

# Response To Öko-Institut

regarding the

## 1st Questionnaire Exemption No. 1-4 (renewal requests)

### *General Questions for Lamp Exemptions Related to Mercury*

Date of submission: September 25, 2015

#### Name and contact details

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## Abbreviations and Definitions

Hg	Mercury
EoL	End-of-life
LEU	LightingEurope

## Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract<sup>1</sup> for the evaluation of applications for the renewal of exemptions currently listed in Annexes III of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.<sup>1</sup>

LightingEurope has submitted a request for the renewal of the above mentioned exemption, which has been subject to a first evaluation. The information you have referred has been reviewed and as a result we have identified that there is some information missing and have formulated a few questions to clarify some aspects concerning your request.

## Questions

1. Some of the exemptions at hand specify that the lamps are for general lighting purposes. Others refer to “special purposes”; “different purposes in the professional market”, etc. Please clarify terms used relevant to the various exemptions such as:

- a. General lighting purposes:

**Answer LightingEurope:** “General lighting lamps are marketed or commercialized primarily for the production of visible light. They have standard shape, dimensions and cap. General lighting lamps are lamps, which are not covered by the “special purpose” lamp definition.”<sup>2</sup>

- b. Special lighting purposes:

**Answer LightingEurope:** Special purpose lamps have documented and communicated application-specific features. They generally manufactured in accordance with general-purpose lamp making technology. The use of special design, materials and process steps provide their special features<sup>3</sup>, e.g.:

Where non-visible radiation has importance, for example:

- Medical/Therapy lamps
- Sun tanning lamps

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<sup>1</sup> Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

<sup>2</sup> These definitions are first published in:

[http://www.lightingeurope.org/uploads/files/ELC\\_FAQs\\_RoHS\\_20111214\\_final.pdf](http://www.lightingeurope.org/uploads/files/ELC_FAQs_RoHS_20111214_final.pdf)

And cited in appendix D „Definitions“ of the following document:

[http://www.lightingeurope.org/uploads/files/LE\\_PP\\_Global\\_Mercury\\_limit\\_20131002\\_final.pdf](http://www.lightingeurope.org/uploads/files/LE_PP_Global_Mercury_limit_20131002_final.pdf)

<sup>3</sup> *Ibidem*

- Black light lamps (e.g. for diazoprinting reprography, lithography, insect traps, photochemical and curing processes)
- Black light blue lamps (e.g. for entertainment, forensics, dermatology, banknote validation)
- Disinfection lamps
- Pet care lamps (e.g. aquaria or reptile lamps)

Where different applications require specific lamps, for example:

- Technical lamps for colour comparison
- Coloured lamps (incl. saturated colours)
- Lamps used in horticultural lighting
- Lamps designed for eye-sensitivity of birds and other animals
- Projector lamps
- High colour rendering index lamps like food lighting applications, bakeries, etc.
- Lamps with special ignition features (e.g. external ignition strip)

c. Professional market:

**Answer LightingEurope:** Professional Lighting is all lighting other than Residential Lighting and includes among others Office Lighting<sup>4</sup> and Public Street Lighting<sup>5</sup> as defined in Regulation EC/245/2009. Next to that McKinsey<sup>6</sup> defined six application types: office, hospitality, shop, industrial, architectural, and outdoor. Those can be considered a professional market.

d. Industrial use:

**Answer LightingEurope:** McKinsey defines this as “This application consists of general lighting in production, assembly and storage spaces in factories, warehouses, indoor sporting areas and halls. This includes downlights, linear lights, spotlights, high/low bay lights, and task lighting.”<sup>7</sup>

e. Long-life lamps (please specify the difference in service life between such lamps and regular life lamps for different lamp types).

