average Linear and Circular Fluorescent Lamp Efficacies in Japan are potentially significantly higher as shown in the supporting document *Japanese HF fluorescent lamp efficacies - IEA 4E* at: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>

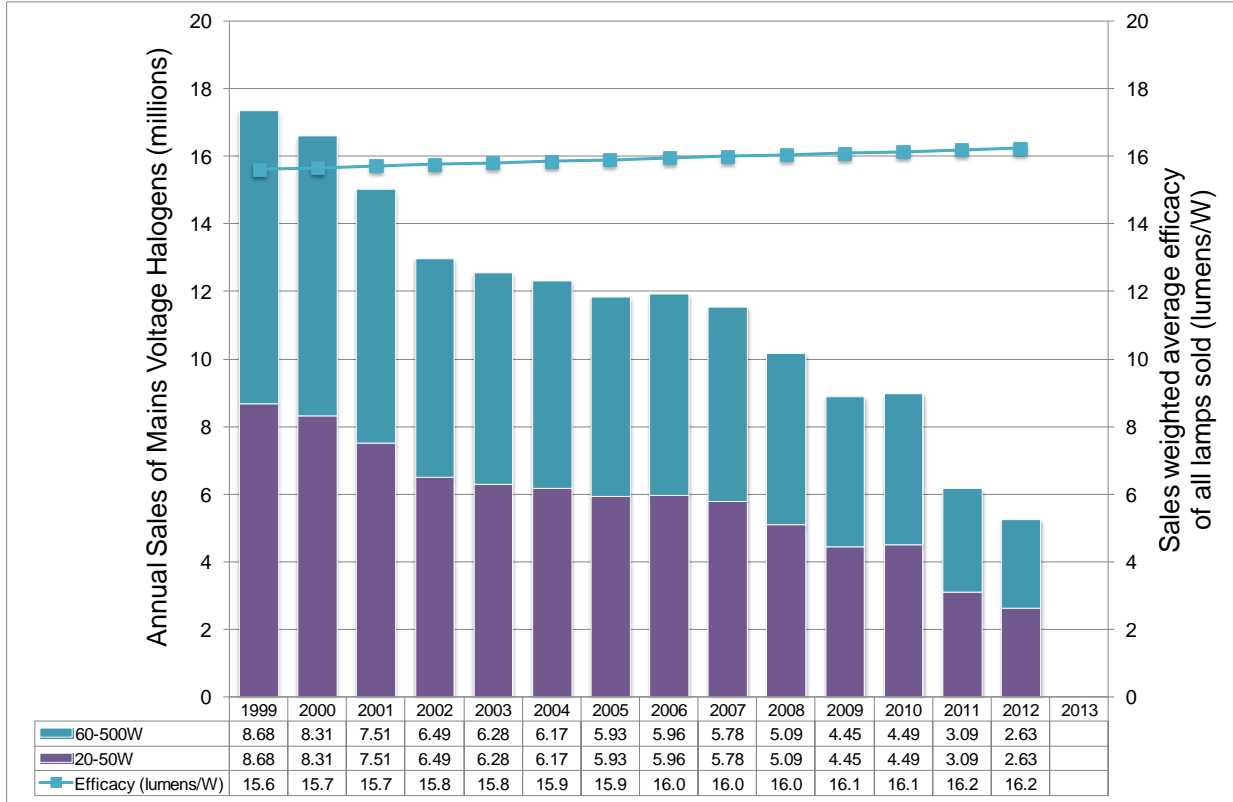
Sales of Mains Voltage Incandescent lamps by wattage range - Japan



Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown, and about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps.

