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for Ecodesign and/or Energy Labelling Requirements  
(‘Lot 8/9/19’).

# Final report, Task 2

## *Markets*

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## Contents

Executive summary .....	5
1. Introduction .....	10
2. Model for European Light Sources Analysis .....	12
2.1. Introduction to MELISA .....	12
2.2. Sales volumes (units) for light sources .....	12
2.3. Unit cost for light sources.....	19
2.4. Consumer expense for light sources .....	20
2.5. Industry revenue for light sources .....	25
2.6. Lifetimes and operating hours .....	30
2.7. Installed number of light sources (stock) .....	32
3. Data from Eurostat .....	38
4. Data from LightingEurope .....	44
4.1. Introduction to LE-data .....	44
4.2. Data elaboration.....	45
4.3. LE-data summary.....	46
5. Data from GfK .....	48
6. Data from McKinsey .....	50
6.1. Introduction to McKinsey data.....	50
6.2. Lighting market value data derived from McKinsey .....	50
6.3. Light sources market value data derived from McKinsey .....	51
6.4. Light sources sales quantities derived from McKinsey .....	52
7. Data from other sources.....	55
8. Data on ballasts .....	56
List of figures .....	58
List of tables .....	59
Acronyms.....	61
Annex A. Statement of contractor on right to delivered result .....	65
Annex B. Description of MEErP Task 2 .....	66
Annex C. Sales data from Eurostat .....	68
C.1 Introduction .....	68
C.2 Data elaboration .....	69
C.3 Data per EU Member Country for the year 2012 .....	70
C.4 Eurostat EU-28 data 1995-2013 for Sealed Beam (PAR) lamps.....	77
C.5 Eurostat EU-28 data 1995-2013 for Tungsten HL-MV lamps.....	78
C.6 Eurostat EU-28 data 1995-2013 for Tungsten HL-LV lamps .....	79

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C.7 Eurostat EU-28 data 1995-2013 for GLS MV <200W lamps.....	80
C.8 Eurostat EU-28 data 1995-2013 for Other Filament lamps .....	81
C.9 Eurostat EU-28 data 1995-2013 for Linear Fluorescent (LFL) lamps .....	82
C.10 Eurostat EU-28 data 1995-2013 for Compact Fluorescent (CFL) lamps .....	83
C.11 Eurostat EU-28 data 1995-2013 for Other Discharge lamps .....	84
C.12 Eurostat EU-28 data 1995-2013 for UV IR ARC lamps .....	85
C.13 Eurostat EU-28 Production totals for all lamp types .....	86
C.14 Eurostat EU-28 Import totals for all lamp types .....	89
C.15 Eurostat EU-28 Export totals for all lamp types.....	92
C.16 Eurostat EU-28 Apparent Consumption totals for all lamp types .....	95
C.17 Eurostat EU-28 Apparent Consumption compared to MELISA data.....	98
C.18 Eurostat EU-28 data 1995-2013 for Magnetic Ballasts.....	102
C.19 Eurostat EU-28 data 1995-2013 for Electronic Ballasts.....	103
Annex D. Sales data from GfK.....	104
D.1 Introduction to GfK data.....	104
D.2 Elaboration of GfK data .....	105
D.3 Results from scaling of GfK data to EU-28 level .....	106
Annex E. Sales data from McKinsey .....	109
E.1 Introduction .....	109
E.2 Data elaboration on Lighting Market Values .....	109
E.3 Data elaboration on Light Source Quantities.....	115

## EXECUTIVE SUMMARY

This document covers MEErP Task 2, i.e. sales and stock data for light sources, market trends, and consumer expenditure base data.

In the context of this preparatory study, the study team has developed and will continue to develop the 'Model for European Light Sources Analysis' (MELISA). This model currently contains, for EU-28, for all lamp technology types, and for the period 1990-2030:

- Sales volumes (units)
- Life & use data (lifetimes, average lumens, wattage, burning hours, efficiencies, prices)
- Stock for light sources (installed number of units)
- Installed capacity in terms of (Tera) lumen
- Total use in terms of (Tera) operating hours
- Energy consumption by light sources (TWh)
- Economic data (sales value, industry revenue, energy cost, total consumer expense)

The above data are subdivided in residential use and non-residential use. In particular in the context of the parallel Lot 37 lighting systems study, a future further subdivision of the non-residential sector is foreseen (outdoor, indoor, subsectors) and a more detailed implementation of the effects of lighting controls is under consideration. At the end of the study, in MEErP Task 7, MELISA will be used for the scenario analyses. Current data in MELISA are preliminary and may be updated as the study proceeds, also following comments on this draft report.

MELISA is being developed with the aim to:

- Harmonise the data used in the various studies on light sources, as requested by the European Commission;
- Create a single stock model for light sources that is accepted by interested parties as the main reference model for all studies and discussions on lighting in Europe.

In this report, the presentation of [MELISA data on light sources](#) is limited to the MEErP Task 2 topics, i.e. sales (quantities and monetary values) and installed stock, for the period 1990-2013.

As regards [sales quantities](#), the main conclusions from current MELISA data are:

- From 1990 to 2007 the number of light sources sold in EU-28 has increased from 2112 to 2836 million units/year. This was an increase of 34% in 17 years, corresponding to a CAGR of 1.75%.
- From 2007 to 2013 the sales decreased from 2836 to 1731 million units/year. This was a decrease of 39% in 6 years, corresponding to a compound annual growth rate (CAGR) of -8%. This decrease is due to the longer lifetime of recent energy-efficient lamps that require less frequent substitution.
- From 2008 to 2013 the share of incandescent lamps (GLS) in unit sales decreased from 46% to 9%. They are mainly being substituted by halogen lamps that increased their share from 18% to 45% in the same period. The share of CFLs remained constant 20%. The share of LFL increased from 14% in 2008 to 20% in 2013 (but the quantities sold anyway decreased slightly).

- In 2013 the share of LED light sources is around 5% (in number of units sold).
- In 2013, 59% of light source sales quantities is for residential use, with average sales of 7.1 lamps/household/year.

As regards consumer acquisition costs for light sources, the current MELISA data show:

- From 1990 to 2010 consumer acquisition costs for light sources have continuously increased, with an increased growth rate between 2004 and 2009, from 4637 million euros in 1990 to 11762 million in 2010. In later years the consumer expense shows a slight tendency to decrease, reaching 10880 million euros in 2013.
- From 2008 to 2013 the share of incandescent lamps (GLS) in consumer acquisition costs decreased from 10% to 1%. They are mainly being substituted by halogen lamps that increased their sales value-share from 27% to 37% in the same period. The value-share of CFLs decreased from 24% in 2008 to 15% in 2013. The share of LFL decreased from 30% to 26%.
- In 2013 the value-share of LED light sources is around 12% (of consumer acquisition costs).
- In 2013, 52% of light source sales values is for residential acquisition (5619/10880 million euros). This value implies an average acquisition cost of €28.3/household/year in 2013, of which €16.8 for halogen lamps.

As regards the installed stock of light sources, the MELISA data indicate:

- From 1990 to 2013 the EU-28 stock of light sources has approximately doubled, from 5634 million units in 1990 to 11001 million in 2013.
- From 2008 to 2013 the share of incandescent lamps (GLS) in the installed stock decreased from 33% to 10%. They are mainly being substituted by halogen lamps that increased their share in the stock from 16% to 27% in the same period. The share of CFLs increased from 30% in 2008 to 41% in 2013. The share of LFL remained constant 20%.
- In 2013 the share of LED light sources in the installed stock is around 1%.
- In 2013, 59% of the installed light sources are for residential use (6509/11001 million units). This implies an average of nearly 33 installed light sources per household in 2013, of which 13 CFL and nearly 13 halogen. In 1990 the number of lamps per household was 21.

The data currently present in MELISA are based on:

- aggregated EU-28 light source consumption derived from LightingEurope information and trade data imports,
- apparent consumption data derived by the study team as Eurostat's Production + Import – Export,
- some minor data sources, and on
- the general experience of the study team in the lighting sector.

In this report, the MELISA data are also compared to data recently gathered by GfK (2014) and to data published in 2012 by McKinsey. These data sources are discussed and presented in this report, except for disaggregated LightingEurope data that are not available in the public domain.

From the comparison between MELISA and the named data sources, some topics have been derived that need further investigation and that could lead to adjustments of the MELISA data. Before starting such a revision of the model, the study team would like to collect the comments from stakeholders.

A summary of the main conclusions from the analysis of the LE-data is presented below. Due to the confidentiality of the data only qualitative conclusions can be presented:

- Sales of LFL 'T8 halophosphor' have decreased by a factor 20 between 2009 and 2011. This is a direct consequence of ecodesign measures.
- Sales of LFL 'T8 tri-phosphor' show a 70% increase from 2009 to 2011, but since then sales are decreasing.
- Sales for LFL 'T5 new' show a 50% increase from 2009 to 2011, but they have stabilised in recent years.
- Sales for 'CFL' show a decreasing trend. In particular, CFLi sales in 2013 are about one-third of those in 2009. These lamps are potential substitutes for phased-out GLS lamps, but consumers seem to prefer MV-HL and –increasingly– LED lamps.
- Sales for 'mains voltage halogen' lamps as a substitute for GLS lamps show a strong increase, approximately doubling from 2009 to 2013. This is a direct consequence of ecodesign measures.
- Sales for 'legacy incandescent lamps (GLS)' have collapsed between 2009 and 2013 (decrease of a factor 10). This is a direct consequence of ecodesign measures.
- Sales of 'LED lamps' are rapidly developing but their quantities (as sold by LE-members) are still small with respect to CFLi, MV-HL and GLS-lamps.
- The total number of lamp units sold by LE-members in EU-27 has approximately halved between 2009 and 2013. For a significant part, this is likely to be due to the longer lifetimes of energy-efficient lamps (CFL, HL, LED) that consequently need less substitution. Another part may be due to increased imports from non-EU27 countries.
- From 2009 to 2013 average unit sales prices for lamps (not inflation corrected) have nearly doubled, both in Western Europe and in Central+Eastern Europe <sup>1</sup>. This is mainly due to switching from cheaper incandescent lamps to more expensive CFL, HL and LED lamps.
- The average sales price per lamp in Central+Eastern Europe (C+E EU) is approximately half of that in Western Europe. Apart from differences in labour costs and retail margins, this is also due to the different mix of lamp types sold (higher share of cheap incandescent lamps in C+E

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<sup>1</sup> This also includes the Russian Federation and other non-EU-28 countries.

EU) and maybe also due to the different mix of sales channels (more sales to original equipment manufacturers and professionals in C+E EU).

As regards Eurostat data, the study team encountered several difficulties. The grouping of light source types is not always adequate for the purposes of the current study, in particular as regards the 'other filament lamps', the 'other discharge lamps', and the absence of a specific code for LED lighting products (see also Task 1 report). In some cases clearly anomalous data were found, that have been (assumed) corrected during the data analysis. Doubts have also arisen regarding the production and import data. Some EU-28 production might in reality be intra-company imports of European manufacturers from their plants in Asia. There might also be some double-counting, the same products being counted both as production and as import. Of course, illegal imports of light sources, especially in Eastern Europe, are not registered in Eurostat. Nevertheless, Eurostat data remain an important reference, in particular for imports and exports.

Eurostat data are extensively presented and discussed in this report. Some major conclusions:

- Considering all reported lamp types, the EU-28 apparent consumption of light sources has decreased from 3476 million units in 2003 to 2833 million in 2013 (-18.5%). The apparent value derived from Eurostat data has decreased from 3026 million euros in 2003 to 2878 million in 2013 (-4.9%).
- Comparing the apparent consumption (units) data for years 2003 and 2013, there is a significant decrease in GLS-lamps (-67%) and an increase in both fluorescent lamps (+113%) and halogen lamps (+60%). This is the trend that was expected, considering the ecodesign measures.

The GfK-data<sup>2</sup> published in September 2014 regard only residential sales of light sources. The data cover a (specified) share of the sales in nine European countries, thus covering around 50% of EU-28 households in 2007-2010 and 60% in 2011-2013. These data have been scaled-up by the study team to the EU-28 level. Trends in GfK data are similar to those in other data sources.

For the main lamp types used in the residential sector (incandescent lamps, single-ended MV-halogens, self-ballasted CFLi, and LEDs) the MELISA sales values are generally close to those derived from GfK data, with a maximum deviation for CFLi where scaled GfK data are 82% of the MELISA values. This is considered a good match. For LV-halogens, the match between MELISA and GfK is worse.

The McKinsey 'Lighting the Way' report update of 2012 provides an interesting breakdown of the global lighting market, not only per lamp technology type (incandescent, halogen, HID, LFL, CFL, LED retrofit and LED full), but also per application sector (residential, office, industrial, shop/retail, hospitality, outdoor, architectural) and per market type (light source replacement, lighting control systems, luminaire market, further split in (new) light sources, control gears and fixtures).

Unfortunately, for the current study, most data are provided at a global level. A regional breakdown including 'Europe' is provided but only in terms of market value, not in terms of number of units sold. Which countries are exactly included in McKinsey's 'Europe' is not defined, but there are indications that it also includes the Russian Federation and all other ex-Soviet republics. McKinsey's market

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<sup>2</sup> GfK ('Gesellschaft für Konsumforschung') is an institute for market research based in Germany and now represented in more than 100 countries. <http://www.gfk.com/de/Seiten/default.aspx>



value is based on ASP's (euros/unit), assumed to be Average Selling Prices, but the exact meaning is not further defined in the report.

As regards the market values, the study team scaled McKinsey's 'European' data down to EU-28 level, allowing the following conclusions:

- The EU-28 general lighting market <sup>3</sup> is expected to grow from 13 billion euros in 2011 to 16 billion in 2020.
- Approximately 78% of the market value comes from new sales (luminaire market, includes light sources, control gears and fixtures).
- The share of the light source replacement market decreases from 18% in 2011 to 9% in 2020.
- The share of the control system market increases from 4% in 2011 to 13% in 2020.
- By 2020, the value share of LED lighting in the total market is expected to be 73%.
- The residential lighting market accounts for slightly less than half of the total market. A slight loss of market value share from 49% in 2011 to 44% in 2020 is predicted.
- The value shares of the outdoor sector (10->13%) and the office sector (13->16%) slightly increase from 2011 to 2020.
- For other sectors, the share of market value is constant throughout the years, 7-9% each for hospitality, retail/shops and industrial, and 4% for architectural.

The study team also made an attempt to derive sales quantities for EU-28 from the McKinsey market value data. This is not an easy task and requires assumptions to be made regarding the applicable prices per unit. The global ASP's reported by McKinsey are certainly not representative for EU-28 (much too low). The result of the elaboration is interesting but should be used with care, because at least some of the outcomes are not reliable.

For example, the McKinsey 2012 market value data for legacy incandescent lamps, even when applying a reasonably high price/unit, implies annual sales of around 1500 million units of these lamps in 2012 in the EU-28. Making other assumptions this could maybe be lowered to 800-1000 million units, but it remains incompatible with the data from LightingEurope and Eurostat (and MELISA), that indicate 300-400 million units. This raised considerable doubt on the validity of the McKinsey data for the EU-28 market.

As regards ballast sales, the Eurostat data are retained not reliable for reasons explained in chapter 8. For the moment the CELMA&ELC data of 2008 (prevision up to 2010) will be used. These data indicate a market share of electronic ballasts of at least 60% in 2010.

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<sup>3</sup> General lighting excludes automotive lighting and backlighting for displays, but includes luminaires, dimmers, etc.

# 1. INTRODUCTION

This document covers MEErP Task 2, i.e. sales and stock data for light sources, market trends, and consumer expenditure base data. For more details on the contents of this task, see Annex B.

Compared to the situation during previous preparatory studies <sup>4 5 6</sup>, the availability of sales and market data on light sources has considerably improved, both in quantity and in quality. Unfortunately, the information from different sources is not always in agreement, or the data are difficult to compare because light sources are grouped in different ways <sup>7</sup>, because the data regard only a share of the market <sup>8</sup>, or because the region considered is different from the EU-28 targeted here <sup>9</sup>. These aspects, and the corresponding data elaboration, will be addressed when discussing the individual data sources.

Reviewing and comparing the data from the various sources, it is easy to get confused. Therefore, for clarity, this report first presents the outcome of the data analysis (chapter 0), i.e. the sales and stock<sup>10</sup> data for EU-28 light sources as currently contained in the “Model for European Light Sources Analysis” (MELISA) <sup>11</sup>, which is the model that will be used in the current study. This model has been developed by the study team, also considering the desire of the Commission to harmonise the projections for past and future lighting energy use between the Lots <sup>12</sup>. MELISA will be adapted and refined as the study proceeds and then be used for the scenario analysis in MEErP Task 7. The ambition for MELISA is to become the main reference model for all lighting studies in Europe and that it will be agreed upon by the interested parties.

The other chapters are dedicated to the individual data sources: Eurostat (chapter 3), LightingEurope (chapter 4), GfK (chapter 5), McKinsey (chapter 6) and other sources (chapter 7). The review of these other sources also includes an auto-critical comparison with the data currently inserted in MELISA, and an indication of some topics for further study during a future MELISA revision. However, before starting such a revision the study team would like to collect comments from the stakeholders.

The focus in this report is on market data for light sources. No specific research has been made to collect data for ballasts, control gears, lighting controls, dimmers, luminaires and other lighting-related products. However, some information on these products can be found in chapter 6, in particular as regards the market value.

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<sup>4</sup> Preparatory Studies for Eco-design requirements of EuPs, Final Report, Lot 19: Domestic lighting, Study for the European Commission DGTREN unit D3, contact Andras Toth, by VITO in cooperation with Bio Intelligence Service, Energy Piano and Kreios, October 2009, Contract TREN/07/D3/390-2006/S07.72702, available through ‘eup4light.net’

<sup>5</sup> Preparatory Studies for Eco-design requirements of EuPs, Final Report, Lot 9: Public Street lighting, Study for the European Commission DGTREN unit D3, contact Andras Toth, by VITO in cooperation with Laborelec and Kreios, January 2007, Contract TREN/D1/40-2005/LOT9/S07.56457, available through ‘eup4light.net’

<sup>6</sup> Preparatory Studies for Eco-design requirements of EuPs, Final Report, Lot 8: Office lighting, Study for the European Commission DGTREN unit D3, contact Andras Toth, by VITO in cooperation with Laborelec and Kreios, April 2007, Contract TREN/D1/40-2005/LOT8/S07.56452, available through ‘eup4light.net’

<sup>7</sup> For example Eurostat uses a group ‘other filament lamps’ and a group ‘other discharge lamps’ while no specific coding is available yet for LED lighting products.

<sup>8</sup> This is the case for example for data from LightingEurope (only sales from LE-members) and from GfK (mainly residential sales).

<sup>9</sup> For example McKinsey considers the whole of Europe, including the Russian Federation. GfK data have been gathered in some countries only, see chapter 5.

<sup>10</sup> In ecodesign context the term ‘stock’ refers to the products installed and operating in EU-28 countries. It does NOT refer to the quantity of products stored in warehouses.

<sup>11</sup> This name is newly introduced here. Suggestions for other names are welcome.

<sup>12</sup> See the assignment in the Task 0 report. In parallel to the current Lot 8/9/19 study on Light Sources, a Lot 37 study on Lighting Systems is being performed by VITO and VHK, see Task 0 report.

For sales and stock data of special purpose lamps and other lamps exempted from the existing regulations, see Annex D.15 of the Task 1 report.

Revision 0 of this document, as presented during the 1<sup>st</sup> stakeholder meeting of 5 February 2015, has been integrated with comments from the stakeholders. In particular data on ballasts have been added. For convenience, the following table provides a survey of the paragraphs that have been changed in revision 1. Changes that are only editorial have not been included in this table.

Paragraph	Description of change(s) in revision 1
Annex C.18	New: added Eurostat data for magnetic ballasts
Annex C.19	New: added Eurostat data for electronic ballasts
Chapter 8	New: discussion on sales data for ballasts, including CELMA&ELC 2010 data
Executive Summary	Added information on ballasts

## 2. MODEL FOR EUROPEAN LIGHT SOURCES ANALYSIS

### 2.1. Introduction to MELISA

In the context of this preparatory study, the study team has developed and will continue to develop a 'Stock model for Light Sources', now re-baptised MELISA, an abbreviation for 'Model for European Light Sources Analysis'. This model currently contains, for EU-28, for all lamp technology types, and for the period 1990-2030:

- Sales volumes (units)
- Life & use data (lifetimes, average lumens, wattage, burning hours, efficiencies, prices)
- Stock for light sources (installed number of units)
- Installed capacity in terms of (Tera) lumen
- Total use in terms of (Tera) operating hours
- Energy consumption by light sources (TWh)
- Economic data (sales value, industry revenue, energy cost, total consumer expense)

The above data are subdivided in residential use and non-residential use. In particular in the context of the parallel Lot 37 lighting systems study, a further subdivision of the non-residential sector is foreseen (outdoor, indoor, subsectors).

MELISA is being developed with the aim to:

- Harmonise the data used in the various studies on light sources, as requested by the European Commission;
- Create a single stock model for light sources that is accepted by (hopefully) all interested parties as the main reference model for all studies and discussions on lighting in Europe.

The following EU-28 total data from MELISA, relevant for MEErP Task 2, are reported below for the period 1990-2013:

- Sales volumes (units)
- Unit costs of light sources for consumers (euro/unit)
- Consumer expense (= sales volume \* unit cost, in euros)
- Industry revenue part: part of unit cost representing industry revenue (%)
- Industry revenue (= consumer expense \* industry revenue part, in euros)
- Lifetime of the light source (hours)
- Operating hours per light source type and sector (hours/year)
- Life in years of the light source (= lifetime in hours / operating hours, per year)
- Installed stock of light sources (= sum of sales over life years).

These data are preliminary and may be updated as the study proceeds.

### 2.2. Sales volumes (units) for light sources

The most important source for EU light source/lamp sales is data from manufacturer's association LightingEurope (LE)<sup>13</sup>. These are data that the individual manufacturers, members of LE, claim to have sold in 'Europe'<sup>14</sup>. Currently these sales relate to the period 2009-2013. The main problem with these data is that they do not provide the total light source market, but only the share of this market

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<sup>13</sup> previously split in ELC for lamps and CELMA for fixtures

<sup>14</sup> includes non-EU countries that have been filtered out in the further analysis

represented by the LE-members. LE claims a share of 80-90% for some lamp types and 40-50% for other types, but essentially the shares are uncertain.

The LightingEurope sales data have been checked against other sources as much as possible. The most important check is against Eurostat production and trade data (from ProdCom). The Eurostat data is known to be inaccurate for various reasons<sup>15</sup>, but especially for external trade (in particular imports) it is the only official source available. The Eurostat 'apparent consumption' (see chapter 3) gives some measure how far the Eurostat data deviate from LE data and which points still need clarification.

In addition, sales data were checked for consistency against data from GfK (chapter 5) and from McKinsey (chapter 6). GfK data have the drawback that they consider only residential sales, that they are limited to some countries (scaling required to obtain EU-28 estimates) and that they represent a share of the sales in those countries<sup>16</sup>. The published McKinsey data predominantly regard the global lighting market. Some data are reported for Europe, but they all refer to monetary market values and the conversion in quantity of light sources sold requires (uncertain) assumptions to be made. In addition McKinsey's 'Europe' is wider than the EU-28<sup>17</sup> so there is a scaling problem.

Other sources have also been taken into account: German lamp sales from manufacturer's association ZVEI, data from Chinese and Japanese sources, and anecdotal data in annual reports from individual manufacturers, magazine and newspaper magazines, etc.

The 'Omnibus' study (see Task 0 report, par. 2.7) gave new data and more insight into two subjects: better quantification of illegal imports of incandescent lamps in especially Eastern Europe, and a first inventory of the so-called special purpose lamps and other exemptions from the existing legislation (see Task 1 report, par. 1.4 and Annex D). In the course of this preparatory study, the latter inventory needs to be confirmed with manufacturers, and extended to all types of exemptions.

Preceding the Omnibus study there was also an exploratory CLASP study (see Task 0 report, par. 2.5), which contributed in identifying the saving potential that lies ahead from LEDs. As regards historical sales, stock, or energy consumption data, the CLASP study was based on the 2009 preparatory studies.

It was also checked how the sales data from LightingEurope deviated from the outcomes of the ecodesign preparatory studies and impact assessments for office lighting (Lot 8), street lighting (Lot 9), and non-directional domestic lighting and directional light sources (Lot 19), see chapter 2 of the Task 0 report for details. These 2009 studies suffered from limited data availability. For directional light sources (DLS), the impact assessments study was performed a little later (2010-2011) enabling additional sources to be tapped. This allowed making more robust projections of the (rising) trends in DLS sales, stock and energy consumption in a residential setting.

The reasonability of the sales data (and other data) in MELISA was also checked indirectly by judging the effect of these data on for example the total residential energy consumption for lighting, the average number of light sources installed per household, the quantity of lumens installed per square meter of non-residential area, etc.

The presentation of the sales data includes a 'GLS stock' and a 'Tungsten stock'. The associated quantities are not real sales, but reflect the lamp units that seem to appear on the 'market' from existing stocks in households after the phase-out of these lamp types due to ecodesign measures.

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<sup>15</sup> E.g. a lot of 'production' is actually intra-company imports of EU-companies from Asia, e.g. lamp types are not identified correctly, and there are illegal imports.

<sup>16</sup> The presumed share is specified for each country, but anyway remains a factor of uncertainty.

<sup>17</sup> 'Europe' is not exactly defined by McKinsey, but the impression is that it also includes the Commonwealth of Independent States (ex-U.S.S.R. republics, among which the Russian Federation).

They should not be counted as sales (and are NOT included in the presented sales totals), but they are relevant for stock and energy computations, and thus have been included in the model. The quantities are estimates from the study team.

The sales data in MELISA are subdivided per main technology type (LFL, CFL, HL, GLS, HID, LED) with some further subdivisions within these types. The subdivision is the same as that used by LightingEurope for the supply of their sales data, see chapter 4.

MELISA data are also split in residential and non-residential. For all lamp types except LED, the residential sales have been derived from the total sales using the following shares: LFL 6.4%, CFLi 60%, CFLni 30%, HL and GLS 80%, and HID 0%. For LED light sources the residential and non-residential quantities have been estimated separately.

MELISA's light source sales quantities for all sectors are reported in Figure 1, Figure 2, Table 1 and Table 2. The sales quantities for the residential sector are reported in Table 3 and Figure 3; those for the non-residential sector in Table 4 and Figure 4.

From 1990 to 2007, the total quantity of light sources sold in EU-28 has increased from 2112 to 2836 million units/year. This is an increase of 34% in 17 years, corresponding to a compound annual growth rate (CAGR) of 1.75%.

From 2007 to 2013, the sales quantity decreased from 2836 to 1731 million units/year. This is a decrease of 39% in 6 years, corresponding to a CAGR of -8%.

In 2013, 59% of light source sales quantities is for residential use (1018/1731 million units), with average sales of 7.1 lamps/household/year (Table 5).

Table 6 shows the subdivision per technology type for the EU-28 sales quantities of light sources for the years 2008 and 2013. This table clearly indicates the shift from incandescent (GLS) to halogen (HL) (and LED) light sources as a direct effect of the ecodesign measures.

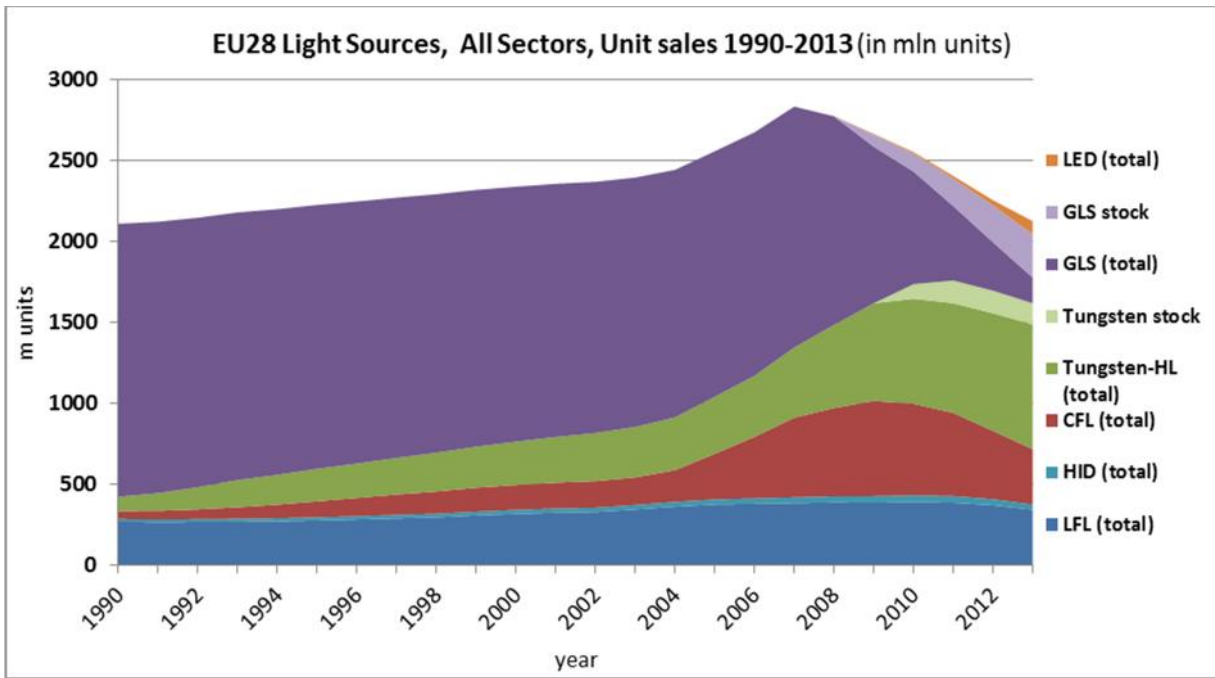


Figure 1: Sales data for light sources, EU-28 cumulative total in millions of units. ALL SECTORS ('GLS stock' and 'Tungsten stock' are not real sales, see text final paragraph page 11)

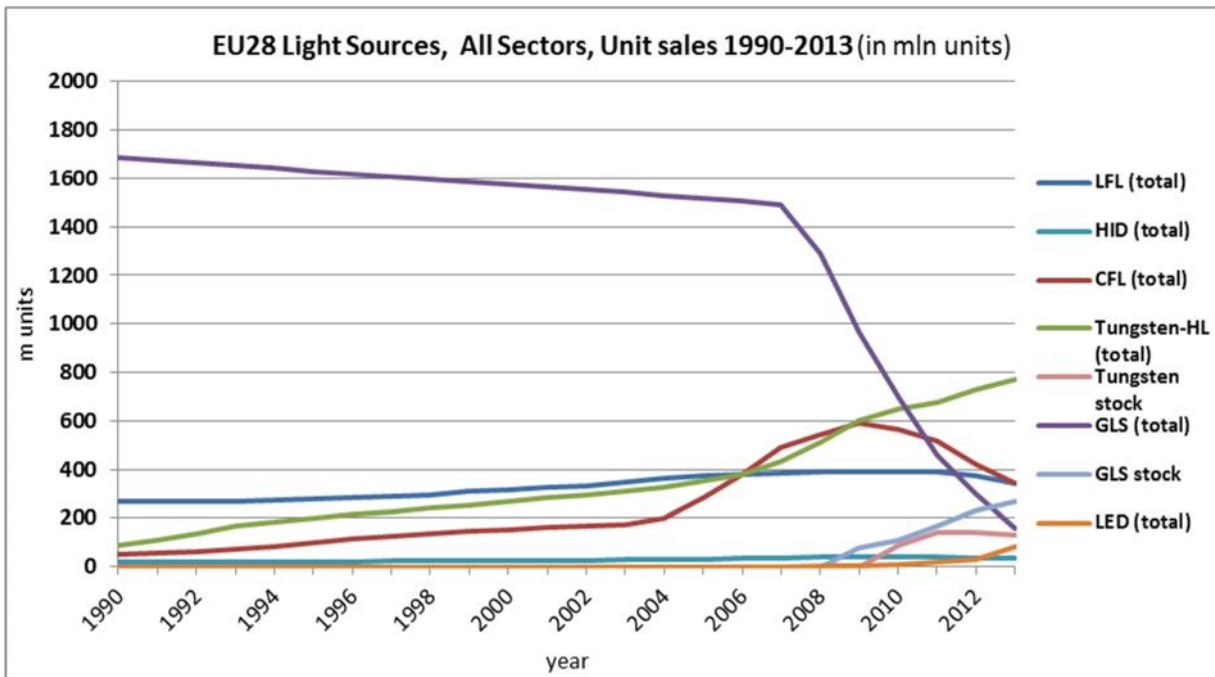


Figure 2: Sales data for light sources, EU-28 totals per lamp type in millions of units. ALL SECTORS

EU-28 SALES SUMMARY, All Sectors million units	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
	LFL (total)	269	276	318	376	380	385	389	387	390	387	372
CFL (total)	51	99	154	282	381	493	545	589	567	514	422	342
Tungsten-HL (total)	88	201	268	352	377	433	514	603	650	678	726	772
GLS (total)	1688	1631	1576	1519	1506	1490	1290	968	697	461	299	159
HID (total)	17	21	25	32	34	36	38	40	42	41	37	33
LED (total)	0	0	0	0	0	0	2	4	8	17	31	82
GLS stock	0	0	0	0	0	0	0	75	112	168	228	267
Tungsten stock	0	0	0	0	0	0	0	0	90	140	140	130
<b>TOTAL</b>	<b>2112</b>	<b>2228</b>	<b>2341</b>	<b>2560</b>	<b>2677</b>	<b>2836</b>	<b>2777</b>	<b>2592</b>	<b>2354</b>	<b>2099</b>	<b>1889</b>	<b>1731</b>

**Table 1: Sales data for light sources, EU-28 totals per main lamp type in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

EU-28 SALES TOTAL, All Sectors million units		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	80	47	29	16	14	12	10	8	6	5	3	1
	T8 halophosphor	95	119	154	176	165	154	143	113	68	26	4	2
	T8 tri-phosphor	71	83	100	121	131	142	153	175	216	254	261	245
	T5 new (14 - 80w) including circular	0	0	0	23	31	39	47	57	68	76	81	76
	All others (including T5 old types 4 - 13w and special FL)	23	28	36	40	39	38	37	34	32	27	23	19
	<b>LFL (total)</b>	<b>269</b>	<b>276</b>	<b>318</b>	<b>376</b>	<b>380</b>	<b>385</b>	<b>389</b>	<b>387</b>	<b>390</b>	<b>387</b>	<b>372</b>	<b>344</b>
CFL	Retrofit - CFLi	28	68	109	220	313	420	467	506	480	431	345	271
	Non-retrofit - CFLni	23	31	44	62	67	73	79	84	87	83	78	72
	<b>CFL (total)</b>	<b>51</b>	<b>99</b>	<b>154</b>	<b>282</b>	<b>381</b>	<b>493</b>	<b>545</b>	<b>589</b>	<b>567</b>	<b>514</b>	<b>422</b>	<b>342</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	20	54	93	130	136	140	144	148	150	151	154	164
	Linear (high voltage) [R7s]	15	90	90	90	80	67	54	47	45	41	40	38
	LV halogen capsule [G4, GY6.35]	52	52	52	52	52	52	52	53	52	49	45	42
	HV halogen capsule [G9]	0	0	0	10	23	47	60	70	70	70	70	67
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	27	81	141	172	196	244	303
	Other mains halogen - PAR 16/20/ 25/30 Hard glass reflectors, GU10 etc.	0	5	32	69	82	101	122	144	162	172	174	158
	<b>Tungsten-HL (total)</b>	<b>88</b>	<b>201</b>	<b>268</b>	<b>352</b>	<b>377</b>	<b>433</b>	<b>514</b>	<b>603</b>	<b>650</b>	<b>678</b>	<b>726</b>	<b>772</b>
GLS	Reflector	173	163	155	144	140	134	115	94	72	61	54	36
	GLS (Including clear/pearl, candles, coloured & decorative)	1514	1468	1421	1375	1365	1356	1174	874	624	400	245	123
	<b>GLS (total)</b>	<b>1688</b>	<b>1631</b>	<b>1576</b>	<b>1519</b>	<b>1506</b>	<b>1490</b>	<b>1290</b>	<b>968</b>	<b>697</b>	<b>461</b>	<b>299</b>	<b>159</b>
HID	All mercury lamps (including mixed)	8	9	9	7	7	6	6	5	5	4	3	2
	All sodium lamps	7	8	9	12	13	14	16	16	15	14	14	14
	Metal halide lamps	2	4	7	12	14	15	17	19	22	23	20	16
	<b>HID (total)</b>	<b>17</b>	<b>21</b>	<b>25</b>	<b>32</b>	<b>34</b>	<b>36</b>	<b>38</b>	<b>40</b>	<b>42</b>	<b>41</b>	<b>37</b>	<b>33</b>
LED	LED directional	0	0	0	0	0	0	1	3	6	11	18	41
	LED non-directional	0	0	0	0	0	0	1	1	3	6	13	41
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>17</b>	<b>31</b>	<b>82</b>
GLS stock	0	0	0	0	0	0	0	75	112	168	228	267	
Tungsten stock	0	0	0	0	0	0	0	0	90	140	140	130	
<b>TOTAL</b>	<b>2112</b>	<b>2228</b>	<b>2341</b>	<b>2560</b>	<b>2677</b>	<b>2836</b>	<b>2777</b>	<b>2592</b>	<b>2354</b>	<b>2099</b>	<b>1889</b>	<b>1731</b>	

**Table 2: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**



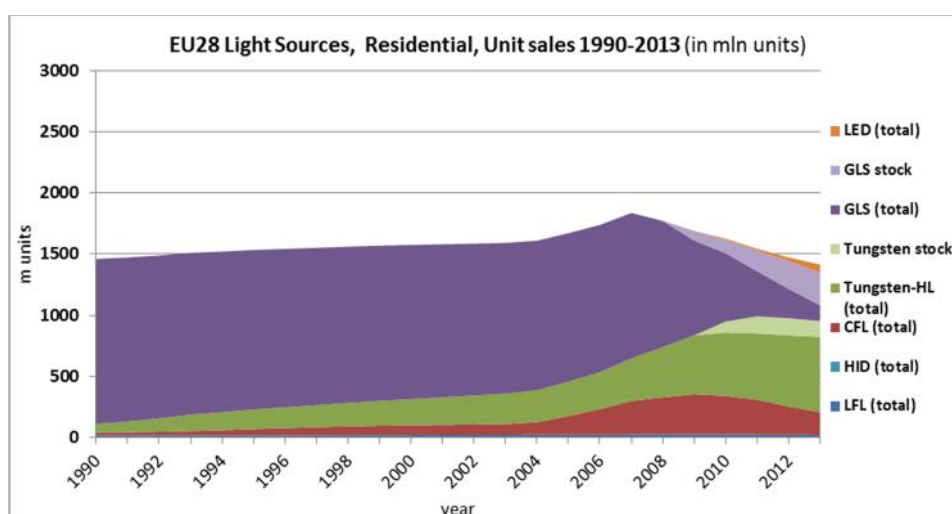


Figure 3: Sales data for light sources, EU-28 cumulative total in millions of units. RESIDENTIAL

EU-28 SALES RESIDENTIAL million units		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	5	3	2	1	1	1	1	0	0	0	0	0
	T8 halophosphor	6	8	10	11	11	10	9	7	4	2	0	0
	T8 tri-phosphor	5	5	6	8	8	9	10	11	14	16	17	16
	T5 new (14 - 80w) including circular	0	0	0	1	2	2	3	4	4	5	5	5
	All others (including T5 old types 4 - 13w and special FL)	1	2	2	3	2	2	2	2	2	2	1	1
<b>LFL (total)</b>		<b>17</b>	<b>18</b>	<b>20</b>	<b>24</b>	<b>24</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>25</b>	<b>24</b>	<b>22</b>
CFL	Retrofit - CFLi	17	41	66	132	188	252	280	304	288	259	207	162
	Non-retrofit - CFLni	7	9	13	19	20	22	24	25	26	25	23	22
	<b>CFL (total)</b>	<b>23</b>	<b>50</b>	<b>79</b>	<b>151</b>	<b>208</b>	<b>274</b>	<b>304</b>	<b>329</b>	<b>314</b>	<b>284</b>	<b>230</b>	<b>184</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	16	43	74	104	108	112	115	118	120	120	123	131
	Linear (high voltage) [R7s]	12	72	72	72	64	53	43	38	36	33	32	30
	LV halogen capsule [G4, GY6.35]	42	42	42	42	42	42	42	42	41	39	36	34
	HV halogen capsule [G9]	0	0	0	8	19	37	48	56	56	56	56	53
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	21	65	113	138	157	195	242
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	4	26	55	66	80	98	115	129	138	139	127
	<b>Tungsten-HL (total)</b>	<b>70</b>	<b>161</b>	<b>214</b>	<b>281</b>	<b>302</b>	<b>347</b>	<b>411</b>	<b>482</b>	<b>520</b>	<b>543</b>	<b>581</b>	<b>617</b>
GLS	Reflector	138	130	124	115	112	107	92	75	58	49	43	29
	GLS (Including clear/pearl, candles, coloured & decorative)	1212	1174	1137	1100	1092	1085	940	700	500	320	196	99
	<b>GLS (total)</b>	<b>1350</b>	<b>1305</b>	<b>1261</b>	<b>1215</b>	<b>1204</b>	<b>1192</b>	<b>1032</b>	<b>775</b>	<b>558</b>	<b>369</b>	<b>239</b>	<b>127</b>
HID	All mercury lamps (including mixed)	0	0	0	0	0	0	0	0	0	0	0	0
	All sodium lamps	0	0	0	0	0	0	0	0	0	0	0	0
	Metal halide lamps	0	0	0	0	0	0	0	0	0	0	0	0
	<b>HID (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
LED	LED directional	0	0	0	0	0	0	1	3	6	10	17	33
	LED non-directional	0	0	0	0	0	0	1	1	3	6	13	34
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>8</b>	<b>15</b>	<b>30</b>	<b>68</b>
GLS stock		0	0	0	0	0	0	0	75	112	168	228	267
Tungsten stock		0	0	0	0	0	0	0	0	90	140	140	130
<b>TOTAL</b>		<b>1461</b>	<b>1533</b>	<b>1575</b>	<b>1671</b>	<b>1739</b>	<b>1837</b>	<b>1773</b>	<b>1614</b>	<b>1425</b>	<b>1235</b>	<b>1104</b>	<b>1018</b>

Table 3: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL

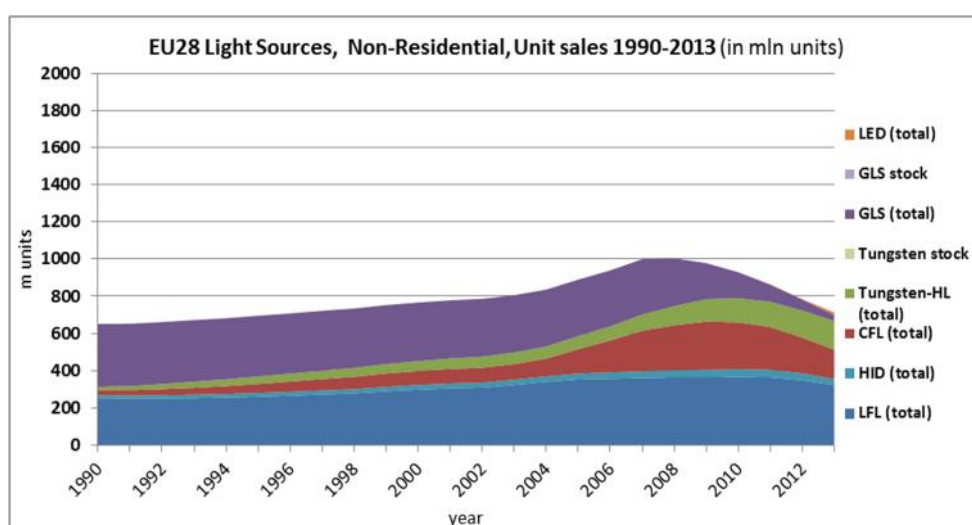


Figure 4: Sales data for light sources, EU-28 cumulative total in millions of units. NON-RESIDENTIAL

EU-28 SALES NON-RESIDENTIAL million units		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	75	44	27	15	13	11	9	7	6	5	3	1
	T8 halophosphor	89	111	144	165	155	144	134	106	63	24	4	2
	T8 tri-phosphor	67	77	93	113	123	133	143	164	203	238	244	230
	T5 new (14 - 80w) including circular	0	0	0	22	29	37	44	53	64	71	76	71
	All others (including T5 old types 4 - 13w and special FL)	21	26	33	38	37	35	34	32	30	25	21	18
<b>LFL (total)</b>		<b>252</b>	<b>259</b>	<b>298</b>	<b>352</b>	<b>356</b>	<b>360</b>	<b>364</b>	<b>363</b>	<b>365</b>	<b>362</b>	<b>348</b>	<b>322</b>
CFL	Retrofit - CFLi	11	27	44	88	125	168	187	202	192	172	138	108
	Non-retrofit - CFLni	16	22	31	43	47	51	55	58	61	58	54	50
<b>CFL (total)</b>		<b>27</b>	<b>49</b>	<b>75</b>	<b>131</b>	<b>172</b>	<b>219</b>	<b>242</b>	<b>261</b>	<b>253</b>	<b>231</b>	<b>192</b>	<b>158</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	4	11	19	26	27	28	29	30	30	30	31	33
	Linear (high voltage) [R7s]	3	18	18	18	16	13	11	9	9	8	8	8
	LV halogen capsule [G4, GY6.35]	10	10	10	10	10	10	10	11	10	10	9	8
	HV halogen capsule [G9]	0	0	0	2	5	9	12	14	14	14	14	13
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	1	5	16	28	34	39	49	61
Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	1	6	14	16	20	24	29	32	34	35	32	
<b>Tungsten-HL (total)</b>		<b>18</b>	<b>40</b>	<b>54</b>	<b>70</b>	<b>75</b>	<b>87</b>	<b>103</b>	<b>121</b>	<b>130</b>	<b>136</b>	<b>145</b>	<b>154</b>
GLS	Reflector	35	33	31	29	28	27	23	19	14	12	11	7
	GLS (Including clear/pearl, candles, coloured & decorative)	303	294	284	275	273	271	235	175	125	80	49	25
<b>GLS (total)</b>		<b>338</b>	<b>326</b>	<b>315</b>	<b>304</b>	<b>301</b>	<b>298</b>	<b>258</b>	<b>194</b>	<b>139</b>	<b>92</b>	<b>60</b>	<b>32</b>
HID	All mercury lamps (including mixed)	8	9	9	7	7	6	6	5	5	4	3	2
	All sodium lamps	7	8	9	12	13	14	16	16	15	14	14	14
	Metal halide lamps	2	4	7	12	14	15	17	19	22	23	20	16
<b>HID (total)</b>		<b>17</b>	<b>21</b>	<b>25</b>	<b>32</b>	<b>34</b>	<b>36</b>	<b>38</b>	<b>40</b>	<b>42</b>	<b>41</b>	<b>37</b>	<b>33</b>
LED	LED directional	0	0	0	0	0	0	0	0	0	1	1	7
	LED non-directional	0	0	0	0	0	0	0	0	0	0	0	7
<b>LED (total)</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>14</b>
GLS stock		0	0	0	0	0	0	0	0	0	0	0	0
Tungsten stock		0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>		<b>651</b>	<b>695</b>	<b>766</b>	<b>889</b>	<b>939</b>	<b>999</b>	<b>1004</b>	<b>978</b>	<b>929</b>	<b>863</b>	<b>784</b>	<b>713</b>

Table 4: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL

Check on sales per household	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Number of households (millions)</b>	<b>171.6</b>	<b>181.5</b>	<b>188.9</b>	<b>192.6</b>	<b>193.3</b>	<b>194.1</b>	<b>194.8</b>	<b>195.6</b>	<b>196.3</b>	<b>197.1</b>	<b>197.8</b>	<b>198.6</b>
LFL per hh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
CFL per hh	0.1	0.3	0.4	0.8	1.1	1.4	1.6	1.7	1.6	1.4	1.2	0.9
Tungsten per hh	0.4	0.9	1.1	1.5	1.6	1.8	2.1	2.5	3.1	3.5	3.6	3.8
GLS per hh	7.9	7.2	6.7	6.3	6.2	6.1	5.3	4.3	3.4	2.7	2.4	2.0
LED per hh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3
<b>TOTAL lamps/hh</b>	<b>8.5</b>	<b>8.4</b>	<b>8.3</b>	<b>8.7</b>	<b>9.0</b>	<b>9.5</b>	<b>9.1</b>	<b>8.6</b>	<b>8.3</b>	<b>7.8</b>	<b>7.4</b>	<b>7.1</b>
<i>of which DLS</i>	<i>0.9</i>	<i>1.0</i>	<i>1.2</i>	<i>1.4</i>	<i>1.5</i>	<i>1.5</i>	<i>1.6</i>	<i>1.6</i>	<i>1.6</i>	<i>1.6</i>	<i>1.6</i>	<i>1.6</i>

**Table 5: Residential sales of light sources per household, years 1990, 1995, 2000, 2005 – 2013.**

Division of EU-28 lamp sales (quantities) over the technology types, year 2008 & 2013	year 2008			year 2013		
	All Sectors	Residential	Non-residential	All Sectors	Residential	Non-residential
LFL (total)	14%	1%	36%	20%	2%	45%
CFL (total)	20%	17%	24%	20%	18%	22%
Tungsten-HL (total)	18%	23%	10%	45%	61%	22%
GLS (total)	46%	58%	26%	9%	13%	4%
HID (total)	1%	0%	4%	2%	0%	5%
LED (total)	0%	0%	0%	5%	7%	2%
TOTAL	100%	100%	100%	100%	100%	100%

**Table 6: Years 2008 and 2013, subdivision of EU-28 sales quantities for light sources/lamps over the main technology types.**

### 2.3. Unit cost for light sources

Table 7 reports the prices per light source as currently used in MELISA for all lamp technology types except LEDs. These are the consumer acquisition costs (in euro/unit) for lamps of the indicated technology that have the indicated reference power and efficiency.

Residential unit prices are inclusive VAT (20%); non-residential prices are exclusive VAT. Prices are on 2010 price level. At the moment, the same prices are used for all years (except for LEDs), i.e. no depreciation rate is used.

Table 8 provides price information for LED retrofit lamps. For LED lamps, the model does consider a variation of prices with the years.

Sales prices per unit have been derived from LightingEurope data, internet sites, manufacturer's and seller's catalogues, and from other literature.