**Answer LightingEurope:** The term long-life as applied in exemptions 1(g) and 2(a)(5) is used for lamps which have a significantly longer lifetime compared to normal lifetime. These lamps are used in areas where lamp replacement is difficult and expensive due to high ceilings, when special luminaire design for critical application is required or when too much disturbance of running processes would occur during

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<sup>4</sup> ‘office lighting’ means a fixed lighting installation for office work intended to enable people to perform visual tasks efficiently and accurately, ref: Regulation EC/245/2009, page 3

<sup>5</sup> ‘public street lighting’ means a fixed lighting installation intended to provide good visibility to users of outdoor public traffic areas during the hours of darkness to support traffic safety, traffic flow and public security; ref: Regulation EC/245/2009, page 3

<sup>6</sup> Lighting the way: Perspectives on the global lighting market – McKinsey & Company, Second Edition, August 2012, page 42

<sup>7</sup> *Ibidem*

long operating hours. There is more mercury in the lamp since the process consuming mercury in the lamps is taking place for a longer time. The product is different and more expensive to produce since for instance more rare earths are used in the phosphor to produce the lamps.

The lifetime of lamps is standardised in a number of relevant standards: EN60969 (CFL-I lamps with integrated electronic control gear), EN60901 (CFL-ni, CCG magnetic ballast and ECG electronic control gear)<sup>8</sup>, EN60081 (T8 lamps, CCG, magnetic ballast and ECG electronic control gear). The standard specifies the operation conditions during lifetime: switching time, driver type etc. Not in all standards the lifetime is defined as “service life”<sup>9</sup>. The lifetime is part of the mandatory product information published in the internet and printed on the packaging.

What is the relevant lifetime to the customer depends on the application. For example:

- When lamps are operated 24 hours a day, the lifetime reduction due to switching cycles, might not be relevant.
- When legal requirement on the minimal illumination level (e.g. offices) exists, service life is relevant.
- When a customer needs to decide on group or spot replacement, the failure percentage is more relevant. This might be the case in applications with group replacement, or where the lamps are used in continuous lines. Here the lifetime where 1% or 10% of the lamps have failed are more relevant than the 50% point.

As indicated earlier, all producers are required by European regulations (e.g. EC 244/2009 and EC 245/2009) to publish several measures of the lifetime on their websites<sup>10</sup>, including a lamp-ballast combination characteristics. Next to that lumen maintenance is published. The interested professional customer can decide which lifetime number is most relevant for his-her situation.

Examples of the different life-times published by the different manufactures for normal lifetime lamps and long lifetime lamps can be found in the table below:

Table 1: Lifetimes ranges published for two examples of normal and long life lamps.

Lifetime definition	Normal lifetime product	Long lifetime product
<b>Example: T8 36W</b>		
Life to 50% failures CCG	13-15 kWhrs	28-63 kWhrs
Life to 50% failures ECC (pre heat)	20 kWhrs	30-90 kWhrs

<sup>8</sup> E.g. For CFL as covered by exemption 1(g) the common lifetime performance is measured in 3 hour-cycles (165 min. on – 15 min. off).

<sup>9</sup> Note: A large variation on lifetime will exist depending on the operating conditions of the ECG driver (e.g. cold start versus warm start, see manufacturers’ product pages for reference and presented table). The preferred definition for lifetime of the lamps is the one according to EN60081, which includes measurements of lifetime and lumen maintenance, which are the basis for the service life.

<sup>10</sup> Examples of these publications by LightingEurope members:

[http://download.p4c.philips.com/l4bt/3/322835/master\\_tl-d\\_hf\\_super\\_80\\_322835\\_ffs\\_aen.pdf](http://download.p4c.philips.com/l4bt/3/322835/master_tl-d_hf_super_80_322835_ffs_aen.pdf)

<http://www.osram.com/media/resource/HIRES/349830/7129720/single-and-double-capped-fluorescent-lamps-english-part-1.pdf>

<http://catalog.gelighting.com/lamp/d=0/?r=emea>

Life to 50% failures ECC (no pre heat)	12 kHrs	22 kHrs
<b>Example: CFL-ni 26W <sup>11</sup></b>		
Life to 50% failures CCG	6,5-12 kHrs	16-20 kHrs
Life to 50% failures ECC (pre heat)	10-13 kHrs	20-36 kHrs
Life to 50% failures ECC (no pre heat)	Not Advised	9 kHrs

Source: LightingEurope

2. Please substantiate the statement “*LED lamps do contain electronic components as well as materials which like nearly all other electronic equipment use the RoHS regulated substance lead in applications exempted by Annex III of the Directive*”, in terms of applications where use of RoHS substances are expected; If relevant, please detail differences relevant in this regard to the various exemptions for which renewal requests have been submitted.