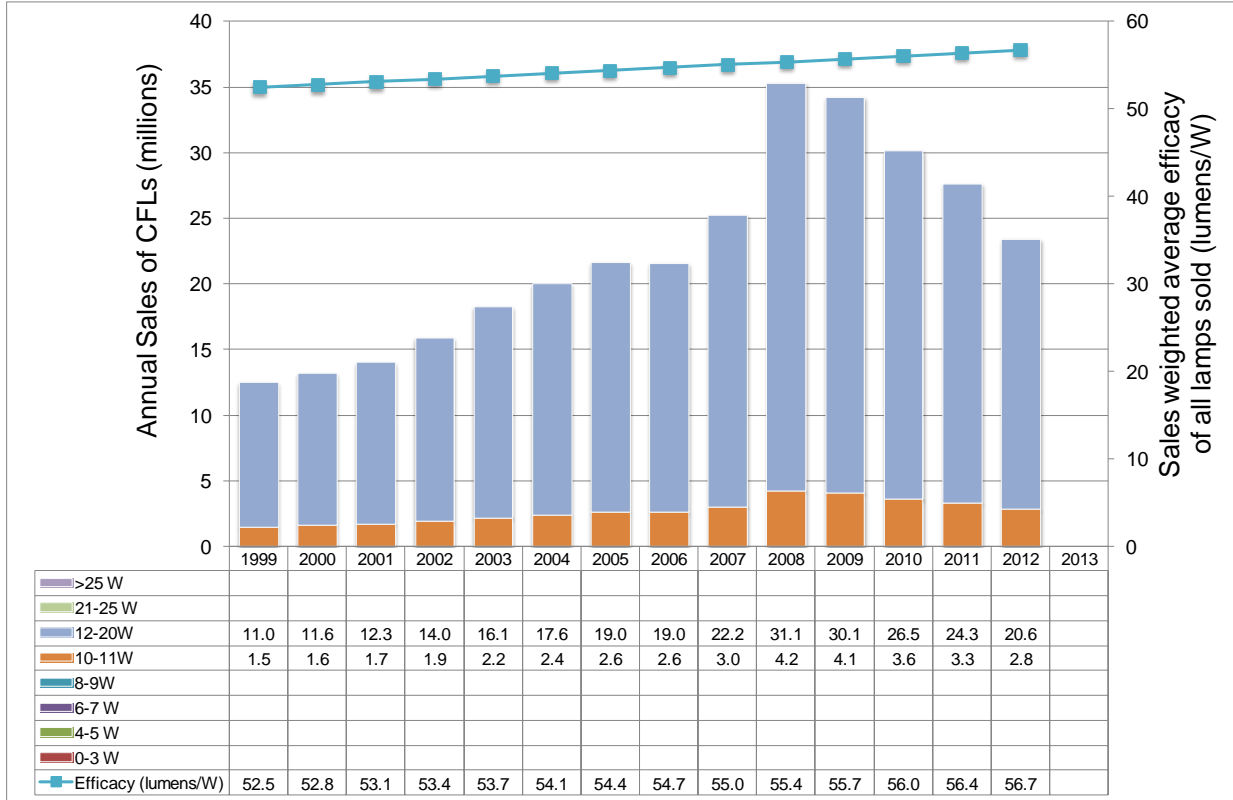
Sales of Halogen lamps by wattage range - Japan



Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown, and about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps.

