
Luminaire efficiency: what mandatory and voluntary labels achieve, and what they should achieve in the future

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Topten International Services TIS



8th International Conference on Energy Efficiency
in Domestic Appliances and Lighting – EEDAL'15
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About Topten

Topten shows the most energy efficient products...
...in 16 European countries and China...
...for free...
...based on neutral technical criteria that are tightened as the market develops...
...thereby creating a dynamic benchmark for the best available technology (BAT)
...and helping manufacturers, buyers and policy makers in recognizing the best products.

The screenshot shows the homepage of topten.eu, titled "Best Products of Europe". The header includes navigation links: "About us", "Partners", "Info", "Contact", and "Sitemap", along with a search bar. Below the header is a row of product category images: Cars, Household, Lighting, Office Equipment, Consumer Electronics, Building Components, and Professional Refrigerators. The main content area is divided into several sections:

- Best products in your country:** Features a map of Europe with 16 countries highlighted in green. Below the map is a list of countries with their respective flags: Austria, Belgium, Czech Rep., France, Germany, Italy, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and UK. A link for "China" is also present.
- News:** Contains three articles with energy efficiency icons:
 - Article 1: Discusses the future Energy Label proposal by the European Commission, mentioning an A-G scale and a database for all products. Includes a link to "more information" (July 2015).
 - Article 2: Describes the Euro-Topten Max project, an IEE-supported project allowing consumers to find the best products in 19 European countries. Includes links to "full report" and "short summary version" (June 2015).
 - Article 3: Shows market trends for refrigerators, washing machines, and tumble driers up to 2014, based on sales data. Includes links to "full report" and "short summary version" (June 2015).
- Energy efficiency for consumers, in policy and procurement:** Contains three sub-sections:
 - Topten reveals the best products in Europe:** States that Topten is a web portal guiding consumers to the most energy efficient appliances and cars in Europe, with a link to the "Euro-Topten Max report".
 - Topten documentation:** Mentions that all Topten policy recommendations and other publications related to energy efficient products can be accessed [here](#).
 - Professional procurement:** States that Topten Pro gives purchasing guidance for public procurers and other professional buyers, providing clear guidance on tender criteria to buy the most efficient product on the market.

The footer includes logos for the European Union, the European Climate Foundation, WWF, and the copyright notice "© 2015 Topten International Group".

Topten label for domestic luminaires since 2009

- Collaboration between suppliers / manufacturers, the energy efficiency project „Topten“ and the testing laboratory at HTW Chur
- Switzerland's two largest retailers, Coop (Lumimart) and Migros (Micasa), show Topten labelled products in their shops and online



Criteria for the Topten label

Technical Criteria:

- **Luminaire efficiency factor: ≥ 50 lumens per watt**
- **Standby power: ≤ 0.5 W, with in-built dimmer ≤ 1.0 W**
- **For LED: colour rendering index CRI ≥ 80**

Measurement of the luminaire is needed:

- Power in use-mode and in standby-mode (watts), power factor (-)
- Colour temperature (kelvins), colour rendering (-), colour spectrum (image file)
- Total luminous flux (lumens), light distribution curve (image and .ldt file)

Organisational:

Listing on topten.ch is free, all models for which eligibility is documented with test reports (and available on Swiss market) are listed, optional measurement at HTW Chur or other test reports can be submitted

Example of Topten list: Spots

topten.ch Der Klick zum besten Produkt! Deutsch Français Italiano

Dialog Sitemap Unsere Ziele Partner

Suche eingeben ...