MELISA, unit lamp prices in euro/unit	LFL					CFL		TUNGSTEN						GLS		HID		
	T12	T8 Halophosphor	T8 tri-phosphor	T5 new (14 - 80w) including Circular	All others (including T5 old types 4 - 13w and Special FL)	Retrofit - CFLi	Non-Retrofit - CFLni	Single Ended, Mirrored (Low voltage) [M16, M25etc]	Linear (High voltage) [R7s]	LV halogen Capsule [G4, GY6.35]	HV halogen Capsule [G9]	Mains halogen (Substitute for GLS and Reflector) [E14, E27]	Other Mains halogen - PAR 16/20/25/30 Hard glass reflectors, GU10 etc.	Reflector	GLS (including clear/pearl, candles, coloured & decorative)	All Mercury Lamps (including mixed)	All Sodium Lamps	Metal Halide Lamps
Reference power (W)	35	32	30	25	12	9.5	12	35	250	35	35	36	35	54	54	250	140	160
Reference efficiency (lm/W)	70	75	80	91	86	55	55	14	12	14	12	12	12	9.5	9.5	40	95	82
Price/unit residential €	10.10	10.10	10.10	9.50	9.50	5.26	5.26	3.79	3.16	3.16	3.79	2.63	14.21	1.37	0.84	20.40	32.40	32.40
Price/unit non-residential €	8.42	8.42	8.42	7.92	7.92	4.39	4.39	3.16	2.63	2.63	3.16	2.19	11.84	1.14	0.70	17.00	27.00	27.00

**Table 7: Unit consumer sales prices for light sources (except LEDs) from the MELISA model. Prices are in euro/unit for the indicated lamp type with the indicated reference power and efficiency. Prices are 2010-level and for the moment they are model constants valid for all years.**

LED price/unit	2009	2010	2011	2012	2013
lm / W (for sales in year)	25	30	40	60	80
watt @ 500 lm	20.0	16.7	12.5	8.3	6.3
euro / lumen (source: LightingEurope 2013)	0.056	0.048	0.042	0.034	0.020
euro @ 500 lm (excl. VAT)	28.00	24.00	21.00	17.00	10.00

**Table 8: Unit consumer sales prices for LED retrofit lamps from the MELISA model. Prices are provided in euro/lumen and in euro/unit for a 500 lm lamp. Prices exclusive VAT.**

## 2.4. Consumer expense for light sources

MELISA light source sales values (consumer acquisition costs) for all sectors are reported in Figure 5, Figure 6, Table 9 and Table 10. The sales values for the residential sector are reported in Table 11 and Figure 7; those for the non-residential sector in Table 12 and Figure 8. Residential values are inclusive 20% VAT; non-residential values are exclusive VAT.

The consumer acquisition costs have been calculated by multiplying the sales volumes (number of units) of par. 2.2 with the prices/unit of par. 2.3.

From 1990 to 2010 consumer acquisition costs for light sources have continuously increased, with an increased growth rate between 2004 and 2009, from 4637 million euros in 1990 to 11762 million in 2010. In later years the consumer expense shows a slight tendency to decrease, reaching 10880 million euros in 2013.

In 2013, 52% of light source sales values is for residential acquisition (5619 / 10880 million euros). These values imply an average acquisition cost of €28.3 /household/year in 2013, of which €16.8 for halogen lamps, see Table 13.

Table 14 shows the subdivision per technology type for the EU-28 sales values of light sources/lamps for the years 2008 and 2013. This table clearly indicates the shift from incandescent (GLS) (and CFL) to halogen (HL) (and LED) light sources.

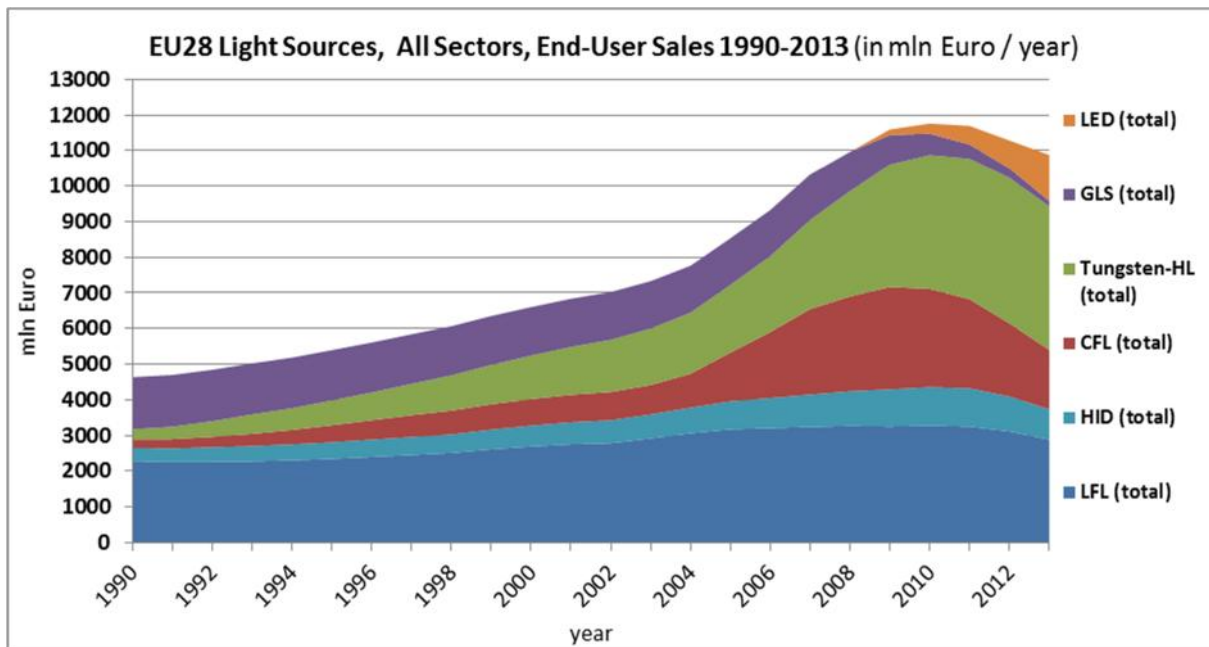


Figure 5: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros. ALL SECTORS

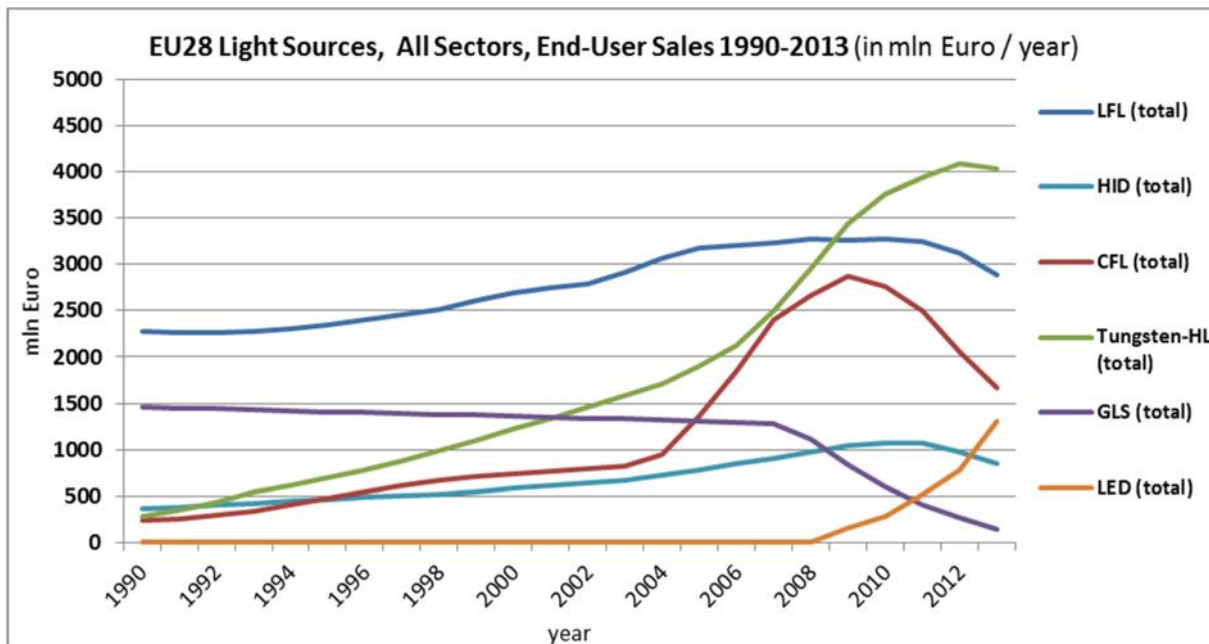


Figure 6: Consumer expense for acquisition of light sources, EU-28 totals per lamp-type in millions of euros. ALL SECTORS

<b>EU-28 END-USER SALES SUMMARY, All Sectors million euros / year</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
LFL (total)	2283	2342	2692	3175	3206	3238	3270	3256	3277	3249	3115	2881
CFL (total)	243	479	744	1369	1851	2401	2658	2873	2760	2503	2054	1663
Tungsten-HL (total)	280	696	1221	1899	2126	2498	2956	3438	3757	3943	4084	4032
GLS (total)	1461	1410	1362	1309	1297	1280	1108	836	604	406	271	148
HID (total)	370	468	585	783	846	909	971	1038	1079	1073	978	855
LED (total)	0	0	0	0	0	0	0	155	285	522	781	1301
<b>TOTAL</b>	<b>4637</b>	<b>5394</b>	<b>6603</b>	<b>8535</b>	<b>9327</b>	<b>10326</b>	<b>10964</b>	<b>11596</b>	<b>11762</b>	<b>11697</b>	<b>11284</b>	<b>10880</b>

**Table 9: Consumer expense for acquisition of light sources, EU-28 totals per main lamp-type in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

<b>EU-28 END-USER SALES TOTAL, All Sectors million euros / year</b>		<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>LFL</b>	T12	684	401	247	134	117	100	83	66	54	42	26	10
	T8 halophosphor	810	1015	1309	1502	1407	1312	1216	965	578	222	37	18
	T8 tri-phosphor	607	704	848	1031	1120	1210	1300	1494	1845	2166	2222	2091
	T5 new (14 - 80w) including circular	0	0	0	185	249	313	377	457	547	606	648	607
	All others (including T5 old types 4 - 13w and special FL)	182	222	287	322	313	304	295	274	253	213	182	155
	<b>LFL (total)</b>	<b>2283</b>	<b>2342</b>	<b>2692</b>	<b>3175</b>	<b>3206</b>	<b>3238</b>	<b>3270</b>	<b>3256</b>	<b>3277</b>	<b>3249</b>	<b>3115</b>	<b>2881</b>
<b>CFL</b>	Retrofit - CFLi	135	334	537	1082	1538	2061	2292	2485	2357	2117	1693	1329
	Non-retrofit - CFLni	108	145	207	287	313	340	366	388	403	387	361	333
	<b>CFL (total)</b>	<b>243</b>	<b>479</b>	<b>744</b>	<b>1369</b>	<b>1851</b>	<b>2401</b>	<b>2658</b>	<b>2873</b>	<b>2760</b>	<b>2503</b>	<b>2054</b>	<b>1663</b>
<b>TUNGSTEN (HL)</b>	Single ended, mirrored (low voltage) [M16, M25 etc.]	74	197	341	476	496	514	528	540	548	551	562	600
	Linear (high voltage) [R7s]	46	275	275	275	244	203	165	144	136	124	122	116
	LV halogen capsule [G4, GY6.35]	160	160	160	160	160	160	160	161	157	150	137	129
	HV halogen capsule [G9]	0	0	0	37	85	171	220	256	256	256	256	244
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	8	68	206	359	437	498	621	770
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	64	445	952	1132	1382	1678	1976	2222	2363	2385	2174
	<b>Tungsten-HL (total)</b>	<b>280</b>	<b>696</b>	<b>1221</b>	<b>1899</b>	<b>2126</b>	<b>2498</b>	<b>2956</b>	<b>3438</b>	<b>3757</b>	<b>3943</b>	<b>4084</b>	<b>4032</b>
<b>GLS</b>	Reflector	229	216	205	191	186	177	153	124	96	81	72	48
	GLS (Including clear/pearl, candles, coloured & decorative)	1233	1195	1157	1119	1111	1104	956	712	508	326	199	100
	<b>GLS (total)</b>	<b>1461</b>	<b>1410</b>	<b>1362</b>	<b>1309</b>	<b>1297</b>	<b>1280</b>	<b>1108</b>	<b>836</b>	<b>604</b>	<b>406</b>	<b>271</b>	<b>148</b>
<b>HID</b>	All mercury lamps (including mixed)	129	152	150	126	117	107	98	90	81	72	57	38
	All sodium lamps	197	220	254	327	358	388	419	426	416	386	378	376
	Metal halide lamps	43	95	181	331	372	413	455	523	581	615	544	442
	<b>HID (total)</b>	<b>370</b>	<b>468</b>	<b>585</b>	<b>783</b>	<b>846</b>	<b>909</b>	<b>971</b>	<b>1038</b>	<b>1079</b>	<b>1073</b>	<b>978</b>	<b>855</b>
<b>LED</b>	LED directional	0	0	0	0	0	0	0	113	201	317	442	568
	LED non-directional	0	0	0	0	0	0	0	42	84	204	339	732
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>155</b>	<b>285</b>	<b>522</b>	<b>781</b>	<b>1301</b>
<b>TOTAL</b>	<b>4637</b>	<b>5394</b>	<b>6603</b>	<b>8535</b>	<b>9327</b>	<b>10326</b>	<b>10964</b>	<b>11596</b>	<b>11762</b>	<b>11697</b>	<b>11284</b>	<b>10880</b>	

**Table 10: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

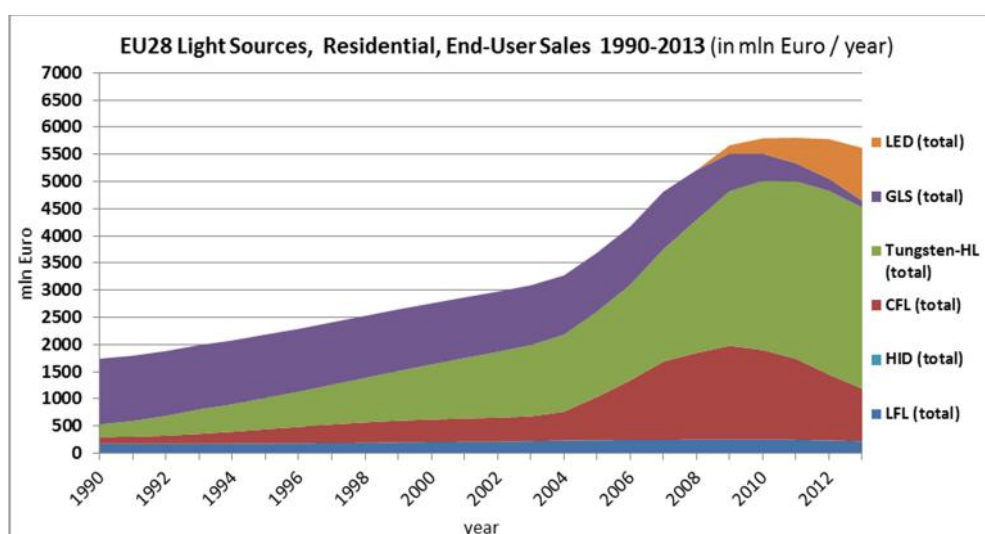


Figure 7: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros. RESIDENTIAL (inclusive 20% VAT)

EU-28 END-USER SALES RESIDENTIAL million euros / year		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	52	30	19	10	9	8	6	5	4	3	2	1
	T8 halophosphor	61	77	99	114	107	99	92	73	44	17	3	1
	T8 tri-phosphor	46	53	64	78	85	92	99	113	140	164	169	159
	T5 new (14 - 80w) including circular	0	0	0	14	19	24	29	35	42	46	49	46
	All others (including T5 old types 4 - 13w and special FL)	14	17	22	24	24	23	22	21	19	16	14	12
	<b>LFL (total)</b>	<b>173</b>	<b>178</b>	<b>204</b>	<b>241</b>	<b>243</b>	<b>246</b>	<b>248</b>	<b>247</b>	<b>249</b>	<b>246</b>	<b>236</b>	<b>218</b>
CFL	Retrofit - CFLi	87	215	345	696	989	1325	1473	1597	1515	1361	1088	855
	Non-retrofit - CFLni	37	49	70	97	106	115	124	132	137	131	123	113
	<b>CFL (total)</b>	<b>123</b>	<b>264</b>	<b>415</b>	<b>793</b>	<b>1095</b>	<b>1440</b>	<b>1598</b>	<b>1729</b>	<b>1652</b>	<b>1492</b>	<b>1211</b>	<b>968</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	62	163	282	394	411	425	437	447	453	456	465	497
	Linear (high voltage) [R7s]	38	227	227	227	202	168	136	120	113	103	101	96
	LV halogen capsule [G4, GY6.35]	133	133	133	133	133	133	133	133	130	124	114	106
	HV halogen capsule [G9]	0	0	0	30	71	141	182	212	212	212	212	202
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	7	56	170	297	362	412	514	637
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	53	369	788	937	1144	1389	1636	1839	1956	1974	1799
	<b>Tungsten-HL (total)</b>	<b>232</b>	<b>576</b>	<b>1010</b>	<b>1572</b>	<b>1760</b>	<b>2067</b>	<b>2447</b>	<b>2845</b>	<b>3109</b>	<b>3263</b>	<b>3380</b>	<b>3337</b>
GLS	Reflector	189	178	170	158	154	146	126	103	79	67	59	39
	GLS (Including clear/pearl, candles, coloured & decorative)	1020	989	957	926	920	913	791	589	421	269	165	83
	<b>GLS (total)</b>	<b>1209</b>	<b>1167</b>	<b>1127</b>	<b>1084</b>	<b>1073</b>	<b>1059</b>	<b>917</b>	<b>692</b>	<b>500</b>	<b>336</b>	<b>224</b>	<b>122</b>
HID	All mercury lamps (including mixed)	0	0	0	0	0	0	0	0	0	0	0	0
	All sodium lamps	0	0	0	0	0	0	0	0	0	0	0	0
	Metal halide lamps	0	0	0	0	0	0	0	0	0	0	0	0
	<b>HID (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
LED	LED directional								113	201	300	416	479
	LED non-directional								42	84	169	313	495
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>155</b>	<b>285</b>	<b>468</b>	<b>729</b>	<b>974</b>
<b>TOTAL</b>	<b>1738</b>	<b>2184</b>	<b>2757</b>	<b>3689</b>	<b>4171</b>	<b>4813</b>	<b>5210</b>	<b>5668</b>	<b>5795</b>	<b>5806</b>	<b>5781</b>	<b>5619</b>	

Table 11: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL (inclusive 20% VAT)

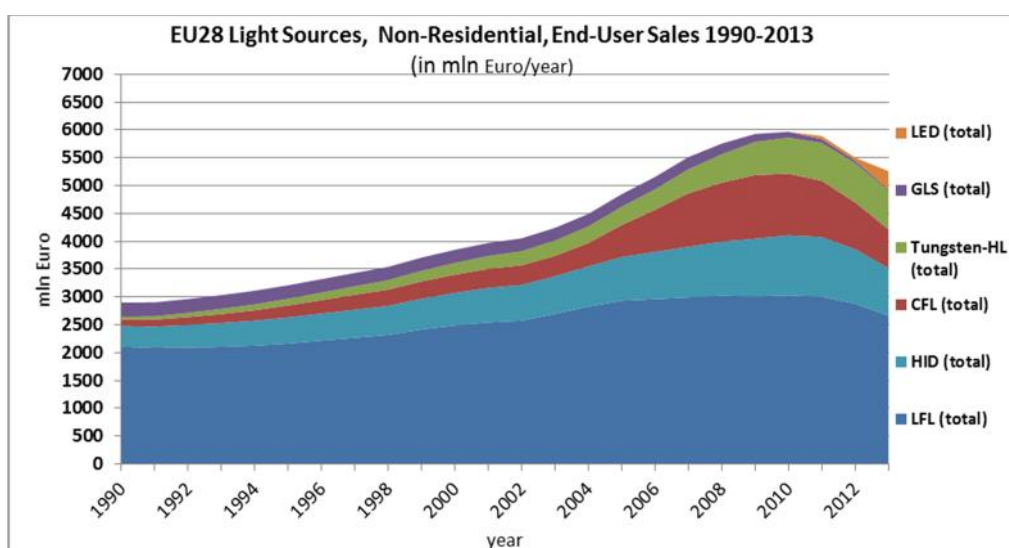


Figure 8: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros.  
NON-RESIDENTIAL (exclusive VAT)

EU-28 END-USER SALES NON-RESIDENTIAL million euros / year		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	632	371	228	124	108	92	76	61	50	39	24	9
	T8 halophosphor	748	938	1210	1388	1300	1212	1124	891	534	206	34	17
	T8 tri-phosphor	561	651	784	952	1036	1119	1202	1381	1705	2002	2054	1932
	T5 new (14 - 80w) including circular	0	0	0	171	230	289	348	422	506	560	599	561
	All others (including T5 old types 4 - 13w and special FL)	169	205	265	298	289	281	272	254	234	197	168	143
<b>LFL (total)</b>	<b>2110</b>	<b>2165</b>	<b>2488</b>	<b>2934</b>	<b>2963</b>	<b>2993</b>	<b>3022</b>	<b>3009</b>	<b>3029</b>	<b>3003</b>	<b>2879</b>	<b>2663</b>	
CFL	Retrofit - CFLi	48	119	192	386	549	736	819	887	842	756	605	475
	Non-retrofit - CFLni	71	95	137	189	207	224	242	256	266	255	239	220
	<b>CFL (total)</b>	<b>119</b>	<b>215</b>	<b>328</b>	<b>576</b>	<b>756</b>	<b>961</b>	<b>1060</b>	<b>1144</b>	<b>1108</b>	<b>1011</b>	<b>843</b>	<b>695</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	13	34	59	82	86	89	91	93	94	95	97	103
	Linear (high voltage) [R7s]	8	47	47	47	42	35	28	25	24	21	21	20
	LV halogen capsule [G4, GY6.35]	28	28	28	28	28	28	28	28	27	26	24	22
	HV halogen capsule [G9]	0	0	0	6	15	29	38	44	44	44	44	42
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	1	12	36	62	75	86	107	133
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	11	77	164	195	238	289	341	383	407	411	375
<b>Tungsten-HL (total)</b>	<b>48</b>	<b>120</b>	<b>210</b>	<b>327</b>	<b>367</b>	<b>431</b>	<b>510</b>	<b>593</b>	<b>648</b>	<b>680</b>	<b>704</b>	<b>695</b>	
GLS	Reflector	39	37	35	33	32	30	26	21	17	14	12	8
	GLS (Including clear/pearl, candles, coloured & decorative)	213	206	199	193	192	190	165	123	88	56	34	17
	<b>GLS (total)</b>	<b>252</b>	<b>243</b>	<b>235</b>	<b>226</b>	<b>224</b>	<b>221</b>	<b>191</b>	<b>144</b>	<b>104</b>	<b>70</b>	<b>47</b>	<b>26</b>
HID	All mercury lamps (including mixed)	129	152	150	126	117	107	98	90	81	72	57	38
	All sodium lamps	197	220	254	327	358	388	419	426	416	386	378	376
	Metal halide lamps	43	95	181	331	372	413	455	523	581	615	544	442
	<b>HID (total)</b>	<b>370</b>	<b>468</b>	<b>585</b>	<b>783</b>	<b>846</b>	<b>909</b>	<b>971</b>	<b>1038</b>	<b>1079</b>	<b>1073</b>	<b>978</b>	<b>855</b>
LED	LED directional								0	0	18	27	89
	LED non-directional								0	0	36	26	238
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>54</b>	<b>53</b>	<b>327</b>
<b>TOTAL</b>	<b>2899</b>	<b>3210</b>	<b>3847</b>	<b>4846</b>	<b>5156</b>	<b>5513</b>	<b>5755</b>	<b>5928</b>	<b>5967</b>	<b>5891</b>	<b>5503</b>	<b>5261</b>	

Table 12: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL (exclusive VAT)



Sales in euro per household	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Number of households (mln)</b>	<b>171.6</b>	<b>181.5</b>	<b>188.9</b>	<b>192.6</b>	<b>193.3</b>	<b>194.1</b>	<b>194.8</b>	<b>195.6</b>	<b>196.3</b>	<b>197.1</b>	<b>197.8</b>	<b>198.6</b>
LFL sales (euro) per hh	1.0	1.0	1.1	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.2	1.1
CFL sales (euro) per hh	0.7	1.5	2.2	4.1	5.7	7.4	8.2	8.8	8.4	7.6	6.1	4.9
Tungsten sales (euro) per hh	1.4	3.2	5.3	8.2	9.1	10.7	12.6	14.6	15.8	16.6	17.1	16.8
GLS sales (euro) per hh	7.0	6.4	6.0	5.6	5.6	5.5	4.7	3.5	2.5	1.7	1.1	0.6
LED sales (euro) per hh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.5	2.4	3.7	4.9
<b>TOTAL sales (euro)/hh</b>	<b>10.1</b>	<b>12.0</b>	<b>14.6</b>	<b>19.2</b>	<b>21.6</b>	<b>24.8</b>	<b>26.7</b>	<b>29.0</b>	<b>29.5</b>	<b>29.5</b>	<b>29.2</b>	<b>28.3</b>
<i>of which DLS sales (euro)</i>	1.5	2.2	4.3	7.0	7.8	8.8	10.0	11.8	13.1	14.1	14.7	14.2

**Table 13: Residential consumer expense for acquisition of light sources, years 1990, 1995, 2000, 2005 – 2013. (inclusive 20% VAT) (in euros/year/household)**

Division of EU-28 consumer acquisition costs for lamps over the technology types, year 2008 & 2013	year 2008			year 2013		
	All Sectors	Residential	Non-residential	All Sectors	Residential	Non-residential
LFL (total)	30%	5%	53%	26%	4%	51%
CFL (total)	24%	31%	18%	15%	17%	13%
Tungsten-HL (total)	27%	47%	9%	37%	59%	13%
GLS (total)	10%	18%	3%	1%	2%	0%
HID (total)	9%	0%	17%	8%	0%	16%
LED (total)	0%	0%	0%	12%	17%	6%
TOTAL	100%	100%	100%	100%	100%	100%

**Table 14: Years 2008 and 2013, subdivision of EU-28 consumer expense for acquisition of light sources/lamps over the main technology types.**

## 2.5. Industry revenue for light sources

The industry revenue from the sales of light sources in EU-28 <sup>18</sup> is computed from the consumer acquisition costs of par. 2.4 considering the industrial revenue part (IRP) of the consumer prices/unit. These IRP's have been taken as:

- For LFL and HID: IRP = 66% of consumer prices/unit
- For CFL, HL, GLS and LED: IRP = 38% of consumer prices/unit

MELISA industry revenues from sales of light sources for all sectors are reported in Figure 9, Figure 10, Table 15 and Table 16. The revenues for the residential sector are reported in Table 17 and Figure 11; those for the non-residential sector in Table 18 and Figure 12.

From 1990 to 2010 industry revenues from light sources have continuously increased, with an increased rate between 2004 and 2009, from 2508 million euros in 1990 to 5694 million in 2010. In

<sup>18</sup> Note that all sales are in EU-28. This does NOT imply that also all revenues go to manufacturers in the EU-28.

later years, the consumer expense shows a slight tendency to decrease, reaching 5185 million euros in 2013.

In 2013, 42% of industry revenue is from residential sales (2201 / 5185 million euros).

Table 19 shows the subdivision per technology type for the EU-28 industry revenue for light sources/lamps for the years 2008 and 2013. Industry revenues decreased for LFL, CFL and GLS while they increased for HL and LED.

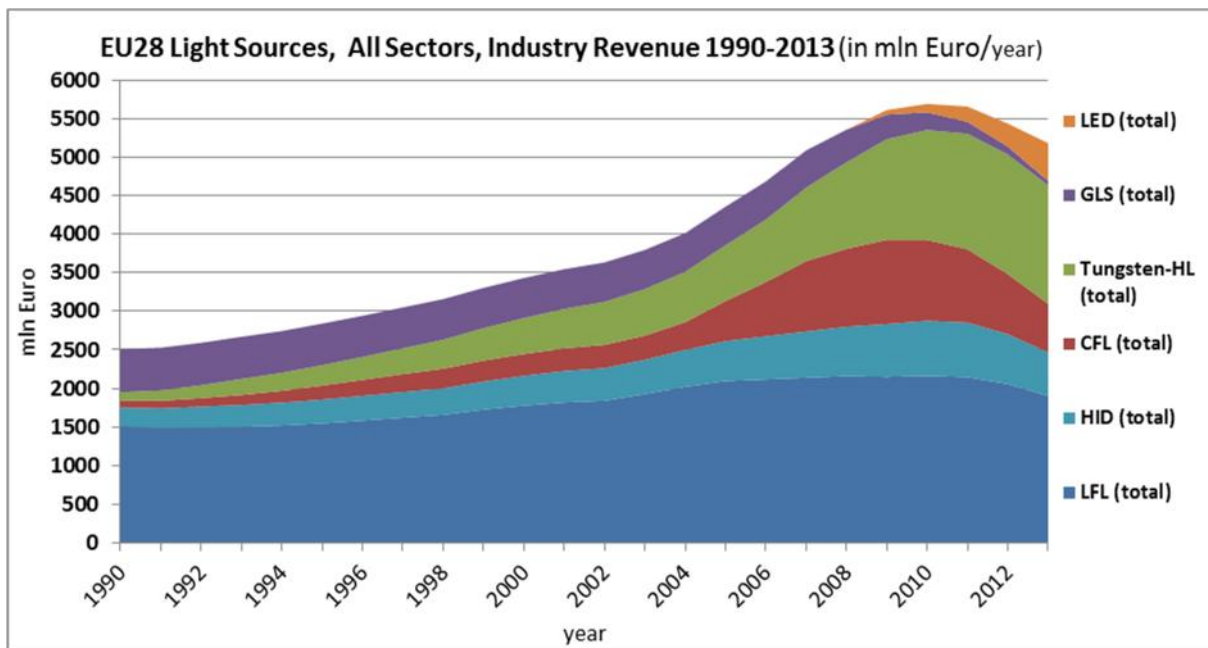


Figure 9: Industry revenue from sales of light sources, EU-28 cumulative total in millions of euros. ALL SECTORS

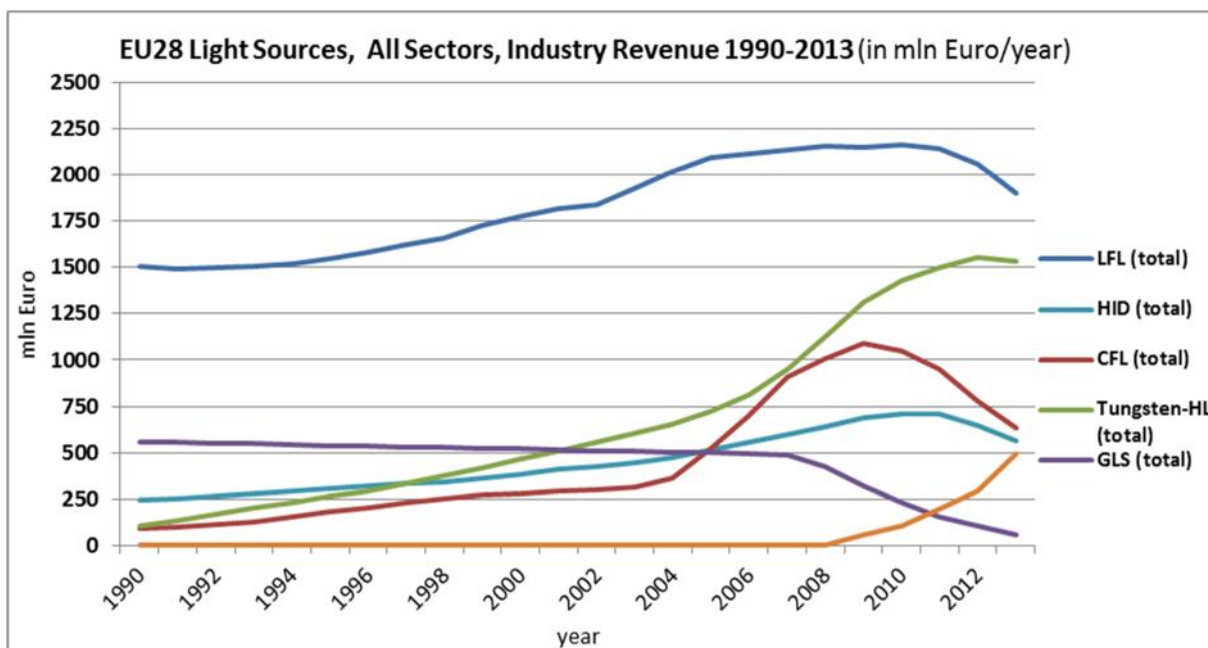


Figure 10: Industry revenue from sales of light sources, EU-28 totals per lamp type in millions of euros. ALL SECTORS

<b>EU-28 INDUSTRY REVENUE SUMMARY, All Sectors million euros/year</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
LFL (total)	1507	1547	1777	2096	2117	2138	2159	2150	2164	2145	2057	1902
CFL (total)	92	182	283	520	703	912	1010	1092	1049	951	781	632
Tungsten-HL (total)	107	265	465	723	810	951	1126	1309	1431	1501	1555	1536
GLS (total)	558	538	520	500	495	489	423	319	231	155	104	56
HID (total)	244	309	386	517	558	600	641	685	712	708	645	565
LED (total)	0	0	0	0	0	0	0	59	108	198	297	494
<b>TOTAL</b>	<b>2508</b>	<b>2840</b>	<b>3431</b>	<b>4356</b>	<b>4684</b>	<b>5090</b>	<b>5359</b>	<b>5614</b>	<b>5694</b>	<b>5660</b>	<b>5439</b>	<b>5185</b>

**Table 15: Industry revenue from sales of light sources, EU-28 totals per main lamp type in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

<b>EU-28 INDUSTRY REVENUE TOTAL, All Sectors million euros / year</b>		<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>LFL</b>	T12	452	265	163	88	77	66	55	44	36	28	17	7
	T8 halophosphor	535	670	865	992	929	866	803	637	381	147	24	12
	T8 tri-phosphor	401	465	560	681	740	799	858	986	1218	1430	1467	1381
	T5 new (14 - 80w) including circular	0	0	0	122	165	207	249	302	361	400	428	401
	All others (including T5 old types 4 - 13w and special FL)	120	147	189	213	207	201	195	181	167	140	120	102
<b>LFL (total)</b>		<b>1507</b>	<b>1547</b>	<b>1777</b>	<b>2096</b>	<b>2117</b>	<b>2138</b>	<b>2159</b>	<b>2150</b>	<b>2164</b>	<b>2145</b>	<b>2057</b>	<b>1902</b>
<b>CFL</b>	Retrofit - CFLi	51	127	204	411	584	783	871	944	896	804	643	505
	Non-retrofit - CFLni	41	55	79	109	119	129	139	148	153	147	137	127
	<b>CFL (total)</b>	<b>92</b>	<b>182</b>	<b>283</b>	<b>520</b>	<b>703</b>	<b>912</b>	<b>1010</b>	<b>1092</b>	<b>1049</b>	<b>951</b>	<b>781</b>	<b>632</b>
<b>TUNGSTEN (HL)</b>	Single ended, mirrored (low voltage) [M16, M25 etc.]	28	75	130	181	189	196	201	206	209	210	214	228
	Linear (high voltage) [R7s]	17	105	105	105	93	77	63	55	52	47	46	44
	LV halogen capsule [G4, GY6.35]	61	61	61	61	61	61	61	61	60	57	52	49
	HV halogen capsule [G9]	0	0	0	14	33	65	84	98	98	98	98	93
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	26	78	137	167	190	237	293
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	24	170	362	431	526	639	753	846	900	908	828
	<b>Tungsten-HL (total)</b>	<b>107</b>	<b>265</b>	<b>465</b>	<b>723</b>	<b>810</b>	<b>951</b>	<b>1126</b>	<b>1309</b>	<b>1431</b>	<b>1501</b>	<b>1555</b>	<b>1536</b>
<b>GLS</b>	Reflector	87	82	78	73	71	67	58	47	37	31	27	18
	GLS (Including clear/pearl, candles, coloured & decorative)	470	456	441	427	424	421	365	272	194	124	76	38
	<b>GLS (total)</b>	<b>558</b>	<b>538</b>	<b>520</b>	<b>500</b>	<b>495</b>	<b>489</b>	<b>423</b>	<b>319</b>	<b>231</b>	<b>155</b>	<b>104</b>	<b>56</b>
<b>HID</b>	All mercury lamps (including mixed)	85	100	99	83	77	71	65	59	54	48	37	25
	All sodium lamps	130	145	168	216	236	256	276	281	274	255	249	248
	Metal halide lamps	29	63	119	218	246	273	300	345	384	406	359	292
	<b>HID (total)</b>	<b>244</b>	<b>309</b>	<b>386</b>	<b>517</b>	<b>558</b>	<b>600</b>	<b>641</b>	<b>685</b>	<b>712</b>	<b>708</b>	<b>645</b>	<b>565</b>
<b>LED</b>	LED directional	0	0	0	0	0	0	0	43	76	121	168	216
	LED non-directional	0	0	0	0	0	0	0	16	32	78	129	278
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>59</b>	<b>108</b>	<b>198</b>	<b>297</b>	<b>494</b>
<b>TOTAL</b>		<b>2508</b>	<b>2840</b>	<b>3431</b>	<b>4356</b>	<b>4684</b>	<b>5090</b>	<b>5359</b>	<b>5614</b>	<b>5694</b>	<b>5660</b>	<b>5439</b>	<b>5185</b>

**Table 16: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

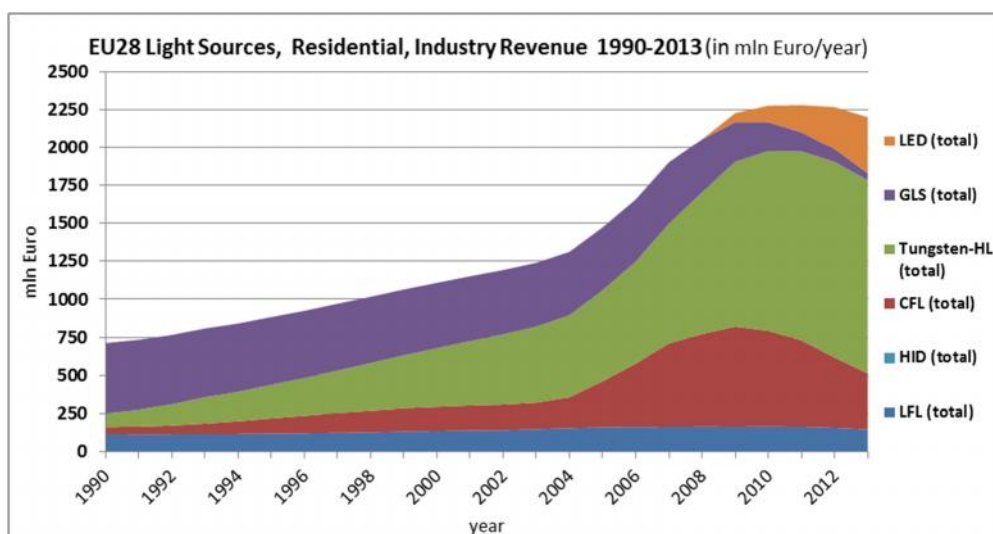


Figure 11: Industry Revenue from sales of light sources, EU-28 cumulative total in millions of euros.  
RESIDENTIAL

EU-28 INDUSTRY REVENUE RESIDENTIAL million euros / year		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	34	20	12	7	6	5	4	3	3	2	1	1
	T8 halophosphor	41	51	66	76	71	66	61	49	29	11	2	1
	T8 tri-phosphor	31	35	43	52	56	61	65	75	93	109	112	105
	T5 new (14 - 80w) including circular	0	0	0	9	13	16	19	23	28	30	33	31
	All others (including T5 old types 4 - 13w and special FL)	9	11	14	16	16	15	15	14	13	11	9	8
<b>LFL (total)</b>		<b>115</b>	<b>118</b>	<b>136</b>	<b>160</b>	<b>161</b>	<b>163</b>	<b>165</b>	<b>164</b>	<b>165</b>	<b>164</b>	<b>157</b>	<b>145</b>
CFL	Retrofit - CFLi	33	82	131	264	376	504	560	607	576	517	414	325
	Non-retrofit - CFLni	14	19	27	37	40	44	47	50	52	50	47	43
	<b>CFL (total)</b>	<b>47</b>	<b>100</b>	<b>158</b>	<b>301</b>	<b>416</b>	<b>547</b>	<b>607</b>	<b>657</b>	<b>628</b>	<b>567</b>	<b>460</b>	<b>368</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	23	62	107	150	157	162	166	170	173	174	177	189
	Linear (high voltage) [R7s]	14	87	87	87	77	64	52	46	43	39	38	37
	LV halogen capsule [G4, GY6.35]	50	50	50	50	50	50	50	51	50	47	43	41
	HV halogen capsule [G9]	0	0	0	12	27	54	69	81	81	81	81	77
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	21	65	113	138	157	196	243
	Other mains halogen - PAR 16/20/ 25/30 hard glass reflectors, GU10 etc.	0	20	140	300	357	436	529	623	701	745	752	686
	<b>Tungsten-HL (total)</b>	<b>88</b>	<b>219</b>	<b>385</b>	<b>599</b>	<b>670</b>	<b>788</b>	<b>932</b>	<b>1084</b>	<b>1185</b>	<b>1243</b>	<b>1288</b>	<b>1271</b>
GLS	Reflector	72	68	65	60	59	56	48	39	30	26	23	15
	GLS (Including clear/pearl, candles, coloured & decorative)	390	378	366	354	351	349	302	225	161	103	63	32
	<b>GLS (total)</b>	<b>462</b>	<b>446</b>	<b>430</b>	<b>414</b>	<b>410</b>	<b>405</b>	<b>350</b>	<b>264</b>	<b>191</b>	<b>128</b>	<b>86</b>	<b>47</b>
HID	All mercury lamps (including mixed)	0	0	0	0	0	0	0	0	0	0	0	0
	All sodium lamps	0	0	0	0	0	0	0	0	0	0	0	0
	Metal halide lamps	0	0	0	0	0	0	0	0	0	0	0	0
	<b>HID (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
LED	LED directional								43	76	114	158	182
	LED non-directional								16	32	64	119	188
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>59</b>	<b>108</b>	<b>178</b>	<b>277</b>	<b>370</b>
<b>TOTAL</b>		<b>712</b>	<b>883</b>	<b>1109</b>	<b>1474</b>	<b>1658</b>	<b>1903</b>	<b>2054</b>	<b>2228</b>	<b>2277</b>	<b>2280</b>	<b>2268</b>	<b>2201</b>

Table 17: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL

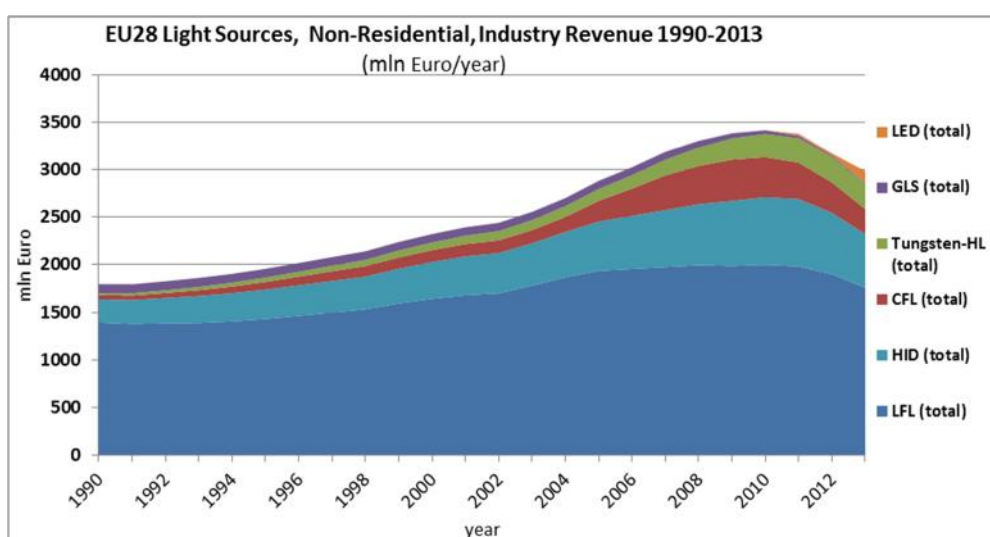


Figure 12: Industry revenue from sales of light sources, EU-28 cumulative total in millions of euros. NON-RESIDENTIAL

EU-28 INDUSTRY REVENUE NON-RESIDENTIAL million euros / year		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	417	245	151	82	71	61	50	40	33	26	16	6
	T8 halophosphor	494	619	799	916	858	800	742	588	352	136	22	11
	T8 tri-phosphor	370	430	517	629	683	738	793	911	1125	1321	1355	1275
	T5 new (14 - 80w) including circular	0	0	0	113	152	191	230	279	334	369	395	370
	All others (including T5 old types 4 - 13w and special FL)	111	135	175	197	191	185	180	167	154	130	111	94
	<b>LFL (total)</b>	<b>1392</b>	<b>1429</b>	<b>1642</b>	<b>1936</b>	<b>1956</b>	<b>1975</b>	<b>1995</b>	<b>1986</b>	<b>1999</b>	<b>1982</b>	<b>1900</b>	<b>1757</b>
CFL	Retrofit - CFLi	18	45	73	147	209	280	311	337	320	287	230	180
	Non-retrofit - CFLni	27	36	52	72	79	85	92	97	101	97	91	84
	<b>CFL (total)</b>	<b>45</b>	<b>82</b>	<b>125</b>	<b>219</b>	<b>287</b>	<b>365</b>	<b>403</b>	<b>435</b>	<b>421</b>	<b>384</b>	<b>320</b>	<b>264</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	5	13	22	31	33	34	35	35	36	36	37	39
	Linear (high voltage) [R7s]	3	18	18	18	16	13	11	9	9	8	8	8
	LV halogen capsule [G4, GY6.35]	10	10	10	10	10	10	10	11	10	10	9	8
	HV halogen capsule [G9]	0	0	0	2	6	11	14	17	17	17	17	16
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	1	4	13	24	29	33	41	50
	Other mains halogen - PAR 16/20/ 25/30 hard glass reflectors, GU10 etc.	0	4	29	62	74	91	110	129	146	155	156	142
	<b>Tungsten-HL (total)</b>	<b>18</b>	<b>46</b>	<b>80</b>	<b>124</b>	<b>139</b>	<b>164</b>	<b>194</b>	<b>225</b>	<b>246</b>	<b>258</b>	<b>268</b>	<b>264</b>
GLS	Reflector	15	14	13	12	12	12	10	8	6	5	5	3
	GLS (Including clear/pearl, candles, coloured & decorative)	81	78	76	73	73	72	63	47	33	21	13	7
	<b>GLS (total)</b>	<b>96</b>	<b>92</b>	<b>89</b>	<b>86</b>	<b>85</b>	<b>84</b>	<b>73</b>	<b>55</b>	<b>40</b>	<b>27</b>	<b>18</b>	<b>10</b>
HID	All mercury lamps (including mixed)	85	100	99	83	77	71	65	59	54	48	37	25
	All sodium lamps	130	145	168	216	236	256	276	281	274	255	249	248
	Metal halide lamps	29	63	119	218	246	273	300	345	384	406	359	292
	<b>HID (total)</b>	<b>244</b>	<b>309</b>	<b>386</b>	<b>517</b>	<b>558</b>	<b>600</b>	<b>641</b>	<b>685</b>	<b>712</b>	<b>708</b>	<b>645</b>	<b>565</b>
LED	LED directional								0	0	7	10	34
	LED non-directional								0	0	14	10	90
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>	<b>124</b>
<b>TOTAL</b>	<b>1796</b>	<b>1957</b>	<b>2322</b>	<b>2882</b>	<b>3026</b>	<b>3188</b>	<b>3305</b>	<b>3386</b>	<b>3418</b>	<b>3380</b>	<b>3171</b>	<b>2984</b>	

Table 18: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL

Division of EU-28 industry revenue from lamps over the technology types, year 2008 & 2013	year 2008			year 2013		
	All Sectors	Residential	Non-residential	All Sectors	Residential	Non-residential
LFL (total)	40%	8%	60%	37%	7%	59%
CFL (total)	19%	30%	12%	12%	17%	9%
Tungsten-HL (total)	21%	45%	6%	30%	58%	9%
GLS (total)	8%	17%	2%	1%	2%	0%
HID (total)	12%	0%	19%	11%	0%	19%
LED (total)	0%	0%	0%	10%	17%	4%
TOTAL	100%	100%	100%	100%	100%	100%

**Table 19: Years 2008 and 2013, subdivision of EU-28 industry revenue from sales of light sources/lamps over the main technology types.**

## 2.6. Lifetimes and operating hours

As will be explained in the next paragraph, the number of light sources installed in EU-28 (stock) is derived from the sales of par. 2.2 considering the life (in years) of the light sources. The lifetime of the various types of lamps is originally expressed in (operating) hours. To convert this to a life in years, the lifetime in hours has to be divided by the number of operating hours per year. The latter depend on the application and are different for the residential and non-residential sector. Consequently the life in years is also different for these two sectors.

As currently implemented, the operating hours in MELISA are full-power equivalent hours. This means that for example effects of dimming are included in the operating hours<sup>19</sup>. Life calculations are based on these full-power equivalent hours.

Table 20 presents the lifetime in hours, the operating hours for the residential and non-residential sectors, and the corresponding life in years for these two sectors, for all lamp types except LEDs.

The lifetime in hours is based on values taken from literature<sup>20</sup>. For LEDs 20,000 hours has been assumed<sup>21</sup>.

As regards the operating hours, new specific knowledge on the Dutch situation, combined with outcomes of measurement projects that have taken place in France<sup>22</sup>, Sweden<sup>23</sup> and the UK<sup>24</sup>,

<sup>19</sup> For example: a lamp that is used at full power for 250 hours/year and dimmed at half power for 400 hours/year would have  $250 + 400/2 = 450$  operating hours/year as input in MELISA.

<sup>20</sup> **For LFL, CFL and HID:** "ZVEI, Lebensdauerhalten von Entladungslampen für die Beleuchtung Grundlagen, ZVEI Fachverband Elektrische Lampen, November 2005". **For HL and GLS:** "CLASP, Estimating potential additional energy savings from upcoming revisions to existing regulations under the ecodesign and energy labelling directives, Feb. 2013, appendix F, table 2.3".

<sup>21</sup> Often higher lifetimes are declared for LEDs, but for the time being, the study team preferred to stay on the conservative side. Anyway, higher lifetimes would hardly make any difference regarding the time horizon of 2030 considered in this study: for most applications a LED light source bought in 2014 will last beyond 2030.