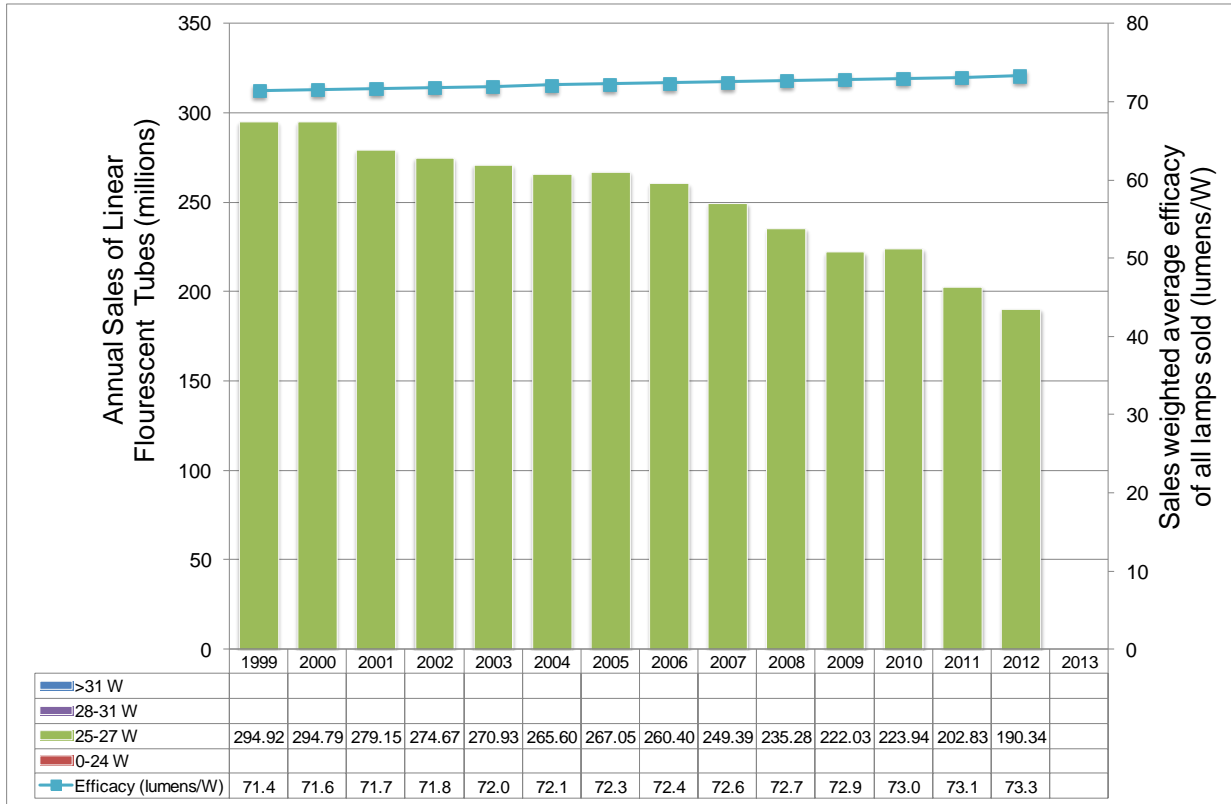
Sales of CFL lamps by wattage range - Japan



Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown, and about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps.

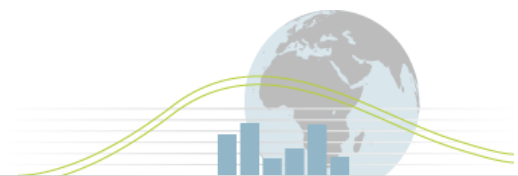
Sales of Linear Fluorescent Tubes by wattage range: Japan



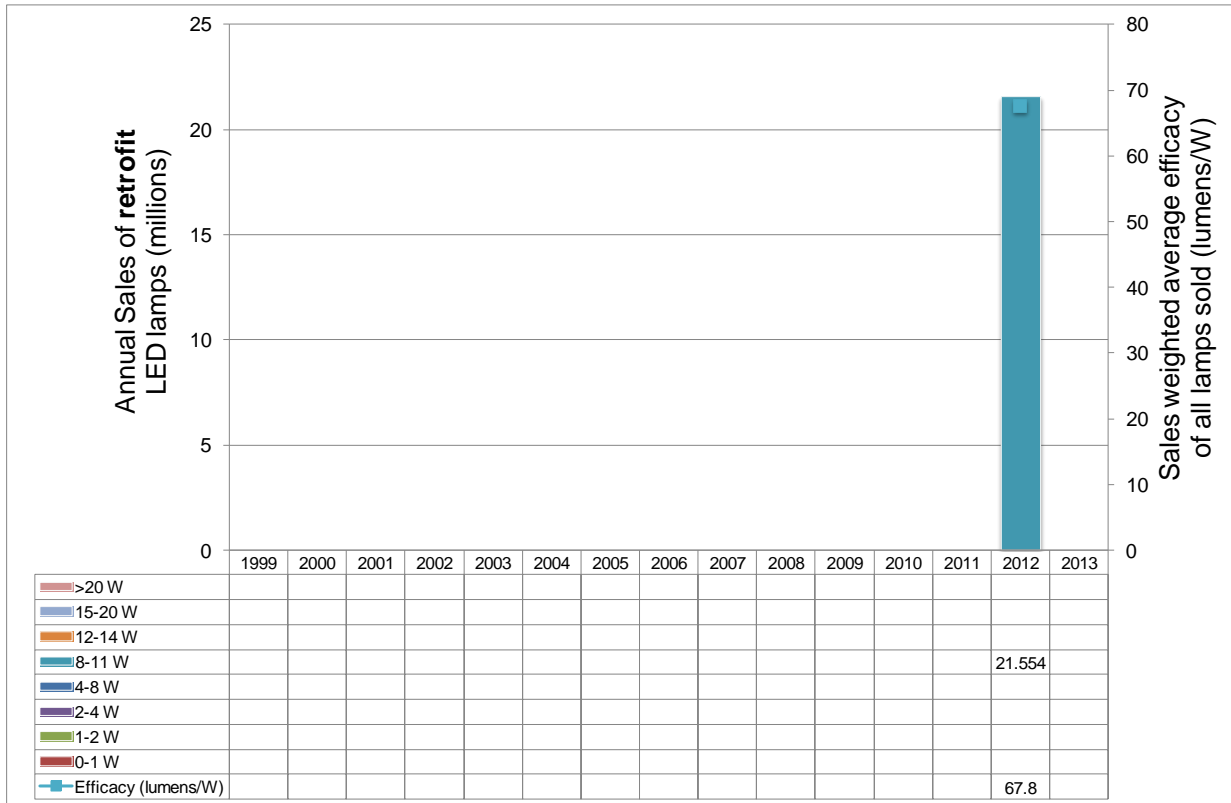
Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown, and about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps. These global average efficacies are likely to be below the average efficacies of Linear and Circular Fluorescent lamps sold in Japan⁶ and therefore the average sales weighted efficacy shown in the above graphic is likely to underestimate the actual average efficacy of lamp sales.