Haushalt Haus Beleuchtung Büro / TV Mobilität Freizeit Ökoenergie Gewerbe

Beleuchtung

LED-Lampen
LED-Spots
Wohnleuchten
Büro-/Objektleuchten
Aussenleuchten

Wohnleuchten

Tischpendel <=100 cm
Tischpendel >100 cm
Tischpendel rund
Tischpendel >40 Watt
Pendelleuchten
Tischleuchten
Schreibtischleuchten
Leseleuchten
Stehleuchten
Säulen-Stehleuchten
Spots
Deckenleuchten
Wandleuchten

Spots

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	Lumimart	Micasa		Lumimart	Busch	Philips	Philips	Lumimart	Philips	
Marke	Lumimart	Micasa		Lumimart	Busch	Philips	Philips	Lumimart	Philips	
Modell	Oase	Glossy		Aramis 1er Spot	Athos	Zesta / Ursu	Universa / Sim	Noa	Particon / Fria	
Weitere Modelle	4.808.230, 4.808.231			2er / 3er / 4er / 6er auch in Holz und in Messing		3er	1er / 3er	3er	1er / 2er	
Kaufpreis (Fr.)	39	75		29	448	189	249	79	569	19
Stromkosten (Fr. in 15 J.)	15	15		24	27	36	39	39	69	81
Leistung (W)	5.5	7.0		10.0	11.0	16.0	17.0	17.0	30.0	35.0
Energie (kWh/Jahr)	5	5		8	9	12	13	13	23	27
Lampentyp	LED	LED	LED	FL	LED	LED	LED	FL	LED	EcoHalogen
Warmweiss	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dimmbar	x	x	x	✓	x	✓	✓	x	✓	✓
Dimmer integriert	x	x	x	x	x	x	x	x	x	x
Erhältlich bei										
Auswahlkriterien für Verkaufsstellen										

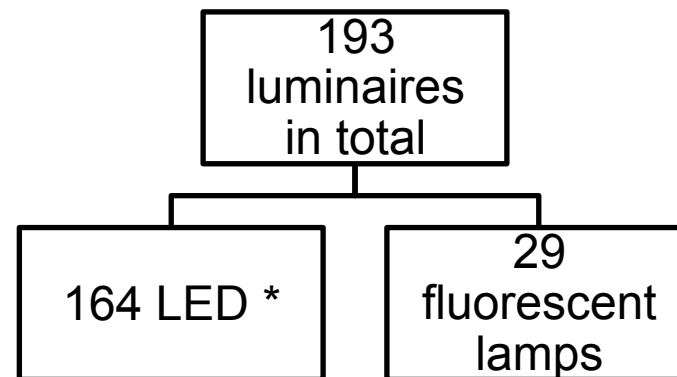
29/01/2015

WWF S.A.F.E. ewz topten.eu EKZ ROMANDE ENERGIE

3 Gründungspartner © 2015 Topten International Group

Test reports from the last 2 years

- 193 household luminaires
- Between 1.5 – 40 watts (some stray until max. 85 watts)
- No halogen or incandescent because only luminaires with chance of meeting Topten criteria are tested