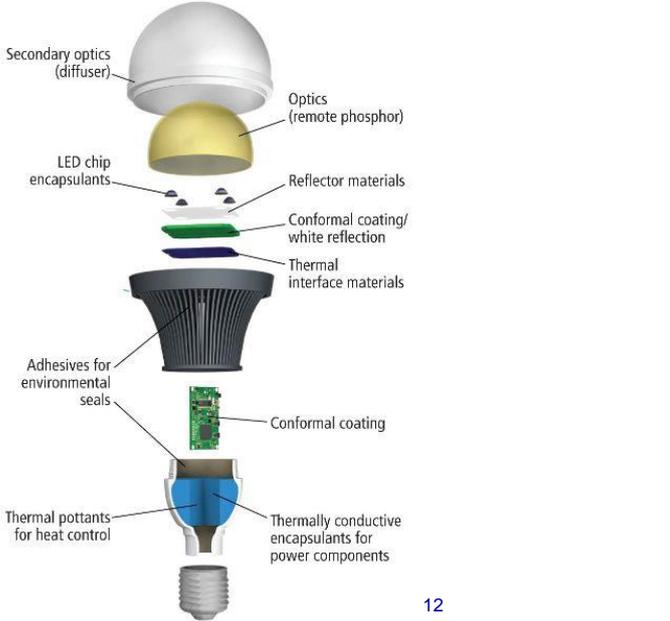
**Answer LightingEurope:** No differentiation between lamps in different exemptions request is observed. Please find examples provided in Table 1 (general examples of lamp composition) and Table 2 (real examples of electronics used in LED retrofit and compact fluorescent lamps). Both lamp technologies use similar electronic circuits and similar components.

The lamps as well as luminaires might use exemptions 5(b), 6(a, b, c), 7(a), 7(c)(I, II, IV) or 15 all for the element lead.

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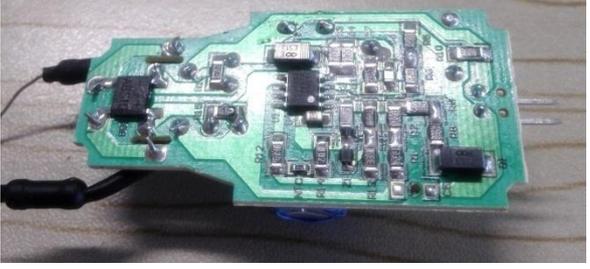
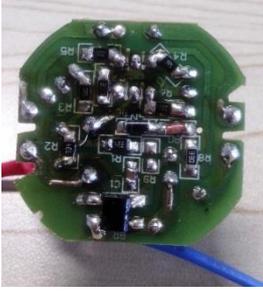
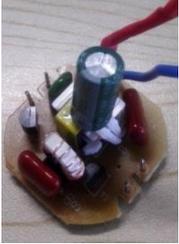
<sup>11</sup> For the CFL-Ni lamps the CCG numbers are for the two pin lamp the ECG numbers for the 4 pin lamp.

Table 2 General composition of LED and CFL i lamps.