⁶ e.g. as shown in the supporting document *Japanese HF fluorescent lamp efficacies - IEA 4E* at: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>

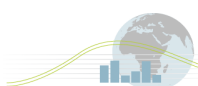


Sales of LED lamps by wattage range - Japan



Key notes on Graph (See notes section 2)

- Data are based on the Japanese Government (METI) Industrial Statistics.
- Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Simple assumptions are made about the allocation of these to one of the specific lamp types shown, and about the average wattage of lamps for each type. Furthermore, LED sales data is only available for 2012. These assumptions and uncertainties mean that results should be viewed with some caution.
- Annual market average efficacies calculated on a sales weighted basis using estimated average global efficacies for each lamp type and associated wattage range for 240V lamps.



Major Policy Interventions (See notes Section 3)

There are no legal regulations, such as MEPS, for phase-out of incandescent lamps in Japan. In 2008, the Japanese Government, Ministry of Economy, Trade and Industry (METI), issued an administrative guideline, or administrative request, for promoting high efficiency lamps including CFLs and replacing incandescent lamp by 2012⁷. This guideline didn't impose any legal obligation to lamp manufacturers and importers.

In 2012, one year after of the tragedy of huge earthquake and consequent power shortage, Japanese Government, METI and Ministry of the Environment (MOE), issued again the administrative guideline for promoting the high efficiency lamps including CFLs and LEDs which followed up the first guideline issued 2008. Again, this guideline had no legal force.

The Japanese lamp manufacturers ended incandescent lamp production under the voluntary agreement with the Japanese Government from 2008 onwards.

⁷ A copy of this guideline, and the 2012 update, is available in Japanese in the "Country Reports Materials" of the domestic lighting product page of the IEA 4E mapping and benchmarking pages:
<http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>

Cultural Issues (See Notes Section 4)

When CFLs were first introduced in the market, Japanese consumers had a similar negative response to the product as has been seen in European and American markets. There are two reasons why Japanese consumers no longer have such a negative reaction against CFLs:

1. The first reason is down to industry efforts. The original CFLs were not acceptable to the market due to poor colour rendering performance and slow start up. But, Japanese consumers tended to purchase the lamps with high efficiency because Japanese electricity costs were relatively expensive. Therefore Japanese manufacturers paid efforts to improve the colour rendering performance and the switch on time of CFLs responding the consumers' demand. Consequently, the Japanese CFLs show the best performance in the world in colour rendering and consumers now have a wide variety of choices in purchasing CFLs types for usage in different settings, (living room, dining room, bed room etc.).
2. The second reason is precise and correct declarations by Japanese manufacturers on the specifications of products, i.e. there are very small discrepancies between declaration values and measured ones. This is one of Japanese manufacturers' intrinsic characters traditionally and Japanese consumers have perfect confidence in declared specifications of the Japanese manufacturers' products.