* 158 built-in and 6 retrofit GU10

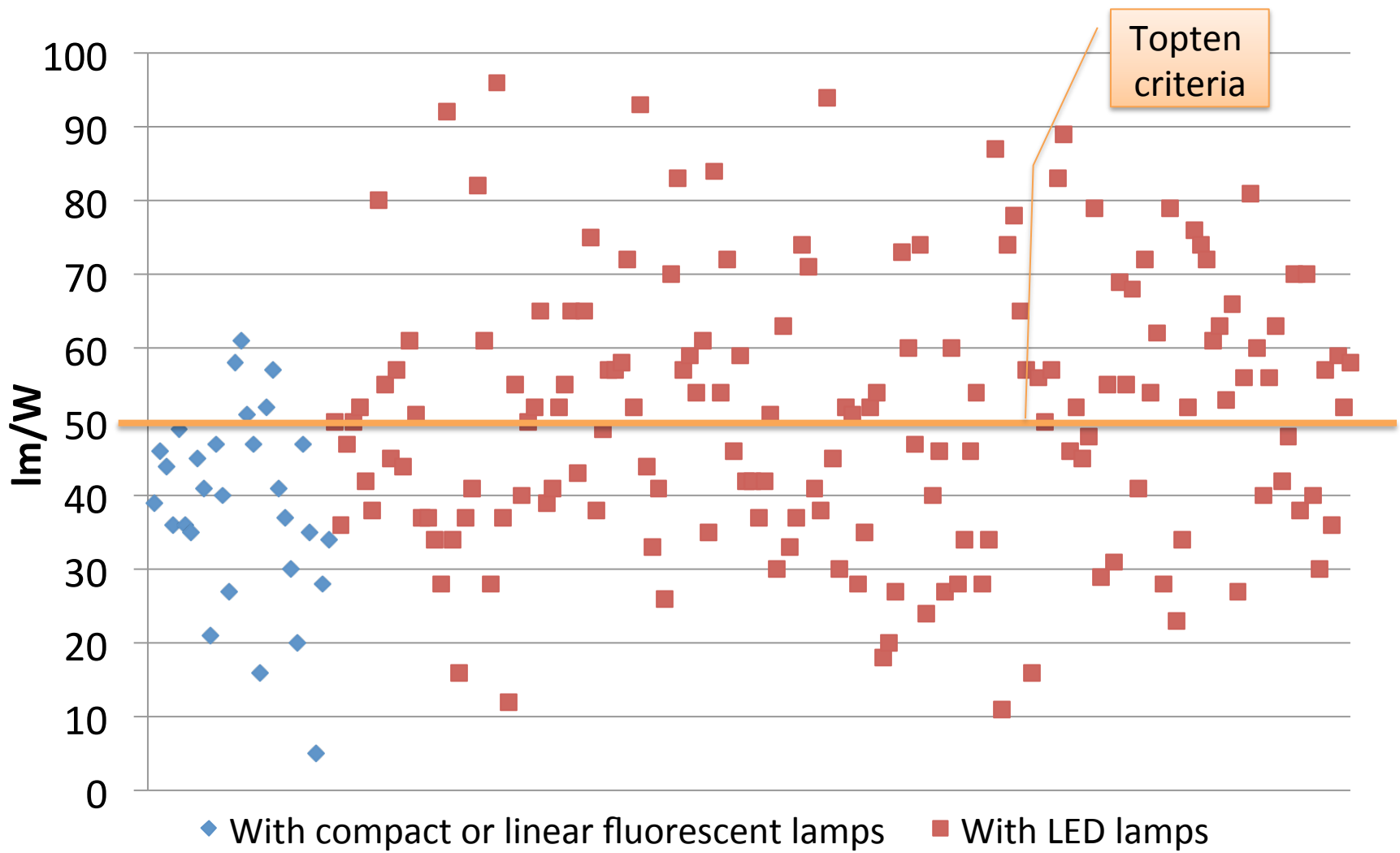
Topten or not?

87 of 193 met the Topten criteria (45%) → pre-screening of luminaires works pretty well

Where did the others fail?

Efficiency	62
CRI (colour rendering index)	25
Standby	7
Efficiency + CRI	5
Efficiency + Standby	5
CRI + Standby	2
Efficiency + CRI + Standby	0