<sup>22</sup> The ECL100 project – ADEME, EDF – Light metering campaign in 100 French households – 03/2004.

allowed to improve and update on the quality of the data on operating hours (and the wattage) of **residential** light sources. These measurement projects indicate, for instance, that there is a considerable difference in outcome between so-called diary- and questionnaire type of investigations, which tend to considerably overestimate hours/wattage/consumption, and hard measurement data. This is also the reason why the current MELISA estimates for the operating hours (and wattage) are 10-20% lower than those in the previous preparatory studies (typically 450 h/year) and the number of installed light sources some 10-20% higher. The measurement projects also confirm that there are considerable differences between the North and South of the EU in terms of operating hours /wattage /number of lamps per household /light type /consumption. The average EU energy consumption for lighting is around 450-500 kWh per year per household (2013), but could be as high as 700-800 kWh in the North and as low as 300 kWh in the South.

As regards the **non-residential** sector, there are hardly any reliable sources for operating hours and wattage that the study team has identified so far. The current model continues to use the VITO 2009 data <sup>25</sup> as a basis for the wattage and for the operating hours of HID-lamps (4000 h/year). For the operating hours of LFL-lamps, the current study uses 2200 hours, which is in line with the values used by VITO <sup>26</sup> (from 2000 to 2500 hours for office lighting, depending on type of office and type of control), but considerably lower than the >3000 h/year of the US DoE study by Navigant <sup>27</sup>. Note that the high DoE numbers assume practically no daylight (windows) contribution, while in the EU this is different.

As regards the **operating hours for LEDs**, these should essentially be in line with those for the non-LED lamps that they substitute.

For residential use, 500 hours/year has been assumed, which corresponds to the 450 hours/year for the GLS, HL and CFLi lamps that they mainly substitute, but considering a rebound-effect <sup>28</sup> around 10%. Together with the 20,000 hours lifetime, this implies a life of 40 years for residential LEDs.

For non-residential use, NDLS-LEDs (non-directional light sources) substitute a mix of LFL with high operating hours (2200) and GLS, HL with low operating hours (450). For years up to 2013, 1500 hours/year has been used for NDLS-LEDs in the non-residential sector, but in later years this number would be expected to increase as the share of LFL in the substituted mix will increase.

For non-residential use, DLS-LEDs (directional light sources) will initially substitute other DLS, but it is expected that they will increasingly substitute also non-directional light sources. The preliminary estimate of the study team gave 984 hours/year for 2013 for non-residential DLS-LEDs.

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<sup>23</sup> The SWE400 project, End-use metering campaign in 400 households in Sweden, Assessment of the Potential Electricity Savings, CONTRACT 17-05-2743, 2009. [http://www.energimyndigheten.se/Global/Statistik/F%C3%B6rb%C3%A4ttringar/20energistatistik/Festis/Final\\_report.pdf](http://www.energimyndigheten.se/Global/Statistik/F%C3%B6rb%C3%A4ttringar/20energistatistik/Festis/Final_report.pdf)

<sup>24</sup> Household Electricity Survey. A study of domestic electrical product usage. Intertek R66141 Final report issue 4, May 2012, chapter 12, [http://savethebulb.org/wordpress/wp-content/uploads/2012/07/10043\\_R66141HouseholdElectricitySurveyFinalReportissue41.pdf](http://savethebulb.org/wordpress/wp-content/uploads/2012/07/10043_R66141HouseholdElectricitySurveyFinalReportissue41.pdf)

<sup>25</sup> Preparatory Studies for Eco-design requirements of EuPs, Final Report, Lot 9: Public Street lighting, Study for the European Commission DGTREN unit D3, contact Andras Toth, by VITO in cooperation with Laborelec and Kreios, January 2007, Contract TREN/D1/40-2005/LOT9/S07.56457, available through 'eup4light.net'

<sup>26</sup> Preparatory Studies for Eco-design requirements of EuPs, Final Report, Lot 8: Office lighting, Study for the European Commission DGTREN unit D3, contact Andras Toth, by VITO in cooperation with Laborelec and Kreios, April 2007, Contract TREN/D1/40-2005/LOT8/S07.56452, available through 'eup4light.net'

<sup>27</sup> 2010 U.S. Lighting Market Characterization, prepared for Solid-state Lighting program, Building Technologies Program, Office of Energy Efficiency and renewable Energy, U.S. Department of Energy, prepared by Navigant Consulting Inc, January 2012. Report available at: [http://www1.eere.energy.gov/buildings/ssl/tech\\_reports.html](http://www1.eere.energy.gov/buildings/ssl/tech_reports.html)

<sup>28</sup> The rebound-effect is the consumer tendency to increase lamp operating times when lamps are more energy-efficient. See for example: Schleich, J., et al., A brighter future? Quantifying the rebound effect in energy efficient lighting. Energy Policy (2014), <http://dx.doi.org/10.1016/j.enpol.2014.04.028>

The variability over the years of the LED operating hours for non-residential use would also imply a variable life in years. For the moment this has not been fully implemented: a life of 11 years was chosen for NDLS-LEDs (non-residential) and 18 years for DLS-LEDs (non-residential).

Lifetime (hours), operating hours (hours/year) and life (years) per type of light source	LFL					CFL		TUNGSTEN						GLS		HID		
	T12	T8 Halophosphor	T8 tri-phosphor	T5 new (14 - 80w) including Circular	All others (including T5 old types 4 - 13w and Special Fl.)	Retrofit - CFLi	Non-Retrofit - CFLni	Single Ended, Mirrored (Low voltage) [M16,M25etc]	Linear (High voltage) [R7s]	LV halogen Capsule [G4, GY6.35]	HV halogen Capsule [G9]	Mains halogen (Substitute for GLS and Reflector)[E14, E27]	Other Mains halogen - PAR 16/20/25/30 Hard glass reflectors, GU10 etc.	Reflector	GLS (Including clear/pearl, candles, coloured & decorative)	All Mercury Lamps (including mixed)	All Sodium Lamps	Metal Halide Lamps
Life (hours)	8000	8000	13000	20000	11000	6000	10000	2000	1000	2000	1500	1500	1500	1000	1000	8000	12000	8000
Operating (h/a) residential	700	700	700	700	700	500	700	450	450	450	450	450	450	450	450	700	700	700
Operating (h/a) non-residential	2200	2200	2200	2200	2200	500	1600	450	450	450	450	450	450	450	450	4000	4000	4000
Life (years) residential	11.4	11.4	18.6	28.6	15.7	12.0	14.3	4.4	2.2	4.4	3.3	3.3	3.3	2.2	2.2	11.4	17.1	11.4
Life (years) non-residential	3.6	3.6	5.9	9.1	5.0	12.0	6.3	4.4	2.2	4.4	3.3	3.3	3.3	2.2	2.2	2.0	3.0	2.0

**Table 20: Lifetime in hours, operating hours per year (residential and non-residential), and corresponding life in years (computed) for the various types of light sources, as currently used in MELISA. For LED light sources, see text.**

## 2.7. Installed number of light sources (stock)

The total number of light sources installed in EU-28 (stock, all sectors) is the sum of the residential and non-residential stocks.

These latter stocks are computed from the sales in the preceding years (par. 2.2) considering the life in years for the type of lamp (par. 2.6). Decimal years are also taken into account.

The formula implemented in the MELISA Excel-file to compute the stock is quite complex and difficult to understand, but at the end, the stock is simply the sum of sales over a number of preceding years that corresponds to the life in years of the lamp-type:

$$\text{Stock in year } N = \left\{ \sum_{N-INTlife+1}^N \text{Sales year} \right\} + \text{DECLife} * \text{Sales } N - \text{INTlife}$$

where INTlife = integer part of the lamp life in years

DECLife = decimal part of the lamp life in years

For example, if the year considered is N=2014 and the life in years for the lamp type has been computed as 3.2 years (INTlife=3 and DECLife=2): Stock (2014) = Sales(2014)+Sales(2013)+Sales(2012)+0.2\*Sales(2011)

MELISA's installed number (stock) of light sources for all sectors is reported in Figure 13, Figure 14, Table 21 and Table 22. The stock for the residential sector is reported in Table 23 and Figure 15; that for the non-residential sector in Table 24 and Figure 16.

From 1990 to 2013 the EU-28 stock of light sources has approximately doubled, from 5634 million units in 1990 to 11001 million in 2013.



For the year 2013, 59% of the installed light sources are for residential use (6509 / 11001 million units).

The residential quantities imply an average of nearly 33 installed light sources per household in 2013, of which 13 CFL and nearly 13 halogen, see Table 25. In 1990 the number of lamps per household was 21.

Table 26 shows the subdivision per technology type for the EU-28 installed stock of light sources for the years 2008 and 2013. This table clearly indicates the shift from incandescent (GLS) to CFL and halogen (HL).

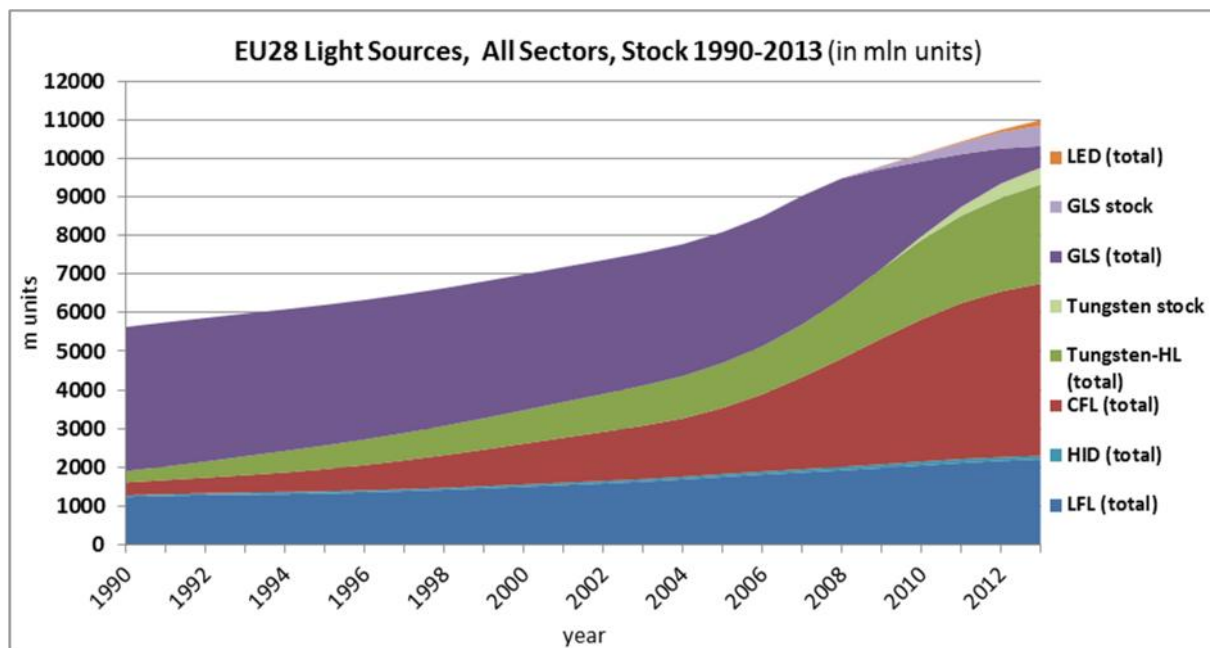


Figure 13: Installed number (stock) of light sources, EU-28 cumulative total in millions of units. ALL SECTORS

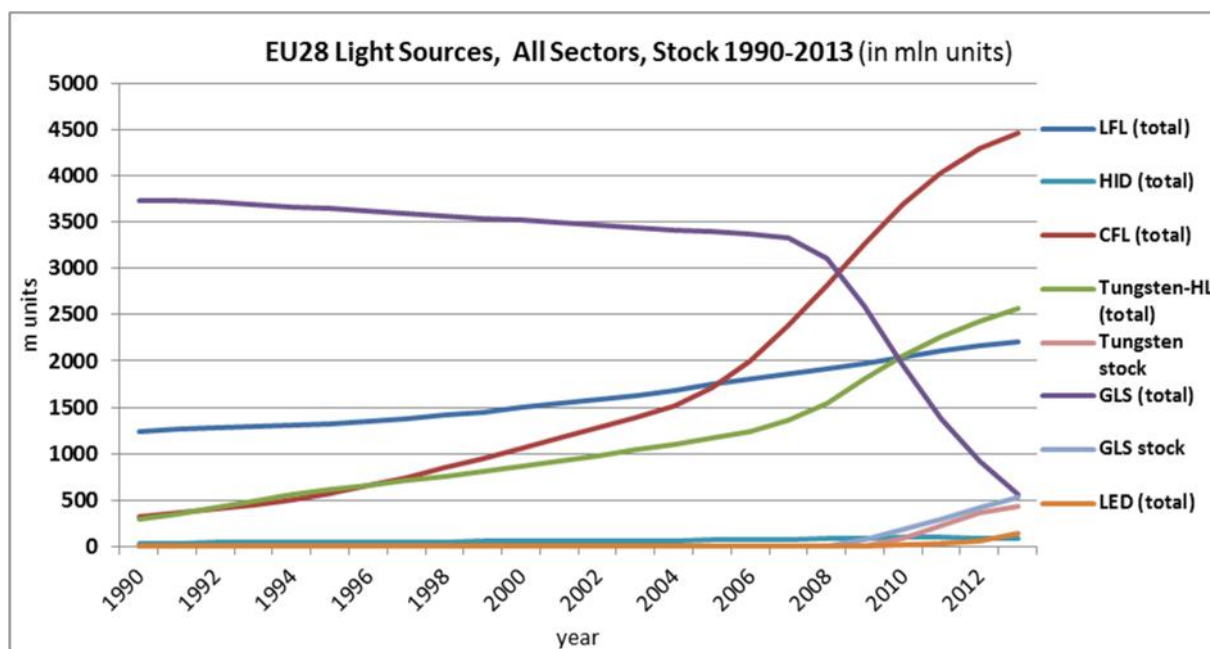


Figure 14: Installed number (stock) of light sources, EU-28 totals per lamp type in millions of units. ALL SECTORS

<b>EU-28 STOCK SUMMARY, All Sectors million units</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
LFL (total)	1241	1328	1495	1748	1809	1864	1921	1979	2047	2111	2165	2209
CFL (total)	325	576	1056	1715	2002	2387	2810	3264	3682	4037	4293	4460
Tungsten-HL (total)	297	611	868	1164	1243	1363	1549	1804	2059	2264	2426	2569
GLS (total)	3731	3641	3519	3392	3364	3333	3114	2589	1952	1373	915	561
HID (total)	40	48	57	72	77	82	87	93	98	99	94	84
LED (total)	0	0	0	0	0	0	2	6	14	31	62	144
GLS stock	0	0	0	0	0	0	0	75	187	297	421	532
Tungsten stock	0	0	0	0	0	0	0	0	90	230	370	440
<b>TOTAL</b>	<b>5634</b>	<b>6204</b>	<b>6996</b>	<b>8091</b>	<b>8496</b>	<b>9028</b>	<b>9483</b>	<b>9809</b>	<b>10128</b>	<b>10442</b>	<b>10747</b>	<b>11001</b>

**Table 21: Installed number (stock) of light sources, EU-28 totals per main lamp-type in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

<b>EU-28 STOCK TOTAL, All Sectors million units</b>		<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
<b>LFL</b>	T12	321	239	150	85	76	67	58	50	42	34	27	20
	T8 halophosphor	370	450	578	698	701	684	653	596	504	380	251	152
	T8 tri-phosphor	432	499	590	698	732	772	824	895	1003	1138	1270	1376
	T5 new (14 - 80w) including circular	0	0	0	53	84	123	170	227	295	367	440	501
	All others (including T5 old types 4 - 13w and special FL)	119	140	177	214	217	218	216	211	203	192	177	160
	<b>LFL (total)</b>	<b>1241</b>	<b>1328</b>	<b>1495</b>	<b>1748</b>	<b>1809</b>	<b>1864</b>	<b>1921</b>	<b>1979</b>	<b>2047</b>	<b>2111</b>	<b>2165</b>	<b>2209</b>
<b>CFL</b>	Retrofit - CFLi	197	376	770	1317	1575	1926	2314	2729	3109	3434	3669	3827
	Non-retrofit - CFLni	128	200	286	398	428	460	496	535	573	604	624	633
	<b>CFL (total)</b>	<b>325</b>	<b>576</b>	<b>1056</b>	<b>1715</b>	<b>2002</b>	<b>2387</b>	<b>2810</b>	<b>3264</b>	<b>3682</b>	<b>4037</b>	<b>4293</b>	<b>4460</b>
<b>TUNGSTEN (HL)</b>	Single ended, mirrored (low voltage) [M16, M25 etc.]	64	181	352	523	554	581	605	625	642	654	665	683
	Linear (high voltage) [R7s]	29	190	200	200	190	167	138	116	104	96	91	87
	LV halogen capsule [G4, GY6.35]	204	233	233	233	233	233	233	234	233	229	222	211
	HV halogen capsule [G9]	0	0	0	10	33	80	133	184	216	230	233	230
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	30	111	250	403	536	659	800
	Other mains halogen - PAR 16/20/ 25/30 hard glass reflectors, GU10	0	7	83	197	229	272	328	394	461	518	555	558
	<b>Tungsten-HL (total)</b>	<b>297</b>	<b>611</b>	<b>868</b>	<b>1164</b>	<b>1243</b>	<b>1363</b>	<b>1549</b>	<b>1804</b>	<b>2059</b>	<b>2264</b>	<b>2426</b>	<b>2569</b>
<b>GLS</b>	Reflector	383	366	347	324	317	306	280	239	192	154	131	104
	<b>GLS (total)</b>	<b>3731</b>	<b>3641</b>	<b>3519</b>	<b>3392</b>	<b>3364</b>	<b>3333</b>	<b>3114</b>	<b>2589</b>	<b>1952</b>	<b>1373</b>	<b>915</b>	<b>561</b>
<b>HID</b>	All mercury lamps (including mixed)	15	18	18	15	14	13	12	11	10	9	8	6
	All sodium lamps	22	24	27	34	37	40	43	46	47	45	44	42
	Metal halide lamps	3	7	13	23	26	29	32	36	41	44	43	37
	<b>HID (total)</b>	<b>40</b>	<b>48</b>	<b>57</b>	<b>72</b>	<b>77</b>	<b>82</b>	<b>87</b>	<b>93</b>	<b>98</b>	<b>99</b>	<b>94</b>	<b>84</b>
<b>LED</b>	LED directional	0	0	0	0	0	0	1	4	10	20	39	79
	<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>14</b>	<b>31</b>	<b>62</b>	<b>144</b>
GLS stock		0	0	0	0	0	0	0	75	187	297	421	532
Tungsten stock		0	0	0	0	0	0	0	90	230	370	440	
<b>TOTAL</b>		<b>5634</b>	<b>6204</b>	<b>6996</b>	<b>8091</b>	<b>8496</b>	<b>9028</b>	<b>9483</b>	<b>9809</b>	<b>10128</b>	<b>10442</b>	<b>10747</b>	<b>11001</b>

**Table 22: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS**

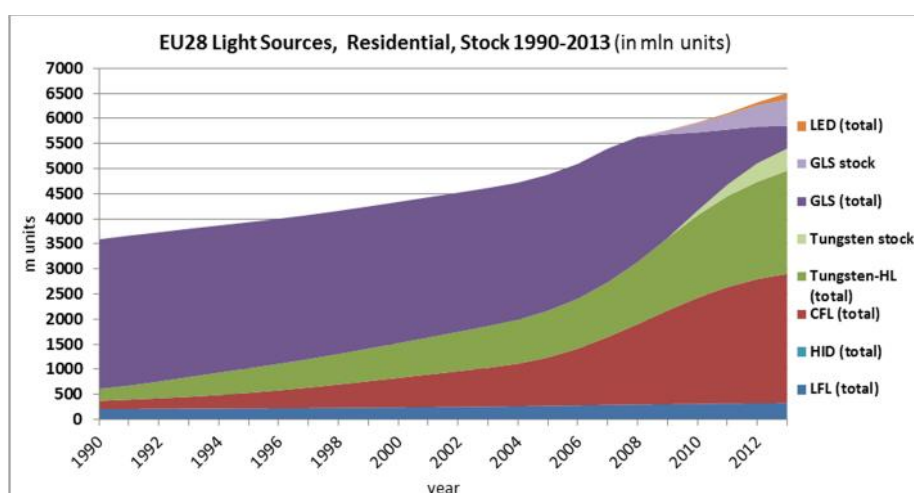


Figure 15: Installed number (stock) of light sources, EU-28 totals per lamp-type in millions of units. RESIDENTIAL

EU-28 STOCK RESIDENTIAL million units		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	59	52	38	22	20	18	16	14	12	11	9	8
	T8 halophosphor	60	71	88	110	113	115	115	114	109	101	91	81
	T8 tri-phosphor	66	76	89	105	109	114	119	125	135	146	158	168
	T5 new (14 - 80w) including circular	0	0	0	3	5	8	11	15	19	24	29	34
	All others (including T5 old types 4 - 13w and special FL)	18	22	26	32	33	34	35	35	36	35	35	34
	<b>LFL (total)</b>	<b>203</b>	<b>220</b>	<b>241</b>	<b>272</b>	<b>280</b>	<b>288</b>	<b>296</b>	<b>303</b>	<b>311</b>	<b>317</b>	<b>322</b>	<b>325</b>
CFL	Retrofit - CFLi	118	225	462	790	945	1156	1388	1637	1865	2060	2201	2296
	Non-retrofit - CFLni	50	84	124	174	186	200	215	231	247	262	274	283
	<b>CFL (total)</b>	<b>168</b>	<b>310</b>	<b>586</b>	<b>964</b>	<b>1131</b>	<b>1356</b>	<b>1604</b>	<b>1869</b>	<b>2113</b>	<b>2322</b>	<b>2475</b>	<b>2580</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	51	144	282	419	443	465	484	500	513	523	532	546
	Linear (high voltage) [R7s]	23	152	160	160	152	133	111	93	83	77	72	70
	LV halogen capsule [G4, GY6.35]	165	187	187	187	187	187	187	187	186	184	178	169
	HV halogen capsule [G9]	0	0	0	8	27	64	107	148	172	184	187	184
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	3	24	89	200	323	429	527	640
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	6	66	158	183	218	263	315	369	415	444	446
<b>Tungsten-HL (total)</b>	<b>239</b>	<b>489</b>	<b>694</b>	<b>931</b>	<b>994</b>	<b>1091</b>	<b>1239</b>	<b>1443</b>	<b>1647</b>	<b>1811</b>	<b>1941</b>	<b>2055</b>	
GLS	Reflector	306	293	278	259	254	245	224	191	154	124	105	83
	GLS (Including clear/pearl, candles, coloured & decorative)	2675	2620	2537	2454	2438	2421	2267	1880	1408	975	627	366
<b>GLS (total)</b>	<b>2981</b>	<b>2913</b>	<b>2815</b>	<b>2713</b>	<b>2691</b>	<b>2666</b>	<b>2491</b>	<b>2071</b>	<b>1561</b>	<b>1099</b>	<b>732</b>	<b>449</b>	
HID	All mercury lamps (including mixed)	0	0	0	0	0	0	0	0	0	0	0	0
	All sodium lamps	0	0	0	0	0	0	0	0	0	0	0	0
	Metal halide lamps	0	0	0	0	0	0	0	0	0	0	0	0
<b>HID (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
LED	LED directional	0	0	0	0	0	0	1	4	10	20	37	70
	LED non-directional	0	0	0	0	0	0	1	2	4	10	23	57
<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>	<b>14</b>	<b>30</b>	<b>59</b>	<b>127</b>	
GLS stock		0	0	0	0	0	0	0	75	187	297	421	532
Tungsten stock		0	0	0	0	0	0	0	0	90	230	370	440
<b>TOTAL</b>		<b>3590</b>	<b>3932</b>	<b>4336</b>	<b>4880</b>	<b>5097</b>	<b>5401</b>	<b>5632</b>	<b>5767</b>	<b>5923</b>	<b>6105</b>	<b>6321</b>	<b>6509</b>

Table 23: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL

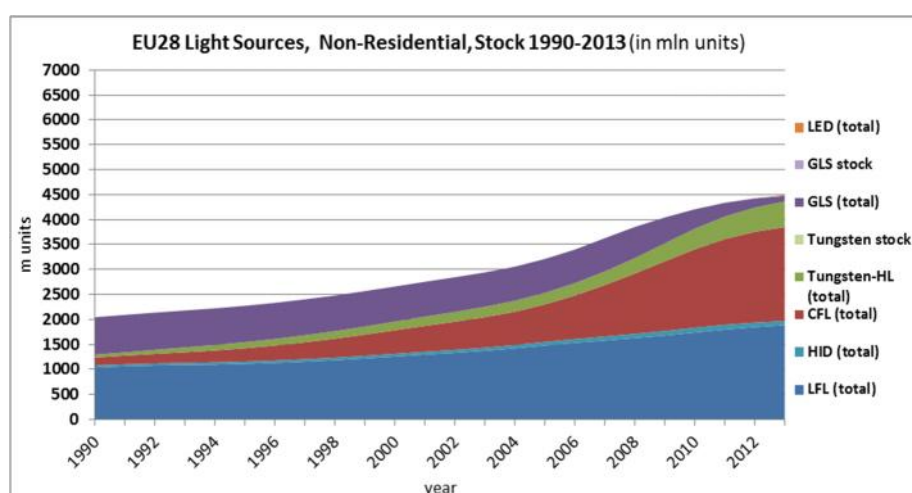


Figure 16: Installed number (stock) of light sources, EU-28 totals per lamp-type in millions of units. NON-RESIDENTIAL

EU-28 STOCK NON-RESIDENTIAL million units		1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
LFL	T12	262	187	113	63	56	49	42	35	29	24	18	12
	T8 halophosphor	310	379	491	589	588	569	537	482	395	279	159	71
	T8 tri-phosphor	366	423	501	593	623	659	705	770	868	992	1112	1208
	T5 new (14 - 80w) including circular	0	0	0	50	79	115	159	212	276	344	411	467
	All others (including T5 old types 4 - 13w and special FL)	100	119	151	182	184	184	182	176	168	156	142	126
	<b>LFL (total)</b>	<b>1039</b>	<b>1108</b>	<b>1254</b>	<b>1477</b>	<b>1530</b>	<b>1576</b>	<b>1625</b>	<b>1676</b>	<b>1736</b>	<b>1794</b>	<b>1843</b>	<b>1884</b>
CFL	Retrofit - CFLi	79	150	308	527	630	771	926	1092	1244	1373	1468	1531
	Non-retrofit - CFLni	78	116	162	225	241	260	281	304	326	342	350	350
	<b>CFL (total)</b>	<b>157</b>	<b>266</b>	<b>470</b>	<b>751</b>	<b>871</b>	<b>1030</b>	<b>1207</b>	<b>1395</b>	<b>1569</b>	<b>1715</b>	<b>1817</b>	<b>1881</b>
TUNGSTEN (HL)	Single ended, mirrored (low voltage) [M16, M25 etc.]	13	36	70	105	111	116	121	125	128	131	133	137
	Linear (high voltage) [R7s]	6	38	40	40	38	33	28	23	21	19	18	17
	LV halogen capsule [G4, GY6.35]	39	47	47	47	47	47	47	47	47	46	44	42
	HV halogen capsule [G9]	0	0	0	2	7	16	27	37	43	46	47	46
	Mains halogen (substitute for GLS and reflector)[E14, E27]	0	0	0	0	1	6	22	50	81	107	132	160
	Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.	0	1	17	39	46	54	66	79	92	104	111	112
	<b>Tungsten-HL (total)</b>	<b>58</b>	<b>122</b>	<b>174</b>	<b>233</b>	<b>249</b>	<b>273</b>	<b>310</b>	<b>361</b>	<b>412</b>	<b>453</b>	<b>485</b>	<b>514</b>
GLS	Reflector	77	73	69	65	63	61	56	48	38	31	26	21
	<b>GLS (total)</b>	<b>750</b>	<b>728</b>	<b>704</b>	<b>678</b>	<b>673</b>	<b>667</b>	<b>623</b>	<b>518</b>	<b>390</b>	<b>275</b>	<b>183</b>	<b>112</b>
HID	All mercury lamps (including mixed)	15	18	18	15	14	13	12	11	10	9	8	6
	All sodium lamps	22	24	27	34	37	40	43	46	47	45	44	42
	Metal halide lamps	3	7	13	23	26	29	32	36	41	44	43	37
<b>HID (total)</b>	<b>40</b>	<b>48</b>	<b>57</b>	<b>72</b>	<b>77</b>	<b>82</b>	<b>87</b>	<b>93</b>	<b>98</b>	<b>99</b>	<b>94</b>	<b>84</b>	
LED	LED directional	0	0	0	0	0	0	0	0	0	1	2	9
	LED non-directional	0	0	0	0	0	0	0	0	0	0	1	8
<b>LED (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>17</b>
GLS stock		0	0	0	0	0	0	0	0	0	0	0	0
Tungsten stock		0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>		<b>2044</b>	<b>2272</b>	<b>2659</b>	<b>3211</b>	<b>3399</b>	<b>3628</b>	<b>3851</b>	<b>4042</b>	<b>4205</b>	<b>4337</b>	<b>4426</b>	<b>4492</b>

Table 24: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL

Stock per household	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Number of households (mln)</b>	<b>171.6</b>	<b>181.5</b>	<b>188.9</b>	<b>192.6</b>	<b>193.3</b>	<b>194.1</b>	<b>194.8</b>	<b>195.6</b>	<b>196.3</b>	<b>197.1</b>	<b>197.8</b>	<b>198.6</b>
LFL per hh	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6
CFL per hh	1.0	1.7	3.1	5.0	5.9	7.0	8.2	9.6	10.8	11.8	12.5	13.0
Tungsten per hh	1.4	2.7	3.7	4.8	5.1	5.6	6.4	7.4	8.8	10.4	11.7	12.6
GLS per hh	17.4	16.0	14.9	14.1	13.9	13.7	12.8	11.0	8.9	7.1	5.8	4.9
LED per hh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.6
<b>TOTAL lamps/hh</b>	<b>20.9</b>	<b>21.7</b>	<b>23.0</b>	<b>25.3</b>	<b>26.4</b>	<b>27.8</b>	<b>28.9</b>	<b>29.5</b>	<b>30.2</b>	<b>31.0</b>	<b>32.0</b>	<b>32.8</b>
<i>of which DLS</i>	2.1	2.4	3.3	4.3	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.8

**Table 25: Number of installed light sources per household, years 1990, 1995, 2000, 2005 – 2013.**

Division of EU-28 installed stock over the technology types, year 2008 & 2013	year 2008			year 2013		
	All Sectors	Residential	Non-residential	All Sectors	Residential	Non-residential
LFL (total)	20%	5%	42%	20%	5%	42%
CFL (total)	30%	28%	31%	41%	40%	42%
Tungsten-HL (total)	16%	22%	8%	27%	38%	11%
GLS (total)	33%	44%	16%	10%	15%	2%
HID (total)	1%	0%	2%	1%	0%	2%
LED (total)	0%	0%	0%	1%	2%	0%
TOTAL	100%	100%	100%	100%	100%	100%

**Table 26: Years 2008 and 2013, subdivision of EU-28 Installed number of light sources/lamps over the main technology types. (GLS and HL include the contributions from the respective 'stocks' reported under sales in par. 2.2)**

### 3. DATA FROM EUROSTAT

Full details on Eurostat sales data for light sources are reported in Annex C.

Annex C.1 and C.2 explain the lamp types for which data are presented, the availability of the data, and the elaborations performed in analysing the data.

Eurostat data are available for Production, Import and Export. The 'Sales' are identified as the 'Apparent Consumption', which is computed following the MEErP as:

$$\text{Apparent Consumption} = \text{Production} + \text{Import} - \text{Export}^{29}.$$

Eurostat data are available for EU-28 Member States and for EU-15, EU-25, EU-27 and EU-28 as a whole. The Member State data are sometimes missing, because they are confidential or have not been reported to Eurostat. EU-totals data are more complete, including the confidential Member State data and including estimates for missing Member State data.

EU-15 totals are provided for the years 1995-2005. EU-25, EU-27 and EU-28 totals are available for the years 2003-2013. An attempt has been made to derive EU-28 data also for the years 1995-2002, but the resulting data were not convincing and are not reported here. Consequently, the tables and graphs in Annex C present EU-15 data up to 2002 and EU-28 data from 2003 onwards.

Some 'anomalies' have been found in the Eurostat data and these have been 'corrected' as indicated in the Annex.

Annex C.3 provides Production, Import, Export and Apparent Consumption data for all major lamp types, per Member State for the year 2013, which is the last year for which data were available. Both quantity (unit) and monetary value (euro) data are shown. Due to missing or confidential data, these Member State data are often difficult to interpret.

Annex C.4 through C.12 each address one specific lamp type and provide EU-totals data for the years 1995-2013. Production, Import, Export and Apparent Consumption are shown, both as units and as euros. Unitary values (euro/unit) are shown as well, but only for reference. Data up to 2002 are for EU-15; data from 2003 onwards are for EU-28.

Regarding lamp types note that:

- Non-halogen incandescent lamps in Eurostat are limited to mains voltage (> 100 V) and to power < 200 W (group indicated as 'GLS-MV < 200W' in the Annex). Another ProdCom group includes all 'other filament' lamps (which anyway are non-halogen and non-automotive).
- The ProdCom heading 'discharge other' includes HID lamps but also a significant quantity of other lamp types, such as CCFL for backlighting. Not all these lamps are HID and not all are inside the scope of the existing lighting regulations.
- Sealed beam lamps (PAR) are used at least in part in the transport sector and those lamps would be out of the scope of the existing lighting regulations.
- UV IR ARC lamps are reported in the Annex but they are special purpose lamps (even if not excluded from the initial scope of this study, see Task 1 report).
- Eurostat does not provide data for LED lighting.

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<sup>29</sup> This computation has been applied both to quantities in units and to values in euros. The application to monetary values is even less correct but anyway considered indicative, see remarks in Annex C.1 and C.2.

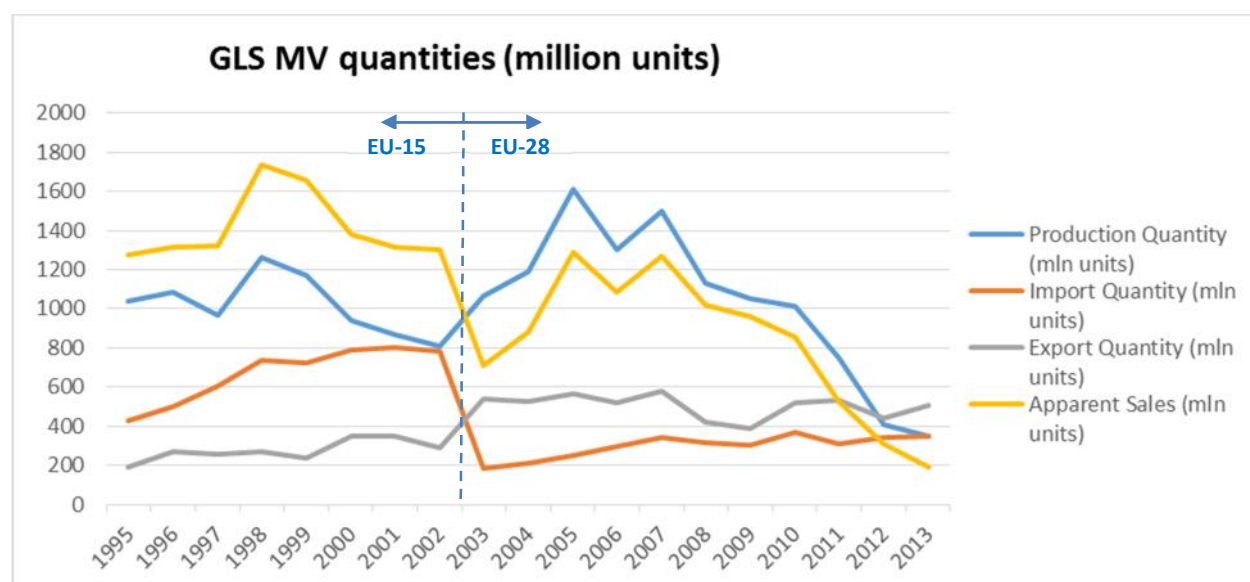
**NOTE:**

In several graphs in Annex C, the passage from the 2002 data for EU-15 to the 2003 data for EU-28 does not seem to be logical. In particular, the production and the apparent consumption (sales) of lamps in EU-28 would be expected to be higher than in EU-15<sup>30</sup>, but this is not always the case. This has been verified and it is not an error: this is what is derived from the Eurostat data.

Table 27 and Figure 17 provide an example of the data presented in the Annex, for ‘GLS-MV < 200W’. For other lamp types, see the Annex.

GLS MV <200W year	EU-15								EU-28											
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Production Quantity (mln units)	1040	1085	969	1263	1171	939	867	806	1067	1192	1610	1303	1500	1130	1051	1012	751	407	352	
Import Quantity (mln units)	426	502	607	738	725	788	799	784	186	212	248	295	344	313	301	367	311	343	350	
Export Quantity (mln units)	193	272	256	267	237	348	350	291	542	525	568	516	576	423	391	522	534	439	509	
Apparent Sales (mln units)	1272	1316	1320	1734	1659	1379	1316	1299	711	878	1290	1082	1269	1020	961	857	528	311	192	
Production Value (mln euro)	354	340	357	380	365	320	325	313	289	314	377	293	331	346	342	325	221	210	200	
Import Value (mln euro)	100	123	142	169	185	204	201	193	49.7	47.7	53.6	61.1	65.7	60.3	62.1	88.4	79.9	83.8	75.3	
Export Value (mln euro)	71.1	89.4	99.0	97.9	93.2	117	129	99.1	134	134	116	112	113	95.0	83.8	101	99.3	94.1	104	
Apparent Sales (mln euro)	383	374	400	451	457	407	398	407	204	227	315	243	284	311	320	312	202	199	172	
Production Value (euro/unit)	0.34	0.31	0.37	0.30	0.31	0.34	0.38	0.39	0.27	0.26	0.23	0.22	0.22	0.31	0.33	0.32	0.29	0.51	0.57	
Import Value (euro/unit)	0.24	0.24	0.23	0.23	0.26	0.26	0.25	0.25	0.27	0.23	0.22	0.21	0.19	0.19	0.21	0.24	0.26	0.24	0.22	
Export Value (euro/unit)	0.37	0.33	0.39	0.37	0.39	0.34	0.37	0.34	0.25	0.26	0.20	0.22	0.20	0.22	0.21	0.19	0.19	0.21	0.20	
Apparent Value (euro/unit)	0.30	0.28	0.30	0.26	0.28	0.30	0.30	0.31	0.29	0.26	0.24	0.22	0.22	0.31	0.33	0.36	0.38	0.64	0.89	

**Table 27: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, GLS MV <200W lamps (ProdCom code 27401300).**



<sup>30</sup> For imports and exports, this is NOT necessary: imports for EU-15 that came from other EU-28 countries will disappear when considering the import for EU-28.

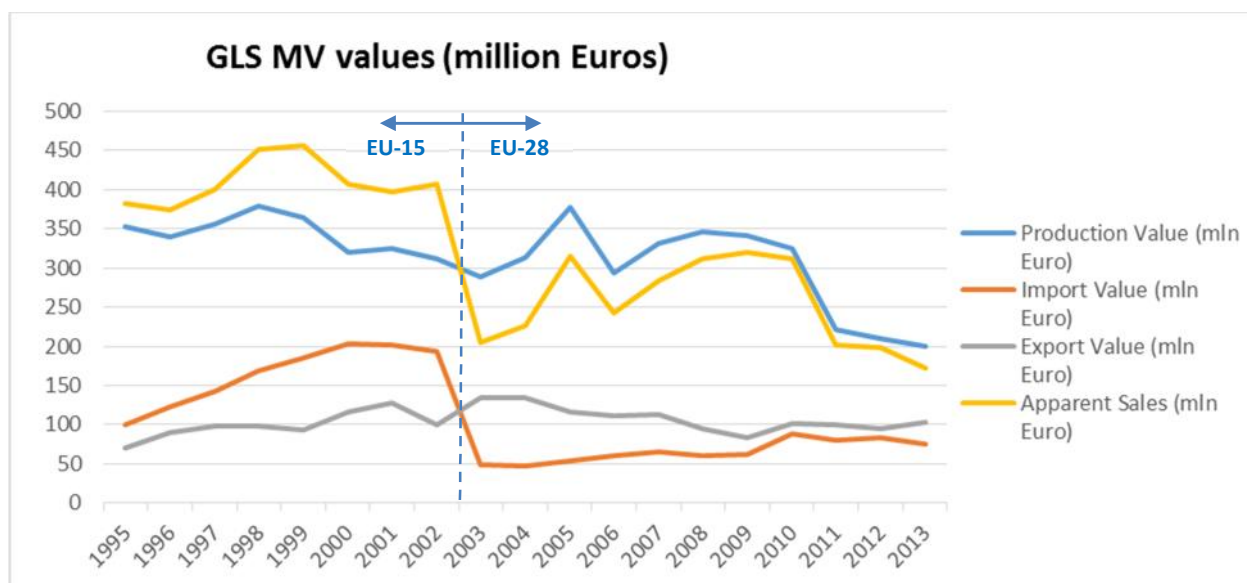


Figure 17: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for GLS MV <200W lamps. Top: quantities; bottom: monetary value.

Annex C.13 through C.16 present EU-15 / EU-28 totals data respectively for Production, Import, Export and Apparent Consumption, for years 1995-2013, for all lamp types together. Each section provides both quantity (units) and value (euros) data, and a comparison between the years 2003 (first year with EU-28 data) and 2013 (last year with Eurostat data). The graphs for Apparent Consumption are also reported on the following pages.

#### Conclusions:

- The Eurostat data for LFL, CFL, HL-MV and HL-LV seem to be reasonably well defined and could be useful for the study, even if they are not as detailed as the LightingEurope data (see next chapter).
- The Eurostat data for GLS are more difficult to interpret because lamps are split over two groups, 'GLS-MV < 200W' and 'other filament'.
- The ProdCom heading 'discharge other' contains a mix of HID-lamps that are of interest for the study, and of other lamps such as CCFL, that are not of interest to the study.
- Eurostat does not provide specific data for LED lighting.
- Considering all reported lamp types, the EU-28 Apparent Consumption of light sources has decreased from 3476 million units in 2003 to 2833 million in 2013 (-18.5%). The Apparent Value derived from Eurostat data has decreased from 3026 million euros in 2003 to 2878 million in 2013 (-4.9%).
- Comparing the Apparent Consumption (units) data for years 2003 and 2013, there is a significant decrease in GLS lamps (-67%)<sup>31</sup> and an increase in both fluorescent lamps

<sup>31</sup> 'GLS-MV < 200W' and 'other filament' taken together.



(+113%)<sup>32</sup> and halogen lamps (+60%)<sup>33</sup>. This is the trend that was expected, considering the ecodesign measures.

Annex C.17 provides a comparison between Eurostat data and MELISA data. MELISA total lamp sales are smaller than the (comparable <sup>34</sup>) Eurostat Apparent Consumption data and also smaller than the sum of Eurostat Imports and LightingEurope sales data. For some lamp technology types (GLS, CFL) MELISA data are close to Eurostat data, while for other types (HL, LFL) they are closer to the sum of Eurostat Imports and LightingEurope sales data. The deviation between MELISA data and Eurostat data does not necessarily imply that MELISA data need to be adjusted.

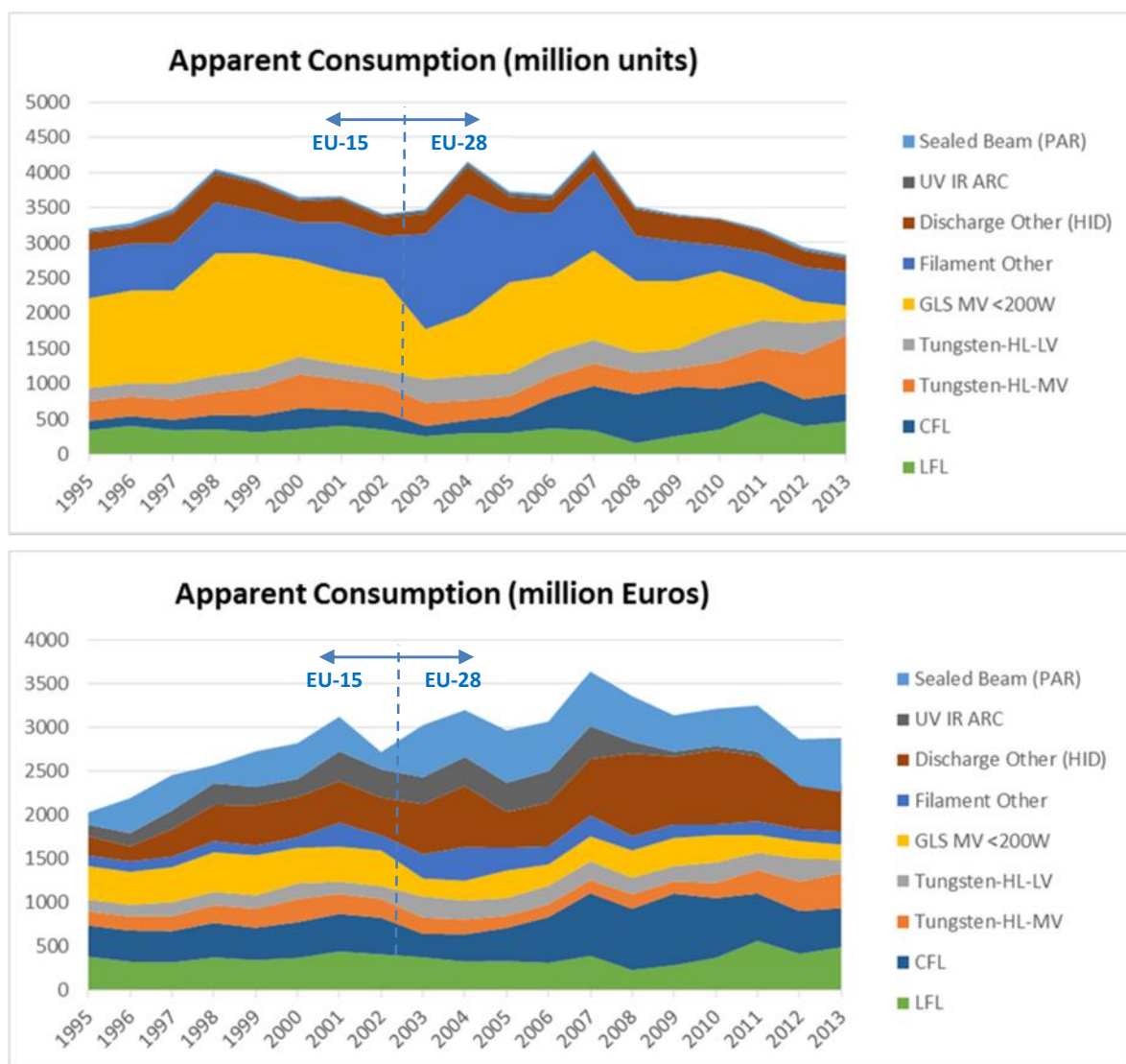
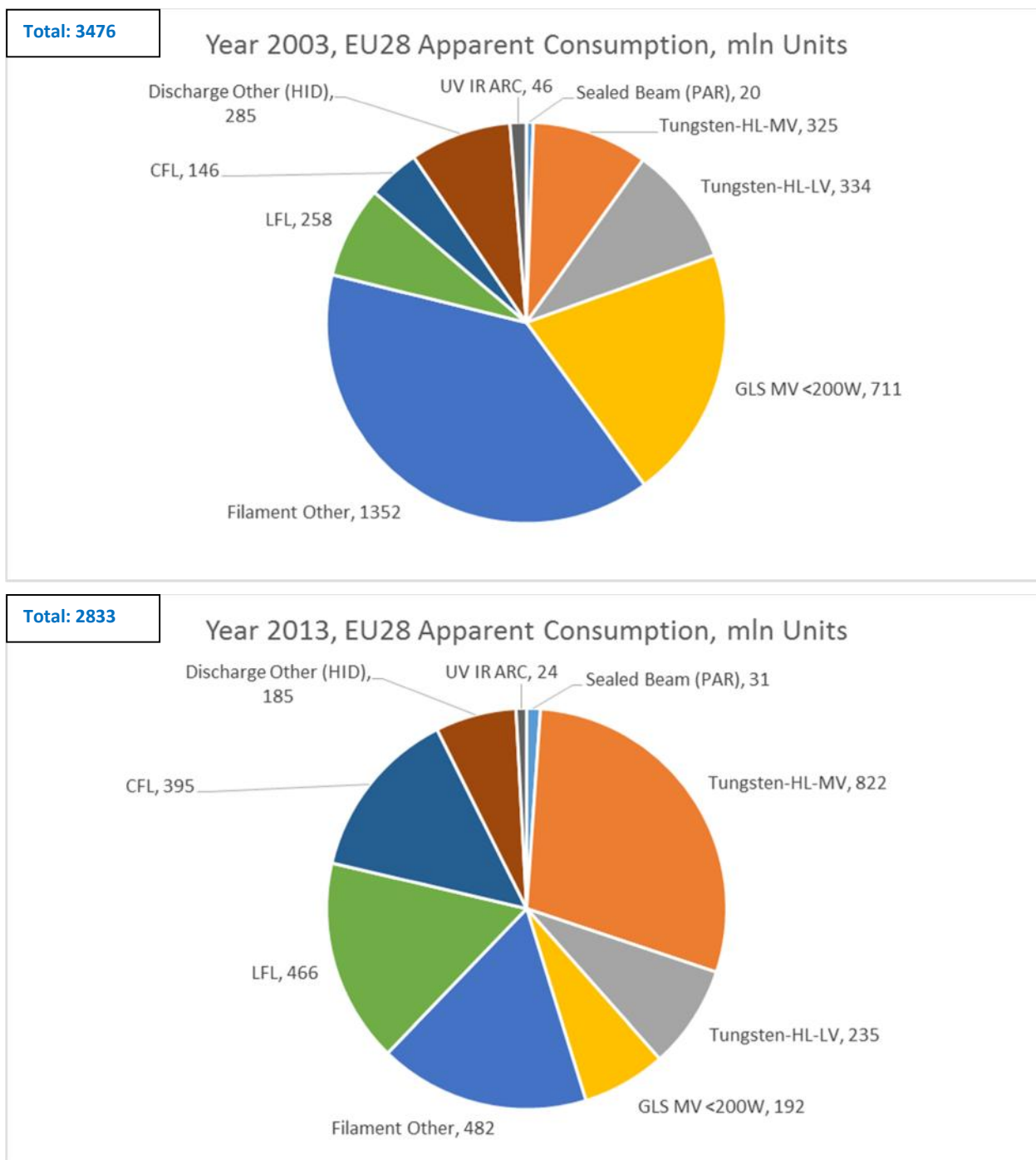


Figure 18: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million Euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

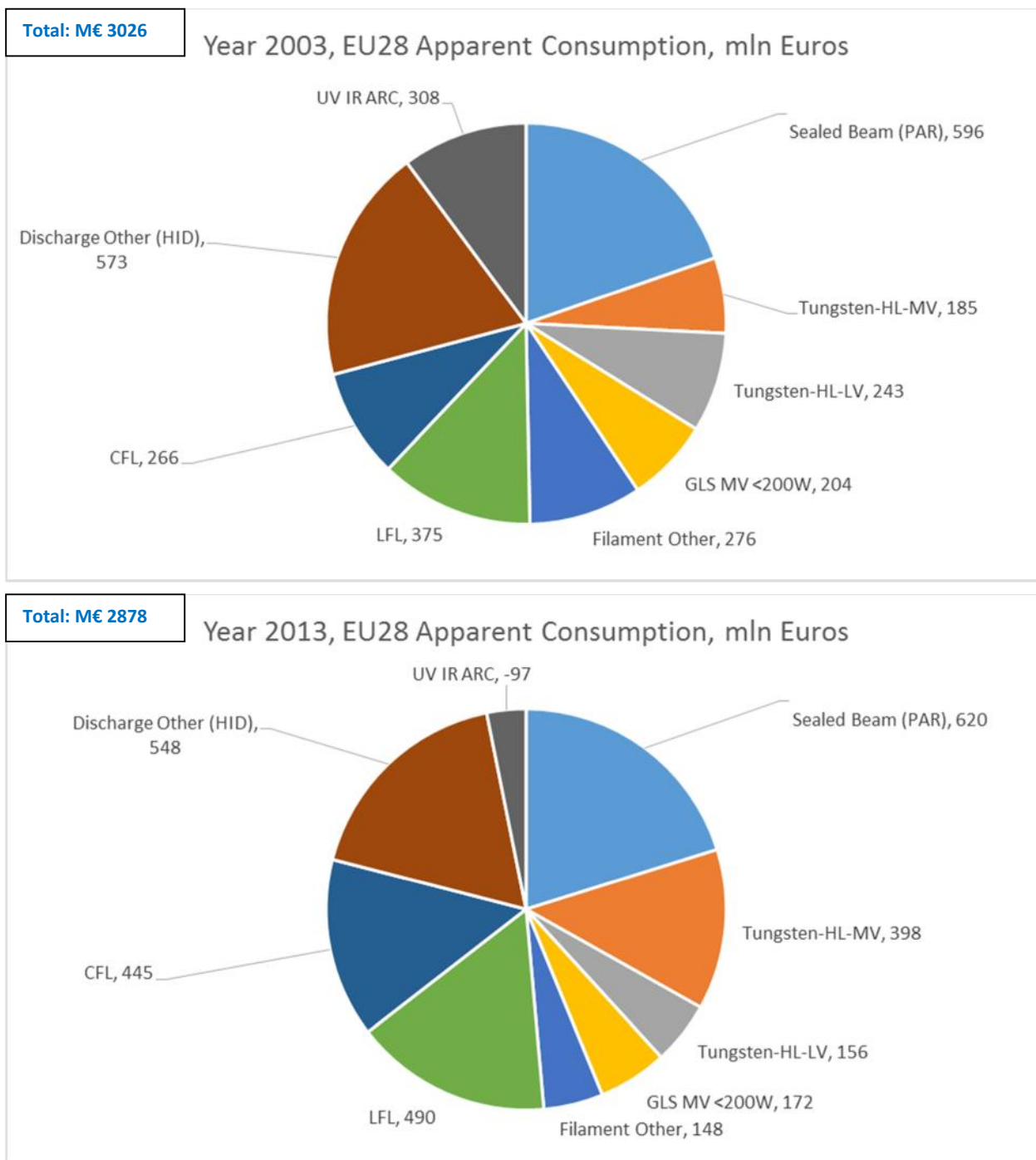
<sup>32</sup> Considers the sum of LFL and CFL.