Notes on data

Section 1: Notes on Phase out regulations

1.1 Overview⁸

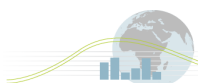
Section 2: Notes on Sales and efficacy of all lamps, total light output and sales by product type

2.1 Data Source

Data are based on the Japanese Government (METI) Industrial Statistics. The following caveats should be noted:

- Incandescent lamps for general lighting are merged to miscellaneous incandescent lamps since July 2012. Data in this statistics are from January to June 2012. Since July 2012, data for incandescent lamps for general lighting have been merged into data for the miscellaneous incandescent lamps, which includes lamps such as backlights of industrial instruments, indicator lamps for communication equipment such as computer and telephone, interior and exterior emergency lamps, lamps for flashlight, lamps for traffic signals and lamps for medical surgery. This has been done because production and sales of the incandescent lamps for general lighting has become small compared to the total production and sales of incandescent lamps, i.e. less than 10%. Consequently, sales of incandescent lamps for general lighting in the period from January to June 2012 have been doubled to estimate a full year's sales volumes.
- Data for the self ballasted type fluorescent lamps (CFLs) are included in the (miscellaneous) fluorescent lamps category [*and merged into LFTs for this analysis*], because production and sales of the CFLs are small compared to the total production and sales of fluorescent lamps, i.e. almost 10%.

⁸ <http://www.energyrating.gov.au/incand-lamps2.html>



2.2 Manipulations of Data Supplied

Data was provided for Incandescent, CFL, Halogen, Fluorescent tube and LED lamps only with no breakdown of type within these categories. Japanese experts estimated which specific lamp types best represent the Japanese market as well as what the average wattage of each lamp type is. These were mapped to the analysis methodology using some simple assumptions. These assumptions will have an impact on the average efficacies calculated but this is considered minor compared with other variations e.g. by lamp type. The Japanese estimates are shown in the table below:

Lamp category	Lamp type assumed	Japan estimate of wattage
Incandescent	Incandescent	41-59W (40%) 60-75W (60%)
Halogen	Mains voltage halogens: - single-ended - <i>double ended</i>	20-50W (36%) 60-500W (64%)
Fluorescent lamps	Mains Voltage Linear Fluorescent Tubes (T8)	0-24W (13%) 25-39W (87%)
CFL - i	Mains Voltage Self- Ballasted CFLs	10-11W (12%) 12-25W (88%)
LED lamps	Retrofit LEDs	8-11W (100%)

Average efficacies calculated on a sales weighted basis by:

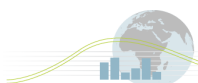
$$\frac{\text{Sum (sales of lamp type } a \text{ sales * efficacy of lamp type } a) + \dots + \text{Sum (sales of lamp type } x \text{ sales * efficacy of lamp type } x)}{\text{Sum (all lamp sales)}}$$

Instantaneous light output calculated as sales weighted basis by:

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

Lifetime light output calculated as sales weighted basis by:

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



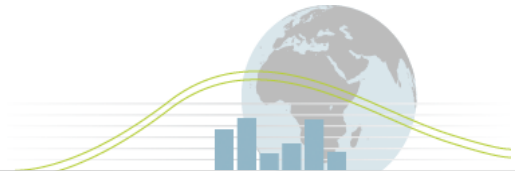
2.2.1 Key assumptions:

- Efficacies used for all calculations based on estimated average global efficacies for each lamp type and associated wattage range for 240V lamps. These global average efficacies are likely to be below the average efficacies of some lamps sold in Japan⁹ and therefore the average sales weighted efficacy shown in the above graphic is likely to underestimate the actual average efficacy of lamp sales.

Lifetimes used for all calculations based on estimated average global lamp life for each lamp type and associated wattage range for 240V lamps.

Tables for efficacy and assumed lifetimes of each lamp type/wattage range for the years 1996-2013 can be viewed in the product definition which is in the supporting documents section of the Domestic Lighting area of the Mapping and Benchmarking website – see <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>

⁹ e.g. average Linear and Circular Fluorescent Lamp Efficacies in Japan are potentially significantly higher as shown in the supporting document *Japanese HF fluorescent lamp efficacies - IEA 4E* at: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5>

**Section 3: Notes on Policy Interventions**

No Additional Notes

Section 4: Notes on Cultural Issues

No additional Notes