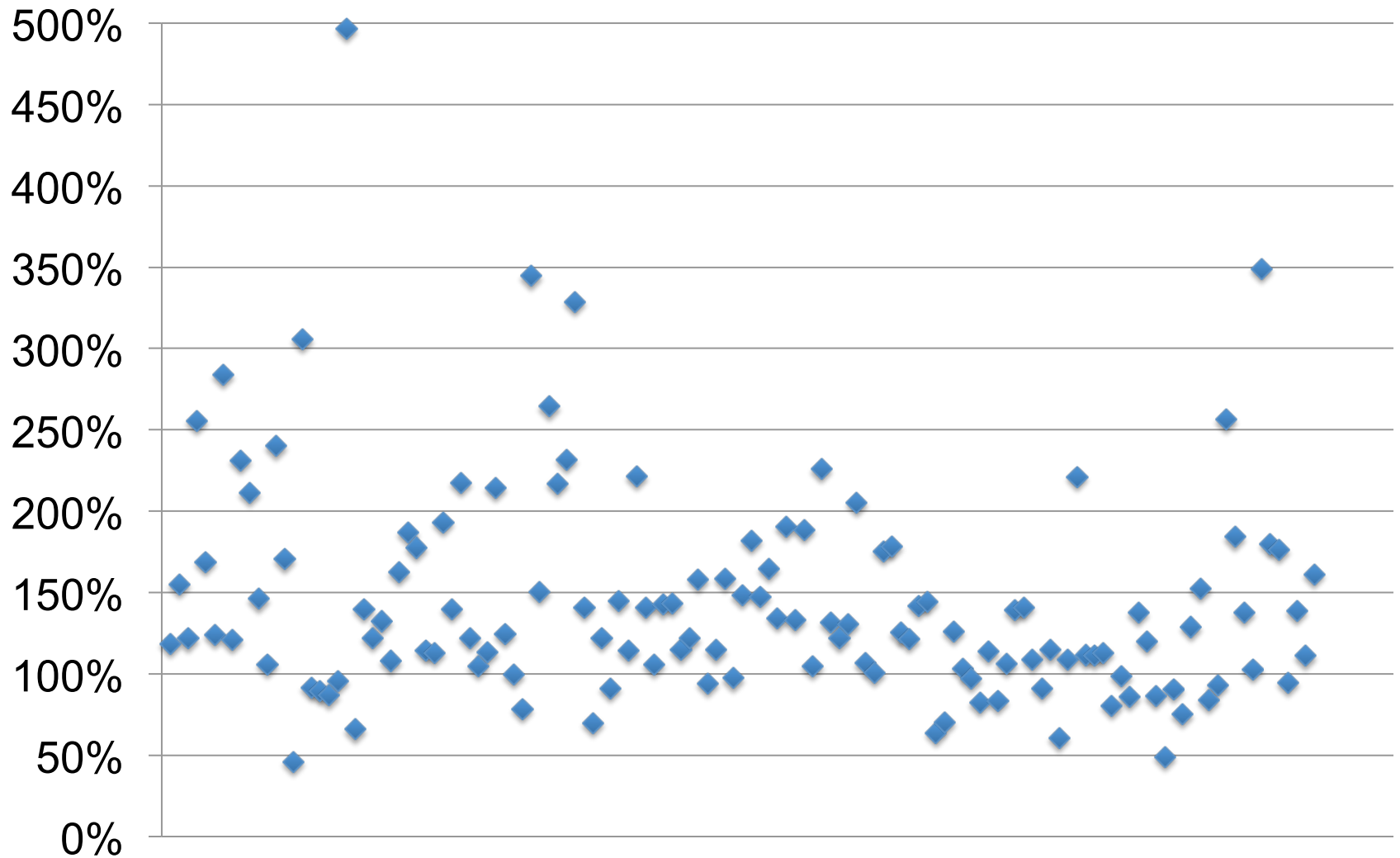
Luminaire efficiency: measured lumens per watt



Typical examples of declared values vs. measured

 LED 3x 2,5W 550 lumen warm white cool white instant 15.000h Can only be dimmed with specific dimmers see product page on www.philips.com		 Plafonniera Deckenleuchte Plafonniera LED 31,2 W, LED, ca. 3700 Lumen, ca. 2850° Kelvin CE	
On packaging: 3 x 2.5 W 550 lumens	Measured: 8.5 W (+13%) 299 lumens (-46%)	On packaging: 31.2 W ca. 3700 lumens	Measured: 31.0 W (-1%) 2463 lumens (-33%)

Declared lumens in relation to measured



Natural appearance of colours (CRI*)