<sup>33</sup> Considers the sum of HL-MV and HL-LV.

<sup>34</sup> Sealed beam lamps, UV IR ARC lamps, filament other lamps, and other discharge lamps have generally been excluded from the Eurostat totals, see details in the Annex.



**Figure 19: Eurostat Apparent Consumption Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom).**



**Figure 20: Eurostat Apparent Consumption Value (million euros) subdivision in 2003 (top) and in 2013 (bottom).**

## 4. DATA FROM LIGHTINGEUROPE

### 4.1. Introduction to LE-data

LightingEurope (LE) provided sales data (quantities) for lamps to the study team, covering the period 2009-2013. These data are confidential and consequently cannot be reported here. Therefore this chapter is limited to an overview of the type of data supplied, their elaboration by the study team, and the main qualitative conclusions that can be drawn from them.

The LE-data are provided for the following lamp types:

- Linear fluorescent lamps (LFL):
  - T12
  - T8 halophosphor
  - T8 tri-phosphor
  - T5 new (14 – 80W) including circular
  - All others (including T5 old types 4 – 13W and special fluorescent)
- Compact fluorescent lamps (CFL):
  - retrofit CFLi (integrated ballast)
  - non-retrofit CFLni (non-integrated ballast)
- Tungsten halogen lamps (HL):
  - Single ended, mirrored (low voltage) (M16, M25, etc.)
  - Linear (high voltage) (R7s)
  - LV halogen capsule (G4, GY6.35)
  - HV halogen capsule (G9)
  - Incandescent shape - GLS, decorative & reflector <sup>35</sup>
  - Other mains halogen - PAR 16/20/25/30 hard glass reflectors, GU10 etc.
- Classical incandescent lamps (GLS):
  - Reflector
  - GLS (including clear/pearl, candles, coloured & decorative)
- High intensity discharge lamps (HID):
  - All mercury lamps (including mixed)
  - All sodium lamps
  - Quartz metal halide lamps
  - Ceramic metal halide lamps
- Light emitting diode lamps (LED):
  - Directional
  - Non-directional

The data are provided per quarter of a year, for all EU-27 countries, for Norway, Russian Federation, Switzerland, Turkey, Ukraine, and (in one group) Belarus, Bosnia/Herzegovina, Croatia, Macedonia, Montenegro and Serbia.

The data include:

- Sales through subsidiaries and majority owned companies.
- Second brands and customer brands.
- Lamps provided with fittings.

The data exclude:

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<sup>35</sup> Also indicated in this study as: 'mains halogen (substitute for GLS and reflector)[E14, E27]'

- Sales to other contributors to the data collection (LE-members).
- Export sales outside the defined country group.

The lighting manufacturers that contributed to the collection of sales data are:

GE Lighting Ltd., Havells Sylvania, Narva, Osram GmbH, Philips Lighting BV and Toshiba. Since Q2 2012 also Verbatim GmbH contributed. For some data, Venture Lighting is listed as contributor.

LE also supplied data regarding the monetary value of their sales and the subdivision of these sales over original equipment manufacturers (OEM), professionals and consumers. A regional subdivision between Western Europe and Central+Eastern Europe is also included (years 2011-2013). These data are supplied for incandescent (GLS), HL, LFL, CFLi, CFLni, HID, LED lamps and LED modules.

The following definitions apply to these data:

- Lamps channel split definitions:
  - o OEM: sales of lamps to (mainly) luminaire manufacturers
  - o Professional: sales of lamps to wholesalers, installers and (large) professional end users
  - o Consumer: sales of lamps to retail trade who will resell the lamps (mainly) to consumers
- Sales value: total net invoice value in thousand euros, exclusive VAT and other taxes and not including trade discounts / rebates / bonuses etc.
  - o Excluded: export sales outside the defined country group, special lamps for photo optical applications, car lamps.
  - o Included: sales through subsidiaries and majority owned companies, second brands and customer brands.
- Country groups 1 – 3 (Western Europe) include: Austria, Benelux, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, UK.
- Country group 4 (Central+Eastern Europe) includes: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey + Belarus, Russian Federation, Ukraine, Yugoslavia.

## 4.2. Data elaboration

The sales data supplied by LightingEurope have been collected by the study team in separate Excel-sheets for further elaboration and for comparison with data from other sources.

The sales totals reported by LE, that also include some non-EU-27 countries (see previous paragraph), have been corrected to cover only EU-27 countries. These EU-27 totals have been determined as the sum of the EU-27 country-specific sales.

Yearly totals have been computed as sums of the quarterly data.

Main lamp type sales totals have been computed from the data provided per subtype.

At the time of writing (October 2014) no complete sales data for the year 2013 were available: data for quarter 2 of 2013 have been estimated from the available data for quarters 1, 3 and 4, assuming that the Q2 / (Q1+Q3+Q4) ratio is the same as in earlier years.

The sales value data were elaborated together with the sales quantity data to compute average unit prices for each lamp type. This also provided insight in the price differences between Western Europe and Central+Eastern Europe.

The question can be raised as to what happens to the lamps sold in a given country. They might be sold in a second step to non-EU27 countries and in that case should NOT be counted as EU-27 sales. In addition, lamps reported by LE as sold in the non-EU27 countries, e.g. Russian Federation, might find their way (back) to EU-27 countries, and in that case should be counted as EU-27 sales. These effects are unknown and have not been taken into account.

The LE-data are more detailed and better defined than the Eurostat data, and from that point of view they are more adequate for the current preparatory study. The main problem with these data is that they do not provide the total EU-28 light source market, but only the share of this market represented by the LE-members. LE claims a share of 80-90% for some lamp types and 40-50% for other types, but essentially the shares are uncertain. Therefore, even if the LE-data were gratefully used, the MELISA data presented in chapter 0 are NOT identical to the LE-data.

### 4.3. LE-data summary

A summary of the main conclusions from the analysis of the LE-data is presented below. Due to the confidentiality of the data only qualitative conclusions can be presented:

- Sales of LFL 'T8 halophosphor' have decreased by a factor 20 between 2009 and 2011. This is a direct consequence of ecodesign measures.
- Sales of LFL 'T8 tri-phosphor' show a 70% increase from 2009 to 2011, but since then sales are decreasing.
- Sales for LFL 'T5 new' show a 50% increase from 2009 to 2011 but they have stabilised in recent years.
- Sales for 'CFL' show a decreasing trend. In particular, CFLi sales in 2013 are about one-third of those in 2009. These lamps are potential substitutes for phased-out GLS lamps, but consumers seem to prefer MV-HL lamps.
- Sales for 'mains voltage halogen' lamps as a substitute for GLS lamps show a strong increase, approximately doubling from 2009 to 2013. This is a direct consequence of ecodesign measures.
- Sales for 'legacy incandescent lamps (GLS)' have collapsed between 2009 and 2013 (decrease of a factor 10). This is a direct consequence of ecodesign measures.
- Sales of 'LED lamps' are rapidly developing but their quantities (as sold by LE-members) are still small with respect to CFLi, MV-HL and GLS-lamps.
- The total number of lamp units sold by LE-members in EU-27 has approximately halved between 2009 and 2013. For a significant part, this is likely to be due to the longer lifetimes of energy-efficient lamps (CFL, HL, LED) that consequently need less substitution. Another part may be due to increased imports from non-EU27 countries.

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- From 2009 to 2013 average sales prices for lamps (not inflation corrected) have nearly doubled, both in Western Europe and in Central+Eastern Europe <sup>36</sup>. This is mainly due to switching from cheaper incandescent lamps to more expensive CFL, HL and LED lamps.
  - The average sales price per lamp in Central+Eastern Europe (C+E EU) is approximately half of that in Western Europe. Apart from the fact that the same lamp usually costs more in Western Europe than in C+E EU, this is also due to the different mix of lamp types sold (higher share of cheap incandescents in C+E EU) and maybe also due to the different mix of sales channels (more sales to OEM and professionals in C+E EU).

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<sup>36</sup> This also includes the Russian Federation and other non-EU-28 countries, see definitions in par. 4.1.

## 5. DATA FROM GfK

Recently the study team obtained GfK<sup>37</sup> sales data for light sources. Since September 2014 these data are also available in the public domain<sup>38</sup>. The data have been gathered in Austria, Belgium, France, Germany, Great Britain, Italy and Netherlands for the years 2007-2013, and in Poland and Spain for the years 2011-2013.

These data are reported to have an average coverage of 70% of the non-LED lamp sales in the countries and years considered. A slightly lower coverage might apply for LED lamps, see details in Annex D. The data regard mainly domestic sales, i.e. lamps for residential use.

An interesting aspect of the GfK data is that they also provide insight in the distribution of the sales over various wattage ranges, thus enabling an estimate of the average installed powers. Sales-weighted average efficiencies (lm/W) are also reported. These aspects will be further explored in the Task 3 report; in this report focus is on the sales data.

The GfK data are not directly valid for the entire EU-28 market (see data scaling below) but they confirm the trends also observed in other data sources (see Figure 53 in Annex D):

- A strong decrease in the sales of incandescent lamps (GLS),
- An increase in the sales of mains voltage halogen lamps (MV-HL)
- An initial increase and following decrease of CFLi sales with a peak around the year 2011.
- A general decrease in the overall quantity of lamp sales.

As explained in Annex D, the GfK sales data for partial coverage of some countries have been scaled by the study team to obtain estimates for the residential sales of light sources in the entire EU-28. The resulting data have been compared with the residential sales data now inserted in the MELISA model. The following conclusions can be drawn (see Table 53 in Annex D):

- For the main lamp types used in the residential sector (incandescent lamps, single-ended MV-halogen, self-ballasted CFLi, and LEDs) the MELISA sales values are generally close to those derived from GfK data, with a maximum deviation for CFLi where scaled GfK data are 82% of the MELISA values. This is considered a good match.
- The main exception is LV-halogen where scaled GfK data are only 42% of the sales quantities used in MELISA. The same difference appears for all years. This could be an indication that the current MELISA estimate for the residential fraction of overall LV-halogen sales is too high, i.e. maybe more LV-halogen should be shifted to the non-residential sector.
- Deviations are also higher for double-ended MV-HLs (2013 scaled GfK sales are 68% of MELISA sales) but for this lamp type the quantities are small, so higher errors can be expected and are acceptable.
- The same low-quantity remark holds for LFL (2013 scaled GfK sales are 69% of MELISA sales). In addition, these lamps are not typical for residential use and therefore their sales might not have been correctly captured by GfK.

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<sup>37</sup> GfK ('Gesellschaft für Konsumforschung') is an institute for market research based in Germany and now represented in more than 100 countries. <http://www.gfk.com/de/Seiten/default.aspx>

<sup>38</sup> "4E Mapping Document, European Union, Domestic Lighting". Available through: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5> together with other supporting material.



- The highest deviation is for CFLni where scaled GfK data are only 17% of the MELISA data. Also here, quantities of these lamps in the residential sector are low, and these lamps are not typical for residential use. It may be that the GfK monitoring did not include the major sales channels to capture the sales for these lamps. It might also be that the MELISA estimate regarding the part of CFLni being used in domestic applications is too high.

In general the match between GfK data and MELISA data is considered to be good, as regards the sales quantities of the main light sources for domestic use.

## 6. DATA FROM MCKINSEY

### 6.1. Introduction to McKinsey data

In its 2012 report “Lighting the way”<sup>39</sup>, McKinsey & Company provide an analysis of the global lighting market. The report contains annual sales volumes (quantities) and market values for new installations (fixtures, containing light sources) and for replacement of light sources. Most of these data are subdivided per sector (residential, office, industrial, shop/retail, hospitality, outdoor, architectural) and per light source technology type (incandescent, halogen, HID, LFL, CFL, LED retrofit and LED full). The data are provided for the years 2011 and 2012 with forecasts for 2016 and 2020. Most data are provided on a global level, i.e. for the entire world.

Some data are also supplied per continent (Europe, North America, Asia (and Pacific), Middle East and Africa, Latin America) and for some major developing countries (Brazil, Russia, India, China), but unfortunately this regional breakdown is reported only in terms of market value, not in terms of sales quantities. The link between values (euros) and number of units sold, i.e. the price per unit, is reported by McKinsey only as an average for the entire global market. These values are not adequate for the EU-28. In addition, McKinsey does not define exactly what ‘Europe’ includes.

McKinsey distinguishes a ‘light source replacement market’ and a ‘luminaire market’. The former is directly of interest for this study, but the latter also includes a share that regards the light sources sold together with the luminaires. Unfortunately, that share is reported only at the global level.

As the McKinsey data are certainly interesting, the study team elaborated the data in an attempt to derive the information relevant for EU-28. Results are reported in Annex E. As detailed in the Annex, many assumptions have been necessary for the derivation of the EU-28 data, so the quantitative results may not be very reliable, but trends seem to be correct.

### 6.2. Lighting market value data derived from McKinsey

Table 54 in Annex E reports, for the years 2011, 2012, 2016 and 2020, the value (million euros)<sup>40</sup> of the EU-28 general lighting market. Two subdivisions are shown: one per light source technology type and the other per market type (luminaire market (new sales), light source replacement market, control system market). Based on these data derived from McKinsey (2012):

- The EU-28 general lighting market<sup>41</sup> is expected to grow from 13 billion euros in 2011 to 16 billion in 2020.
- Approximately 78% of the market value comes from new sales (luminaire market, includes light sources, control gears and fixtures).
- The share of the light source replacement market decreases from 18% in 2011 to 9% in 2020.
- The share of the control system market increases from 4% in 2011 to 13% in 2020.

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<sup>39</sup> “Lighting the way: Perspectives on the global lighting market”, McKinsey & Company, second edition, August 2012. This is an update of the earlier report of 2011.

[http://www.mckinsey.com/~media/mckinsey/dotcom/client\\_service/automotive%20and%20assembly/lighting\\_the\\_way\\_perspectives\\_on\\_global\\_lighting\\_market\\_2012.ashx](http://www.mckinsey.com/~media/mckinsey/dotcom/client_service/automotive%20and%20assembly/lighting_the_way_perspectives_on_global_lighting_market_2012.ashx)

<sup>40</sup> The market value for McKinsey is the number of units sold times the ASP. Most likely ASP is Average Selling Price (euro/unit), but the abbreviation is not explained and no exact definition could be found in the report.

<sup>41</sup> General lighting excludes automotive lighting and backlighting for displays, but includes luminaires and lighting controls.

- By 2020 the value-share of LED lighting in the total market is expected to be 73%.

Table 55 in Annex E provides a sector breakdown of the same market value (residential, office, retail/shop, hospitality, industrial, outdoor, architectural). The following conclusions can be drawn:

- The residential lighting market accounts for slightly less than half of the total market. A slight loss of market value share from 49% in 2011 to 44% in 2020 is predicted.
- The value shares of the outdoor sector (10->13%) and the office sector (13->16%) slightly increase from 2011 to 2020.
- For other sectors the share of market value is constant throughout the years, 7-9% for hospitality, retail/shops and industrial, 4% for architectural.

Table 56 in Annex E presents an even more detailed breakdown of the lighting market value. A subdivision of the global lighting market in sectors is provided, with a further subdivision for each sector in technology types and market types. Many assumptions and adjustments were required to derive this EU-28 table from the global table reported by McKinsey while ensuring consistency with Table 54 and Table 55. Care should be taken when using the data in this table. The following points can be highlighted:

- In most sectors the market value share for LED lighting is estimated to be at least 70% by 2020 (with peaks up to 91% for the architectural sector), but for two sectors a slower introduction of LEDs is predicted: 52% in 2020 for the office sector and 40% for the industry sector.
- In general, the light source replacement market decreases from 2011 to 2020 while the lighting control systems market increases in the same period. In 2020 the largest market value share for lighting control is predicted for the office sector (34%).

### 6.3. Light sources market value data derived from McKinsey

The above applies to the entire general lighting market. For the present study the **light sources market** is of particular interest. This market is the combination of replacement sales, that are explicitly presented, and new sales, that are hidden inside the values for the luminaire market. At global level, for the sum of all sectors, McKinsey supplies a breakdown of the luminaire market that indicates a light sources share from 9% (2011) to 15% (2020).

Assuming that this share can also be applied to the EU-28 data, and to all sectors, the survey of Table 28 can be derived. The table can be commented as follows:

- The light source replacement market decreases from 2011 to 2020 while the new light source market (light sources sold inside luminaires) increases. By 2020 the new market exceeds the replacement market by value.
- The combined light sources market (new and replacements) shows a peak of 3.9 billion euros in 2016. Afterwards the market value is predicted to decrease.
- Comparison of the EU-28 light source market 2012 from various sources (million euros):
  - McKinsey: 3576 (as derived by the study team)

- Eurostat apparent value: 2865 (including all lamp types)  
2415 (exclusive sealed beam, UV IR ARC, but still includes all discharge other and all filament other)
- MELISA model: 5439 (industry revenue). This value seems to be on the high side. The share of consumer acquisition cost that forms industry revenue could be reconsidered during a model revision.
- LightingEurope: less than the above values, which is logical considering that LE has only a part of the market. The LE-value could be compatible with the value derived from McKinsey data.
- (not shown in the table) The residential light sources market value derived from McKinsey for the year 2012 is 1769 million euros. This compares fairly well to the 2268 million resulting from the MELISA model. The non-residential light sources market value from McKinsey for the same year is 1807 million euros, compared to 3171 million in MELISA. The market value difference signalled above consequently stems mainly from the non-residential sector.

EU-28 light sources market		2011	2012	2016	2020
<b>Based on McKinsey, All Sectors</b>	<b>m €</b>	<b>3237</b>	<b>3576</b>	<b>3940</b>	<b>3439</b>
<i>incandescent</i>	<i>m €</i>	<i>502</i>	<i>420</i>	<i>82</i>	<i>0</i>
<i>halogen</i>	<i>m €</i>	<i>536</i>	<i>591</i>	<i>531</i>	<i>204</i>
<i>HID</i>	<i>m €</i>	<i>461</i>	<i>507</i>	<i>423</i>	<i>181</i>
<i>LFL</i>	<i>m €</i>	<i>820</i>	<i>859</i>	<i>736</i>	<i>493</i>
<i>CFL</i>	<i>m €</i>	<i>643</i>	<i>675</i>	<i>357</i>	<i>123</i>
<i>LED</i>	<i>m €</i>	<i>275</i>	<i>523</i>	<i>1809</i>	<i>2439</i>
Light source NEW	m €	909	1128	1678	1935
Light source REPLACEMENT	m €	2328	2447	2262	1504

**Table 28 EU-28 market for light sources/lamps/modules, as derived by the study team from McKinsey data. Sum of all sectors. Values in million euros.**

## 6.4. Light sources sales quantities derived from McKinsey

In its report McKinsey presents ASP's per light source technology type (euro/unit). The abbreviation is not explained but is assumed to mean Average Selling Price. An exact definition is not provided by McKinsey, but the study team assumes that these are the prices at which the manufacturer sells the light sources to OEM (luminaire manufacturers), wholesalers, installers, professional end-users or retail traders (who will resell the light sources to consumers).

These ASP's could be used to translate the light source market values presented in the previous paragraph in quantities of light sources sold (units). The problem is that McKinsey's ASP's are averages at the global level. These prices/unit are too low for EU-28 and consequently would lead to overestimate the number of units sold.

This has also been confirmed by a study of the average selling prices derived from LightingEurope data. LE-prices for EU-28 are significantly higher than the global ASP's reported by McKinsey. In addition, the LE-data show a clear difference between the price/unit in Western Europe (higher) and in Central+Eastern Europe (lower).

For the derivation of the quantity of light sources sold, the study team selected two sets of unit prices for the year 2011. The set with the highest prices is based on data for EU-28 (mainly sales in Western Europe). The set with the lowest prices is based on a mix of data for Central+Eastern Europe and McKinsey's global ASP's. For the years 2012, 2016 and 2020 the same price trends as reported for the McKinsey ASP's were used. The market values from Table 28 have been divided by the two sets of unit prices to produce two sets of quantities of light sources sold. These data are presented in Table 29.

Light source unit price (€/unit)	High price set				Low price set			
	2011	2012	2016	2020	2011	2012	2016	2020
incandescent	0.28	0.28	0.31	0.33	0.21	0.21	0.24	0.25
halogen	1.00	1.03	0.98	0.83	0.88	0.91	0.86	0.73
HID	9.67	9.44	8.27	7.10	7.31	7.14	6.25	5.37
LFL	1.30	1.27	1.16	1.07	0.87	0.85	0.78	0.72
CFL	2.01	1.92	1.57	1.28	1.60	1.53	1.25	1.02
LED Lamps	11.67	9.06	5.53	4.79	7.85	6.10	3.72	3.22

Light sources sold in EU-28 (million units/year)	3351	3211	2045	1336	4431	4248	2749	1875
incandescent	1789	1497	261	0	2377	1989	347	0
halogen	538	573	544	245	612	651	618	279
HID	48	54	51	25	63	71	68	34
LFL	633	678	634	460	943	1010	944	685
CFL	320	351	228	96	402	441	286	121
LED	24	58	327	510	35	86	486	757
<i>Light sources NEW</i>	926	997	853	733	1223	1318	1144	1022
<i>Light sources REPLACEMENT</i>	2426	2214	1192	603	3208	2930	1605	853

**Table 29 EU-28 sales quantities for light sources/lamps/modules, as derived by the study team from McKinsey market value data and for two sets of assumed unit prices. Sum of all sectors, in million units.**

The following comments can be made regarding this table:

- On the basis of market value data for light sources derived by the study team from McKinsey data, and on the basis of two assumed sets of unit prices (one could be typical for Western Europe; the other could be typical for Central+Eastern Europe and for imported light sources) the number of light sources sold in EU-28 in 2012 is estimated between 3211 and 4248 million units.
- Slightly less than half of the sales are (non-halogen) incandescent lamps, but these sales are predicted to drop to zero by 2020.
- By 2020 approximately 40% of the sold light sources are predicted to be LED lamps or LED modules.
- The new sales and replacement sales reported in the table have been computed from the total sales assuming that the unit shares are the same as the value shares of Table 28.

- 
- In general the sales of light sources are predicted to decrease by 60% from 2011 to 2020. The largest part of this decrease comes from replacement sales. By 2020 the quantity of new sales (mainly light sources sold inside luminaires) exceeds the quantity of replacement sales.
  
  - Comparison of the EU-28 light source sales quantities 2012 from various sources (million units):
    - McKinsey: 3211-4248 (as derived by the study team)
    - Eurostat Apparent: 2937 (including all lamp types)  
2883 (exclusive sealed beam, UV IR ARC, but still includes all discharge other and all filament other)
    - MELISA model: 1889 (This seemingly low value compared to the other data sources mainly derives from the estimated sales for incandescent lamps (GLS). The estimate derived from McKinsey data gives 1497-1989 million units, while the MELISA model and Eurostat give 299 million. LE-sales are slightly higher than MELISA data, but the order of magnitude is the same. The McKinsey-derived GLS data are judged as much too high.)
    - LightingEurope: (Confidential, but lower than the other values because LE represents only a share of the total market. However, McKinsey derived data seem too high compared to the LE-quantity.)

## 7. DATA FROM OTHER SOURCES

Recently (August 2014) the study team obtained sales and trade data for light sources from:

- Chinese Lighting Association
- All China Market Research
- Japanese Lighting Association (JLMA), via the Ministry of Economy, Industry and Trade (METI)

The Chinese data permitted to verify that the Chinese exports to EU-28 for GLS, fluorescent (mainly CFL) and HID (mercury, sodium, metal-halide) are in reasonable agreement with the imports for these lamp types from China as reported by Eurostat's external trade database.

The Chinese production of LED lighting, in terms of quantities, has increased by a factor 8 from 2010 to 2013. In the same period, the monetary value of this production has increased by approximately a factor 4, implying that prices per unit have approximately halved in four years.

As regards the data from Japan, a comparison between European lamp sales (from MELISA) and the Japanese lamp sales is shown in Figure 21.

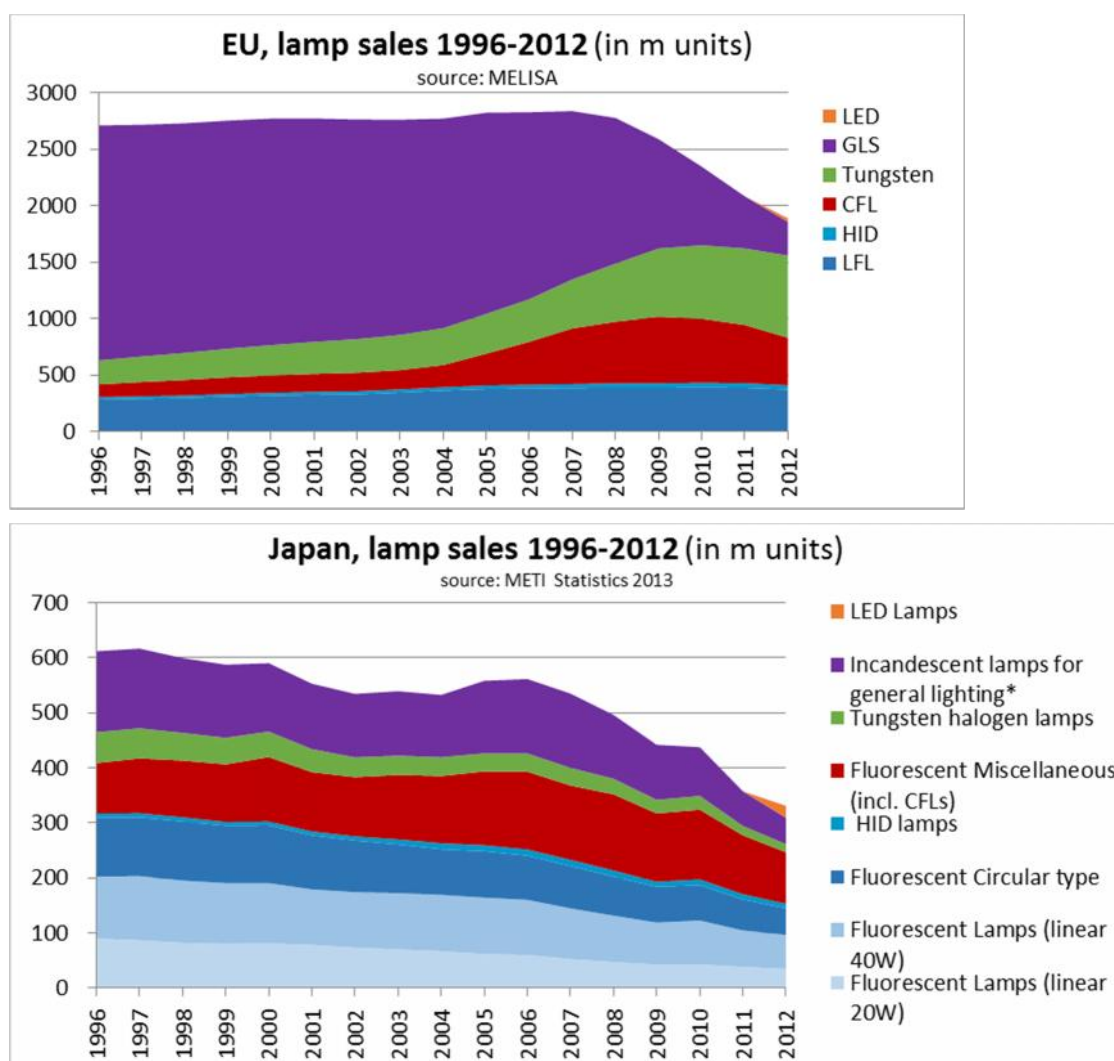


Figure 21: Comparison between European lamp sales and Japanese lamp sales for the period 1996-2012.  
(sources: MELISA model, and JLMA / METI)

## 8. DATA ON BALLASTS

Annex C.18 and C.19 present the Eurostat data for magnetic and electronic ballast. These data include production, import, export and apparent consumption (sales), expressed in quantities (units) and in values (euros). For general remarks on the Eurostat data and on how they have been processed, see chapter 3. The presented data are for the following ProdCom codes:

- 27115013 - Inductors for discharge lamps or tubes (assumed to represent magnetic ballasts)
- 27115015 - Ballasts for discharge lamps or tubes (excluding inductors) (assumed to represent electronic ballasts)

The data can be summarized as follows:

- In 2013 around 600 million **magnetic ballasts** were sold in EU-28, representing a total value of around 165 million euros, for an average value of 0.27 euros/ballast.  
As regards sales quantities there is no clear trend: since 2005 the annual sales go up and down, varying from 600 to 900 million units per year.  
As regards sales values, the last ten years show a downward trend, even if with ups and downs.
- In 2013 around 70 million **electronic ballasts** were sold in EU-28, representing a total value of around 550 million euros, for an average value of 8.11 euros/ballast.  
As regards sales quantities there is a downward trend, from 150 million units in 2006-2007 to 70 million units in 2013.  
As regards sales values, the last ten years show an upward trend, from around 300 million euros in 2003 to around 600 million euros in 2011, with stabilization in the last two years.

For several reasons, these Eurostat data are puzzling and retained unreliable <sup>42</sup>:

- The total number of ballasts sold in 2013, around 670 million units, is high compared to the number of LFL and HID lamps sold (400-500 million), in particular when considering that one ballast often controls more than one LFL.
- According to the Eurostat data the share of electronic ballasts would be around 10%. This is contrary to the expectations, contrary to trends elsewhere in the world (approximately 80% electronic in Australia and Canada; 75% electronic in the USA in 2005 <sup>42</sup>) and contrary to CELMA information from 2010 (see below) that gave 50% electronic ballasts in Europe in 2008 with increasing trend.
- An average magnetic ballast would be expected to weigh not less than 0.5 kg, which would imply a value of around 0.50 euros/kg or less. This looks more like a scrap-value than a value for a new product being sold.

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<sup>42</sup> The same conclusion was drawn in a recent CLASP report on LFL's, see in particular paragraph 2.4.5 in:

CLASP, November 2014, "Mapping & Benchmarking of Linear Fluorescent Lighting".

<http://clasponline.org/en/Resources/Resources/PublicationLibrary/2014/Benchmarking-Analysis-Linear-Fluorescent-Lighting.aspx>



In a 2010 publication <sup>43</sup>, CELMA & ELC (now LightingEurope) provide the annual numbers of new installed lamps driven by a given type of ballast, for the period 1997-2008 with a prevision up to 2010, separated in LFL and HID-lamps:

- For linear fluorescent lamps, 221 million ballasts were sold in 2008, of which 48% electronic. The prediction for 2010 showed a share of at least 62% for electronic ballasts (Figure 22).
- For high-intensity discharge lamps, 20 million ballasts were sold in 2008, of which 33% electronic. The prediction for 2010 showed a share of 41% for electronic ballasts (Figure 23).

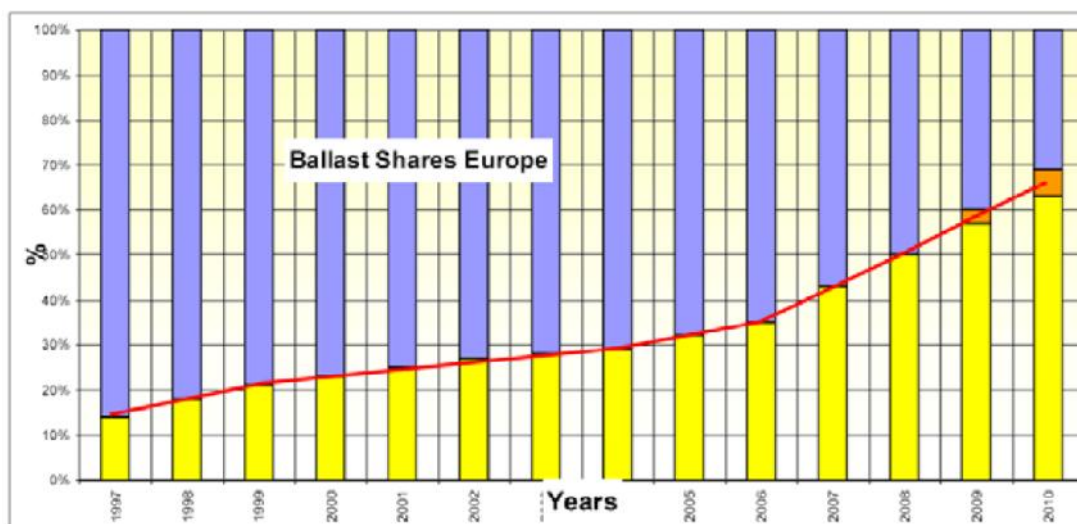


Figure 22 Market share (1997-2008) and expected market share (2009-2010) of the ballast sales development in Europe based on operated linear fluorescent lamps (blue=magnetic ballast; yellow=electronic ballast; orange=tolerance band) (Source: <sup>43</sup>)

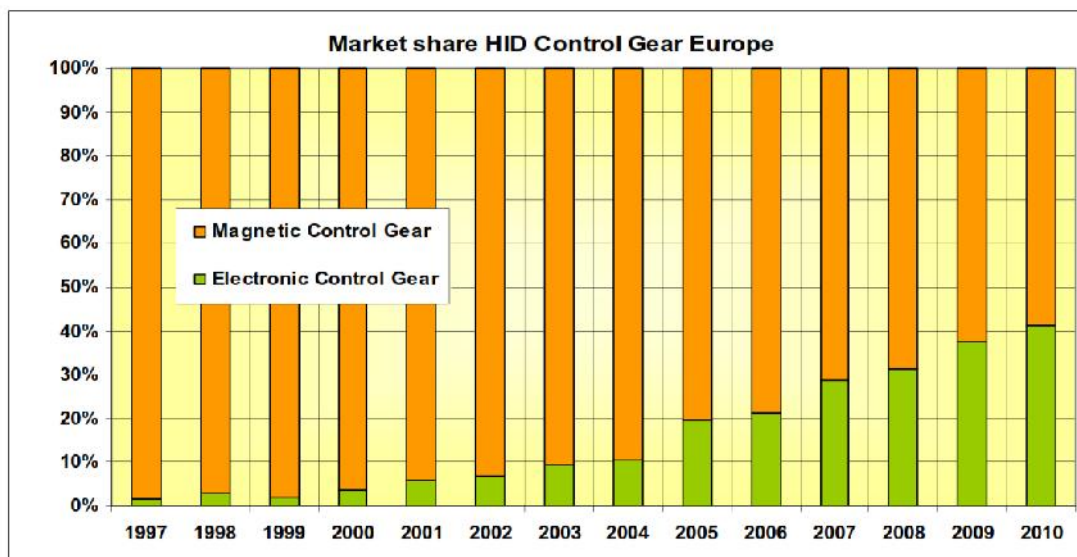


Figure 23 Market share (1997-2010) of the ballast sales development in Europe based on operated high-intensity discharge lamps (orange=magnetic ballast; green=electronic ballast) (Source: <sup>43</sup>)

<sup>43</sup> Guide of the European Lighting Industry (ELC & CELMA) for the application of the Commission Regulation (EC) No. 245/2009 amended by the Regulation No. 347/2010 setting EcoDesign requirements for “Tertiary sector lighting products”, 2<sup>nd</sup> edition, September 2010, annex C5 and C6  
[http://www.lightingeurope.org/uploads/files/CELMA\\_EcoDesign\\_%28SM%29258\\_CELMA\\_ELC\\_Tertiary\\_Lighting\\_Guide\\_2nd\\_Edition\\_FINAL2\\_Sept2010.pdf](http://www.lightingeurope.org/uploads/files/CELMA_EcoDesign_%28SM%29258_CELMA_ELC_Tertiary_Lighting_Guide_2nd_Edition_FINAL2_Sept2010.pdf)

The 2010 CELMA&ELC data are retained more reliable than the Eurostat data and will therefore be preferred. In the course of the preparatory study an attempt will be made to acquire more recent data.

## LIST OF FIGURES

Figure 1: Sales data for light sources, EU-28 cumulative total in millions of units. ALL SECTORS ('GLS stock' and 'Tungsten stock' are not real sales, see text final paragraph page 11) .....	15
Figure 2: Sales data for light sources, EU-28 totals per lamp type in millions of units. ALL SECTORS .....	15
Figure 3: Sales data for light sources, EU-28 cumulative total in millions of units. RESIDENTIAL .....	17
Figure 4: Sales data for light sources, EU-28 cumulative total in millions of units. NON-RESIDENTIAL .....	18
Figure 5: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros. ALL SECTORS .....	21
Figure 6: Consumer expense for acquisition of light sources, EU-28 totals per lamp-type in millions of euros. ALL SECTORS .....	21
Figure 7: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros. RESIDENTIAL (inclusive 20% VAT) .....	23
Figure 8: Consumer expense for acquisition of light sources, EU-28 cumulative total in millions of euros. NON-RESIDENTIAL (exclusive VAT) .....	24
Figure 9: Industry revenue from sales of light sources, EU-28 cumulative total in millions of euros. ALL SECTORS .....	26
Figure 10: Industry revenue from sales of light sources, EU-28 totals per lamp type in millions of euros. ALL SECTORS .....	26
Figure 11: Industry Revenue from sales of light sources, EU-28 cumulative total in millions of euros. RESIDENTIAL.....	28
Figure 12: Industry revenue from sales of light sources, EU-28 cumulative total in millions of euros. NON-RESIDENTIAL .....	29
Figure 13: Installed number (stock) of light sources, EU-28 cumulative total in millions of units. ALL SECTORS .....	33
Figure 14: Installed number (stock) of light sources, EU-28 totals per lamp type in millions of units. ALL SECTORS .....	33
Figure 15: Installed number (stock) of light sources, EU-28 totals per lamp-type in millions of units. RESIDENTIAL.....	35
Figure 16: Installed number (stock) of light sources, EU-28 totals per lamp-type in millions of units. NON-RESIDENTIAL.....	36
Figure 17: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for GLS MV <200W lamps. Top: quantities; bottom: monetary value. ....	40
Figure 18: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million Euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	41
Figure 19: Eurostat Apparent Consumption Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom). ....	42
Figure 20: Eurostat Apparent Consumption Value (million euros) subdivision in 2003 (top) and in 2013 (bottom). ....	43
Figure 21: Comparison between European lamp sales and Japanese lamp sales for the period 1996-2012. (sources: MELISA model, and JLMA / METI) .....	55
Figure 22 Market share (1997-2008) and expected market share (2009-2010) of the ballast sales development in Europe based on operated <u>linear fluorescent lamps</u> (blue=magnetic ballast; yellow=electronic ballast; orange=tolerance band) (Source: <sup>43</sup> ) .....	57
Figure 23 Market share (1997-2010) of the ballast sales development in Europe based on operated <u>high-intensity discharge lamps</u> (orange=magnetic ballast; green=electronic ballast) (Source: <sup>43</sup> ).....	57
Figure 23: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Sealed Beam (PAR) lamps. Top: quantities; bottom: monetary value. ....	77
Figure 24: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Tungsten HL-MV lamps. Top: quantities; bottom: monetary value. ....	78
Figure 25: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Tungsten HL-LV lamps. Top: quantities; bottom: monetary value. ....	79
Figure 26: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for GLS MV <200W lamps. Top: quantities; bottom: monetary value. ....	80
Figure 27: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Other Filament lamps. Top: quantities; bottom: monetary value. ....	81
Figure 28: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Linear Fluorescent (LFL) lamps. Top: quantities; bottom: monetary value .....	82
Figure 29: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Compact Fluorescent (CFL) lamps. Top: quantities; bottom: monetary value .....	83

Figure 30: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Other Discharge lamps. Top: quantities; bottom: monetary value. ....	84
Figure 31: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for UV IR ARC lamps. Top: quantities; bottom: monetary value. ....	85
Figure 32: Eurostat Production Quantity (million units, top) and Production Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	86
Figure 33: Eurostat Production Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom). ....	87
Figure 34: Eurostat Production Value (million euros) subdivision in 2003 (top) and in 2013 (bottom). ....	88
Figure 35: Eurostat Import Quantity (million units, top) and Import Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	89
Figure 36: Eurostat Import Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom). ....	90
Figure 37: Eurostat Import Value (million euros) subdivision in 2003 (top) and in 2013 (bottom). ....	91
Figure 38: Eurostat Export Quantity (million units, top) and Export Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	92
Figure 39: Eurostat Export Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom). ....	93
Figure 40: Eurostat Export Value (million euros) subdivision in 2003 (top) and in 2013 (bottom). ....	94
Figure 41: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	95
Figure 42: Eurostat Apparent Consumption Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom). ....	96
Figure 43: Eurostat Apparent Consumption Value (million euros) subdivision in 2003 (top) and in 2013 (bottom). ....	97
Figure 44: Eurostat total lamp sales compared to MELISA total lamp sales, EU-28 totals, All Sectors (Residential + Non-Residential), for years 2007-2013. LightingEurope total sales + Eurostat Imports are also shown for reference. See text above for details. ....	98
Figure 45: Eurostat incandescent lamp sales (GLS MV < 200W) compared to MELISA GLS lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013. ....	99
Figure 46: Eurostat mains voltage halogen (MV-HL) sales compared to MELISA MV-HL lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013. ....	99
Figure 47: Eurostat low voltage halogen (LV-HL) sales compared to MELISA LV-HL lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013. ....	100
Figure 48: Eurostat CFL sales compared to MELISA CFL sales (sum of CFLi and CFLni), EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013. ....	100
Figure 49: Eurostat LFL sales compared to MELISA LFL sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013. ....	101
Figure 50: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Magnetic ballast. Top: quantities; bottom: monetary value. ....	102
Figure 51: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Electronic ballast. Top: quantities; bottom: monetary value. ....	103
Figure 52: GfK data regarding the sales volumes and average efficacies (lm/W) of lamps in selected European countries, as reported in the “4E Mapping document, European Union, Domestic Lighting” <sup>48</sup> . These data are NOT valid for the entire EU-28 and mainly cover domestic lighting, see text. ....	105
Figure 53: Lamp sales (million units) per type, for years 2007-2013, estimate for entire EU-28, based on GfK 2014 data. Coverage is mainly residential sales. ....	107

## LIST OF TABLES

Table 1: Sales data for light sources, EU-28 totals per main lamp type in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS. ....	16
Table 2: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS. ....	16
Table 3: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL. ....	17
Table 4: Sales data for light sources, EU-28 totals per lamp-subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL. ....	18

Table 5: Residential sales of light sources per household, years 1990, 1995, 2000, 2005 – 2013. ....	19
Table 6: Years 2008 and 2013, subdivision of EU-28 sales quantities for light sources/lamps over the main technology types. ....	19
Table 7: Unit consumer sales prices for light sources (except LEDs) from the MELISA model. Prices are in euro/unit for the indicated lamp type with the indicated reference power and efficiency. Prices are 2010-level and for the moment they are model constants valid for all years. ....	20
Table 8: Unit consumer sales prices for LED retrofit lamps from the MELISA model. Prices are provided in euro/lumen and in euro/unit for a 500 lm lamp. Prices exclusive VAT. ....	20
Table 9: Consumer expense for acquisition of light sources, EU-28 totals per main lamp-type in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	22
Table 10: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	22
Table 11: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL (inclusive 20% VAT) .....	23
Table 12: Consumer expense for acquisition of light sources, EU-28 totals per lamp-subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL (exclusive VAT) .....	24
Table 13: Residential consumer expense for acquisition of light sources, years 1990, 1995, 2000, 2005 – 2013. (inclusive 20% VAT) (in euros/year/household) .....	25
Table 14: Years 2008 and 2013, subdivision of EU-28 consumer expense for acquisition of light sources/lamps over the main technology types. ....	25
Table 15: Industry revenue from sales of light sources, EU-28 totals per main lamp type in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	27
Table 16: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	27
Table 17: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL .....	28
Table 18: Industry revenue from sales of light sources, EU-28 totals per lamp subtype in millions of euros, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL .....	29
Table 19: Years 2008 and 2013, subdivision of EU-28 industry revenue from sales of light sources/lamps over the main technology types. ....	30
Table 20: Lifetime in hours, operating hours per year (residential and non-residential), and corresponding life in years (computed) for the various types of light sources, as currently used in MELISA. For LED light sources, see text.....	32
Table 21: Installed number (stock) of light sources, EU-28 totals per main lamp-type in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	34
Table 22: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. ALL SECTORS .....	34
Table 23: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. RESIDENTIAL .....	35
Table 24: Installed number (stock) of light sources, EU-28 totals per lamp subtype in millions of units, years 1990, 1995, 2000, 2005 – 2013. NON-RESIDENTIAL .....	36
Table 25: Number of installed light sources per household, years 1990, 1995, 2000, 2005 – 2013. ....	37
Table 26: Years 2008 and 2013, subdivision of EU-28 Installed number of light sources/lamps over the main technology types. (GLS and HL include the contributions from the respective 'stocks' reported under sales in par. 2.2).....	37
Table 27: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, GLS MV <200W lamps (ProdCom code 27401300) ..	39
Table 28 EU-28 market for light sources/lamps/modules, as derived by the study team from McKinsey data. Sum of all sectors. Values in million euros. ....	52
Table 29 EU-28 sales quantities for light sources/lamps/modules, as derived by the study team from McKinsey market value data and for two sets of assumed unit prices. Sum of all sectors, in million units. ....	53
Table 30: Lamp types for presentation of Eurostat sales data. ....	68
Table 31: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Quantity in thousands of units</u> . Lamp types 1: Sealed Beam, Tungsten HL-MV and Tungsten HL-LV.....	71
Table 32: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Quantity in thousands of units</u> . Lamp types 2: GLS MV < 200 W, Filament Other and LFL. ....	72
Table 33: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Quantity in thousands of units</u> . Lamp types 3: CFL, Discharge Other and UV IR ARC.....	73

Table 34: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Value in thousands of euros</u> . Lamp types 1: Sealed Beam, Tungsten HL-MV and Tungsten HL-LV. ....	74
Table 35: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Value in thousands of Euros</u> . Lamp types 2: GLS MV < 200 W, Filament Other and LFL. ...	75
Table 36: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. <u>Value in thousands of Euros</u> . Lamp types 3: CFL, Discharge Other and UV IR ARC. ....	76
Table 37: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Sealed Beam (PAR) lamps (27401100). ....	77
Table 38: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Tungsten HL-MV lamps (27401293). ....	78
Table 39: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Tungsten HL-LV lamps (27401295). ....	79
Table 40: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, GLS MV <200W lamps (27401300). ....	80
Table 41: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Other Filament lamps (27401490). ....	81
Table 42: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Linear Fluorescent (LFL) (27401510). ....	82
Table 43: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Compact Fluorescent (CFL) (27401530). ....	83
Table 44: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Other Discharge lamps (27401550). ....	84
Table 45: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, UV IR ARC lamps (27401570). ....	85
Table 46: Eurostat Production Quantity (million units, top) and Production Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	86
Table 47: Eurostat Import Quantity (million units, top) and Import Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	89
Table 48: Eurostat Export Quantity (million units, top) and Export Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	92
Table 49: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013). ....	95
Table 45: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Magnetic ballast (27115013). ....	102
Table 45: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Electronic ballast (27115015). ....	103
Table 50: Lamp sales (million units) per type, for years 2007-2013, estimate for entire EU-28, based on GfK 2014 data. Coverage is mainly residential sales. ....	106
Table 51: Relative GfK lamp sales quantity data for the residential sector: estimate EU-28 based on GfK 2014 data / MELISA data. ....	107
Table 52: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey. Subdivision per technology type and per market type. The subdivision per technology type is for the market exclusive lighting control systems, but covers both the luminaire market (new sales) and the replacement market. ....	111
Table 53: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey, showing the subdivision per application sector. ....	111
Table 54: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey, showing the subdivision per application sector and within each sector per technology type and market type. The subdivision per technology type is for the market exclusive lighting control systems, but covers both the luminaire market (new sales) and the replacement market. ....	113
Table 55: Breakdown of the luminaire market value in light sources/lamps/modules, drivers (control gears) and fixtures. According to McKinsey on global level, sum of all sectors. ....	113
Table 56: EU-28 market for light sources/lamps/modules, as derived by the study team from McKinsey data. Sum of all sectors. Values in million euros. ....	114
Table 57: EU-28 sales quantities for light sources/lamps/modules, as derived by the study team from McKinsey market value data and for two sets of assumed unit prices. Sum of all sectors, in million units. ....	115

## ACRONYMS

a	Annum, year
ANSI	American National Standards Institute
ASP	Average Selling Price (for McKinsey data)
BAT	Best Available Technology
BAU	Business As Usual

BEF	Ballast Efficacy Rating
BGF	Ballast Gain Factor (due to dimming)
BLE	Ballast Luminous Efficiency
BMF	Ballast Maintenance Factor
bn / bln	Billion (10 <sup>9</sup> )
BNAT	Best Non-Available Technology
BOM	Bill Of Materials
C+E EU	Central+Eastern Europe (may also include the Russian Federation and other non-EU-28 countries)
CAGR	Compound Annual Growth Rate
CCFL	Cold-Cathode Fluorescent Lamp
CCT	Correlated Colour Temperature
cd	Candela
CDR	Commission Delegated Regulation
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
CIE	International Commission on Illumination
CFL	Compact fluorescent lamps
CFLi	CFL with integrated ballast
CFLni	CFL without integrated ballast
CISPR	Comité International Spécial des Perturbations Radioélectriques
CN / CN8	Combined Nomenclature (coding)
cor	Corrected
CRI	Colour Rendering Index
DLS	Directional light sources
DEFRA	UK Department for Environment, Food and Rural Affairs
E14, E27	Screw-type lamp caps for general purpose lamp
EC	European Commission
ECEEE	European Council for an Energy Efficient Economy
ECG	Electronic Control Gear
ECO	Scenario considering ecodesign or energy labelling measures
ED	Ecodesign / Ecodesign Directive
EEI	Energy Efficiency Index
ELC	European association of lighting manufacturers, now part of LightingEurope
ELD	Energy Labelling Directive
ELV	Extra Low Voltage
EMC	Electro-Magnetic Compatibility
EoL	End of Life
ErP	Energy related Product
ESL	Electron Stimulated Luminescence
ESO	European Standardisation Organisation
EU	European Union
FIPEL	Field-Induced Polymer Electroluminescent Lighting
FU	Functional Unit
G4, GY6.35	Low-voltage halogen lamp types, 2 pin cap, single ended
G9	Mains-voltage halogen lamp, 2-pin cap, single ended

GDP	Gross Domestic Product
GLS	General Lighting Service (a.k.a. incandescent lamp)
h	Hour
HF	High Frequency
Hg	Mercury
HID	High-Intensity Discharge
HL	Halogen
HPM	High-Pressure Mercury
HPS	High-Pressure Sodium
HS	Harmonised System (coding)
HW	High Wattage
Hz	Hertz
IEC	International Electrotechnical Commission
IES / IESNA	Illuminating Engineering Society (of North America)
ILCOS	International Lamp COding System
ILV	International Lighting Vocabulary
IR, IRC	Infrared, Infrared coating
IR	Incandescent Reflector Lamp
IRP	Industry Revenue Part (of end-user sales price)
ISA	International Solid State Lighting Alliance
ISO	International Organization for Standardisation
LBS	Lampen-Bezeichnungs-System
LCC	Life Cycle Cost
LE	LightingEurope (lighting manufacturers association)
LED	Light Emitting Diode
LENI	Lighting Energy Numerical Indicator
LER	Luminaire Efficacy Rating
LFL	Linear Fluorescent Lamp
LLCC	Least Life Cycle Cost
LLE	LED Light Engine
LLMF	Lamp Lumen Maintenance Factor
lm, $\Phi$	Lumen, unit of luminous flux $\Phi$
LMF	Luminaire Maintenance Factor
LOR	Light Output Ratio
LPD	Lighting Power Density [W/(m <sup>2</sup> .lx)] (Pr EN 13201-5)
LV	Low Voltage (typical 12V)
LW	Low Wattage
max	Maximum
MEErP	Methodology for Ecodesign of Energy-related Products
MELISA	Model for European Light Sources Analysis
MEPS	Minimum Efficacy Performance Standard
MH	Metal Halide
min	Minimum
M / m / mn / mln	Million (10 <sup>6</sup> )
MOCVD	Metal Oxide Chemical Vapour Deposition
Mt	Mega tonnes (10 <sup>9</sup> kg)
MV	Mains Voltage (typical 230V)

---

NACE	Nomenclature statistique des activités économiques dans la Communauté européenne (coding)
NDLS	Non-directional light sources
nec	Not elsewhere classified
NEMA	National Electrical Manufacturers Association
OEM	Original Equipment Manufacturer
OJ	Official Journal of the European Union
OLED	Organic Light Emitting Diode
P	Rated power
PAR	Parabolic Aluminized Reflector
par	Paragraph
ProdCom	PRODUCTION COMMUNAUTAIRE (coding)
-R	Reflector
R	Electrical Resistance
R7s	Mains-voltage linear halogen lamp, double ended
Ra	Colour rendering index, unit
ref	Reference
RGB	Red Green Blue
s	Second (as unit for time)
SCHER	Scientific Committee on Health and Environmental Risks
SCENHIR	Scientific Committee on Emerging and Newly Identified Health Risks
SPL	Special Purpose Lamp
SPP	Special Purpose Product
sr	Steradian
SSL	Solid State Lighting
TBC	To Be Confirmed
TBW	To Be Written / To Be Worked
TC	Technical Committee
TWh	Tera Watt hour ( $10^{12}$ )
UF	Utilisation Factor
UK	United Kingdom
ULOR	Upward Light Output Ratio
US(A)	United States of America
UV	Ultraviolet (subtypes UVA, UVB, UVC)
UVA	near UV-Black Light, 315-400 nm
UVB	middle UV-Erythema, 280-315 nm
UVC	far UV-Germicidal, 100-280 nm
V	Volt
VHK	Van Holsteijn en Kemna
VITO	Vlaamse Instelling voor Technologisch Onderzoek
W	Watt
yr	Year



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## **Annex A. STATEMENT OF CONTRACTOR ON RIGHT TO DELIVERED RESULT**

I, Dirk Fransaer, representing the “Consortium of VITO NV, VHK BV, Viegand & Maagøe ApS, Wuppertal Institute for Climate, Environment and Energy GmbH, and ARMINES”, party to the contract ‘Preparatory Study on Lighting Systems for Ecodesign and/or Energy Labelling Requirements (‘Lot 8/9/19’), specific contract No. ENER/C3/2012-418 LOT1/07/SI2.668526 implementing framework contract No. ENER/C3/2012-418-Lot 1’, warrant that the Contractor holds full right to the delivered Task 2 report of the ‘Preparatory Study on Lighting Systems for Ecodesign and/or Energy Labelling Requirements (‘Lot 8/9/19’), which is free of any claims, including claim of the creators who transferred all their rights and will be paid as agreed within 30 days from the receipt of confirmation of acceptance of work.