- LED could be as excellent as the sun, incandescent or halogen lamps (CRI $\approx$ 100)
- Most tested LED luminaires have a good CRI at the level of fluorescent lamps (CRI $\approx$ 80) **
- Only 12 of 164 have excellent values of CRI $\geq$ 87 and R1-R15 (all 15 sample colours) $\geq$ 50 ***
- Some LED luminaires have insufficient CRI values → Retailers are advised to measure and double-check CRI (spectroradiometers are available for ca. 2000 Euros)

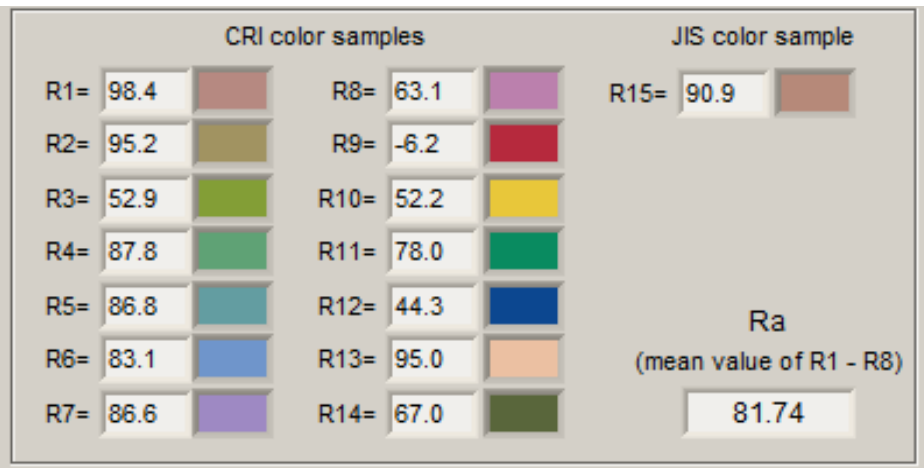
* CRI = colour rendering index

** Ecodesign requirement for LED lamps since 1 September 2013

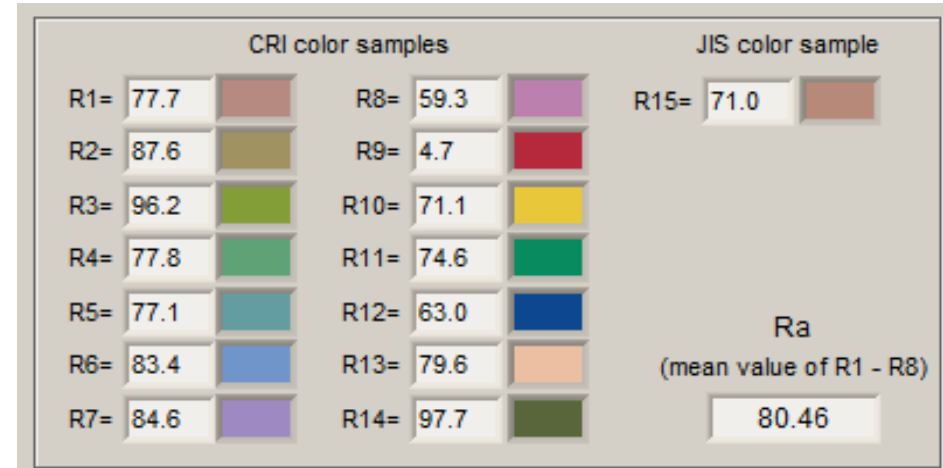
*** This is Topten's own definition of „excellent“ colour rendering

CRI

Typical fluorescent



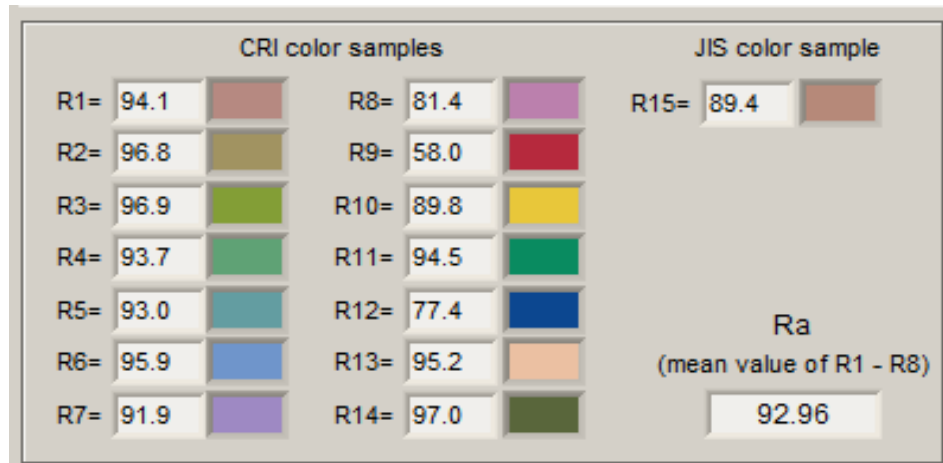
Typical LED



15 colours given, only 8 are considered to calculate CRI (average of R1 – R8)