Mol, Belgium,

Date :

Signature:

Dirk Fransaer

Managing Director VITO NV

## Annex B. DESCRIPTION OF MEERP TASK 2

The MEERP<sup>44</sup> prescribes the following topics to be addressed in Task 2:

### Generic economic data:

*Identify and report*

- a. EU Production;*
- b. Extra-EU Trade;*
- c. Intra-EU Trade;*
- d. EU sales and trade= production + import - export.*

*Data should relate to the latest full year for which at least half of the Member States have reported to Eurostat.*

*Preferably, data should be in physical volume (e.g. units) and in money units and split up per Member State.*

*Information for this subtask should be derived from official EU statistics so as to be coherent with official data used in EU industry and trade policy.*

### Market and stock data:

*In physical units, for EU-27, for each of the categories as defined in task 1.1 and for reference years*

- a. 1990 (Kyoto and "20-20-20" reference);*
- b. 2010 (or most recent real data);*
- c. 2013-2016 (forecast, presumable entry into force of measures);*
- d. 2020-2030-2050 (forecast, years in which all new ecodesigns of today will be absorbed by the market).*

*The following parameters are to be identified:*

- a. Installed base ('stock') and penetration rate;*
- b. Annual sales growth rate (% or physical units);*
- c. Average product life (in years), in service, and a rough indication of the spread (e.g. standard deviation);*
- d. Total sales/ real EU-consumption, (also in euros, when available);*
- e. Replacement sales (derived);*
- f. New sales (derived).*

### Market trends:

*2.3.1. General market trends (growth/ decline, if applicable per segment), trends in product-design and product-features.*

*2.3.2 Market channels and production structure; identification of the major players (associations, large companies, share SMEs, employment);*

*2.3.3 Trends in product design/ features, illustrated by recent consumer association tests (valuable, but not necessarily fully representative of the diversity of products put on the market);*

<sup>44</sup> MEERP 2011, Methodology for Ecodesign of Energy-related Products, part 1: Methods and part 2: Environmental policies and data, René Kemna (VHK) November 28th 2011

**Consumer expenditure base data:**

*For each of the categories defined in subtask 1.1, determine:*

*a. Average EU consumer prices, incl. VAT (for consumer prices; street price)/ excl. VAT (for B2B products), in euros.*

*b. Consumer prices of consumables (detergent, toner, paper, etc.) (euro/kg or euro/piece);*

*c. Repair and maintenance costs (euro/product life);*

*d. Installation costs (for installed appliances only);*

*e. Disposal tariffs/ taxes (euro/product);*

*For electricity, fossil fuel, water, interest, inflation and discount rates use values for January 2011 in MEErP Chapter 2, including the average annual price increases mentioned there.*

*For regional differentiation of consumer prices (for sensitivity analysis,) also see Chapter 2.*

**Recommendations:**

*Make recommendations on:*

*2.5.1 refined product scope from the economical/ commercial perspective (e.g. exclude niche markets)*

*2.5.2 barriers and opportunities for Ecodesign from the economical/ commercial perspective*

## Annex C. SALES DATA FROM EUROSTAT

### C.1 Introduction

EU-28 Production, Import and Export data for lighting products have been obtained from the Eurostat website<sup>45</sup>. These data are organised per ProdCom code. The data presented in the current Annex cover the ProdCom codes indicated in Table 30.

ProdCom code	CN8 code(s)	Indication in this Annex	ProdCom description	Notes
27401100	85391000	Sealed Beam (PAR)	Sealed beam lamp units	Many (but not all) of these lamps are used for transport lighting and thus would be out of scope.
27401293	85392192	Tungsten-HL-MV	Tungsten halogen filament lamps, for a voltage > 100 V (excluding ultraviolet and infrared lamps, for motorcycles and motor vehicles)	
27401295	85392198	Tungsten-HL-LV	Tungsten halogen filament lamps for a voltage ≤ 100 V (excluding ultraviolet and infrared lamps, for motorcycles and motor vehicles)	
27401300	85392210 85392290	GLS MV <200W	Filament lamps of a power ≤ 200 W and for a voltage > 100 V including reflector lamps (excluding ultraviolet, infrared lamps, tungsten halogen filament lamps and sealed beam lamp units)	
27401490	85392992 85392998	Filament Other	Filament lamps n.e.c.	This covers all non-halogen filament lamps with power > 200 W OR voltage ≤ 100 V
27401510	85393110	LFL	Fluorescent hot cathode discharge lamps, with double ended cap (excluding ultraviolet lamps)	
27401530	85393190	CFL	Fluorescent hot cathode discharge lamps (excluding ultraviolet lamps, with double ended cap)	In Eurostat there is no distinction between with and without integrated ballast ( CFLi and CFLni )
27401550	85393210 85393250 85393290 85393900	Discharge Other (HID)	Other discharge lamps (excluding ultraviolet lamps)	This includes all HID lamps, but also CCFL, EEFL and neon lamps, that are predominantly out of scope
27401570	85394100 85394910 85394930	UV IR ARC	Ultraviolet or infrared lamps, arc lamps	These are out of scope of the current study

**Table 30: Lamp types for presentation of Eurostat sales data.**

<sup>45</sup> <http://epp.eurostat.ec.europa.eu/newxtweb/setupdimselection.do>, last access September 2014

Note that LED lighting is NOT included in the list. LED lighting products are currently classified using codes that also include many non-lighting products and the corresponding sales data would not be useful for the current study.

At the moment of access, the Eurostat data were available for the period 1995 – 2013. The data are available for each Member State, and aggregated totals are reported for EU-15 (1995-2005), EU-25, EU-27 and EU-28 (2003-2013). In several occasions, the data for some Member States and for some years are missing, in particular for production data. This can be due to confidentiality of the data or to data not reported by the Member State. The confidential data are anyway included by Eurostat in the reported EU-totals. In the case of missing Member State data Eurostat may have made an estimate which is then also included in the EU-totals. Consequently, the EU-totals usually do NOT correspond with the sum of the Member State values.

Production, Import and Export data are available both in number of units and in monetary value (euros).

The Eurostat data have been imported into an Excel-sheet for further elaboration and analysis.

## C.2 Data elaboration

In some cases the Eurostat data seemed to be ‘abnormal’ and some ‘corrections’ have been applied before proceeding with further analysis. In particular:

- For other discharge lamps (27401550) in the years 1999, 2000 and 2001, the Eurostat data show an exceptional peak in production quantity. In earlier years quantities are around 200-300 million; in later years around 100-200 million; in the peak years respectively 900, 1400 and 1600 million. This peak in quantity is NOT accompanied by a peak in production value (euros), which is more or less constant over the period 1995-2002. The production quantities for the years 1999, 2000 and 2001 have therefore been ‘corrected’, removing the peak values and substituting them with data interpolated between the 1998 and 2002 quantities.
- For UV IR ARC lamps (27401570) the export quantity for the year 2001 was 89 million while for surrounding years this quantity is 4 to 8 million. The 2001 peak value is entirely due to an anomalous production quantity in the U.K. Also in this case there is no similar peak in the monetary value of production. The EU-28 total has been ‘corrected’ by removing the peak value and substituting it with data interpolated between the 2000 and 2002 quantities.

For the years 1995-2005 Eurostat provides totals data for the EU-15.

For the years 2003-2013 there are totals data for the EU-25, EU-27 and EU-28.

Consequently, for the years 2003, 2004 and 2005 there are data for all EU aggregations.

In an attempt to provide a longer historical trend, the EU-28 data for the missing years 1995-2002 have been estimated in two ways (the Excel-sheet for elaboration and analysis of the data has an option that permits switching between the two estimates):

- (1) EU-28 estimate = EU-15 value as reported by Eurostat
- (2) EU-28 estimate = EU-15 value \* SUM(EU-28 for 2003-2005) / SUM(EU-15 for 2003-2005)

The second option assumes that the average ratio between EU-28 and EU-15 values for the years 2003, 2004, 2005 is also applicable to the years 1995-2002.

For production quantities (units and euros) EU-28 totals should be identical or higher than EU-15 values. For these quantities, option (1) often leads to values that are too low while option (2) tends to lead to values that are too high. Only for production quantities, not for import and export data,

and independent from the use of estimate (1) or (2), where EU-28 totals result lower than the sum of the reported values for the Member States, the latter sum has been used as the EU-28 total (this is relevant in particular for GLS MV in 2002 where the reported total EU-15 value is suspiciously low).

For import and export, EU-28 totals can be both lower or higher than EU-15 totals because of intra-EU trading. In this case, the application of estimates (1) and (2) has variable effects and it is difficult to state which estimate is better.

If not specified otherwise, data in tables and graphs are shown for estimate (1), i.e. EU-28 data for years 1995-2002 are actually EU-15 data.

In addition to Production, Import and Export data the tables and graphs also report an Apparent Consumption, which has been calculated by VHK from the Eurostat data, according to the MEErP, as:

$$\text{Apparent Consumption} = \text{Production} + \text{Import} - \text{Export}.$$

Note that in some cases this may result in a negative Apparent Consumption<sup>46</sup>.

The calculation has been applied to monetary values as well, even if that is less correct because Import and Export values include duties, taxes, transport cost and other aspects that are not included in the Production value.

For single lamp types, unit monetary values have been computed as EU-28 monetary value in euros / EU-28 quantity in units.

### C.3 Data per EU Member Country for the year 2012

The following tables provide the Production, Import, Export and (computed) Apparent Consumption data per lamp type and per EU Member State for the year 2013, which is the last year for which data were available at the time of research (September 2014).

The data are provided for the lamp types defined in section C.1.

Empty cells in the tables indicate missing data or confidential data (see section C.1).

The first three tables are for quantities in thousands of units. The last three tables are for monetary values, in thousands of euros.

Prod = Production<sup>47</sup>

Imp = Import

Exp = Export

App = Apparent Consumption

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<sup>46</sup> Some reasons for this are explained in the Europroms User Guide 2008, section 3.4. In general Eurostat does NOT recommend to calculate Apparent Consumption in this way, but there is no alternative. [http://epp.eurostat.ec.europa.eu/portal/pls/portal/!PORTAL.wwpob\\_page.show?\\_docname=30168.PDF](http://epp.eurostat.ec.europa.eu/portal/pls/portal/!PORTAL.wwpob_page.show?_docname=30168.PDF)

<sup>47</sup> According to Eurostat explanations this should refer to actual sales; production for stock is not included; sales from stock are included.

Quantity, 1000 of units	Sealed Beam (PAR)				Tungsten-HL-MV				Tungsten-HL-LV			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France		5473	5037			358573	218398			49304	30783	
Netherlands	0	6567	12598	-6031	0	42161	27617	14544		20749	18633	
Germany		598	263		288159	211730	369455	130434	143421	38969	112742	69648
Italy	436	5669	511	5594		68576	4386		0	25430	3244	22186
United Kingdom	168	11738	326	11579	9291	59555	2513	66334	3398	67441	2686	68153
Ireland	0	185	23	162	0	2000	132	1869	0	567	238	329
Denmark	0	957	53	904	0	7283	976	6307	0	3177	300	2876
Greece	0	269	70	198	0	8716	359	8357	0	1676	260	1415
Portugal		1488	208		0	11147	1161	9986	0	5625	13335	-7710
Spain	8114	3683	829	10967	0	35412	2433	32979		17442	1389	
Belgium	0	2351	12945	-10595		11341	9691			5856	1998	
Luxemburg	0	243			0	722	44	679	0	296	27	269
Sweden	0	1289	67	1222		24955	3312			5288	810	
Finland	0	313	14	299	0	8122	600	7522	0	1497	152	1345
Austria	0	276	447	-170	0	8456	1169	7288		3551	418	
Malta	0	33			0	101			0	33		
Estonia	0	49	1	48	0	1670	333	1337	0	779	507	271
Latvia	0	4306	3305	1002	0	2476	633	1843	0	694	150	544
Lituania	0	31	3	28	0	3870	648	3222	0	799	64	734
Poland	0	1781	25971	-24189		44734	169905		0	26232	24463	1770
Czech Republic		944	174		0	9451	2604	6847	0	6531	1248	5283
Slovakia	0	1463	2193	-730	0	2863	492	2371	0	2127		
Hungary		2056	2723			17385	59401			5317	9164	
Romania		877	345		0	9317	1226	8091	0	1033	127	906
Bulgaria	0	192	22	169		4415	62		0	1401	25	1376
Slovenia	0	49	12	37	0	3668	1572	2095	0	370	43	327
Croatia	0	63	0	63	0	1935	5	1930	0	536	3	534
Cyprus	0	49			0	131			0	74		
EU28TOTALS	26140	13930	8723	31347	596487	358317	132649	822155	157062	156973	78902	235133

**Table 31: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Quantity in thousands of units. Lamp types 1: Sealed Beam, Tungsten HL-MV and Tungsten HL-LV.**

Quantity, 1000 of units	GLS MV <200W				Filament Other				LFL			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France	28517	42117	103271	-32637		25502	8518			80283	70596	
Netherlands	0	49882	20511	29371	0	15872	3905	11967		78445	61216	
Germany	25544	153042	84542	94044	27305	32551	43798	16058	173928	51272		
Italy		47371	37274		3987	10136	841	13282		27703	20783	
United Kingdom	12524	87385	3890	96020	19676	25299	9300	35676	4824	44680	9451	40053
Ireland	0	984	10	974	0	177	11	166	0	1778	128	1650
Denmark	0	3228	385	2844	0	1593	696	898	87	4011	75	4024
Greece	0	4730	9	4721		729	28		0	2692	99	2593
Portugal	0	3399	1510	1889	0	3853	1440	2414	0	6541	3447	3095
Spain		35045	4620			8682	902		0	26458	2578	23881
Belgium		8959	5031		0	3623	3569	55	0	7741	1189	6552
Luxemburg	0	439	23	416	0	95	7	88	0		6	
Sweden		10121	1183			5581	1013			13399	4666	
Finland	0	2156	229	1927	0	1372	47	1325		4826	43	
Austria	0	4879	1964	2915		3348	1149		0	7825	1691	6135
Malta	0	69			0	10			0	105		
Estonia	0	947	26	921	0	161	8	153	0	1493	429	1064
Latvia	0	1663	318	1345	0	386	123	263	0	813	97	716
Lituania	0	10203	4948	5255	0	718	177	541	0	1728	257	1471
Poland		68550	235952		7303	24762	1796	30269		39894	215487	
Czech Republic	0	29310	4928	24382		2091	4641		0	8013	810	7203
Slovakia		7677	20861			1184	798		0	2682	548	2135
Hungary		25440	274578			1601	2740			24911	27398	
Romania		72580	23653		0	9872	619	9253	0	6553	106	6447
Bulgaria		19052	8573			1005	21		0	2650	119	2531
Slovenia	0	4134	411	3723	0	1266	56	1210	0	1303	185	1118
Croatia	0	20567	2	20565	0	217	98	118	0	2112	4	2108
Cyprus	0	104	57	48	0	336			0	179		
EU28TOTALS	351523	349648	509077	192093	400000	108483	26227	482255	591162	59526	184955	465734

**Table 32: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Quantity in thousands of units. Lamp types 2: GLS MV < 200 W, Filament Other and LFL.**



Quantity, 1000 of units	CFL				Discharge Other (HID)				UV IR ARC			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France		109540	58991			18075	16641			3046	1917	
Netherlands		37917	10184			11602	22007		0	8883	16869	-7986
Germany		103993				43430	3502		10028	8102	26965	-8835
Italy	0	54655	26189	28465	9	46925	6592	40342	38	1756	788	1006
United Kingdom	2263	52766	4076	50952	1750	25562	3217	24095	741	5729	2359	4111
Ireland	0	2627	20	2608		541	3546		0	61	1	60
Denmark	0	5701	1281	4419	0	999	80	919	0	234	26	208
Greece		12783	461		0	4300	34	4266	0	538	29	509
Portugal	0	13407	5117	8290	0	3917	3810	107	0	236	102	133
Spain	0	39705	5106	34599	0	16884	3522	13362		4264	159	
Belgium	0	17465	17409	56		2627	61022			538	212	
Luxembourg	0	342	34	308	0	129	1	127	0	10	75	-66
Sweden		11134	3463			2997	423		0	529	75	453
Finland	0	5017	245	4773		1714	239		0	197	24	174
Austria	0	4570	2517	2053	0	3695	2960	736	0	1880	42	1837
Malta	0	424			0	62			0	2		
Estonia	58	1136	199	995	0	350	172	177	0	33	24	9
Latvia	0	1198	223	975	0	207	71	135	0	58	173	-114
Lithuania	0	2176	294	1881	0	453	62	391	0	71	38	33
Poland		53281	66551			22199	13440			2299	10499	
Czech Republic	0	7238	2648	4591		3002	553		0	1729	231	1498
Slovakia	0	3007	1303	1704		1277	7229		0	864	38	826
Hungary		11690	26069			2030	12808			317	8098	
Romania		9762	3228			5245	95		0	1833	2	1831
Bulgaria	0	4505	2792	1713		2325	1147		0	43	2	42
Slovenia	0	2038	979	1060	0	9432	8945	488	0	55	23	32
Croatia	0	1980	46	1934	0	519	4	514	0	64	1	62
Cyprus	0	841	141	699	0	407	1	405	0	87		
EU28TOTALS	92721	339267	37239	394750	103191	142411	60312	185291	45000	12843	33745	24097

**Table 33: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Quantity in thousands of units. Lamp types 3: CFL, Discharge Other and UV IR ARC.**

Value, 1000 of euros	Sealed Beam (PAR)				Tungsten-HL-MV				Tungsten-HL-LV			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France	10014	42497	15588	36923		146691	115434			26016	23535	
Netherlands	0	26515	111300	-84785	0	34873	20628	14245		18033	23612	
Germany		6926	4283		120155	103596	104011	119740	105501	34903	90638	49766
Italy	12944	23556	8562	27938		43371	5255		0	14721	2857	11864
United Kingdom	730	55043	6381	49392	6906	41179	3878	44207	6728	32920	4026	35622
Ireland	0	1984	150	1834	0	1802	103	1699	0	835	91	744
Denmark	0	4361	791	3570	0	6384	764	5621	0	2708	338	2370
Greece	0	1237	96	1140	0	5688	795	4893	0	1036	72	964
Portugal		25405	2580		0	7528	1982	5546	0	2125	5064	-2939
Spain	247809	31812	13505	266116	0	22568	1961	20607		8945	2550	
Belgium	0	14991	132088	-117096		14832	13529			8529	3130	
Luxemburg	0	722			0	1231	101	1130	0	918	171	747
Sweden	0	7851	604	7246		19248	2575			3627	747	
Finland	0	1954	313	1641	0	6065	71	5994	0	1496	197	1299
Austria	0	6052	2711	3341	0	9187	964	8223		5717	640	
Malta	0	265			0	82			0	70		
Estonia	0	378	11	366	0	1509	133	1376	0	605	346	259
Latvia	0	1682	1140	542	0	1396	345	1051	0	474	52	422
Lithuania	0	185	65	120	0	1839	78	1761	0	1064	71	993
Poland	0	10607	60620	-50014		21261	62293		0	8850	22063	-13213
Czech Republic		3561	850		0	5894	1183	4711	0	3652	1125	2526
Slovakia	0	2995	971	2024	0	1994	8330	-6336	0	1252		
Hungary		10075	47239			7336	25205			2063	4337	
Romania		9818	1421		0	4219	347	3872	0	1506	70	1437
Bulgaria	0	1042	356	687		1543	31		0	481	32	448
Slovenia	0	295	64	230	0	2993	210	2783	0	434	61	373
Croatia	0	391	8	383	0	1452	15	1438	0	526	12	513
Cyprus	0	134			0	184			0	227		
EU28TOTALS	648112	43595	71634	620073	350651	152696	65715	437632	162468	66781	73501	155749

**Table 34: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Value in thousands of euros. Lamp types 1: Sealed Beam, Tungsten HL-MV and Tungsten HL-LV.**

Value, 1000 of euros	GLS MV <200W				Filament Other				LFL			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France	45741	23244	37016	31969	2708	12394	6609	8492		78205	87126	
Netherlands	0	23012	14929	8083	0	12049	14111	-2062		28307	90072	
Germany	45532	58167	34537	69162	35981	14760	21578	29163	202374	58689		
Italy		17320	14362		1457	6547	2822	5182		29784	15764	
United Kingdom	5681	22115	4144	23652	2822	16809	7395	12237	13412	41606	14468	40550
Ireland	0	884	23	861	0	457	89	367	0	2494	233	2260
Denmark	9	3025	2585	449	0	1585	985	600	10033	6277	419	15891
Greece	0	2262	18	2243		1166	90		0	2280	145	2135
Portugal	0	2486	1260	1226	0	1775	1692	82	0	7039	2603	4437
Spain		11127	4871			3909	4416		0	23009	3228	19781
Belgium		8543	5661		0	5325	2417	2908	0	14107	3650	10457
Luxemburg	0	1451	52	1398	0	464	15	450	0		17	
Sweden		5612	1712			2357	1402			19634	18045	
Finland	0	1441	159	1282	0	1331	118	1214		7627	192	
Austria	0	5613	1880	3733		4298	1249		0	10898	4316	6583
Malta	0	43			0	59			0	127		
Estonia	0	767	41	726	0	172	27	145	0	1994	632	1362
Latvia	0	577	138	439	0	233	50	182	0	1245	411	834
Lituania	0	1799	961	838	0	322	177	144	0	1793	264	1530
Poland		11825	54980			3944	1242			45760	131618	
Czech Republic	0	6981	2558	4422		1463	683		0	9036	1635	7401
Slovakia		4568	6052			528	680		0	2581	822	1759
Hungary		5220	50957			701	825			18955	24876	
Romania		5733	4428		0	3957	1150	2808	0	4182	105	4077
Bulgaria		2146	1734			656	347		0	2071	221	1849
Slovenia	0	1386	100	1286	0	193	52	141	0	1986	165	1821
Croatia	0	4288	5	4283	0	180	28	152	0	1478	8	1470
Cyprus	0	465	370	95	0	471			0	268		
EU28TOTALS	200000	75295	103679	171616	122642	49206	24176	147673	567562	46273	123928	489907

**Table 35: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Value in thousands of Euros. Lamp types 2: GLS MV < 200 W, Filament Other and LFL.**

Value, 1000 of euros	CFL				Discharge Other (HID)				UV IR ARC			
	Prod	Imp	Exp	App	Prod	Imp	Exp	App	Prod	Imp	Exp	App
France		147510	111038			110190	69047			31477	25027	
Netherlands		50370	19675			127986	194081		0	40970	115597	-74626
Germany		147657				131948	23528		86667	65715	392843	-240460
Italy	0	82700	25204	57496	257	52770	10616	42410	3961	22843	7951	18853
United Kingdom	4122	55039	7674	51488	25894	84700	53433	57162	48221	31958	45090	35089
Ireland	0	3715	69	3646		5164	6087		0	2242	392	1849
Denmark	0	11393	3268	8125	0	6369	800	5569	0	3905	511	3394
Greece		14303	808		0	4300	161	4140	0	953	169	784
Portugal	0	14603	2568	12035	0	9958	5347	4611	0	1548	255	1293
Spain	0	39472	6950	32522	0	30322	5095	25226		24977	4049	
Belgium	0	26330	33652	-7322		32799	319353			11139	5689	
Luxemburg	0	1093	101	992	0	1182	20	1162	0	463	198	265
Sweden		21078	9422			19761	6274		0	7924	5799	2125
Finland	0	9678	729	8949		12544	2745		0	4108	867	3241
Austria	0	9827	4724	5103	0	10227	3748	6479	0	24006	2307	21699
Malta	0	416			0	192			0	78		
Estonia	17	1812	383	1446	0	3000	2006	994	0	391	153	238
Latvia	0	1768	317	1451	0	814	140	674	0	465	1062	-596
Lithuania	0	2868	549	2319	0	1938	1645	293	0	605	453	152
Poland		56597	121518			100520	97211			18572	30055	
Czech Republic	0	11635	5519	6117		8773	6263		0	24893	7735	17158
Slovakia	0	4868	2382	2486		1558	25718		0	2093	426	1667
Hungary		14044	37917			10569	69898			3939	32012	
Romania		7297	667			5184	217		0	2194	49	2145
Bulgaria	0	3568	5813	-2245		2219	1238		0	601	90	511
Slovenia	0	3165	679	2486	0	5134	211	4923	0	1331	287	1044
Croatia	0	2522	37	2485	0	2201	39	2161	0	779	39	740
Cyprus	0	1398	193	1205	0	715	13	703	0	246		
<b>EU28TOTALS</b>	<b>164870</b>	<b>348467</b>	<b>68360</b>	<b>444977</b>	<b>694235</b>	<b>170844</b>	<b>317399</b>	<b>547680</b>	<b>181995</b>	<b>82171</b>	<b>361588</b>	<b>-97421</b>

**Table 36: Eurostat data for Production, Import, Export and (computed) Apparent Consumption per EU Member State and per lamp type, for the year 2013. Value in thousands of Euros. Lamp types 3: CFL, Discharge Other and UV IR ARC.**

### C.4 Eurostat EU-28 data 1995-2013 for Sealed Beam (PAR) lamps

Sealed Beam (PAR) year	EU-15										EU-28								
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	41.5	51.0	41.5	24.0	20.0	30.0	20.0	18.0	18.0	21.8	21.7	19.8	17.5	17.0	11.3	12.6	20.1	23.9	26.1
Import Quantity (mln units)	6.2	5.4	6.2	7.1	7.0	7.5	8.3	6.7	5.9	9.5	13.0	11.9	22.2	14.5	10.7	9.1	7.9	17.2	13.9
Export Quantity (mln units)	7.1	4.0	3.8	2.1	3.2	3.8	6.3	4.6	4.4	5.0	4.3	1.4	2.3	6.3	4.3	6.4	5.1	6.9	8.7
Apparent Sales (mln units)	40.7	52.3	43.9	28.9	23.8	33.7	22.0	20.1	19.5	26.4	30.4	30.3	37.4	25.2	17.7	15.2	23.0	34.2	31.3
Production Value (mln euro)	140	400	400	200	400	400	400	200	600	520	596	554	615	534	421	435	547	568	648
Import Value (mln euro)	13.6	12.7	15.1	18.1	20.2	29.8	23.1	25.9	22.9	38.5	30.9	28.3	34.2	28.2	25.2	39.6	35.4	39.2	43.6
Export Value (mln euro)	11.5	13.8	11.9	11.4	15.5	21.6	28.0	28.1	27.2	23.9	30.4	16.8	21.3	42.7	30.7	48.9	55.3	75.3	71.6
Apparent Sales (mln euro)	142	399	403	207	405	408	395	198	596	535	596	565	628	519	415	425	527	532	620
Production Value (euro/unit)	3.4	7.9	9.6	8.3	20.0	13.3	20.0	11.1	33.3	23.8	27.4	28.0	35.1	31.4	37.2	34.6	27.1	23.8	24.8
Import Value (euro/unit)	2.2	2.4	2.4	2.6	2.9	4.0	2.8	3.9	3.9	4.1	2.4	2.4	1.5	1.9	2.4	4.3	4.5	2.3	3.1
Export Value (euro/unit)	1.6	3.4	3.1	5.3	4.9	5.7	4.4	6.1	6.2	4.8	7.2	11.8	9.1	6.8	7.1	7.6	10.9	10.8	8.2
Apparent Value (euro/unit)	3.5	7.6	9.2	7.2	17.0	12.1	18.0	9.9	30.5	20.3	19.6	18.7	16.8	20.6	23.5	27.9	22.9	15.6	19.8

Table 37: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Sealed Beam (PAR) lamps (27401100).

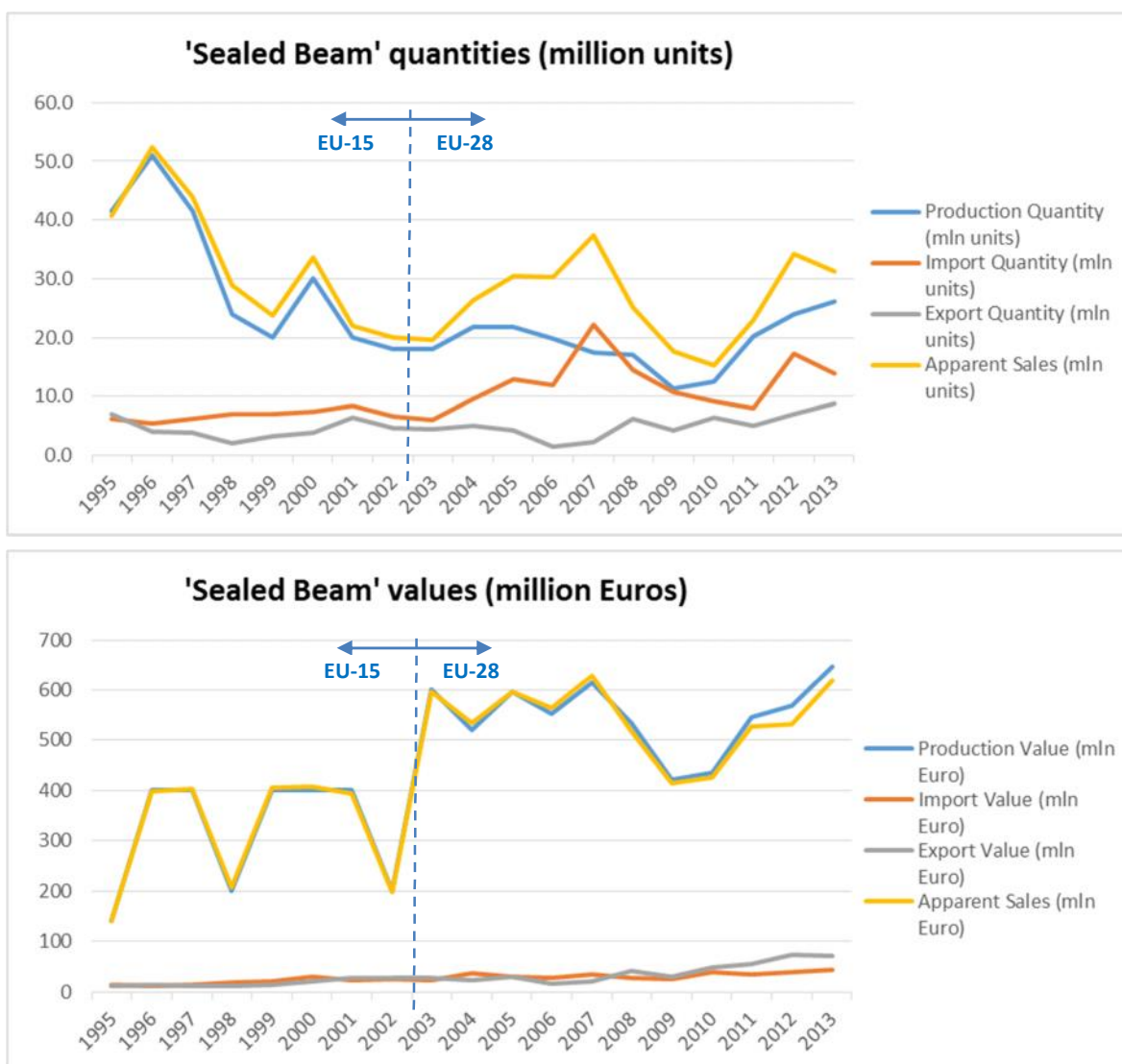


Figure 24: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Sealed Beam (PAR) lamps. Top: quantities; bottom: monetary value.

### C.5 Eurostat EU-28 data 1995-2013 for Tungsten HL-MV lamps

Tungsten-HL-MV year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	258	258	258	286	359	451	386	360	282	220	213	200	201	207	160	206	305	492	596
Import Quantity (mln units)	39.5	39.5	47.8	48.7	57.9	54.3	62.7	60.6	77.8	109	133	155	175	153	144	221	226	245	358
Export Quantity (mln units)	22.8	22.8	22.7	21.3	27.9	27.0	28.8	38.7	34.5	53.2	71.0	52.8	57.3	53.5	49.4	52.2	70.3	89.3	133
Apparent Sales (mln units)	275	275	283	314	389	478	420	382	325	277	275	303	318	307	255	375	460	648	822
Production Value (mln euro)	168	168	174	204	221	264	222	221	199	189	168	151	149	169	134	131	226	299	351
Import Value (mln euro)	33.5	33.5	34.7	36.0	44.1	53.5	58.9	51.0	43.2	47.7	53.2	62.6	66.7	59.1	60.5	107	111	125	153
Export Value (mln euro)	40.9	40.9	42.1	38.9	48.2	55.2	53.9	56.8	56.9	67.0	82.9	67.7	66.1	61.9	55.4	65.7	70.1	87.9	105
Apparent Sales (mln euro)	160	160	167	201	217	263	227	215	185	170	138	146	150	166	139	173	267	336	398
Production Value (euro/unit)	0.65	0.65	0.67	0.71	0.62	0.59	0.58	0.61	0.70	0.86	0.79	0.75	0.74	0.82	0.83	0.64	0.74	0.61	0.59
Import Value (euro/unit)	0.85	0.85	0.73	0.74	0.76	0.99	0.94	0.84	0.56	0.44	0.40	0.40	0.38	0.39	0.42	0.49	0.49	0.51	0.43
Export Value (euro/unit)	1.79	1.79	1.85	1.83	1.73	2.05	1.87	1.47	1.65	1.26	1.17	1.28	1.15	1.16	1.12	1.26	1.00	0.98	0.79
Apparent Value (euro/unit)	0.58	0.58	0.59	0.64	0.56	0.55	0.54	0.56	0.57	0.61	0.50	0.48	0.47	0.54	0.54	0.46	0.58	0.52	0.48

Table 38: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Tungsten HL-MV lamps (27401293).

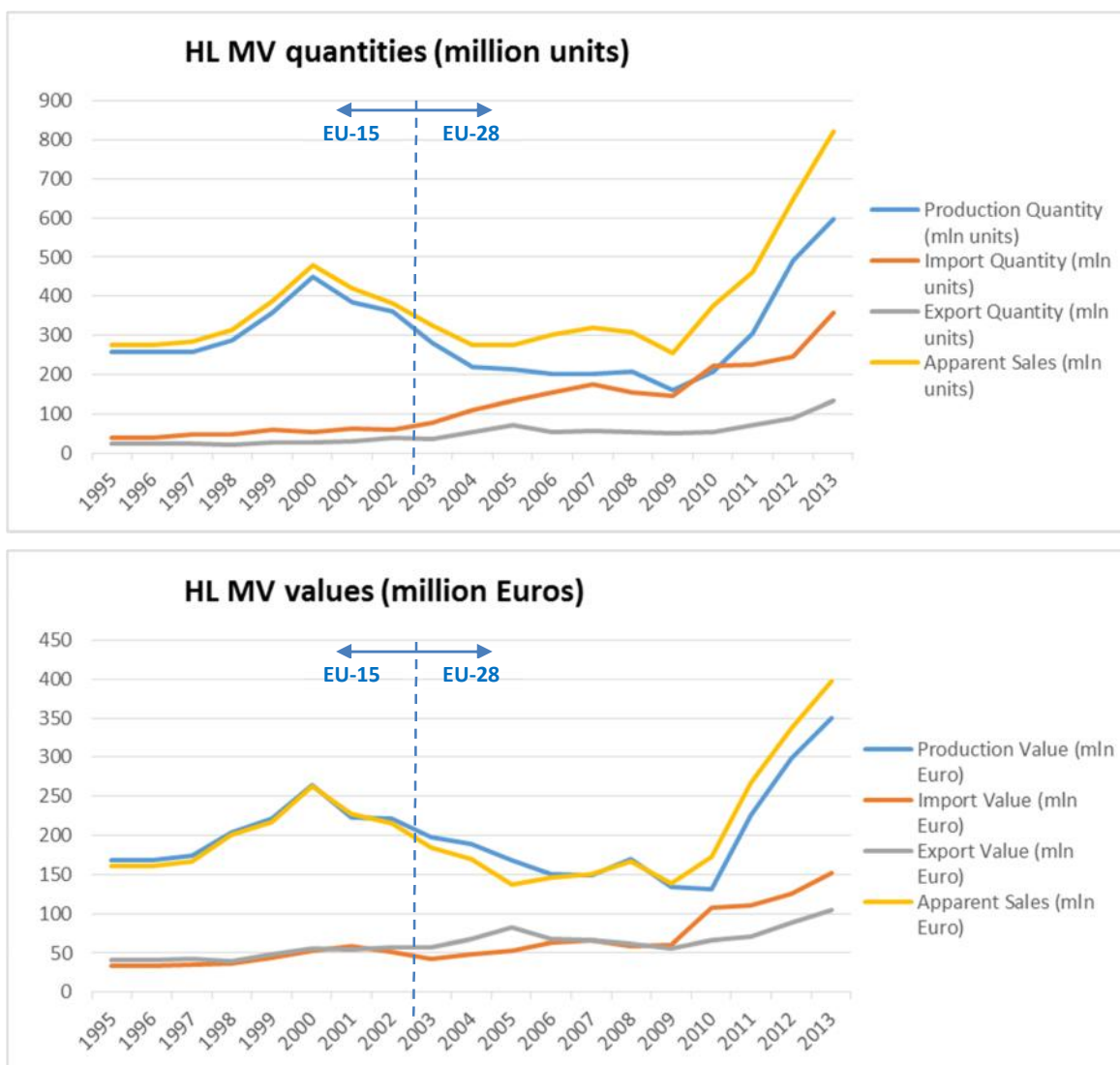


Figure 25: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Tungsten HL-MV lamps. Top: quantities; bottom: monetary value.

### C.6 Eurostat EU-28 data 1995-2013 for Tungsten HL-LV lamps

Tungsten-HL-LV year	EU-15											EU-28							
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	141	141	169	172	201	222	211	210	293	296	265	259	243	224	224	350	300	360	157
Import Quantity (mln units)	93.8	93.8	114	120	115	105	97	96	114	148	153	179	203	155	133	159	167	145	157
Export Quantity (mln units)	46.5	46.5	56.5	55.9	65.3	76.3	88.2	91.6	73.4	94.0	91.8	93.7	108	94.7	77.2	69.8	68.7	70.5	78.9
Apparent Sales (mln units)	188	188	227	236	252	250	220	215	334	351	326	344	337	285	280	439	399	435	235
Production Value (mln euro)	140	140	159	155	165	202	176	162	266	252	234	240	248	215	201	240	196	266	162
Import Value (mln euro)	47.2	47.2	66.0	60.0	56.2	62.9	56.0	66.9	53.3	51.5	51.8	59.6	59.0	55.6	56.3	72.7	75.0	74.4	66.8
Export Value (mln euro)	52.9	52.9	63.7	61.9	67.0	86.1	91.2	83.2	75.8	88.3	83.4	88.1	93.0	82.8	81.3	79.5	71.0	76.2	73.5
Apparent Sales (mln euro)	134	134	161	153	154	179	141	146	243	215	203	212	214	188	176	233	200	265	156
Production Value (euro/unit)	0.99	0.99	0.94	0.91	0.82	0.91	0.84	0.77	0.91	0.85	0.88	0.93	1.02	0.96	0.90	0.69	0.65	0.74	1.03
Import Value (euro/unit)	0.50	0.50	0.58	0.50	0.49	0.60	0.58	0.69	0.47	0.35	0.34	0.33	0.29	0.36	0.42	0.46	0.45	0.51	0.43
Export Value (euro/unit)	1.14	1.14	1.13	1.11	1.03	1.13	1.03	0.91	1.03	0.94	0.91	0.94	0.86	0.87	1.05	1.14	1.03	1.08	0.93
Apparent Value (euro/unit)	0.71	0.71	0.71	0.65	0.61	0.71	0.64	0.68	0.73	0.61	0.62	0.62	0.63	0.66	0.63	0.53	0.50	0.61	0.66

Table 39: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Tungsten HL-LV lamps (27401295).

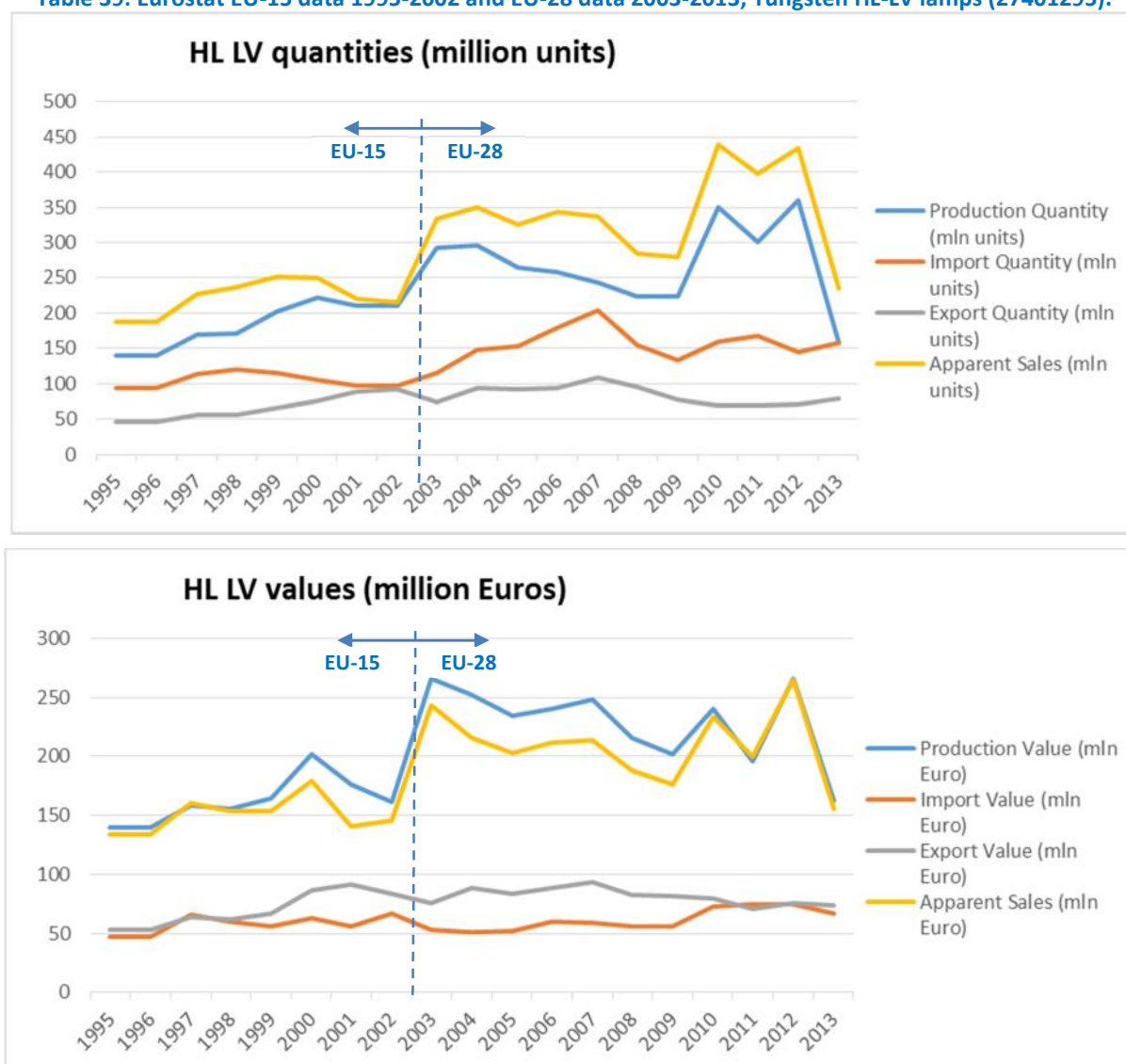


Figure 26: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Tungsten HL-LV lamps. Top: quantities; bottom: monetary value.