Saturated red and blue are often critical with fluorescent and typical LED

Excellent LED



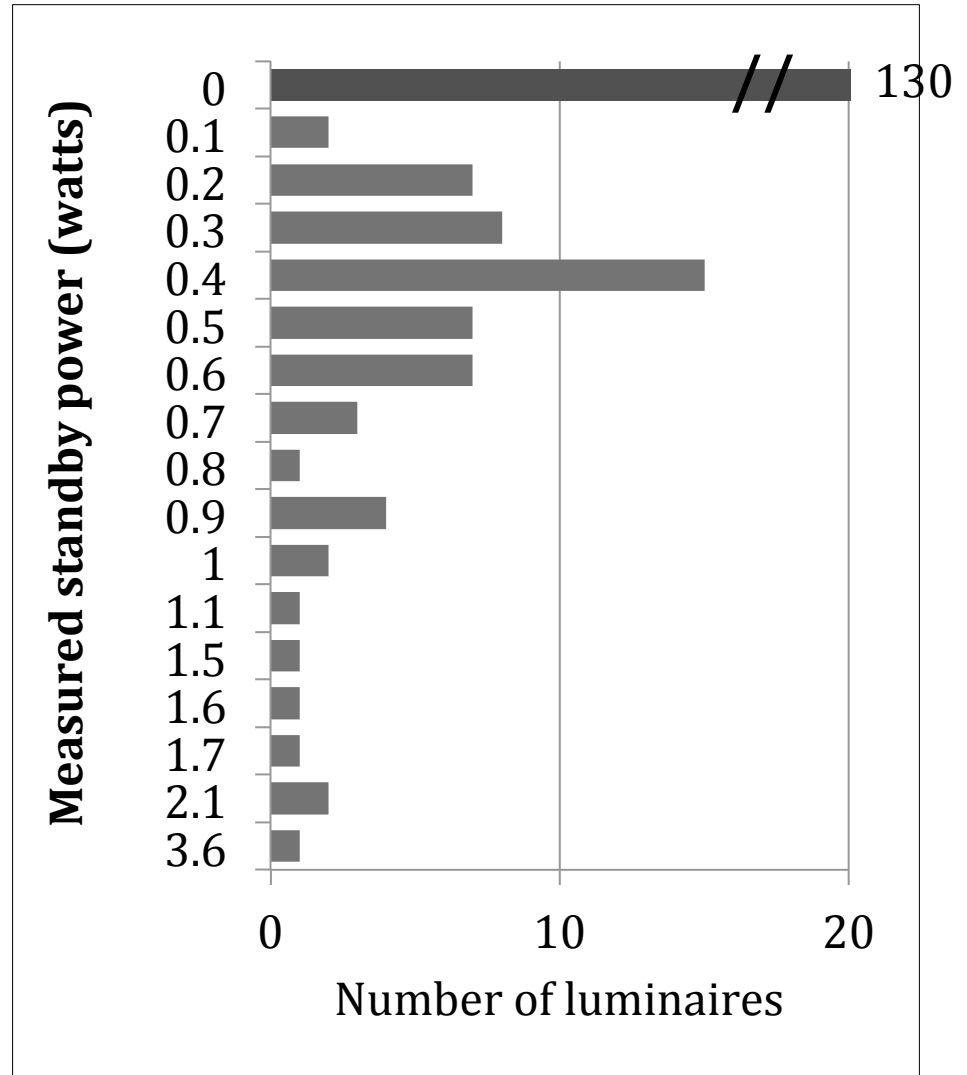
Standby

Many luminaires consume standby energy (63 of 193)

74% of floor-standing, table and desk luminaires

Wall or ceiling mounted luminaires only in few cases (touch dimmers etc.)

→ Too often, power converters are not switched off with the light



Standby

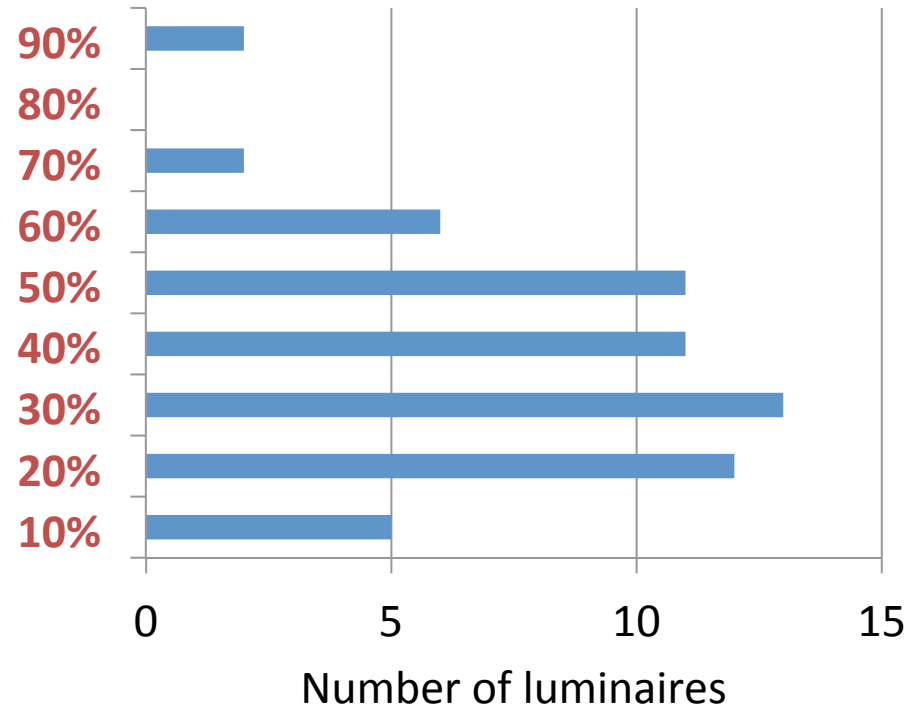
1 year = 8760 hours = 7760 h standby + 1000 h use

Consumers should know about the standby consumption of luminaires

→ Ecodesign requirements would help:

- Mandatory information
- Limited to 0.5 watt in total

Percentage of total energy consumption used in standby-mode



Recommendations for EU policy

In the short-term: treat *luminaires with built-in LEDs* like lamps and include standby information (amend scope and product information requirements of EU regulations No 1194/2012 and 874/2012)

Benefits:

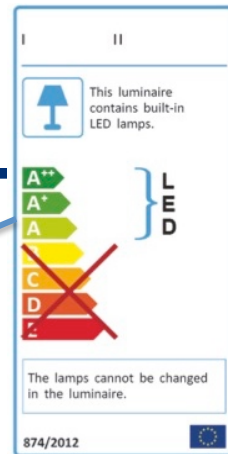
- Much more product information available for *luminaires with built-in LEDs*: energy efficiency class, annual energy consumption (ideally including standby!), **real** lumens, CRI, life time etc.
- Consumers are informed about standby consumption