### C.7 Eurostat EU-28 data 1995-2013 for GLS MV <200W lamps

GLS MV <200W year	EU-15											EU-28							
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	1040	1085	969	1263	1171	939	867	806	1067	1192	1610	1303	1500	1130	1051	1012	751	407	352
Import Quantity (mln units)	426	502	607	738	725	788	799	784	186	212	248	295	344	313	301	367	311	343	350
Export Quantity (mln units)	193	272	256	267	237	348	350	291	542	525	568	516	576	423	391	522	534	439	509
Apparent Sales (mln units)	1272	1316	1320	1734	1659	1379	1316	1299	711	878	1290	1082	1269	1020	961	857	528	311	192
Production Value (mln euro)	354	340	357	380	365	320	325	313	289	314	377	293	331	346	342	325	221	210	200
Import Value (mln euro)	100	123	142	169	185	204	201	193	49.7	47.7	53.6	61.1	65.7	60.3	62.1	88.4	79.9	83.8	75.3
Export Value (mln euro)	71.1	89.4	99.0	97.9	93.2	117	129	99.1	134	134	116	112	113	95.0	83.8	101	99.3	94.1	104
Apparent Sales (mln euro)	383	374	400	451	457	407	398	407	204	227	315	243	284	311	320	312	202	199	172
Production Value (euro/unit)	0.34	0.31	0.37	0.30	0.31	0.34	0.38	0.39	0.27	0.26	0.23	0.22	0.22	0.31	0.33	0.32	0.29	0.51	0.57
Import Value (euro/unit)	0.24	0.24	0.23	0.23	0.26	0.26	0.25	0.25	0.27	0.23	0.22	0.21	0.19	0.19	0.21	0.24	0.26	0.24	0.22
Export Value (euro/unit)	0.37	0.33	0.39	0.37	0.39	0.34	0.37	0.34	0.25	0.26	0.20	0.22	0.20	0.22	0.21	0.19	0.19	0.21	0.20
Apparent Value (euro/unit)	0.30	0.28	0.30	0.26	0.28	0.30	0.30	0.31	0.29	0.26	0.24	0.22	0.22	0.31	0.33	0.36	0.38	0.64	0.89

Table 40: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, GLS MV <200W lamps (27401300).

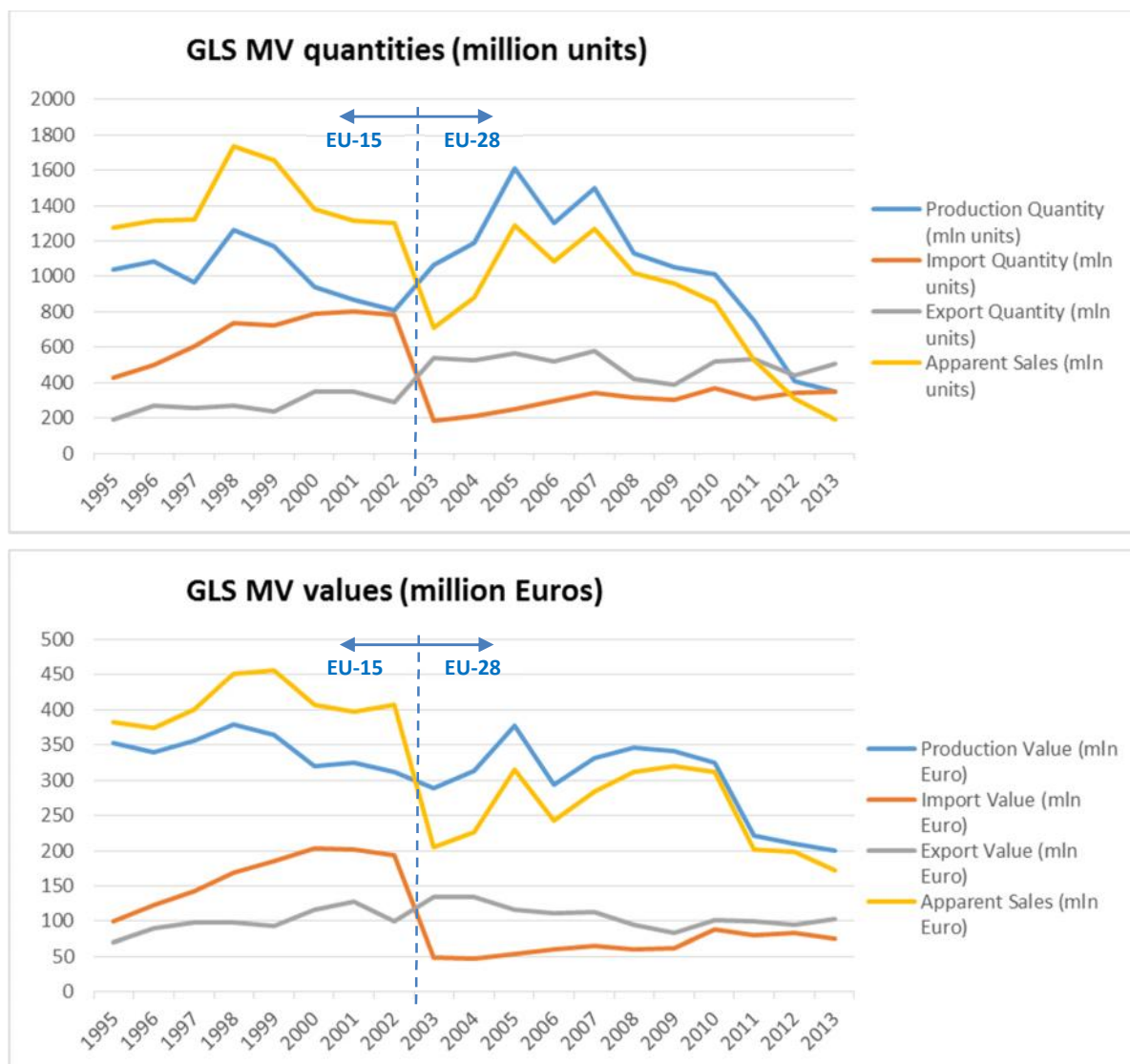


Figure 27: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for GLS MV <200W lamps. Top: quantities; bottom: monetary value.



### C.8 Eurostat EU-28 data 1995-2013 for Other Filament lamps

Filament Other year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	422	422	452	513	469	400	592	622	1229	1554	858	795	957	568	477	259	340	390	400
Import Quantity (mln units)	409	409	400	475	441	516	422	366	309	318	272	218	205	173	137	150	139	125	108
Export Quantity (mln units)	161	161	185	258	299	389	320	383	186	173	137	113	53.4	101	50.5	43.2	43.4	33.3	26.2
Apparent Sales (mln units)	670	670	667	731	612	527	694	605	1352	1699	993	899	1109	639	564	366	436	482	482
Production Value (mln euro)	106	106	100	102	85	87	257	157	259	356	236	183	191	139	130	82	126	110	123
Import Value (mln euro)	56.9	56.9	65.9	76.5	74.1	94.3	78.2	79.2	60.8	64.2	62.4	60.5	75.0	55.5	49.3	65.2	54.8	52.9	49.2
Export Value (mln euro)	41.4	41.4	45.7	50.7	49.8	61.9	61.2	62.2	43.5	36.0	37.8	36.5	26.2	30.5	23.7	24.9	26.1	26.5	24.2
Apparent Sales (mln euro)	121	121	120	128	110	120	274	174	276	384	261	207	240	164	155	122	155	136	148
Production Value (euro/unit)	0.25	0.25	0.22	0.20	0.18	0.22	0.43	0.25	0.21	0.23	0.27	0.23	0.20	0.24	0.27	0.32	0.37	0.28	0.31
Import Value (euro/unit)	0.14	0.14	0.16	0.16	0.17	0.18	0.19	0.22	0.20	0.20	0.23	0.28	0.37	0.32	0.36	0.44	0.39	0.42	0.45
Export Value (euro/unit)	0.26	0.26	0.25	0.20	0.17	0.16	0.19	0.16	0.23	0.21	0.28	0.32	0.49	0.30	0.47	0.58	0.60	0.79	0.92
Apparent Value (euro/unit)	0.18	0.18	0.18	0.18	0.18	0.23	0.40	0.29	0.20	0.23	0.26	0.23	0.22	0.26	0.28	0.34	0.36	0.28	0.31

Table 41: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Other Filament lamps (27401490).

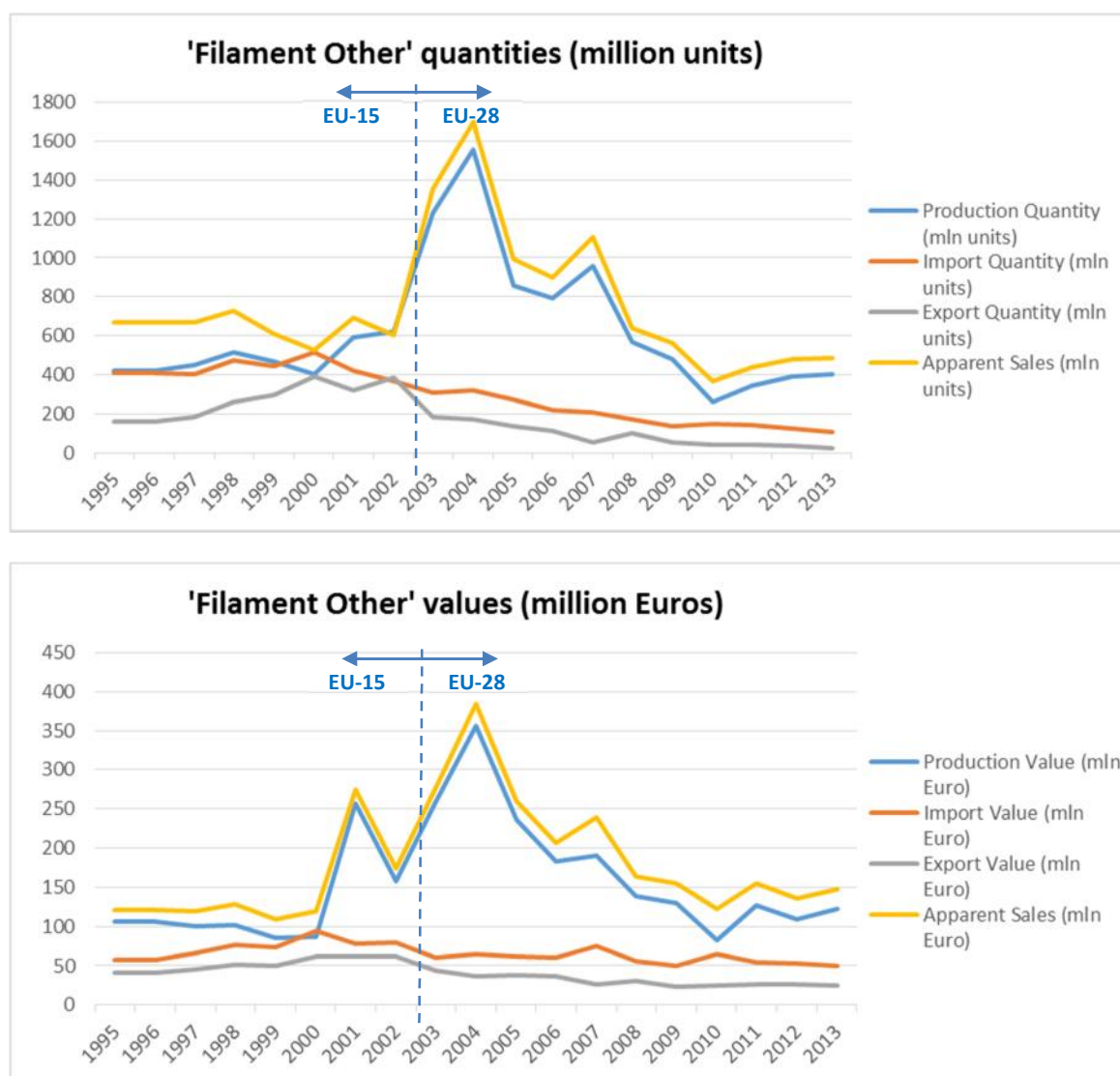


Figure 28: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Other Filament lamps. Top: quantities; bottom: monetary value.

### C.9 Eurostat EU-28 data 1995-2013 for Linear Fluorescent (LFL) lamps

LFL year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	395	439	369	382	338	366	420	383	448	442	459	501	513	320	373	447	669	506	591
Import Quantity (mln units)	35.5	41.7	46.5	49.2	46.5	58.6	63.6	57.5	40.0	40.7	61.1	73.7	59.2	52.1	51.4	56.2	76.9	61.4	59.5
Export Quantity (mln units)	84.3	75.9	74.0	75.9	67.5	65.4	77.8	88.8	230	176	214	204	233	212	161	150	162	163	185
Apparent Sales (mln units)	346	405	342	356	317	359	406	352	258	307	306	371	339	160	264	354	584	404	466
Production Value (mln euro)	413	355	330	388	360	393	457	430	440	397	409	403	491	326	352	429	620	486	568
Import Value (mln euro)	33.6	35.7	49.8	52.5	53.3	49.5	57.3	51.4	27.8	23.8	32.7	38.7	34.0	28.5	30.5	41.2	54.2	49.4	46.3
Export Value (mln euro)	64.0	64.6	62.4	66.9	69.0	74.5	71.6	72.4	92.7	94.5	109	130	134	124	97.7	99.9	111	120	124
Apparent Sales (mln euro)	382	326	317	373	344	368	443	409	375	326	333	312	391	231	285	370	563	415	490
Production Value (euro/unit)	1.05	0.81	0.89	1.01	1.06	1.07	1.09	1.12	0.98	0.90	0.89	0.81	0.96	1.02	0.94	0.96	0.93	0.96	0.96
Import Value (euro/unit)	0.95	0.86	1.07	1.07	1.15	0.84	0.90	0.89	0.70	0.58	0.54	0.53	0.57	0.55	0.59	0.73	0.71	0.80	0.78
Export Value (euro/unit)	0.76	0.85	0.84	0.88	1.02	1.14	0.92	0.82	0.40	0.54	0.51	0.64	0.57	0.58	0.61	0.67	0.69	0.74	0.67
Apparent Value (euro/unit)	1.10	0.81	0.93	1.05	1.08	1.03	1.09	1.16	1.46	1.06	1.09	0.84	1.15	1.44	1.08	1.05	0.97	1.03	1.05

Table 42: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Linear Fluorescent (LFL) (27401510).

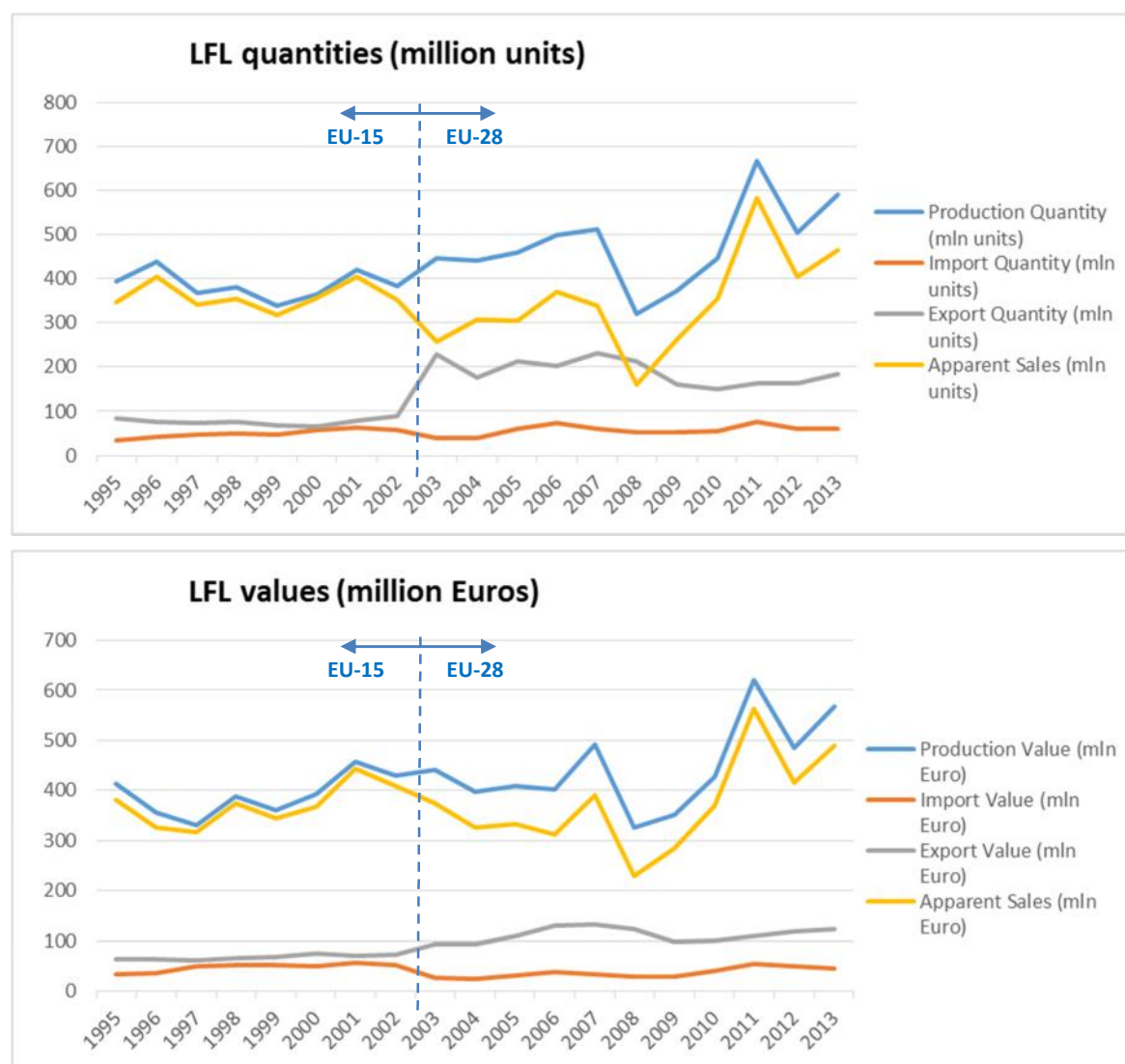


Figure 29: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Linear Fluorescent (LFL) lamps. Top: quantities; bottom: monetary value

### C.10 Eurostat EU-28 data 1995-2013 for Compact Fluorescent (CFL) lamps

CFL year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	93.6	83.1	84.9	90.1	88.2	115.2	96.4	91.1	99.0	102	96.1	255	279	201	225	104	159	101	92.7
Import Quantity (mln units)	62.3	84.7	94.9	149	178	220	177	193	116	140	198	231	404	544	518	525	353	317	339
Export Quantity (mln units)	25.6	28.6	29.7	30.9	34.2	38.7	38.0	39.2	69.3	63.6	51.9	59.3	55.8	55.4	46.0	54.4	52.0	43.7	37.2
Apparent Sales (mln units)	130	139	150	208	232	296	235	245	146	178	242	427	628	689	697	575	461	375	395
Production Value (mln euro)	327	292	286	286	229	231	242	238	270	278	252	376	407	292	361	216	274	193	165
Import Value (mln euro)	99.7	140	150	172	205	248	245	237	126	151	201	226	387	491	531	556	351	376	348
Export Value (mln euro)	72.6	79.8	79.6	65.8	68.1	73.4	61.1	59.7	131	120	78.0	80.6	79.6	86.0	77.5	92.3	87.0	83.3	68.4
Apparent Sales (mln euro)	355	352	357	392	366	406	426	416	266	309	376	521	714	697	815	680	538	486	445
Production Value (euro/unit)	3.50	3.51	3.37	3.18	2.60	2.01	2.51	2.62	2.73	2.72	2.63	1.47	1.46	1.45	1.60	2.07	1.72	1.90	1.78
Import Value (euro/unit)	1.60	1.66	1.58	1.15	1.15	1.13	1.39	1.23	1.09	1.08	1.02	0.98	0.96	0.90	1.03	1.06	0.99	1.18	1.03
Export Value (euro/unit)	2.84	2.79	2.68	2.13	1.99	1.90	1.61	1.52	1.88	1.89	1.50	1.36	1.43	1.55	1.68	1.70	1.67	1.91	1.84
Apparent Value (euro/unit)	2.72	2.53	2.38	1.88	1.58	1.37	1.81	1.70	1.82	1.73	1.55	1.22	1.14	1.01	1.17	1.18	1.17	1.30	1.13

Table 43: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Compact Fluorescent (CFL) (27401530).

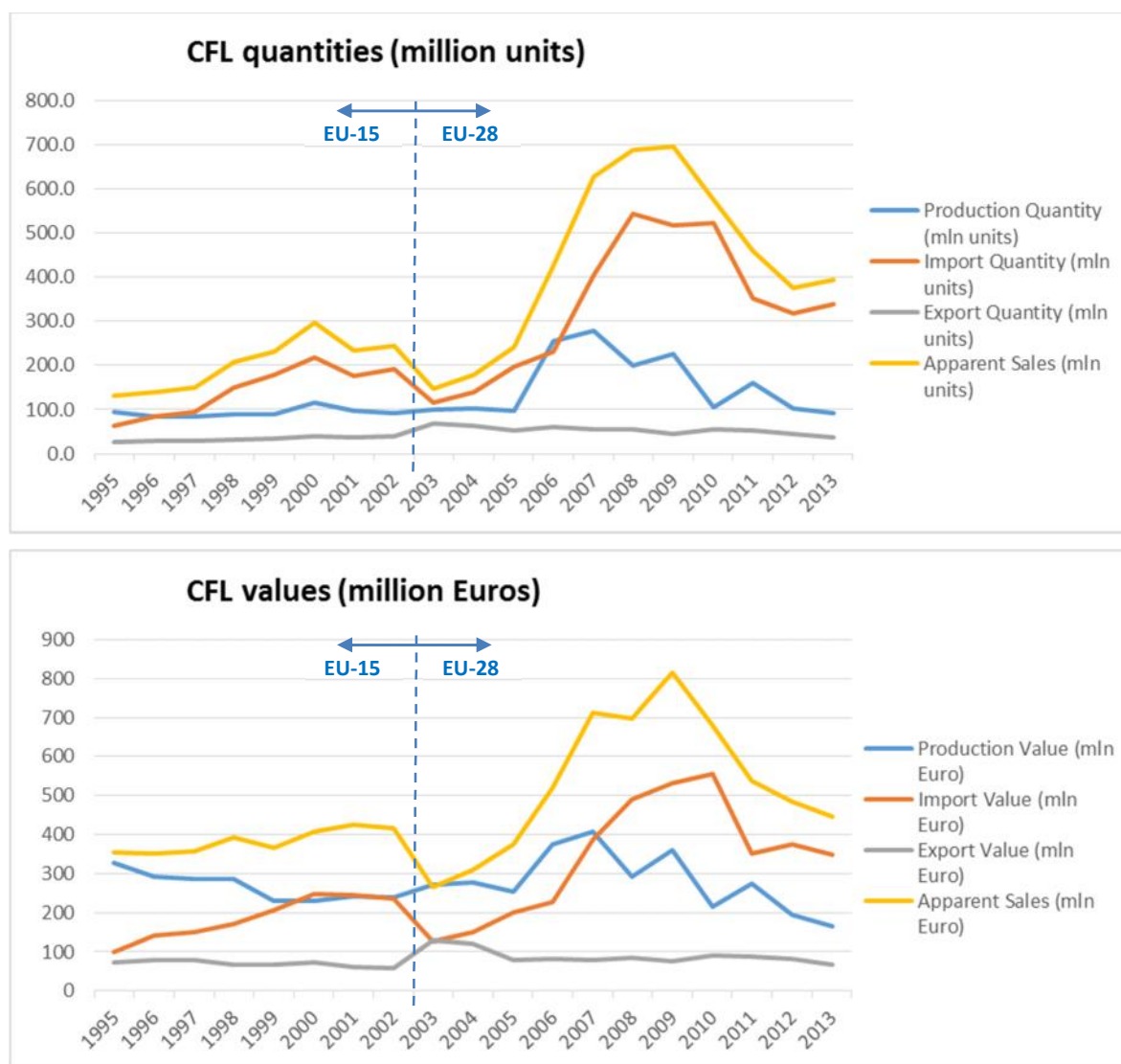


Figure 30: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Compact Fluorescent (CFL) lamps. Top: quantities; bottom: monetary value

### C.11 Eurostat EU-28 data 1995-2013 for Other Discharge lamps

Discharge Other (HID) year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	228	217	313	312	269	225	181	138	114	240	125	77	87	121	108	122	111	109	103
Import Quantity (mln units)	151	110	137	115	136	105	174	167	228	193	142	145	230	293	287	292	227	174	142
Export Quantity (mln units)	118	116	30.8	31.6	25.3	28.2	31.9	46.9	56.9	44.3	46.9	37.3	88.8	40.2	42.4	48.3	51.7	55.7	60.3
Apparent Sales (mln units)	261	211	419	395	380	302	323	258	285	389	220	184	228	374	353	365	287	227	185
Production Value (mln euro)	383	368	374	411	472	506	533	487	606	821	633	675	717	892	777	845	768	748	694
Import Value (mln euro)	72.3	62.4	71.3	83.4	90.3	106	117	128	104	113	115	138	208	294	232	230	206	186	171
Export Value (mln euro)	235	258	132	82.5	102	151	175	186	138	232	340	313	280	240	233	224	227	358	317
Apparent Sales (mln euro)	220	172	313	411	461	461	475	429	573	702	408	501	644	946	777	851	747	577	548
Production Value (euro/unit)	1.68	1.70	1.20	1.31	1.76	2.25	2.94	3.54	5.30	3.41	5.05	8.81	8.26	7.36	7.17	6.93	6.91	6.88	6.73
Import Value (euro/unit)	0.48	0.57	0.52	0.73	0.66	1.01	0.68	0.77	0.46	0.58	0.81	0.95	0.90	1.00	0.81	0.79	0.91	1.07	1.20
Export Value (euro/unit)	1.99	2.22	4.28	2.61	4.03	5.34	5.48	3.97	2.42	5.22	7.25	8.38	3.16	5.98	5.49	4.64	4.39	6.42	5.26
Apparent Value (euro/unit)	0.84	0.82	0.75	1.04	1.21	1.53	1.47	1.67	2.01	1.80	1.85	2.72	2.82	2.53	2.20	2.33	2.60	2.54	2.96

Table 44: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Other Discharge lamps (27401550).

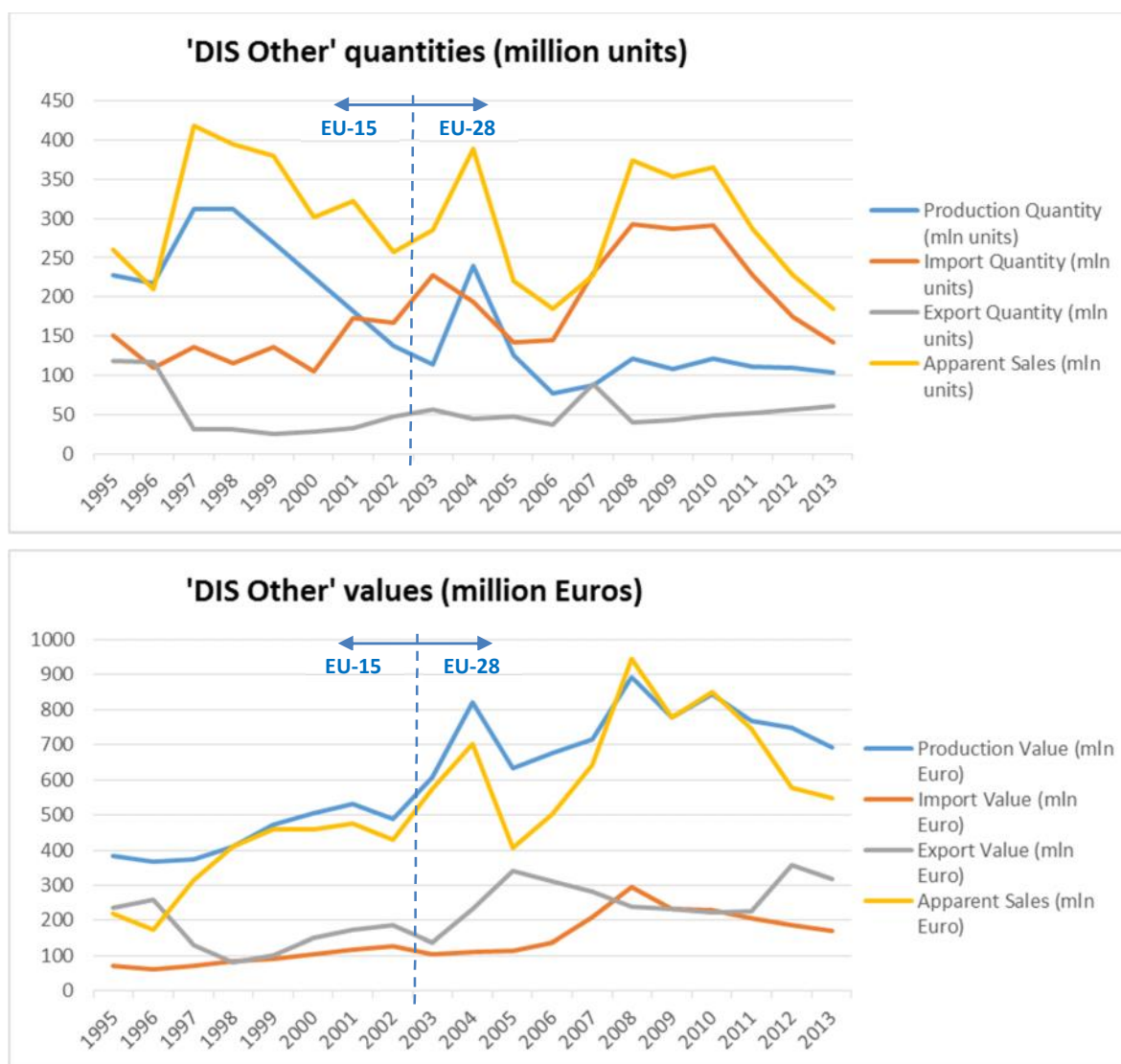


Figure 31: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Other Discharge lamps. Top: quantities; bottom: monetary value.

### C.12 Eurostat EU-28 data 1995-2013 for UV IR ARC lamps

UV IR ARC year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	17.0	22.6	28.5	28.5	25.0	18.0	22.1	32.0	48.1	53.9	52.9	57.0	53.6	24.7	21.6	24.8	36.4	39.3	45.0
Import Quantity (mln units)	8.1	5.8	8.8	23.9	10.2	11.5	10.2	10.1	5.4	5.4	6.6	6.2	12.2	10.5	9.0	9.7	11.2	13.3	12.8
Export Quantity (mln units)	5.1	4.6	4.0	4.3	4.2	4.7	5.5	6.3	7.8	9.1	11.3	12.8	11.2	16.8	16.0	30.4	24.1	32.4	33.7
Apparent Sales (mln units)	20.0	23.8	33.3	48.1	31.1	24.8	26.8	35.9	45.8	50.2	48.1	50.4	54.6	18.4	14.6	4.1	23.4	20.2	24.1
Production Value (mln euro)	144	158	219	250	210	200	339	315	333	361	383	421	426	204	159	188	214	200	182
Import Value (mln euro)	23.3	28.4	38.8	43.4	49.4	70.5	72.9	72.3	48.7	49.4	48.7	53.9	61.4	68.9	64.1	78.3	90.1	90.2	82.2
Export Value (mln euro)	35.4	35.9	41.7	44.2	47.4	64.1	70.9	65.4	74.4	81.4	96.8	115	113	139	169	221	253	371	362
Apparent Sales (mln euro)	132	150	216	249	212	206	341	322	308	329	335	360	375	134	54.2	45.0	50.6	-81.6	-97.4
Production Value (euro/unit)	8.48	6.98	7.67	8.78	8.40	11.11	15.34	9.86	6.92	6.70	7.24	7.38	7.96	8.26	7.38	7.58	5.87	5.09	4.04
Import Value (euro/unit)	2.88	4.91	4.40	1.82	4.83	6.16	7.15	7.16	8.94	9.14	7.44	8.70	5.04	6.56	7.10	8.08	8.08	6.77	6.40
Export Value (euro/unit)	6.98	7.83	10.35	10.35	11.39	13.70	12.97	10.45	9.56	8.93	8.54	8.96	10.08	8.26	10.56	7.27	10.50	11.47	10.72
Apparent Value (euro/unit)	6.59	6.31	6.48	5.18	6.83	8.33	12.71	8.99	6.72	6.56	6.96	7.14	6.87	7.29	3.72	11.06	2.16	-4.04	-4.04

Table 45: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, UV IR ARC lamps (27401570).

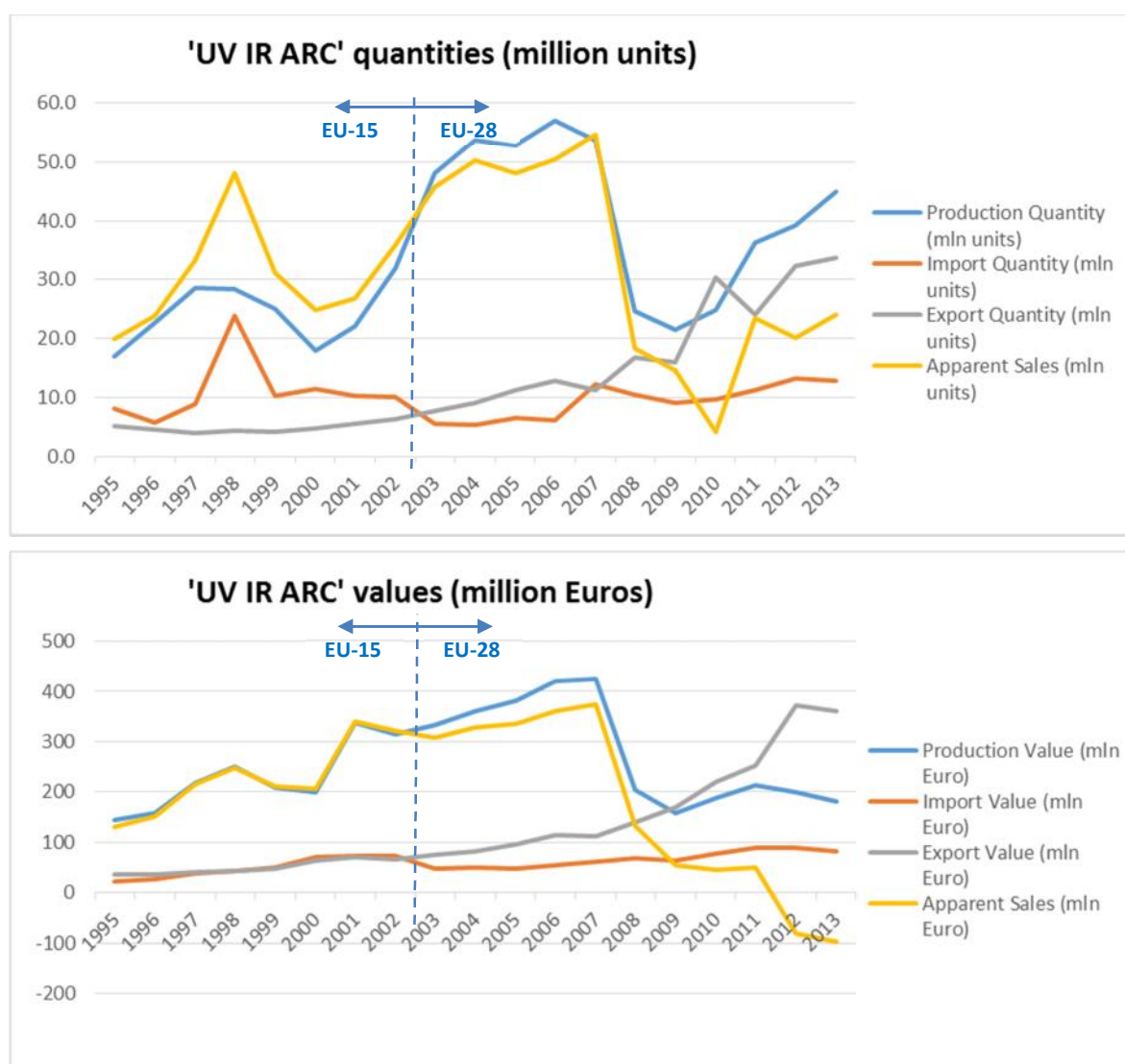


Figure 32: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for UV IR ARC lamps. Top: quantities; bottom: monetary value.

### C.13 Eurostat EU-28 Production totals for all lamp types

PRODUCTION QUANTITY		EU-15								EU-28											
	(million units)																				
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
27401100	Sealed Beam (PAR)	41	51	42	24	20	30	20	18	18	22	22	20	18	17	11	13	20	24	26	
27401293	Tungsten-HL-MV	258	258	258	286	359	451	386	360	282	220	213	200	201	207	160	206	305	492	596	
27401295	Tungsten-HL-LV	141	141	169	172	201	222	211	210	293	296	265	259	243	224	224	350	300	360	157	
27401300	GLS MV <200W	1040	1085	969	1263	1171	939	867	806	1067	1192	1610	1303	1500	1130	1051	1012	751	407	352	
27401490	Filament Other	422	422	452	513	469	400	592	622	1229	1554	858	795	957	568	477	259	340	390	400	
27401510	LFL	395	439	369	382	338	366	420	383	448	442	459	501	513	320	373	447	669	506	591	
27401530	CFL	94	83	85	90	88	115	96	91	99	102	96	255	279	201	225	104	159	101	93	
27401550	Discharge Other	228	217	313	312	269	225	181	138	114	240	125	77	87	121	108	122	111	109	103	
27401570	UV IR ARC	17	23	29	28	25	18	22	32	48	54	53	57	54	25	22	25	36	39	45	
	<b>TOTAL</b>	<b>2635</b>	<b>2719</b>	<b>2685</b>	<b>3071</b>	<b>2940</b>	<b>2765</b>	<b>2796</b>	<b>2659</b>	<b>3598</b>	<b>4123</b>	<b>3701</b>	<b>3466</b>	<b>3849</b>	<b>2813</b>	<b>2652</b>	<b>2537</b>	<b>2692</b>	<b>2429</b>	<b>2363</b>	

PRODUCTION VALUE		EU-15								EU-28										
	(million euros)																			
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	140	400	400	200	400	400	400	200	600	520	596	554	615	534	421	435	547	568	648
27401293	Tungsten-HL-MV	168	168	174	204	221	264	222	221	199	189	168	151	149	169	134	131	226	299	351
27401295	Tungsten-HL-LV	140	140	159	155	165	202	176	162	266	252	234	240	248	215	201	240	196	266	162
27401300	GLS MV <200W	354	340	357	380	365	320	325	313	289	314	377	293	331	346	342	325	221	210	200
27401490	Filament Other	106	106	100	102	85	87	257	157	259	356	236	183	191	139	130	82	126	110	123
27401510	LFL	413	355	330	388	360	393	457	430	440	397	409	403	491	326	352	429	620	486	568
27401530	CFL	327	292	286	286	229	231	242	238	270	278	252	376	407	292	361	216	274	193	165
27401550	Discharge Other	383	368	374	411	472	506	533	487	606	821	633	675	717	892	777	845	768	748	694
27401570	UV IR ARC	144	158	219	250	210	200	339	315	333	361	383	421	426	204	159	188	214	200	182
	<b>TOTAL</b>	<b>2174</b>	<b>2327</b>	<b>2398</b>	<b>2376</b>	<b>2507</b>	<b>2603</b>	<b>2952</b>	<b>2524</b>	<b>3262</b>	<b>3488</b>	<b>3287</b>	<b>3295</b>	<b>3576</b>	<b>3117</b>	<b>2877</b>	<b>2890</b>	<b>3191</b>	<b>3080</b>	<b>3093</b>

Table 46: Eurostat Production Quantity (million units, top) and Production Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

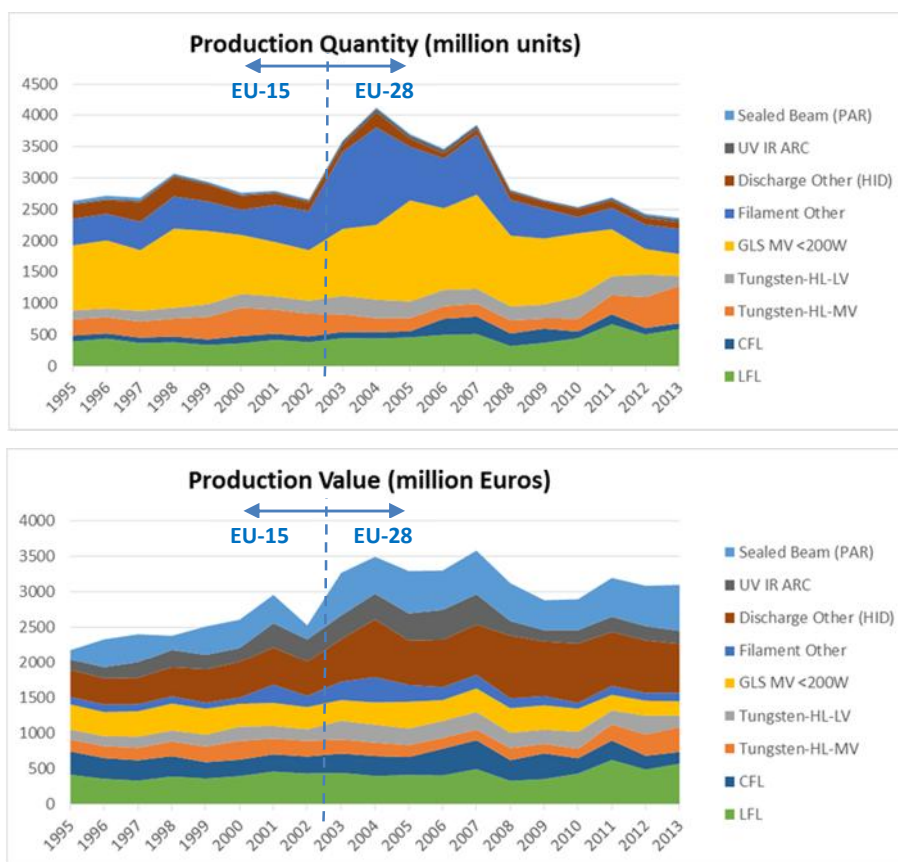


Figure 33: Eurostat Production Quantity (million units, top) and Production Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

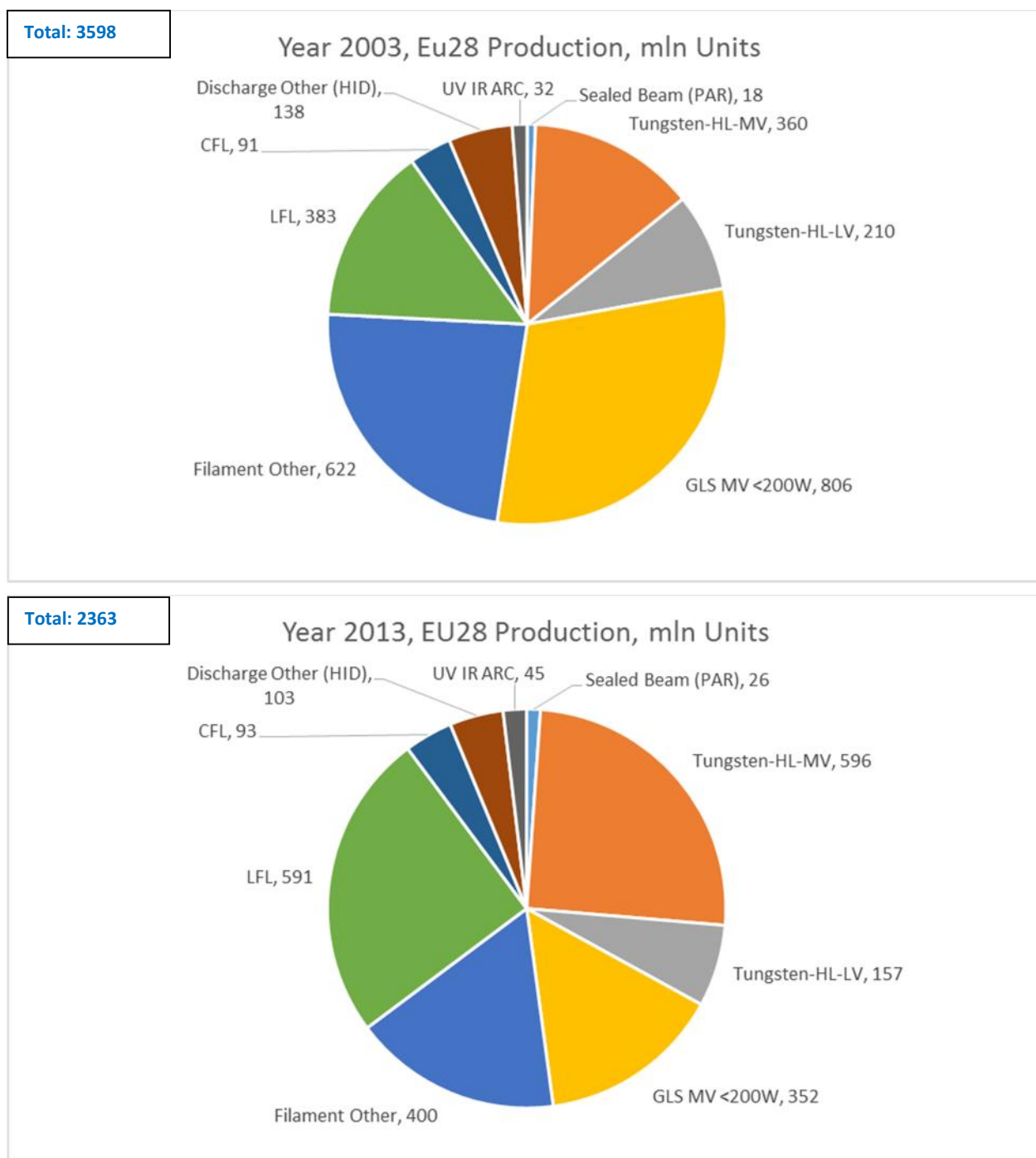


Figure 34: Eurostat Production Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom).

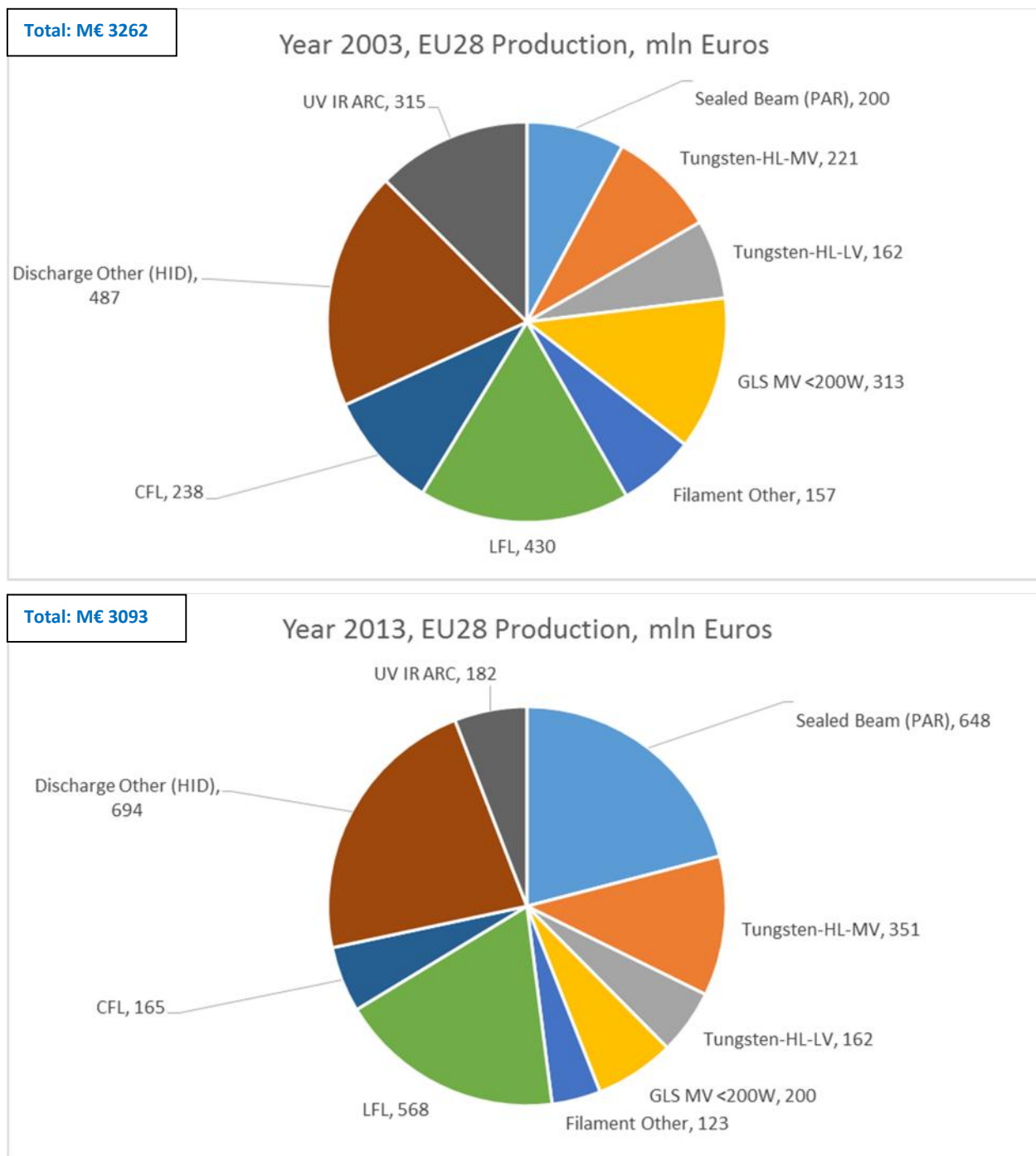


Figure 35: Eurostat Production Value (million euros) subdivision in 2003 (top) and in 2013 (bottom).



### C.14 Eurostat EU-28 Import totals for all lamp types

IMPORT QUANTITY (million units)		EU-15								EU-28										
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	6	5	6	7	7	7	8	7	6	10	13	12	22	14	11	9	8	17	14
27401293	Tungsten-HL-MV	39	39	48	49	58	54	63	61	78	109	133	155	175	153	144	221	226	245	358
27401295	Tungsten-HL-LV	94	94	114	120	115	105	97	96	114	148	153	179	203	155	133	159	167	145	157
27401300	GLS MV <200W	426	502	607	738	725	788	799	784	186	212	248	295	344	313	301	367	311	343	350
27401490	Filament Other	409	409	400	475	441	516	422	366	309	318	272	218	205	173	137	150	139	125	108
27401510	LFL	35	42	46	49	47	59	64	58	40	41	61	74	59	52	51	56	77	61	60
27401530	CFL	62	85	95	149	178	220	177	193	116	140	198	231	404	544	518	525	353	317	339
27401550	Discharge Other (HID)	151	110	137	115	136	105	174	167	228	193	142	145	230	293	287	292	227	174	142
27401570	UV IR ARC	8	6	9	24	10	11	10	10	5	5	7	6	12	11	9	10	11	13	13
	<b>TOTAL</b>	<b>1231</b>	<b>1292</b>	<b>1462</b>	<b>1726</b>	<b>1718</b>	<b>1864</b>	<b>1813</b>	<b>1741</b>	<b>1082</b>	<b>1176</b>	<b>1227</b>	<b>1314</b>	<b>1656</b>	<b>1708</b>	<b>1590</b>	<b>1788</b>	<b>1520</b>	<b>1442</b>	<b>1541</b>

IMPORT VALUE (million euros)		EU-15								EU-28										
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	14	13	15	18	20	30	23	26	23	39	31	28	34	28	25	40	35	39	44
27401293	Tungsten-HL-MV	34	34	35	36	44	54	59	51	43	48	53	63	67	59	61	107	111	125	153
27401295	Tungsten-HL-LV	47	47	66	60	56	63	56	67	53	52	52	60	59	56	56	73	75	74	67
27401300	GLS MV <200W	100	123	142	169	185	204	201	193	50	48	54	61	66	60	62	88	80	84	75
27401490	Filament Other	57	57	66	77	74	94	78	79	61	64	62	60	75	55	49	65	55	53	49
27401510	LFL	34	36	50	52	53	49	57	51	28	24	33	39	34	29	30	41	54	49	46
27401530	CFL	100	140	150	172	205	248	245	237	126	151	201	226	387	491	531	556	351	376	348
27401550	Discharge Other (HID)	72	62	71	83	90	106	117	128	104	113	115	138	208	294	232	230	206	186	171
27401570	UV IR ARC	23	28	39	43	49	71	73	72	49	49	49	54	61	69	64	78	90	90	82
	<b>TOTAL</b>	<b>481</b>	<b>540</b>	<b>634</b>	<b>711</b>	<b>778</b>	<b>919</b>	<b>910</b>	<b>906</b>	<b>537</b>	<b>586</b>	<b>650</b>	<b>729</b>	<b>991</b>	<b>1141</b>	<b>1112</b>	<b>1278</b>	<b>1058</b>	<b>1077</b>	<b>1035</b>

Table 47: Eurostat Import Quantity (million units, top) and Import Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

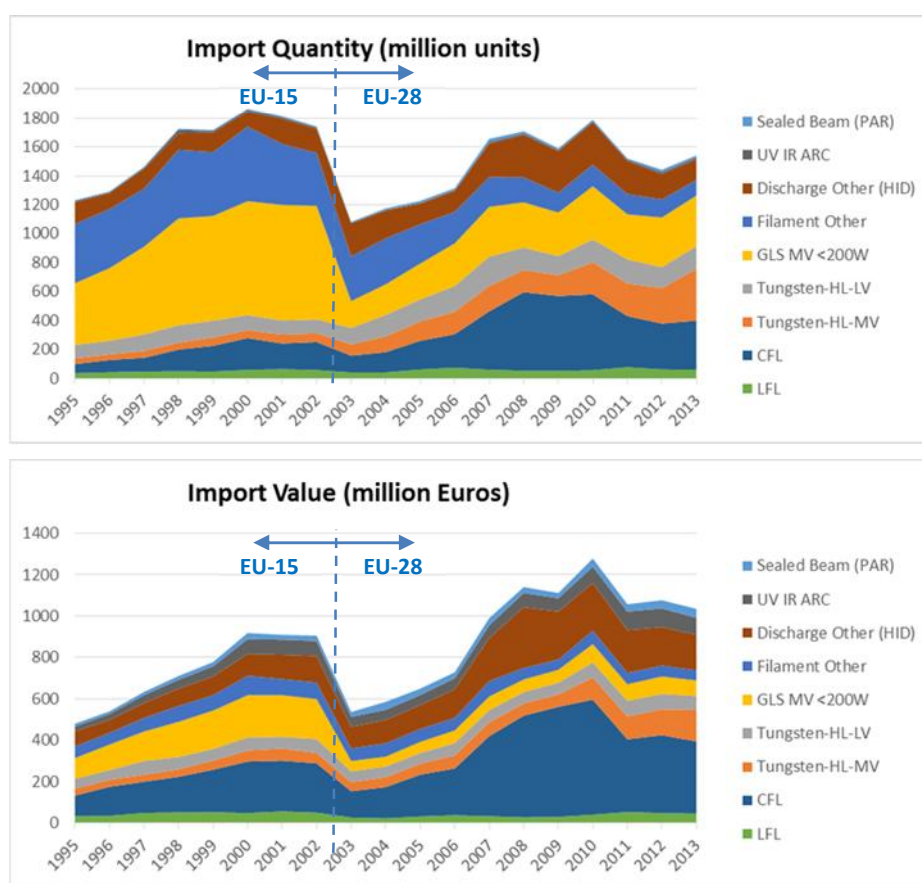


Figure 36: Eurostat Import Quantity (million units, top) and Import Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

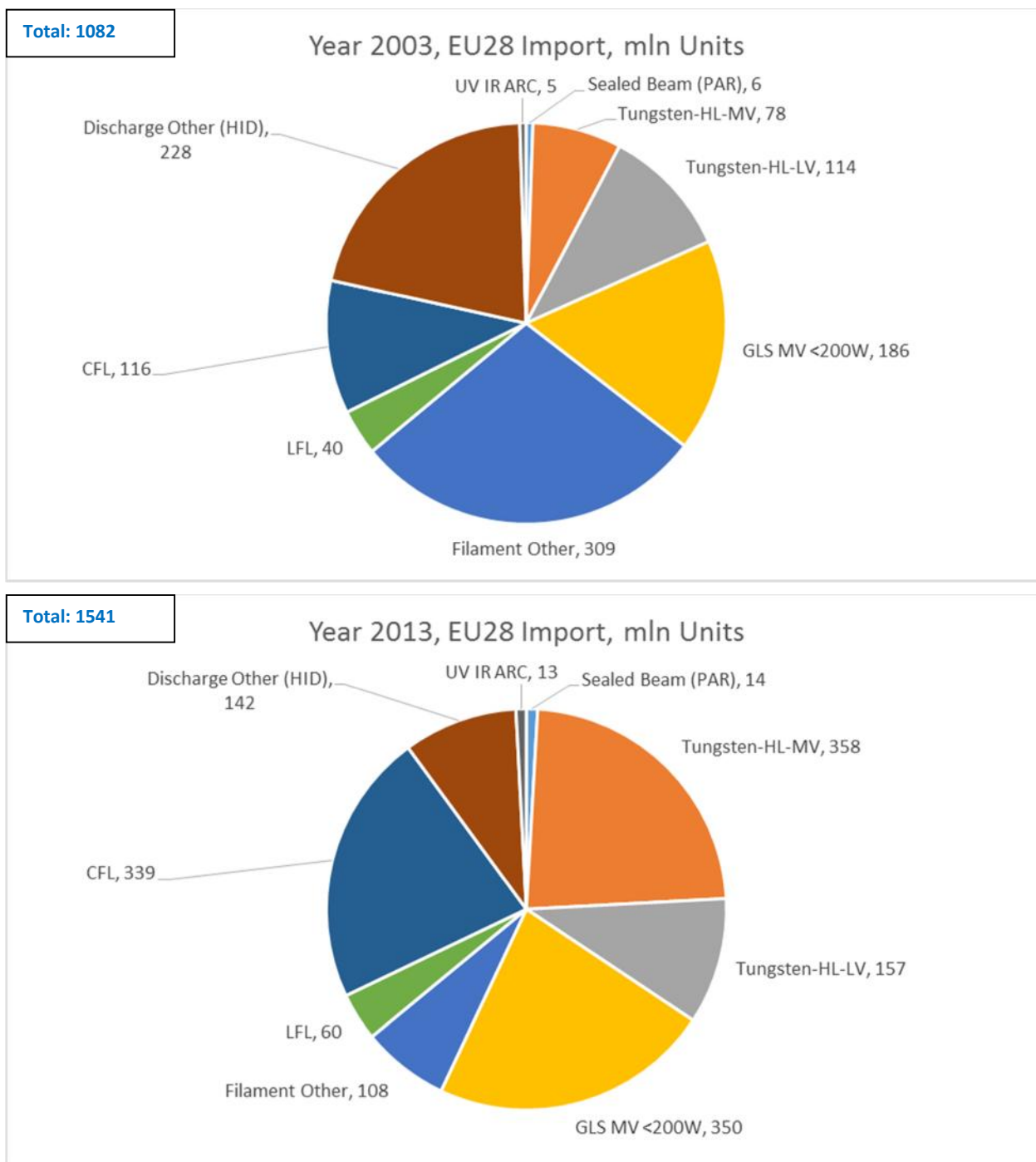
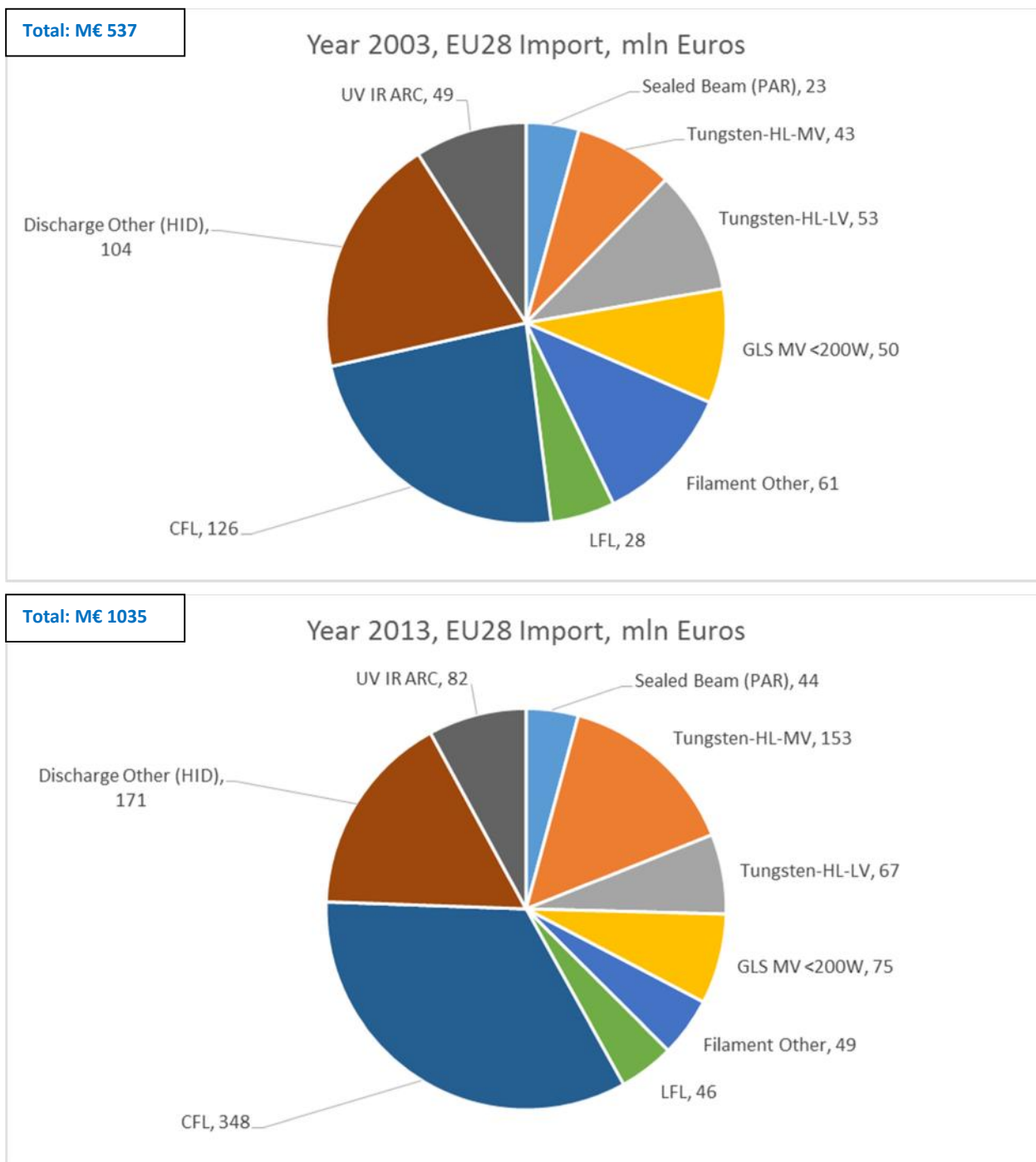


Figure 37: Eurostat Import Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom).



**Figure 38: Eurostat Import Value (million euros) subdivision in 2003 (top) and in 2013 (bottom).**

### C.15 Eurostat EU-28 Export totals for all lamp types

EXPORT QUANTITY		EU-15								EU-28										
(million units)																				
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	7	4	4	2	3	4	6	5	4	5	4	1	2	6	4	6	5	7	9
27401293	Tungsten-HL-MV	23	23	23	21	28	27	29	39	35	53	71	53	57	53	49	52	70	89	133
27401295	Tungsten-HL-LV	46	46	57	56	65	76	88	92	73	94	92	94	109	95	77	70	69	70	79
27401300	GLS MV <200W	193	272	256	267	237	348	350	291	542	525	568	516	576	423	391	522	534	439	509
27401490	Filament Other	161	161	185	258	299	389	320	383	186	173	137	113	53	101	51	43	43	33	26
27401510	LFL	84	76	74	76	67	65	78	89	230	176	214	204	233	212	161	150	162	163	185
27401530	CFL	26	29	30	31	34	39	38	39	69	64	52	59	56	55	46	54	52	44	37
27401550	Discharge Other (HID)	118	116	31	32	25	28	32	47	57	44	47	37	89	40	42	48	52	56	60
27401570	UV IR ARC	5	5	4	4	4	5	5	6	8	9	11	13	11	17	16	30	24	32	34
	<b>TOTAL</b>	<b>664</b>	<b>731</b>	<b>662</b>	<b>747</b>	<b>763</b>	<b>981</b>	<b>947</b>	<b>991</b>	<b>1204</b>	<b>1143</b>	<b>1196</b>	<b>1090</b>	<b>1186</b>	<b>1004</b>	<b>837</b>	<b>970</b>	<b>1011</b>	<b>934</b>	<b>1072</b>

EXPORT VALUE		EU-15								EU-28										
(million euros)																				
code	year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	12	14	12	11	15	22	28	28	27	24	30	17	21	43	31	49	55	75	72
27401293	Tungsten-HL-MV	41	41	42	39	48	55	54	57	57	67	83	68	66	62	55	66	70	88	105
27401295	Tungsten-HL-LV	53	53	64	62	67	86	91	83	76	88	83	88	93	83	81	79	71	76	74
27401300	GLS MV <200W	71	89	99	98	93	117	129	99	134	134	116	112	113	95	84	101	99	94	104
27401490	Filament Other	41	41	46	51	50	62	61	62	43	36	38	37	26	30	24	25	26	26	24
27401510	LFL	64	65	62	67	69	74	72	72	93	95	109	130	134	124	98	100	111	120	124
27401530	CFL	73	80	80	66	68	73	61	60	131	120	78	81	80	86	77	92	87	83	68
27401550	Discharge Other (HID)	235	258	132	83	102	151	175	186	138	232	340	313	280	240	233	224	227	358	317
27401570	UV IR ARC	35	36	42	44	47	64	71	65	74	81	97	115	113	139	169	221	253	371	362
	<b>TOTAL</b>	<b>625</b>	<b>677</b>	<b>578</b>	<b>520</b>	<b>560</b>	<b>704</b>	<b>741</b>	<b>713</b>	<b>773</b>	<b>877</b>	<b>974</b>	<b>959</b>	<b>926</b>	<b>901</b>	<b>852</b>	<b>957</b>	<b>1000</b>	<b>1292</b>	<b>1250</b>

Table 48: Eurostat Export Quantity (million units, top) and Export Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

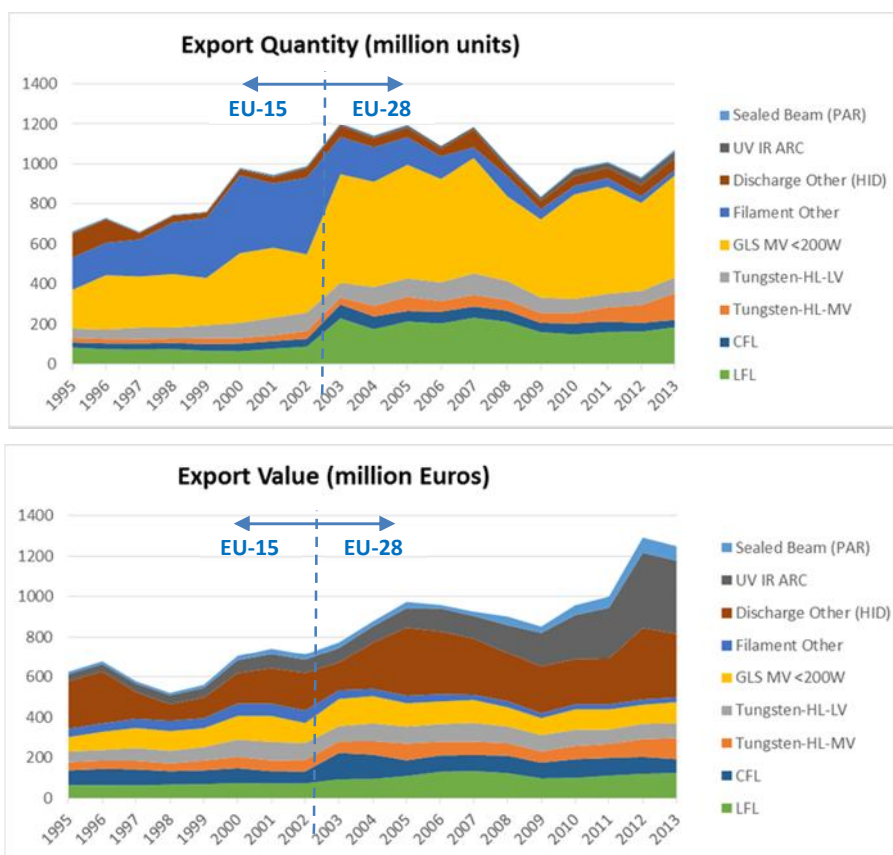


Figure 39: Eurostat Export Quantity (million units, top) and Export Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

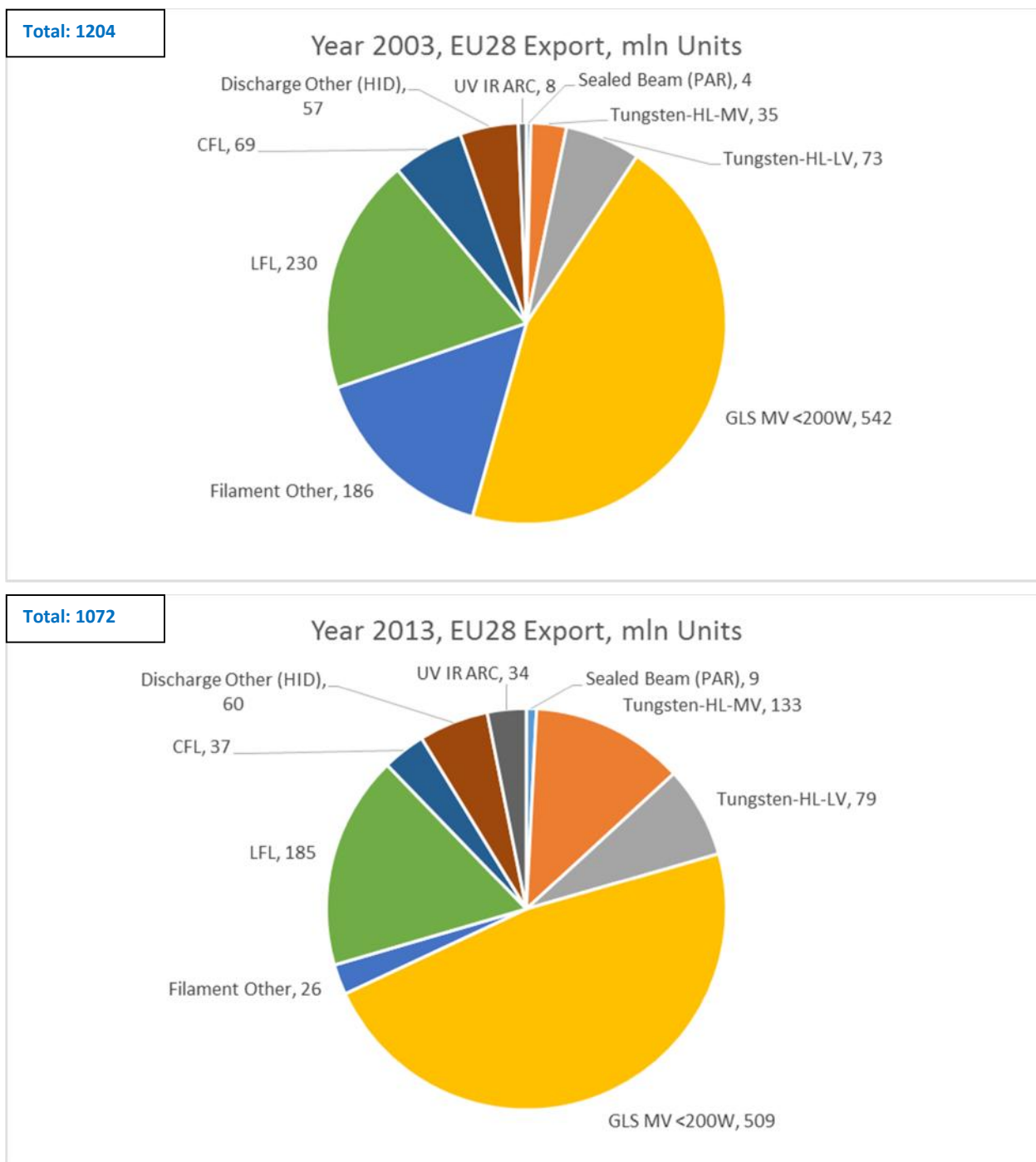
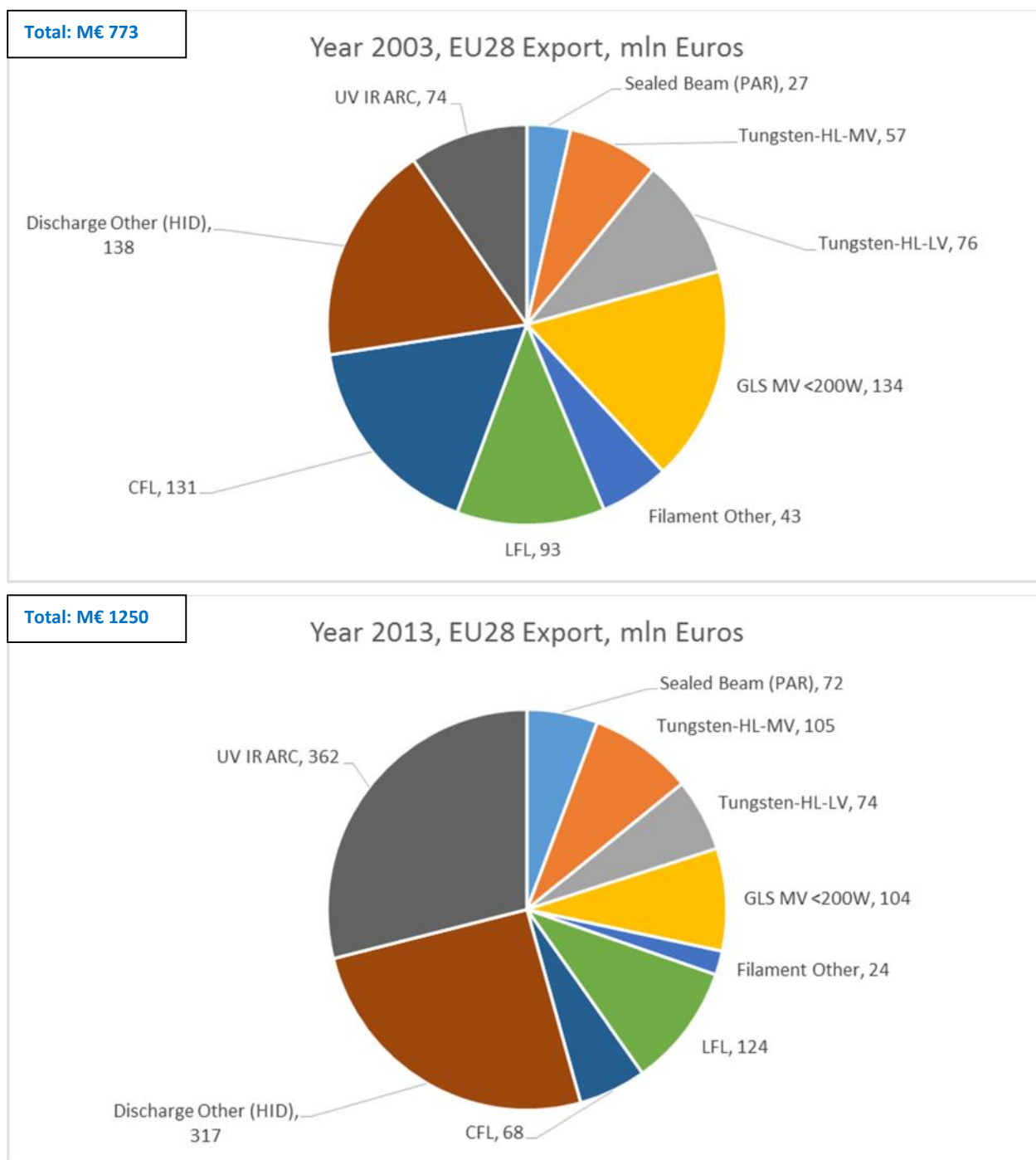


Figure 40: Eurostat Export Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom).



**Figure 41: Eurostat Export Value (million euros) subdivision in 2003 (top) and in 2013 (bottom).**

### C.16 Eurostat EU-28 Apparent Consumption totals for all lamp types

APPARENT CONSUMPTION		EU-15								EU-28										
code	(million units)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	41	52	44	29	24	34	22	20	20	26	30	30	37	25	18	15	23	34	31
27401293	Tungsten-HL-MV	275	275	283	314	389	478	420	382	325	277	275	303	318	307	255	375	460	648	822
27401295	Tungsten-HL-LV	188	188	227	236	252	250	220	215	334	351	326	344	337	285	280	439	399	435	235
27401300	GLS MV <200W	1272	1316	1320	1734	1659	1379	1316	1299	711	878	1290	1082	1269	1020	961	857	528	311	192
27401490	Filament Other	670	670	667	731	612	527	694	605	1352	1699	993	899	1109	639	564	366	436	482	482
27401510	LFL	346	405	342	356	317	359	406	352	258	307	306	371	339	160	264	354	584	404	466
27401530	CFL	130	139	150	208	232	296	235	245	146	178	242	427	628	689	697	575	461	375	395
27401550	Discharge Other (HID)	261	211	419	395	380	302	323	258	285	389	220	184	228	374	353	365	287	227	185
27401570	UV IR ARC	20	24	33	48	31	25	27	36	46	50	48	50	55	18	15	4	23	20	24
	<b>TOTAL</b>	<b>3203</b>	<b>3279</b>	<b>3485</b>	<b>4050</b>	<b>3894</b>	<b>3649</b>	<b>3662</b>	<b>3410</b>	<b>3476</b>	<b>4156</b>	<b>3731</b>	<b>3690</b>	<b>4320</b>	<b>3517</b>	<b>3405</b>	<b>3349</b>	<b>3201</b>	<b>2937</b>	<b>2833</b>

APPARENT CONSUMPTION		EU-15								EU-28										
code	(million euros)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
27401100	Sealed Beam (PAR)	142	399	403	207	405	408	395	198	596	535	596	565	628	519	415	425	527	532	620
27401293	Tungsten-HL-MV	160	160	167	201	217	263	227	215	185	170	138	146	150	166	139	173	267	336	398
27401295	Tungsten-HL-LV	134	134	161	153	154	179	141	146	243	215	203	212	214	188	176	233	200	265	156
27401300	GLS MV <200W	383	374	400	451	457	407	398	407	204	227	315	243	284	311	320	312	202	199	172
27401490	Filament Other	121	121	120	128	110	120	274	174	276	384	261	207	240	164	155	122	155	136	148
27401510	LFL	382	326	317	373	344	368	443	409	375	326	333	312	391	231	285	370	563	415	490
27401530	CFL	355	352	357	392	366	406	426	416	266	309	376	521	714	697	815	680	538	486	445
27401550	Discharge Other (HID)	220	172	313	411	461	461	475	429	573	702	408	501	644	946	777	851	747	577	548
27401570	UV IR ARC	132	150	216	249	212	206	341	322	308	329	335	360	375	134	54	45	51	-82	-97
	<b>TOTAL</b>	<b>2029</b>	<b>2190</b>	<b>2454</b>	<b>2567</b>	<b>2725</b>	<b>2817</b>	<b>3120</b>	<b>2717</b>	<b>3026</b>	<b>3196</b>	<b>2963</b>	<b>3065</b>	<b>3640</b>	<b>3356</b>	<b>3137</b>	<b>3211</b>	<b>3249</b>	<b>2865</b>	<b>2878</b>

Table 49: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).

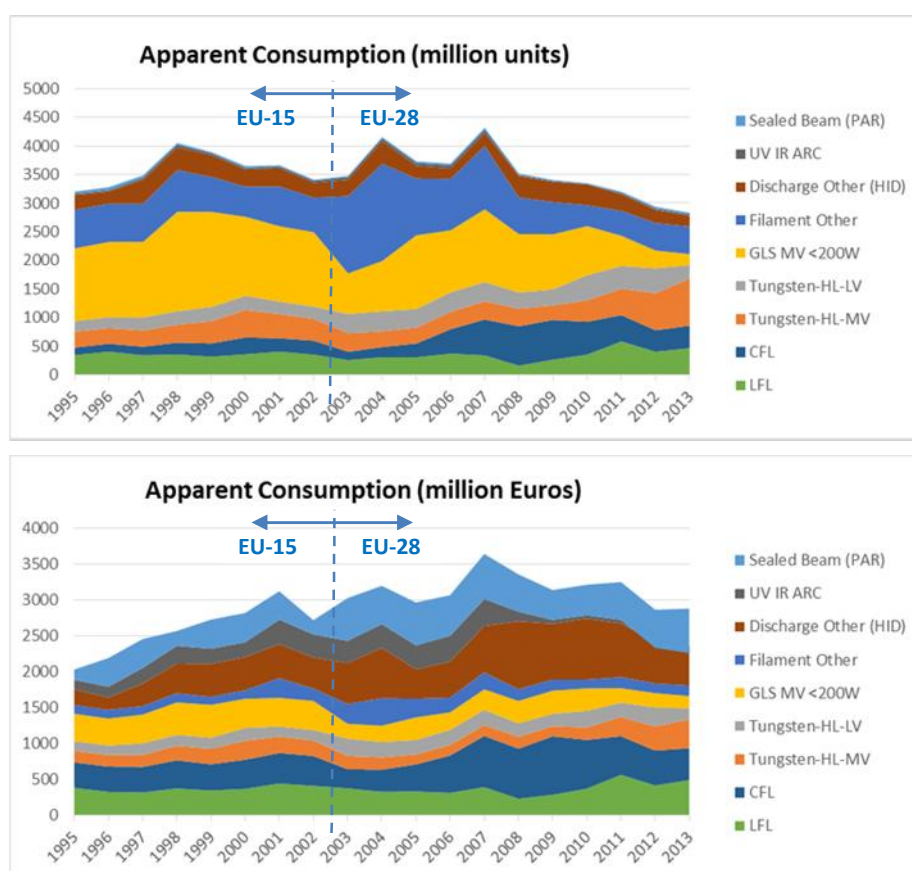
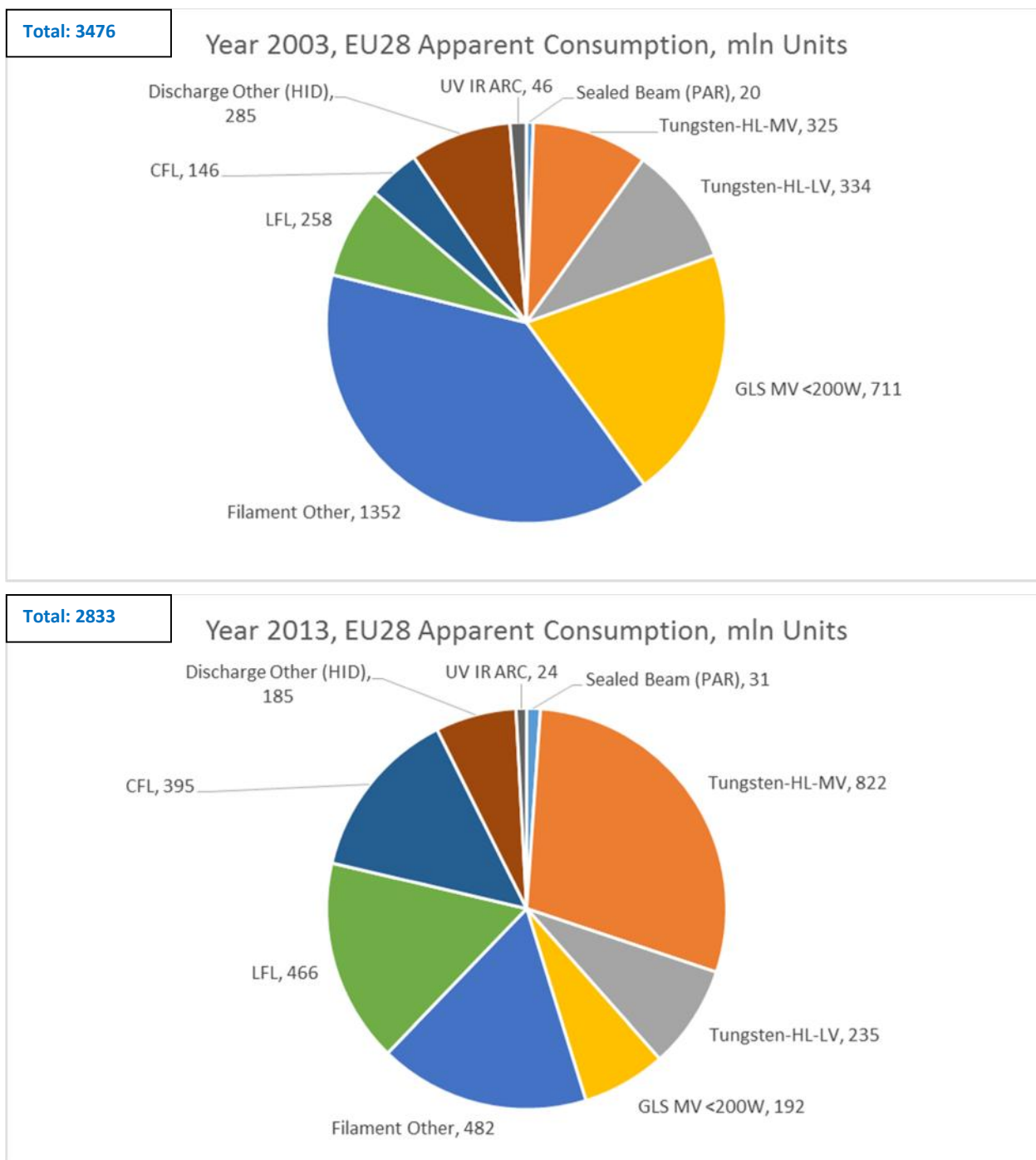
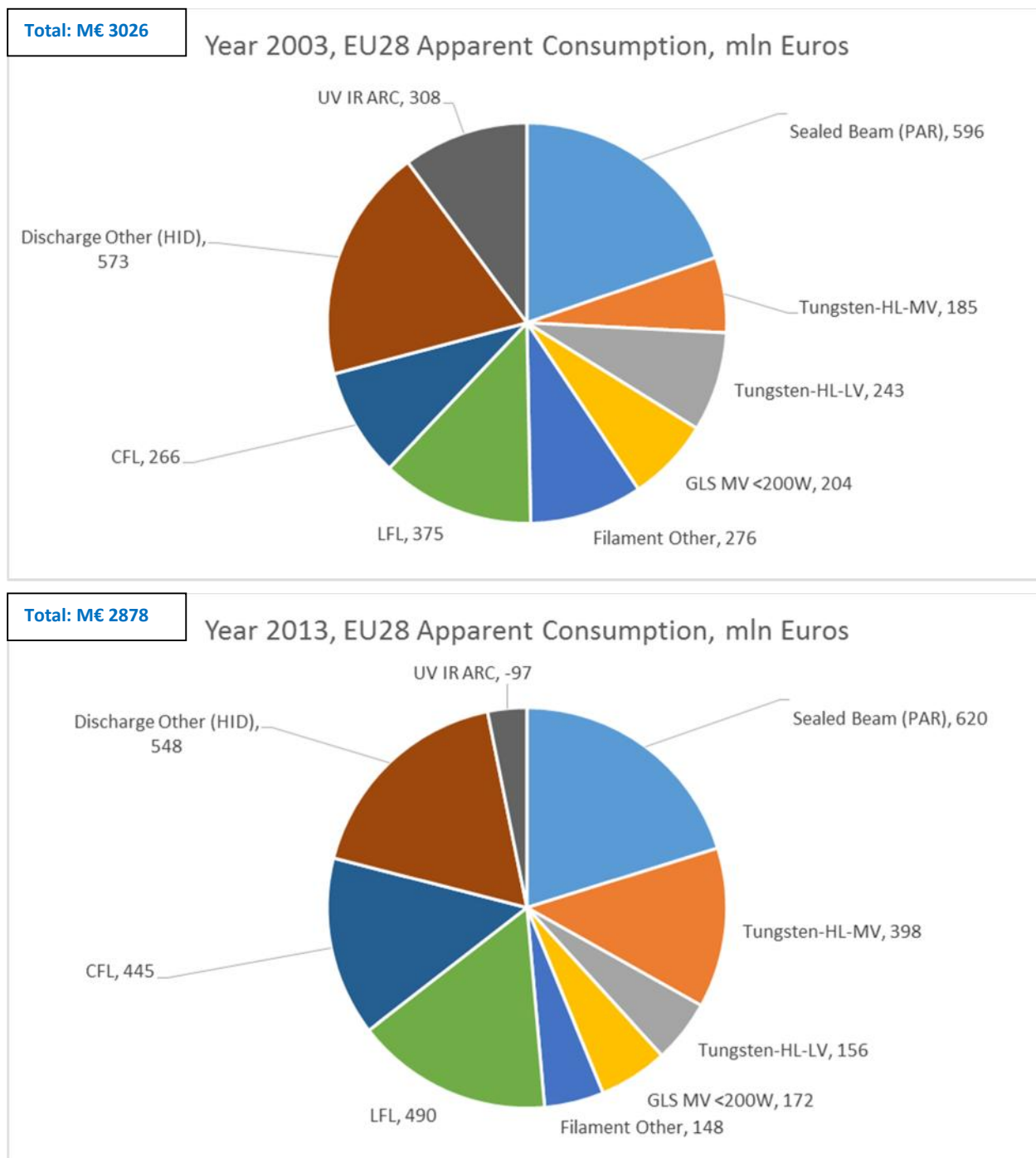


Figure 42: Eurostat Apparent Consumption Quantity (million units, top) and Apparent Consumption Value (million euros, bottom), all lamp types, EU15 (1995-2002) or EU28 (2003-2013).



**Figure 43: Eurostat Apparent Consumption Quantity (million units) subdivision in 2003 (top) and in 2013 (bottom).**



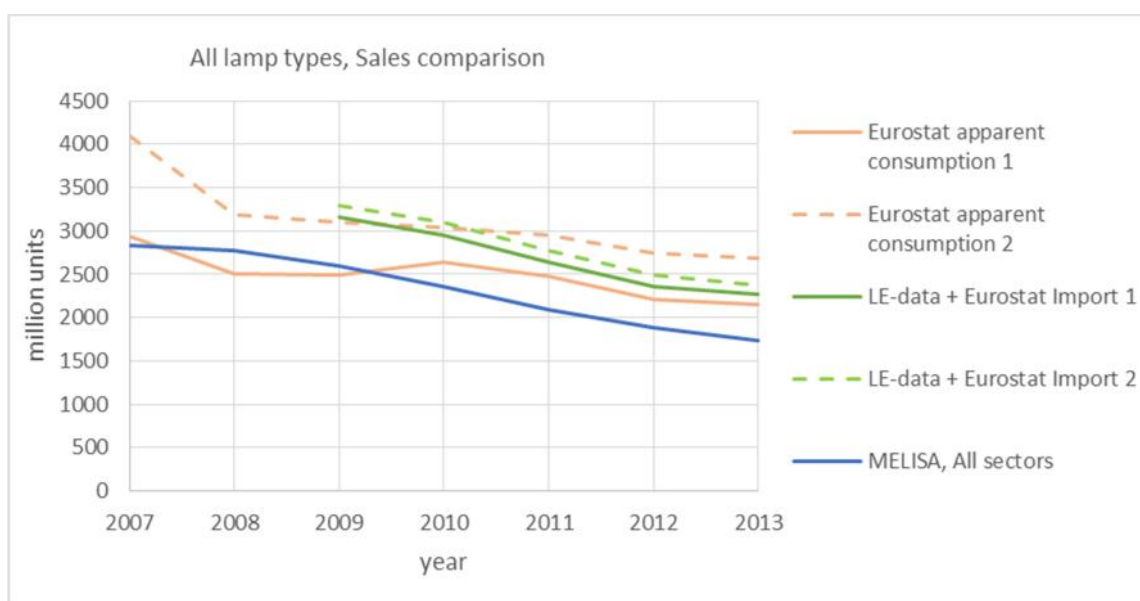


**Figure 44: Eurostat Apparent Consumption Value (million euros) subdivision in 2003 (top) and in 2013 (bottom).**

## C.17 Eurostat EU-28 Apparent Consumption compared to MELISA data

Figure 45 shows the Eurostat Apparent Consumption data compared to the MELISA total sales of light sources. The sum of LightingEurope sales and Eurostat Imports is also shown for reference. The main difference between Eurostat 1 and 2 values is that the latter includes 'Filament Other' sales while the former does not. The following clarifications apply:

- Eurostat Apparent Consumption 1 data are exclusive 'Sealed Beam', 'UV IR ARC'. They are also exclusive 'Discharge Other' lamps, but 40 million HID lamps have been anyway counted each year. In this total 'Filament Other' lamps are also **excluded**.
- Eurostat Apparent Consumption 2 data are exclusive 'Sealed Beam', and 'UV IR ARC'. They are also exclusive 'Discharge Other' lamps, but 60 million HID lamps have anyway been counted each year. In this total 'Filament Other' lamps are **included**.
- Eurostat Import 1 excludes 'Sealed Beam', 'UV IR ARC' and 'Discharge Other' lamps. 'Other Filament' lamps are also **excluded**.
- Eurostat Import 2 excludes 'Sealed Beam', 'UV IR ARC' and 'Discharge Other' lamps. 'Other Filament' lamps are **included**.
- The MELISA data are those for 'All Sectors' (residential and non-residential), including HID and LED. Values for 'GLS-stock' and 'Tungsten-stock' are not real sales and have NOT been counted here.



**Figure 45: Eurostat total lamp sales compared to MELISA total lamp sales, EU-28 totals, All Sectors (Residential + Non-Residential), for years 2007-2013. LightingEurope total sales + Eurostat Imports are also shown for reference. See text above for details.**

The MELISA **total sales of light sources** for years 2010-2013 are relatively low when compared to Eurostat Apparent Consumption data and compared to the sum of LightingEurope data and Eurostat Imports. In 2013 the difference is 21 % (2150 vs. 1731 million units) (compared to Eurostat 1).

Figure 46: in particular in recent years, the MELISA sales for **incandescent lamps (GLS)** are close to those from Eurostat for GLS MV < 200 W (not counting 'Filament Other'). In 2013 the difference is 21 % (192 vs. 159 million units). LightingEurope data summed with Eurostat Imports (not shown <sup>48</sup>) are far higher than these data.

<sup>48</sup> For confidentiality reasons the LightingEurope + Eurostat import data are not shown for individual lamp types.



Figure 46: Eurostat incandescent lamp sales (GLS MV < 200W) compared to MELISA GLS lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013.

Figure 47: Eurostat apparent sales for **MV-HL** differ significantly from those used in MELISA, in particular in recent years. In 2013 the difference is 44 % (822 vs. 566 million units). The MELISA sales for mains voltage halogen lamps are close to those from LightingEurope summed to the Eurostat Imports (not shown), in particular for years 2010-2012.

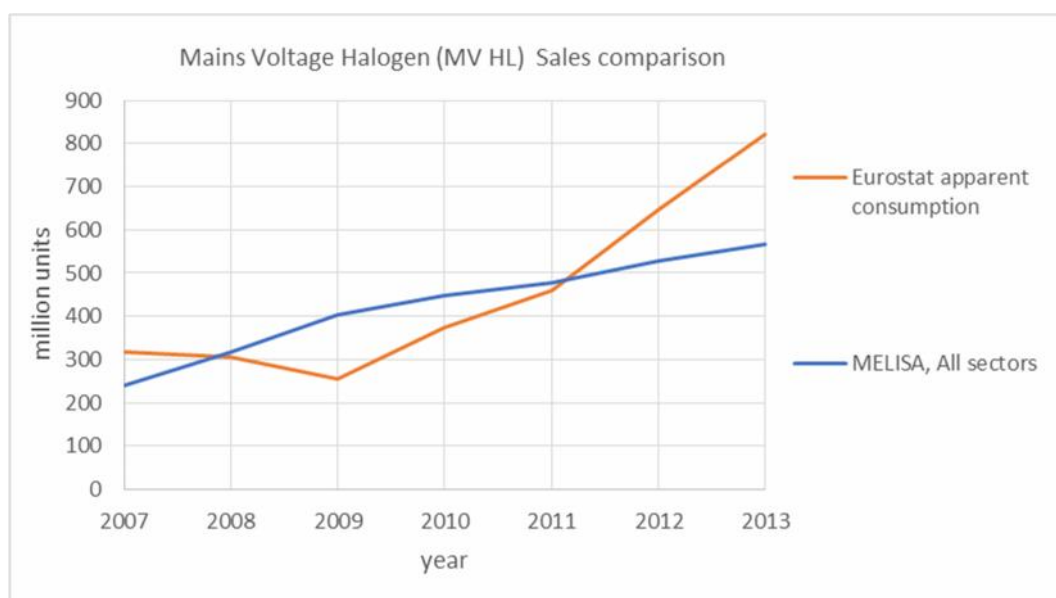


Figure 47: Eurostat mains voltage halogen (MV-HL) sales compared to MELISA MV-HL lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013.

Figure 48: Eurostat apparent sales for **LV-HL** show a large variability in the years, and differ significantly from those used in MELISA. In 2013 the difference is relatively small 14 % (235 vs. 206 million units). The MELISA sales for low voltage halogen lamps are relatively close to those from LightingEurope summed to the Eurostat Imports (not shown).

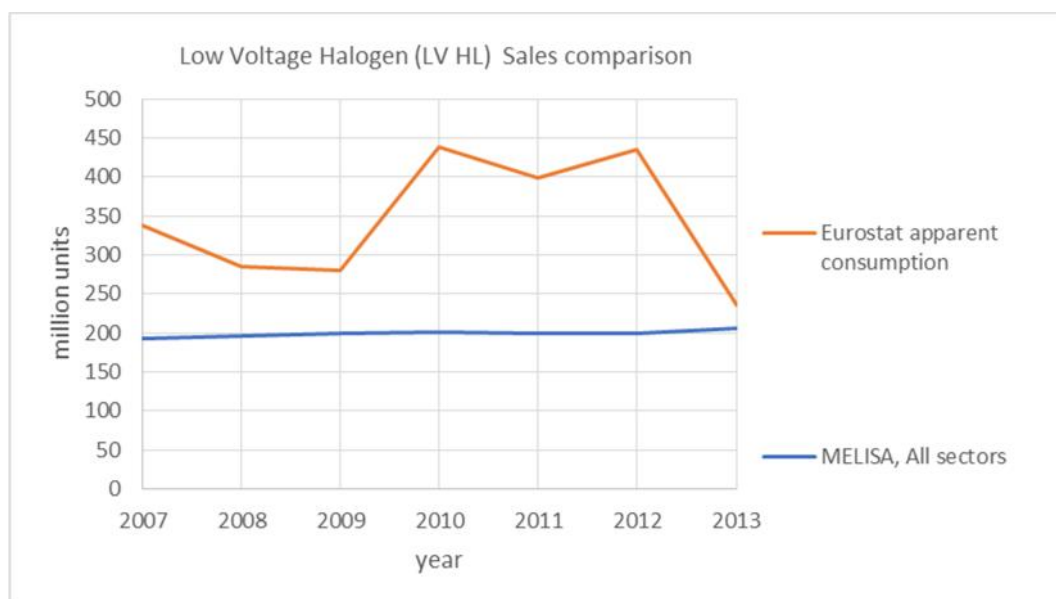


Figure 48: Eurostat low voltage halogen (LV-HL) sales compared to MELISA LV-HL lamp sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013.

Figure 49: Eurostat apparent sales for **CFL** are relatively close to those used in MELISA. In 2013 the difference is 14 % (395 vs. 342 million units). The LightingEurope data summed to the Eurostat Imports are somewhat higher (not shown).