In the mid-term: replace the existing EU energy label for household luminaires with a real rating of luminaire efficiency (based on measured luminaire data and the calculation of an energy efficiency index)

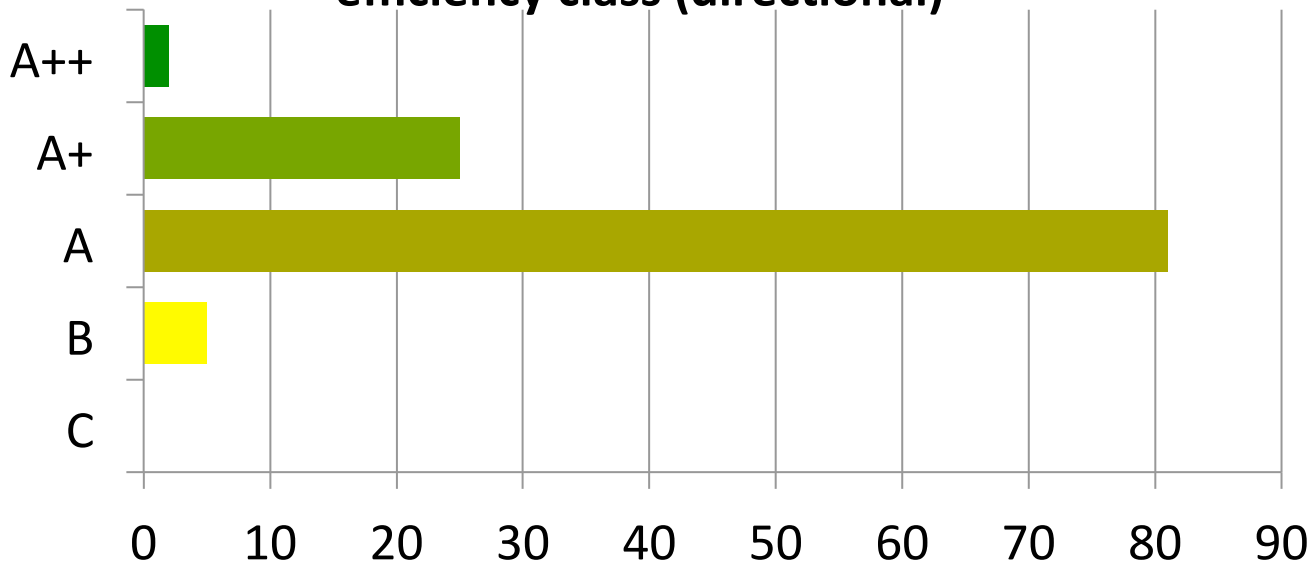
Luminaires with built-in LEDs treated like lamps

This would show which products are more efficient than others

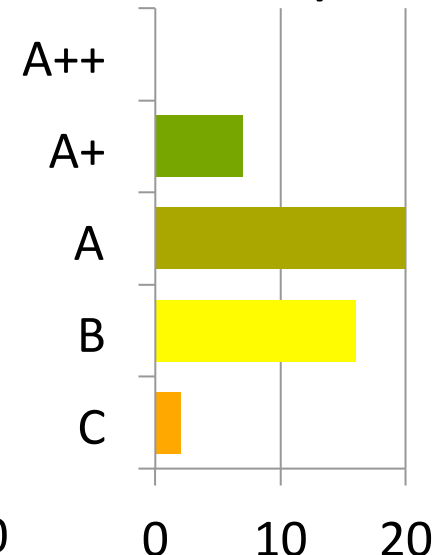
This does not show efficient products



Number of LED luminaires in each energy efficiency class (directional)



(non-directional)



(EU Regulation No 874/2012)

Thank you for your attention

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