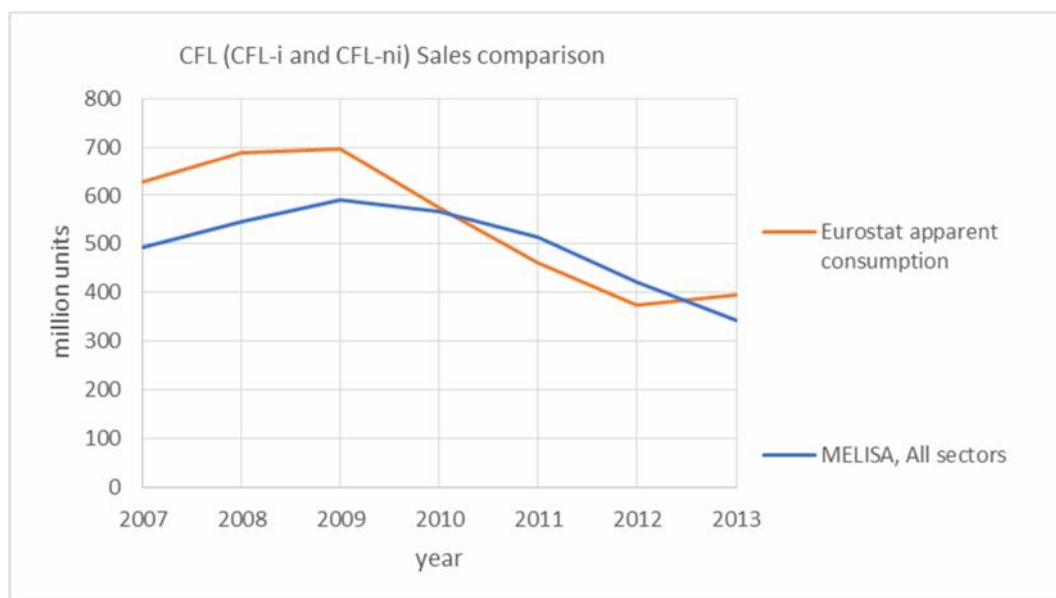


Figure 49: Eurostat CFL sales compared to MELISA CFL sales (sum of CFLi and CFLni), EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013.

Figure 50: Eurostat apparent sales for **LFL** show a large variability in the years, and differ significantly from those used in MELISA. In 2013 the difference is 34 % (466 vs. 344 million units). The MELISA

sales for LFL are relatively close to those from LightingEurope summed to the Eurostat Imports (not shown).

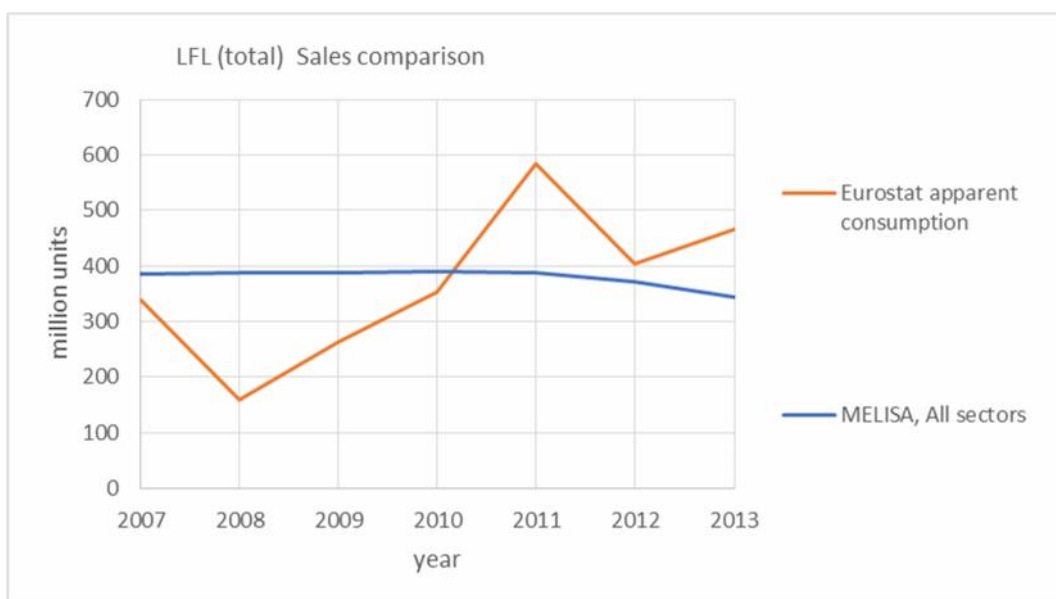


Figure 50: Eurostat LFL sales compared to MELISA LFL sales, EU-28 totals, All sectors (Residential and Non-Residential), for years 2007-2013.

### C.18 Eurostat EU-28 data 1995-2013 for Magnetic Ballasts

Magnetic ballast year	EU-15												EU-28						
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	116	132	143	169	157	202	226	334	498	615	639	782	803	787	635	798	900	672	600
Import Quantity (mln units)	18	13	16	19	46	50	25	16	114	106	97	193	118	111	60	56	39	39	32
Export Quantity (mln units)	40	49	57	49	35	43	55	60	48	54	49	47	46	37	29	32	32	33	30
Apparent Sales (mln units)	94	96	102	139	168	209	196	290	564	667	687	928	874	860	667	822	907	678	602
Production Value (mln euro)	272	297	335	332	302	404	443	433	380	370	320	339	389	373	271	328	328	263	238
Import Value (mln euro)	6	20	16	20	18	33	35	42	33	34	34	34	44	46	29	50	48	49	34
Export Value (mln euro)	82	100	107	105	74	106	144	112	110	136	112	103	104	101	73	88	110	112	106
Apparent Sales (mln euro)	196	216	243	248	246	331	335	362	303	268	242	270	329	317	227	291	266	200	165
Production Value (euro/unit)	2.34	2.26	2.35	1.96	1.93	2.01	1.96	1.30	0.76	0.60	0.50	0.43	0.48	0.47	0.43	0.41	0.36	0.39	0.40
Import Value (euro/unit)	0.35	1.50	0.98	1.06	0.38	0.65	1.42	2.60	0.29	0.32	0.35	0.18	0.37	0.41	0.49	0.89	1.22	1.24	1.06
Export Value (euro/unit)	2.03	2.03	1.89	2.13	2.09	2.45	2.63	1.87	2.30	2.52	2.29	2.20	2.25	2.76	2.56	2.77	3.39	3.41	3.59
Apparent Value (euro/unit)	2.08	2.27	2.38	1.78	1.47	1.59	1.70	1.25	0.54	0.40	0.35	0.29	0.38	0.37	0.34	0.35	0.29	0.29	0.27

Table 50: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Magnetic ballast (27115013).

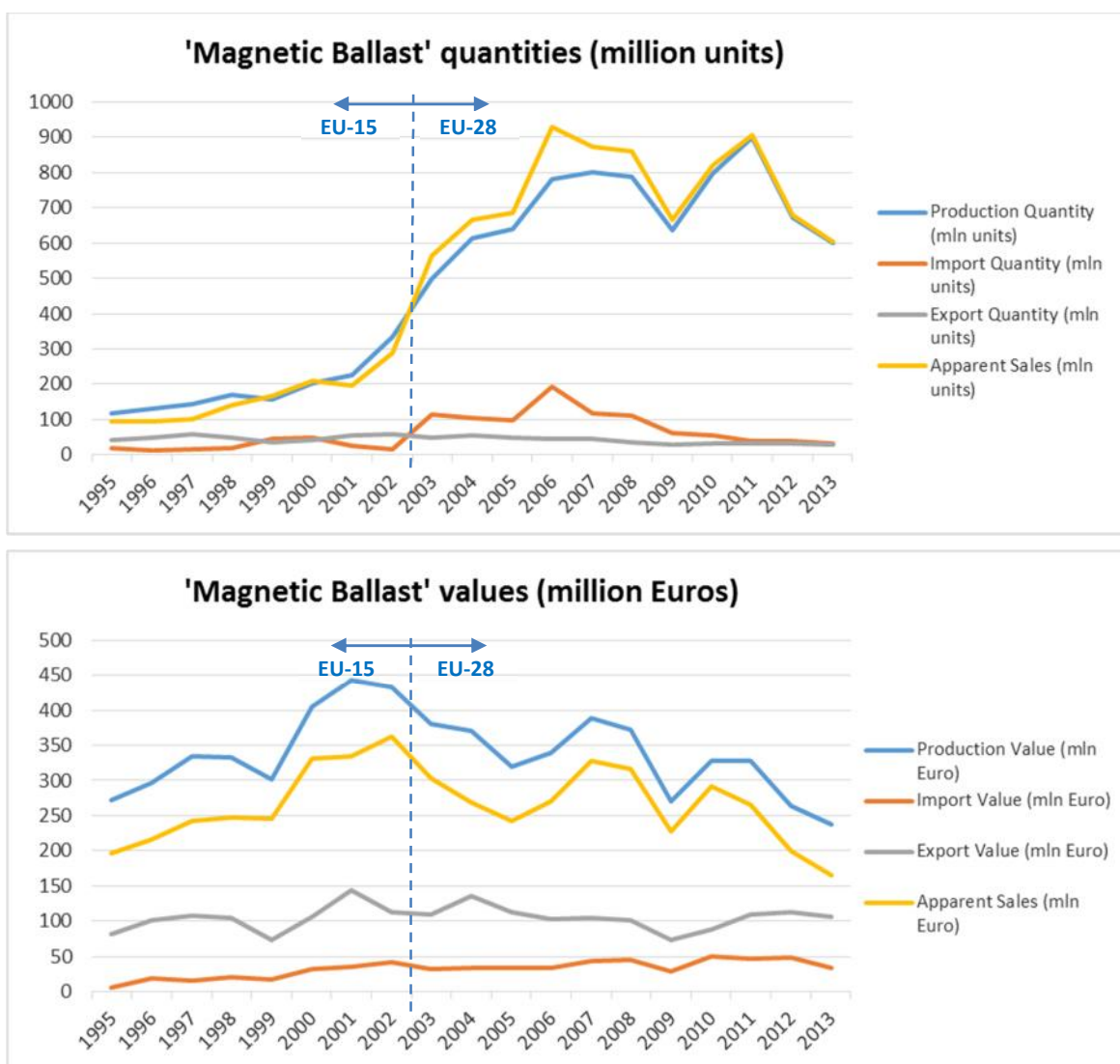


Figure 51: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Magnetic ballast. Top: quantities; bottom: monetary value.

### C.19 Eurostat EU-28 data 1995-2013 for Electronic Ballasts

Electronic ballast year	EU-15								EU-28										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production Quantity (mln units)	15	87	112	121	138	116	112	134	66	66	84	78	81	73	67	69	59	54	46
Import Quantity (mln units)	38	31	49	46	35	23	26	35	54	66	65	98	98	70	44	62	71	60	54
Export Quantity (mln units)	13	18	28	28	44	33	30	44	22	27	23	27	30	30	24	28	30	31	31
Apparent Sales (mln units)	39	100	133	140	130	106	109	126	98	105	125	149	149	113	87	103	100	82	68
Production Value (mln euro)	208	313	331	395	425	305	307	295	292	374	373	399	432	436	465	535	516	475	461
Import Value (mln euro)	28	40	81	117	119	137	163	189	124	129	141	200	215	240	204	264	330	292	278
Export Value (mln euro)	39	54	69	96	143	162	154	189	162	175	154	208	207	195	159	204	205	195	187
Apparent Sales (mln euro)	196	300	342	416	402	280	315	294	253	328	360	391	439	482	510	595	641	572	553
Production Value (euro/unit)	14.33	3.60	2.96	3.25	3.08	2.64	2.74	2.19	4.41	5.70	4.46	5.14	5.32	5.99	6.97	7.78	8.80	8.84	10.12
Import Value (euro/unit)	0.73	1.31	1.65	2.52	3.40	5.88	6.15	5.34	2.31	1.95	2.18	2.03	2.19	3.44	4.65	4.23	4.62	4.87	5.17
Export Value (euro/unit)	3.05	2.96	2.48	3.46	3.28	4.85	5.15	4.30	7.46	6.61	6.59	7.59	6.89	6.55	6.68	7.17	6.92	6.22	5.97
Apparent Value (euro/unit)	5.01	3.01	2.57	2.97	3.10	2.65	2.90	2.34	2.59	3.11	2.88	2.63	2.94	4.27	5.88	5.79	6.38	6.94	8.11

Table 51: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013, Electronic ballast (27115015).

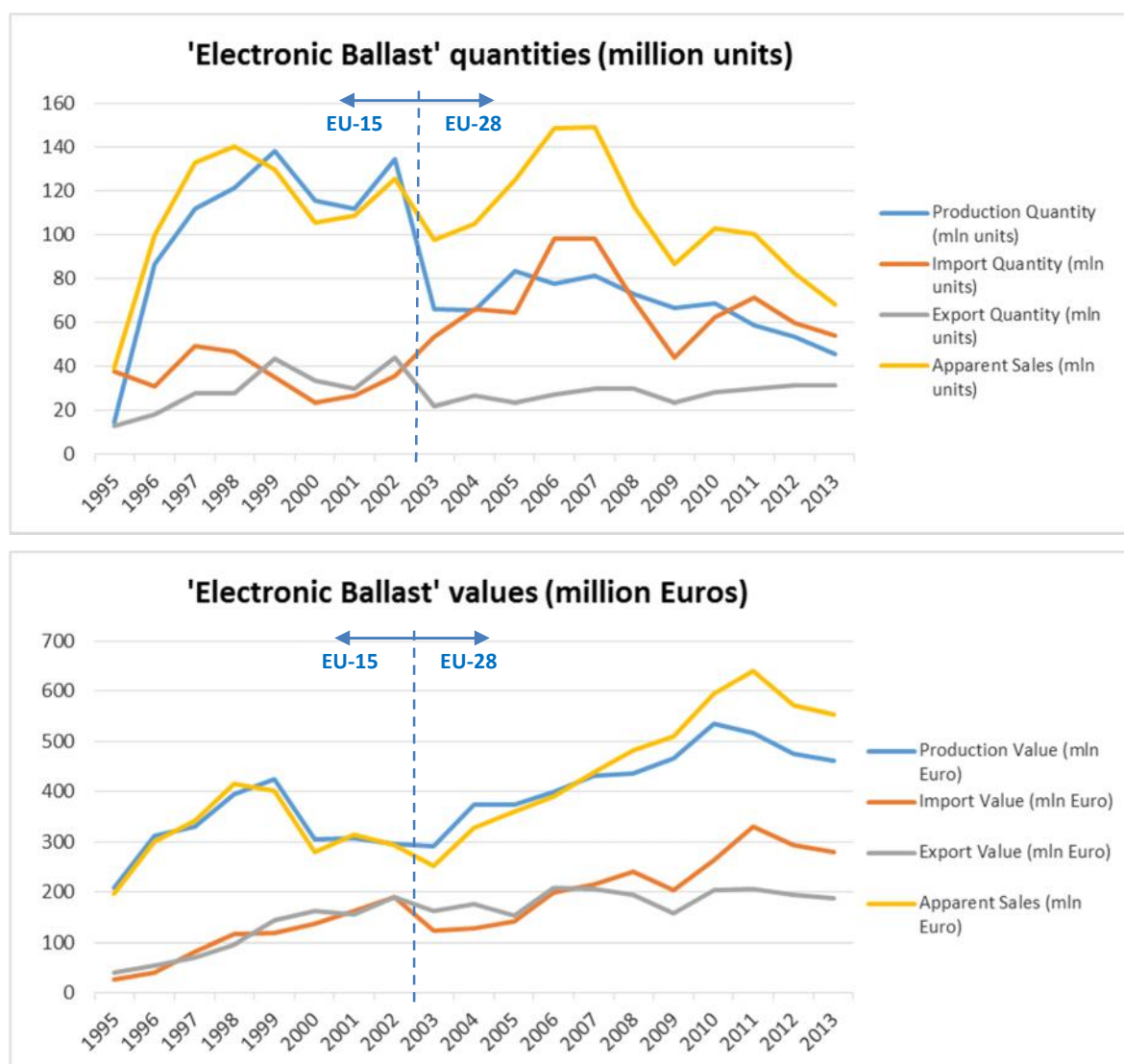


Figure 52: Eurostat EU-15 data 1995-2002 and EU-28 data 2003-2013 for Electronic ballast. Top: quantities; bottom: monetary value.

## Annex D. SALES DATA FROM GfK

### D.1 Introduction to GfK data

GfK ('Gesellschaft für Konsumforschung') is an institute for market research based in Germany and now represented in more than 100 countries <sup>49</sup>.

Recently the study team obtained GfK sales data for light sources. Since September 2014 these data are also available in the public domain <sup>50</sup>. The data have been gathered in Austria, Belgium, France, Germany, Great Britain, Italy and Netherlands for the years 2007-2013, and in Poland and Spain for the years 2011-2013.

GfK data cover mainly domestic sales (light sources for residential use).

GfK estimates that, in the countries covered, the data represent on average 70% of the overall market in all years reported, but this estimate of market coverage might be less reliable for earlier years. The estimated coverage by each market is shown below:

#### Estimated Coverage (2007-2013)

- Austria	75%
- Germany	75%
- France	85%
- Italy (no data for 2007, assumes identical to 2008)	85%
- Belgium	40%
- Netherlands	40%
- Great Britain	85%

#### Estimated Coverage (2011-2013)

- Spain	80%
- Poland	65%

GfK also suggests that market coverage for LED lamps is likely to be different from that of other lamps as this is a new technology, which is sold through specialist channels more often than standard lamps. While the exact variation in LED market coverage is unknown, GfK states that the volume share of LED is around 5% for Europe, 9% in Germany, 5% in France, and 3% in Great Britain and Italy. However, LED sales are reported to be growing sharply in all countries.

An interesting aspect of the GfK data is that they also provide insight in the distribution of the sales over various wattage ranges, thus enabling an estimate of the average installed powers. Data regarding the average efficacy (lumens/Watt) of the lamps are also reported. These topics will be further addressed in the Task 3 report. In this Annex attention is focused on the sales volumes.

Figure 53 provides an overview of the lamp sales as measured by GfK and as reported by the 4E mapping document <sup>50</sup>. These data are not directly valid for the entire EU-28 market (see data scaling below) but they confirm the trends also observed in other data sources:

- A decrease in the sales of incandescent lamps (GLS),
- An increase in the sales of mains voltage halogen lamps (MV-HL)
- An initial increase and following decrease of CFLi with peak around year 2011.

<sup>49</sup> <http://www.gfk.com/de/Seiten/default.aspx>

<sup>50</sup> "4E Mapping Document, European Union, Domestic Lighting". Available through: <http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=5> together with other supporting material.



- A general decrease in the overall quantity of lamp sales.

For more detailed information per lamp type, see the reference.

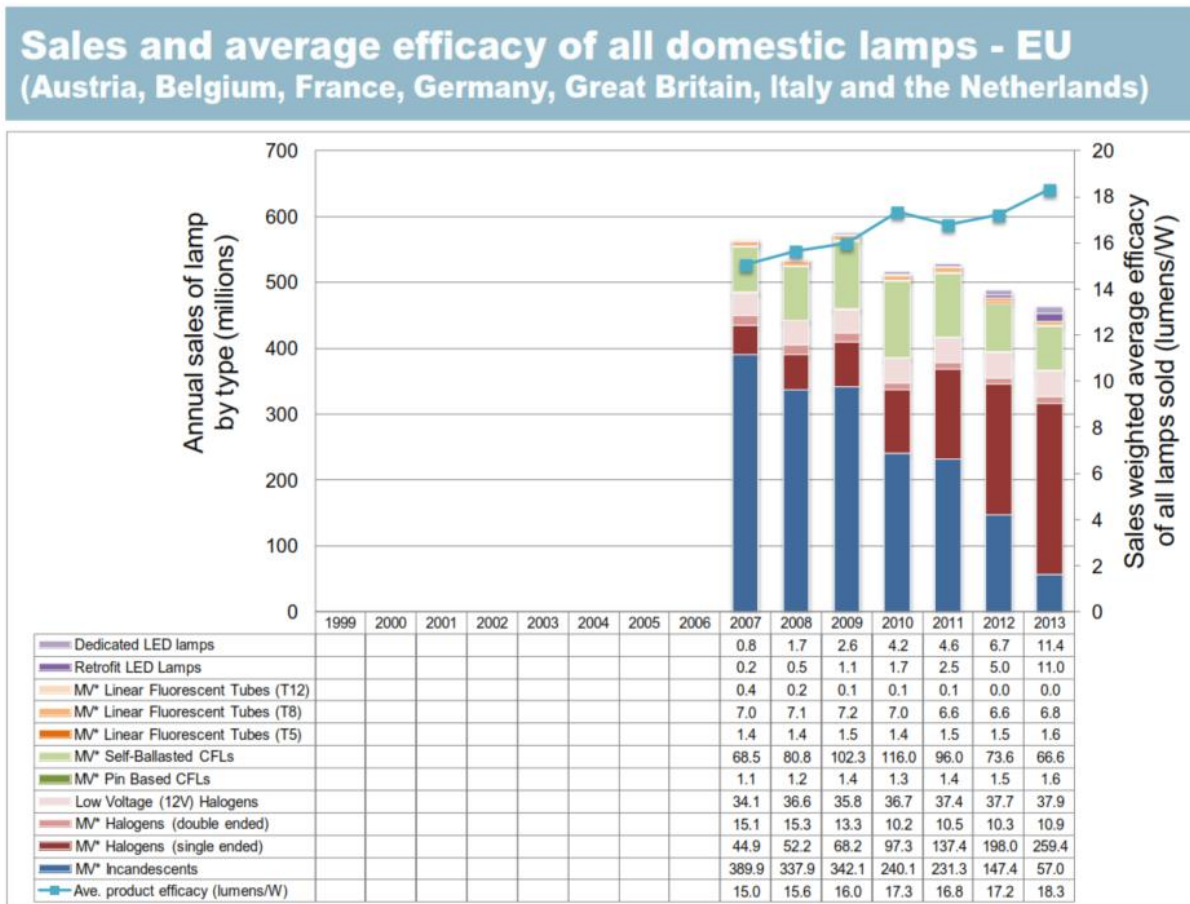


Figure 53: GfK data regarding the sales volumes and average efficacies (lm/W) of lamps in selected European countries, as reported in the “4E Mapping document, European Union, Domestic Lighting”<sup>50</sup>. These data are NOT valid for the entire EU-28 and mainly cover domestic lighting, see text.

## D.2 Elaboration of GfK data

GfK sales data are useful in particular for a comparison with the residential sales data from MELISA (see par. 2.2), but to enable such a comparison they have to be scaled-up to EU-28 level first. This scaling involves two aspects:

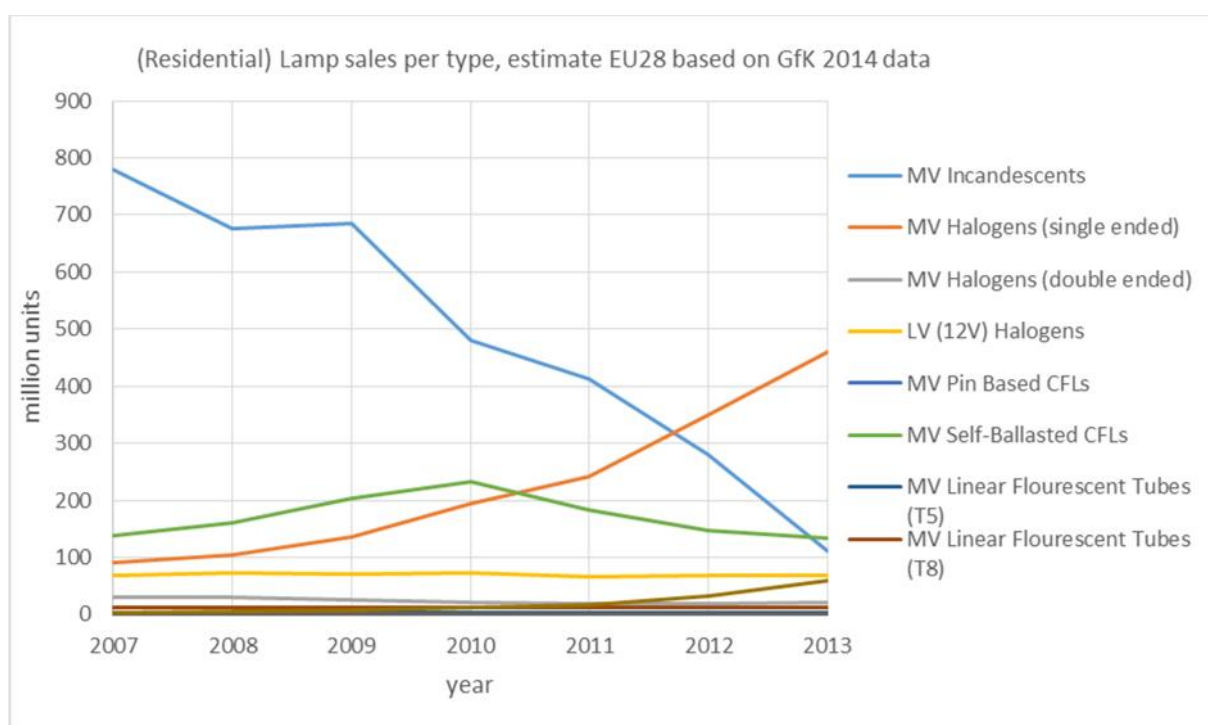
- For the countries considered in the GfK survey, scale from the coverage percentage estimated for these countries to the full sales for these countries.
- From the countries considered in the GfK survey, scale to all countries of the EU-28.

If GfK covered X% of the sales in a country, it is as if sales to X% of the households/persons/GDP were covered. The two scaling aspects can then be integrated in one, using as the part of the EU-28 sales assumed covered by GfK:

$$\frac{\sum_{GfK\ countries} (Country\ Households * Country\ Coverage\ by\ GfK)}{\sum_{EU28} (Country\ Households)}$$

or similar, replacing the number of Households by the number of Persons or by the country GDP.





**Figure 54: Lamp sales (million units) per type, for years 2007-2013, estimate for entire EU-28, based on GfK 2014 data. Coverage is mainly residential sales.**

Comparing these data with those contained in MELISA for the Residential sector, the relative values (GfK derived data / MELISA data) of Table 53 appear:

Relative values: GfK-derived data / MELISA data (%)							
	2007	2008	2009	2010	2011	2012	2013
MV incandescent lamps	65%	65%	88%	86%	112%	117%	87%
MV halogens (single ended)	65%	49%	48%	60%	69%	89%	109%
MV halogens (double ended)	57%	71%	70%	57%	60%	61%	68%
LV (12V) halogens	44%	47%	45%	46%	42%	44%	42%
MV pin based CFLs (CFLni)	9%	9%	10%	9%	13%	15%	17%
MV self-ballasted CFLs (CFLi)	54%	58%	67%	81%	71%	71%	82%
MV LFL tubes (all types)	64%	62%	64%	61%	57%	63%	69%
LED total		262%	193%	152%	110%	108%	89%
<b>TOTAL all lamp types</b>	<b>61%</b>	<b>60%</b>	<b>71%</b>	<b>72%</b>	<b>78%</b>	<b>83%</b>	<b>86%</b>

**Table 53: Relative GfK lamp sales quantity data for the residential sector: estimate EU-28 based on GfK 2014 data / MELISA data.**

It can be concluded from this table that in 2013 for the most important residential lamp types (incandescent lamps, single-ended MV-halogens, self-ballasted CFLi, and LEDs) the MELISA sales values are generally close to those derived from GfK data, with a maximum deviation of 18% for CFLi.

The main exception is LV-halogens where GfK-derived data are only 42% of sales quantities used in MELISA. The same difference appears for all years. This could be an indication that the current

MELISA estimate for the residential fraction of overall LV-halogen sales is too high, i.e. maybe more LV-halogens should be shifted to the non-residential sector.

Deviations are also higher for double-ended MV-HLs (2013 GfK sales 68% of MELISA sales) but for this lamp type the quantities are small, so higher errors are acceptable.

The same remark holds for LFL (2013 GfK sales 68% of MELISA sales). In addition, these lamps are not typical for residential use.

The highest deviation is for CFLni where GfK derived data are only 17% of the MELISA data. Also here, quantities of these lamps in the residential sector are low and these lamps are not typical for residential use. It may be that the GfK monitoring did not include the correct sales channels to capture these lamp sales. It might also be that the MELISA estimate regarding the part of CFLni being used in domestic applications is too high.

## Annex E. SALES DATA FROM MCKINSEY

### E.1 Introduction

In its 2012 report “Lighting the way”<sup>53</sup>, McKinsey & Company provide an analysis of the global lighting market. The report contains annual sales volumes (quantities) and market values for new installations (fixtures, containing light sources) and for replacement of light sources. Most of these data are subdivided per sector (residential, office, industrial, shop/retail, hospitality, outdoor, architectural) and per light source technology type (incandescent, halogen, HID, LFL, CFL, LED retrofit and LED full). The data are provided for the years 2011 and 2012 with forecasts for 2016 and 2020. Most data are provided on a global level, i.e. for the entire world.

Some data are also supplied per continent (Europe, North America, Asia (and Pacific), Middle East and Africa, Latin America) and for some major developing countries (Brazil, Russia, India, China), but unfortunately this regional breakdown is reported only in terms of market value, not in terms of sales quantities.

In addition, McKinsey does not define exactly what ‘Europe’ includes, but there is a (somewhat hidden) footnote in par. 3.2 of the report that states that ‘*Europe includes both Western and Eastern Europe. Eastern Europe includes the Commonwealth of Independent States*’. The study team has assumed that this applies to all tables in the report, and it implies that ‘Europe’ for McKinsey is considerably larger than the EU-28, including e.g. also the Russian Federation and the other ex-Soviet republics.

Another complication, for the current study, is that McKinsey distinguishes a ‘light source replacement market’ and a ‘luminaire market’. The former is directly of interest for the study, but the latter also includes a share that regards the light sources sold together with the luminaires. Unfortunately, that share is reported only at the global level.

As the McKinsey data are certainly interesting, the study team elaborated the data in an attempt to derive the information relevant for EU-28.

### E.2 Data elaboration on Lighting Market Values

In Appendix B of its report, tables 3 and 4, McKinsey provides general lighting<sup>54</sup> market value data for Europe and for Russia. As specified above, for McKinsey ‘Europe’ includes more countries than targeted in this study, so an attempt has been made to reduce the McKinsey data for ‘Europe’ to EU-28 data.

To enable this reduction it has been assumed that McKinsey’s ‘Europe’ includes<sup>55</sup>:

- (1) EU-28 countries
- (2) Iceland, Liechtenstein, Norway, Switzerland, Montenegro, former rep. Macedonia, Serbia, Albania, Bosnia and Herzegovina, (and Kosovo).
- (3) Belarus, Moldova, Ukraine, Georgia
- (4) Armenia, Azerbaidjan, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan
- (5) Russian Federation.

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<sup>53</sup> “Lighting the way: Perspectives on the global lighting market”, McKinsey & Company, second edition, August 2012. This is an update of the earlier report of 2011.

<sup>54</sup> Excludes automotive lighting and backlighting; includes luminaires and lighting controls

<sup>55</sup> It has also been assumed that Turkey is NOT part of McKinsey’s ‘Europe’.

The data for Russia are directly available from McKinsey. The countries of groups (3) and (4) are ex-Soviet republics assumed to be counted by McKinsey as belonging to the Commonwealth of Independent States, and thus included in the European data. For countries (3) and (4) it has been assumed that their lighting market is similar to the Russian market. Together these countries have approximately the same population as Russia (144 million) but only about one-third of the Russian GDP (1.55E6 million euros). As suggested by McKinsey, the light sources replacement market essentially depends on population while the new lighting market is closer related to GDP.

Therefore, in a first step, the McKinsey European data have been cleared from the contributions of countries (3), (4) and (5) by subtracting McKinsey's Russian data <sup>56</sup> multiplied by 2.0 for the light source replacement market, and multiplied by 1.33 for the new lighting market (luminaires and control systems).

The countries of group (2) account for 5.9% of the population of EU-28 + group (2), and for 6.8% of the GDP. Therefore, in a second step, the contribution of these countries has been removed from the data by subtracting 6% from all values (both new market and replacement market).

The result of these elaborations is presented in Table 54. For years 2011, 2012, 2016 and 2020 the table provides the value (million euros) for the EU-28 general lighting market <sup>57</sup>. Two subdivisions are shown: one per technology type (*italic text*) and the other per market type (luminaire market (new sales), light source replacement market, control system market; last three lines in the table). The subdivision per technology type is for the market exclusive lighting control systems, but covers both the luminaire market (new sales) and the replacement market. Based on these data derived from McKinsey (2012):

- The EU-28 general lighting market is expected to grow from 13 billion euros in 2011 to 16 billion in 2020.
- Approximately 78% of the market value comes from new sales (luminaire market, includes light sources, control gear and fixtures).
- The share of the light source replacement market decreases from 18% in 2011 to 9% in 2020.
- The share of the control system market increases from 4% in 2011 to 13% in 2020.
- By 2020 the value share of LED lighting in the total market is expected to be 73%.

In the same way as done above, the European sector data <sup>58</sup>, reported by McKinsey in tables 5 and 6 of its report, can be reduced to the EU-28. The results of this elaboration are shown in Table 55. Based on these data derived from McKinsey (2012):

- The residential lighting market accounts for slightly less than half of the total market. A slight loss of market value share from 49% in 2011 to 44% in 2020 is predicted.
- The value shares of the outdoor and office sectors slightly increase from 2011 to 2020.
- For other sectors, the market value share is constant throughout the years.

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<sup>56</sup> The market value for Russia is 7% - 9% of the total European market.

<sup>57</sup> The market value for McKinsey is the number of units sold times the ASP. Most likely ASP is Average Selling Price, but the abbreviation is not explained and no exact definition could be found in the report.

<sup>58</sup> The meaning of the sectors is quite intuitive. See Appendix A of the McKinsey report for a formal definition.

<b>Estimate for EU-28</b>		2011	2012	2016	2020		2011	2012	2016	2020
<b>total general lighting market</b>	<b>m €</b>	<b>12964</b>	<b>13730</b>	<b>15696</b>	<b>16308</b>					
excl. lighting control systems	m €	12434	13102	14508	14141					
<i>incandescent</i>	m €	1914	1533	303	0	%	15%	12%	2%	0%
<i>halogen</i>	m €	2039	2148	1952	893	%	16%	16%	13%	6%
<i>HID</i>	m €	1859	1958	1608	669	%	15%	15%	11%	5%
<i>LFL</i>	m €	3053	3026	2559	1787	%	25%	23%	18%	13%
<i>CFL</i>	m €	2421	2420	1292	521	%	19%	18%	9%	4%
<i>LED</i>	m €	1149	2017	6793	10272	%	9%	15%	47%	73%
Luminaire market	m €	10107	10655	12246	12637	%	78%	78%	78%	77%
Light Source replacement market	m €	2327	2447	2263	1504	%	18%	18%	14%	9%
Control system market	m €	530	629	1188	2166	%	4%	5%	8%	13%

**Table 54: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey. Subdivision per technology type and per market type. The subdivision per technology type is for the market exclusive lighting control systems, but covers both the luminaire market (new sales) and the replacement market.**

		2011	2012	2016	2020		2011	2012	2016	2020
<b>Estimate for EU-28</b>	<b>m €</b>	<b>12964</b>	<b>13730</b>	<b>15696</b>	<b>16308</b>					
Residential	m €	6360	6547	7135	7225		49%	48%	45%	44%
Hospitality	m €	878	941	1035	1078		7%	7%	7%	7%
Outdoor	m €	1242	1354	2008	2080		10%	10%	13%	13%
Office	m €	1686	1872	2219	2582		13%	14%	14%	16%
Architectural	m €	556	594	654	729		4%	4%	4%	4%
Shop/retail	m €	1123	1243	1380	1303		9%	9%	9%	8%
Industrial	m €	1122	1179	1264	1309		9%	9%	8%	8%

**Table 55: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey, showing the subdivision per application sector.**

In Appendix B, table 2, of the McKinsey 2012 report a subdivision of the global lighting market in sectors is provided, with a further subdivision for each sector in technology types and market types. The study team elaborated an EU-28 version that is shown in Table 56. In a first step, this table was created by scaling the global sector values down to the EU-28 sector values of Table 55, and assuming that the McKinsey percent subdivisions of the global level also apply at EU-28 level. In this way however the sector contributions for the individual technology types and market types did not sum up to the total values of Table 54. While trying to stay as close as possible to the initial data, all values were adapted manually until all totals matched, so that the three tables are now consistent. The following points can be highlighted:

- In most sectors, the market value share for LED lighting is estimated to be at least 70% by 2020 (with peaks up to 91% for the architectural sector), but for two sectors a slower introduction of LEDs is predicted: 52% in 2020 for the office sector and 40% for the industry sector.
- In general the light source replacement market decreases from 2011 to 2020 while the lighting control systems market increases in the same period. In 2020 the largest market value share for lighting control is found in the office sector (34%).

<b>EU-28 (estimate)</b>		2011	2012	2016	2020		2011	2012	2016	2020
<b>Residential, total market</b>	<b>m €</b>	<b>6360</b>	<b>6547</b>	<b>7135</b>	<b>7225</b>					
excluding lighting control systems	m €	6343	6523	7038	6902					
<i>incandescent</i>	m €	1761	1443	286	0		28%	22%	4%	0%
<i>halogen</i>	m €	1813	1891	1723	801		29%	29%	24%	12%
<i>HID</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>LFL</i>	m €	529	524	451	323		8%	8%	6%	5%
<i>CFL</i>	m €	1726	1713	898	390		27%	26%	13%	6%
<i>LED</i>	m €	515	951	3680	5386		8%	15%	52%	78%
Luminaire market	m €	5162	5317	5970	6315		81%	81%	84%	87%
Light source replacement market	m €	1181	1206	1068	587		19%	18%	15%	8%
Lighting control system market	m €	17	24	97	324		0%	0%	1%	4%
<b>Office, total market</b>	<b>m €</b>	<b>1686</b>	<b>1872</b>	<b>2219</b>	<b>2582</b>					
excluding lighting control systems	m €	1452	1591	1724	1699					
<i>incandescent</i>	m €	15	0	0	0		1%	0%	0%	0%
<i>halogen</i>	m €	45	52	44	25		3%	3%	3%	1%
<i>HID</i>	m €	33	37	37	15		2%	2%	2%	1%
<i>LFL</i>	m €	1014	1023	959	707		70%	64%	56%	42%
<i>CFL</i>	m €	240	244	156	65		17%	15%	9%	4%
<i>LED</i>	m €	104	234	527	888		7%	15%	31%	52%
Luminaire market	m €	1207	1312	1447	1446		72%	70%	65%	56%
Light source replacement market	m €	245	279	276	253		15%	15%	12%	10%
Lighting control system market	m €	234	281	496	882		14%	15%	22%	34%
<b>Retail/shop, total market</b>	<b>m €</b>	<b>1123</b>	<b>1243</b>	<b>1380</b>	<b>1303</b>					
excluding lighting control systems	m €	1068	1177	1237	1041					
<i>incandescent</i>	m €	46	24	10	0		4%	2%	1%	0%
<i>halogen</i>	m €	56	64	48	15		5%	5%	4%	1%
<i>HID</i>	m €	236	246	188	62		22%	21%	15%	6%
<i>LFL</i>	m €	497	491	322	172		47%	42%	26%	17%
<i>CFL</i>	m €	144	149	73	23		13%	13%	6%	2%
<i>LED</i>	m €	90	203	596	768		8%	17%	48%	74%
Luminaire market	m €	850	941	1035	922		76%	76%	75%	71%
Light source replacement market	m €	219	236	202	120		19%	19%	15%	9%
Lighting control system market	m €	54	66	144	262		5%	5%	10%	20%
<b>Hospitality, total market</b>	<b>m €</b>	<b>878</b>	<b>941</b>	<b>1035</b>	<b>1078</b>					
excluding lighting control systems	m €	847	904	955	906					
<i>incandescent</i>	m €	81	55	8	0		10%	6%	1%	0%
<i>halogen</i>	m €	114	129	123	53		14%	14%	13%	6%
<i>HID</i>	m €	19	21	10	8		2%	2%	1%	1%
<i>LFL</i>	m €	264	262	188	59		31%	29%	20%	7%
<i>CFL</i>	m €	261	272	149	32		31%	30%	16%	3%
<i>LED</i>	m €	107	166	477	755		13%	18%	50%	83%
Luminaire market	m €	640	678	752	816		73%	72%	73%	76%
Light source replacement market	m €	207	226	203	91		24%	24%	20%	8%
Lighting control system market	m €	31	36	80	172		4%	4%	8%	16%
<b>Industrial, total market</b>	<b>m €</b>	<b>1122</b>	<b>1179</b>	<b>1264</b>	<b>1309</b>					
excluding lighting control systems	m €	1040	1086	1114	1097					
<i>incandescent</i>	m €	11	11	0	0		1%	1%	0%	0%
<i>halogen</i>	m €	11	12	14	0		1%	1%	1%	0%
<i>HID</i>	m €	335	358	323	207		32%	33%	29%	19%



<b>EU-28 (estimate)</b>		2011	2012	2016	2020		2011	2012	2016	2020
<i>LFL</i>	m €	596	590	533	445		57%	54%	48%	41%
<i>CFL</i>	m €	50	42	17	11		5%	4%	1%	1%
<i>LED</i>	m €	36	73	227	434		3%	7%	20%	40%
Luminaire market	m €	779	811	855	864		69%	69%	68%	66%
Light source replacement market	m €	262	275	259	233		23%	23%	20%	18%
Lighting control system market	m €	81	92	150	212		7%	8%	12%	16%
<b>Outdoor, total market</b>	<b>m €</b>	<b>1242</b>	<b>1354</b>	<b>2008</b>	<b>2080</b>					
excluding lighting control systems	m €	1224	1330	1925	1934					
<i>incandescent</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>halogen</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>HID</i>	m €	1094	1170	977	353		89%	88%	51%	18%
<i>LFL</i>	m €	64	58	55	51		5%	4%	3%	3%
<i>CFL</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>LED</i>	m €	65	103	894	1530		5%	8%	46%	79%
Luminaire market	m €	1031	1128	1692	1728		83%	83%	84%	83%
Light source replacement market	m €	193	203	233	206		16%	15%	12%	10%
Lighting control system market	m €	18	24	83	146		1%	2%	4%	7%
<b>Architectural, total market</b>	<b>m €</b>	<b>556</b>	<b>594</b>	<b>654</b>	<b>729</b>					
excluding lighting control systems	m €	462	489	515	560					
<i>incandescent</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>halogen</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>HID</i>	m €	142	125	73	24		31%	26%	14%	4%
<i>LFL</i>	m €	89	78	52	29		19%	16%	10%	5%
<i>CFL</i>	m €	0	0	0	0		0%	0%	0%	0%
<i>LED</i>	m €	232	286	391	507		50%	58%	76%	91%
Luminaire market	m €	440	466	494	545		79%	78%	76%	75%
Light source replacement market	m €	22	23	21	15		4%	4%	3%	2%
Lighting control system market	m €	93	105	139	169		17%	18%	21%	23%

**Table 56: Lighting market value data for EU-28 (million euros), as derived by the study team from data reported by McKinsey, showing the subdivision per application sector and within each sector per technology type and market type. The subdivision per technology type is for the market exclusive lighting control systems, but covers both the luminaire market (new sales) and the replacement market.**

Of particular interest for the current study is the **market for Light Sources**. This market is the combination of Replacement sales, that are explicitly presented in the tables above, and New sales, that are hidden inside the values for the Luminaire market. At global level, for the sum of all sectors, McKinsey supplies a breakdown of the Luminaire market as follows:

<b>Luminaire market breakdown (in value)</b>	<b>2011</b>	<b>2012</b>	<b>2016</b>	<b>2020</b>
% of new install that is lamp/module	9.0%	10.6%	13.7%	15.3%
% of new install that is driver	8.8%	9.2%	12.4%	15.9%
% of new install that is fixture	82.2%	80.2%	73.9%	68.8%

**Table 57: Breakdown of the luminaire market value in light sources/lamps/modules, drivers (control gears) and fixtures. According to McKinsey on global level, sum of all sectors.**

Assuming that the percent share of light sources/lamps/modules inside the Luminaire market, as presented in the table above, can also be applied to the EU-28 data, and to all sectors, the survey of Table 58 can be derived. The subdivision over the lamp technology types has been derived by applying the same shares per sector as displayed in Table 56 and then summing the sector contributions. The table can be commented as follows:

- The Light Source Replacement Market decreases from 2011 to 2020 while the New Light Source Market (light sources sold inside luminaires) increases. By 2020 the New market exceeds the Replacement market by value.
- The combined light sources market (new and replacements) shows a peak of 3.9 billion euros in 2016. Afterwards the market value is predicted to decrease.
- Comparison of the EU-28 light source market 2012 from various sources (million euros):
  - McKinsey: 3576 (as derived above by the study team)
  - Eurostat Apparent Value: 2865 (including all lamp types)  
2415 (exclusive Sealed Beam, UV IR ARC, but still includes all Discharge Other and all Filament Other)
  - MELISA model: 5439 (Industry revenue). This value seems to be on the high side. The share of consumer acquisition cost that forms industry revenue could be reconsidered during a model revision.
  - LightingEurope for EU-27: less than the above values, which is logical considering that LE has only a part of the market. LE-value could be compatible with the value derived from McKinsey data.
- (not shown in the table) The Residential light sources market value derived from McKinsey for the year 2012 is 1769 million euros. This compares fairly well to the 2268 million resulting from the MELISA model. The Non-Residential light sources market value from McKinsey for the same year is 1807 million euros, compared to 3171 million in MELISA. The market value difference signalled above consequently stems mainly from the Non-Residential sector.

<b>EU-28 Light Sources Market</b>		2011	2012	2016	2020
<b>Based on McKinsey, All Sectors</b>	<b>m €</b>	<b>3237</b>	<b>3576</b>	<b>3940</b>	<b>3439</b>
<i>incandescent</i>	<i>m €</i>	502	420	82	0
<i>halogen</i>	<i>m €</i>	536	591	531	204
<i>HID</i>	<i>m €</i>	461	507	423	181
<i>LFL</i>	<i>m €</i>	820	859	736	493
<i>CFL</i>	<i>m €</i>	643	675	357	123
<i>LED</i>	<i>m €</i>	275	523	1809	2439
Light source NEW	m €	909	1128	1678	1935
Light source REPLACEMENT	m €	2328	2447	2262	1504

**Table 58: EU-28 market for light sources/lamps/modules, as derived by the study team from McKinsey data. Sum of all sectors. Values in million euros.**

### E.3 Data elaboration on Light Source Quantities

In Appendix B, table 1, of its report McKinsey presents ASP's per light source (euro/unit). The abbreviation is not explained, but it is assumed to mean Average Selling Price. An exact definition is not provided by McKinsey but the study team assumes that these are the prices at which the manufacturer sells the light sources to OEM (luminaire manufacturers), wholesalers, installers, professional end-users or retail traders (who will resell the light sources to consumers).

These ASP's could be used to transform the light source market values presented in the previous paragraph in quantities of light sources sold (units). The problem is that McKinsey's ASP's are averages on a global level. These prices/unit are too low for EU-28 and consequently would lead to overestimate the number of units sold.

This has also been confirmed by a study of the average selling prices derived from LightingEurope data. LE-prices for EU-28 are significantly higher than the global ASP's reported by McKinsey. In addition, in the LE-data there is a clear difference between the prices/unit in Western Europe (higher) and in Central+Eastern Europe (lower). An additional consideration might be that LE represents only a part of the EU-market and it is likely that their competitors (e.g. imports from Asia) offer the light sources at lower prices.

For the derivation of the quantity of light sources sold, the study team selected two sets of unit prices for the year 2011. The set with the highest prices is based on data for EU-28 (mainly sales in Western Europe). The set with the lowest prices is based on a mix of data for Central+Eastern Europe and McKinsey's global ASP's. For years 2012, 2016 and 2020 the same price trends as reported for the McKinsey ASP's were used. The market values from Table 58 have been divided by the two sets of unit prices to produce two sets of quantities of light sources sold. These data are presented in Table 59.

Light Source unit price (€/unit)	High price set				Low price set			
	2011	2012	2016	2020	2011	2012	2016	2020
incandescent	0.28	0.28	0.31	0.33	0.21	0.21	0.24	0.25
halogen	1.00	1.03	0.98	0.83	0.88	0.91	0.86	0.73
HID	9.67	9.44	8.27	7.10	7.31	7.14	6.25	5.37
LFL	1.30	1.27	1.16	1.07	0.87	0.85	0.78	0.72
CFL	2.01	1.92	1.57	1.28	1.60	1.53	1.25	1.02
LED Lamps	11.67	9.06	5.53	4.79	7.85	6.10	3.72	3.22
<b>Light Sources sold in EU-28</b>	<b>3351</b>	<b>3211</b>	<b>2045</b>	<b>1336</b>	<b>4431</b>	<b>4248</b>	<b>2749</b>	<b>1875</b>
<b>(million units / year)</b>								
incandescent	1789	1497	261	0	2377	1989	347	0
halogen	538	573	544	245	612	651	618	279
HID	48	54	51	25	63	71	68	34
LFL	633	678	634	460	943	1010	944	685
CFL	320	351	228	96	402	441	286	121
LED	24	58	327	510	35	86	486	757
<i>Light sources NEW</i>	<i>926</i>	<i>997</i>	<i>853</i>	<i>733</i>	<i>1223</i>	<i>1318</i>	<i>1144</i>	<i>1022</i>
<i>Light sources REPLACEMENT</i>	<i>2426</i>	<i>2214</i>	<i>1192</i>	<i>603</i>	<i>3208</i>	<i>2930</i>	<i>1605</i>	<i>853</i>

**Table 59: EU-28 sales quantities for light sources/lamps/modules, as derived by the study team from McKinsey market value data and for two sets of assumed unit prices. Sum of all sectors, in million units.**

The following comments can be made regarding this table:

- On the basis of market value data for light sources derived by the study team from McKinsey data, and on the basis of two assumed sets of unit prices (one could be typical for Western Europe; the other could be typical for Central+Eastern Europe and for Imported light sources) the number of light sources sold in EU-28 in 2012 is estimated between 3211 and 4248 million units.
- In 2012 slightly less than half of the sales are (non-halogen) incandescent lamps, but these sales are predicted to drop to zero by 2020.
- By 2020 approximately 40% of the sold light sources are predicted to be LED lamps or LED modules.
- The New sales and Replacement sales reported in the table have been computed from the total sales assuming that the unit shares are the same as the value shares of Table 58.
- In general the sales of light sources are predicted to decrease by 60% from 2011 to 2020. The largest part of this decrease comes from replacement sales. By 2020 the quantity of New sales (mainly light sources sold inside luminaires) exceeds the quantity of Replacement sales.
- Comparison of the EU-28 light source sales quantities 2012 from various sources (million units):
  - McKinsey: 3211-4248 (as derived above by the study team)
  - Eurostat Apparent Consump.: 2937 (including all lamp types)  
2883 (exclusive Sealed Beam, UV IR ARC, but still includes all Discharge Other and all Filament Other)
  - MELISA model: 1889 (This seemingly low value compared to the other data sources mainly derives from the estimated sales for incandescent lamps (GLS). The estimate derived from McKinsey data gives 1497-1989 million units, while the MELISA model and Eurostat give 299 million. LE-sales are slightly higher than MELISA data, but the order of magnitude is the same. The GLS data derived from McKinsey are judged as much too high.)
  - LightingEurope: (Confidential, but lower than the other values because LE represents only a share of the total market. However, McKinsey derived data seem too high compared to the LE-quantity.)