Example of a LED lamp composition	Example of a compact fluorescent (with integrated ballast) lamp composition
 <p>Labels in diagram: Secondary optics (diffuser), Optics (remote phosphor), LED chip encapsulants, Reflector materials, Conformal coating/white reflection, Thermal interface materials, Adhesives for environmental seals, Conformal coating, Thermal potting for heat control, Thermally conductive encapsulants for power components.</p> <p style="text-align: right;">12</p>	 <p>Labels in diagram: Lamp, Cover, Phosphor coating, Mercury vapor, Argon, Ballast, Ballast housing, Base.</p> <p style="text-align: right;">13</p>

Source: See footnotes: 10 and 11.

Table 3 Example of electronics used in LED and CFLi lamps.

Example of a LED electronic driver	Example of a compact fluorescent driver (lamp with integrated ballast)
	
	

Source: LightingEurope

<sup>12</sup> <http://www.ledsmagazine.com/content/dam/leds/migrated/objects/features/9/10/14/MoldableFig3.jpg>

<sup>13</sup> Source: U.S. EPA/ DOE Energy Star Program. "Learn About Compact Fluorescent Light Bulbs" [http://www.energystar.gov/index.cfm?c=cfls.pr\\_cfls\\_about](http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_about)

3. In most of the renewal requests LEU has submitted, a significant part of the argumentation is that without an exemption, replacement lamps would not be available for installations already on the market and in use. This is explained to result in a high environmental impact in terms of installations reaching end-of-life (EoL) early, should such replacements not be available and should the exemptions not be renewed. In parallel, in light of the shift of R&D efforts towards the further development of LED technologies, it can further be understood that where LED alternatives shall not enable substitution of discharge lamps within existing installation there is no intention of developing other alternatives. You further explain that, Hg-based discharge lamps could be needed in some cases for over 25 years to avoid possible environmental costs of early EoL.
  - a. Please clarify for each of the exemptions you have applied for, if a renewal could be limited to the application of Hg in lamps to be used in installations placed on the market in the past.

**Answer LightingEurope:** At the moment mercury containing lamps are still used in new installations. As explained below a limitation of the sales of lamps for existing appliances only is neither possible nor justified under RoHS legislation. As new (LED) luminaires are not backwards compatible so that conventional lamps cannot be used in them. This is one of the reasons for the declining fluorescent lamp markets.

As already explained in the exemption renewal requests (e.g. chapter 4.1.3 of exemption 2(a)(3)) LightingEurope is of the opinion that lamps are category 5 products <sup>14</sup>.

1. Luminaires for general lighting are usually marketed without the lamp. There is no legal ground within the RoHS Directive to prohibit a luminaire or fixture if prohibited substances are not contained exceeding the threshold of RoHS. This would also be very difficult to survey. Even in appliances for special purposes it is possible that different lamps are offered and that the lamp therefore has to be purchased separately.
2. In every exemption there are many applications where no alternative technology is available, that is fully suitable for the customers' purpose and has comparable or better technical, environmental or safety characteristics.

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<sup>14</sup> Quote from the exemption renewal request:

*„LightingEurope is of the opinion that lamps in general are category 5 because the most are used for general illumination. However, they have some of the characteristics of components (used in luminaires), consumables (finite lifetime and regularly replaced) and spare parts (lamps in luminaires have to be replaced when they cease functioning). Some manufacturers of electrical equipment in other RoHS categories may install fluorescent lamps into their equipment for general illumination purposes and so they will need to use lamps that comply with the RoHS directive, however the products that they place on the market are not category 5 but may be household appliances, medical devices or potentially in any RoHS category 1 - 11. LightingEurope is aware of the difficulty to unambiguously classify certain lamps in the category set out by RoHS legislation. For lamp manufacturers it is essential to have legal certainty regarding the possibility to put the products on the market irrespective of the planned application as manufacturers are not able to control the use of the lamps in products falling in other categories in or out of the RoHS scope. In practice, most lamps are installed in buildings for lighting applications (category 5). The way that lamps are used has no effect on lamp design so will not affect this exemption request. Therefore lamp manufacturers do consider the lamps in scope of this document to belong to category 5 as individual products.“*

3. Customers must have the option to buy a new luminaire fitting to their existing installation e.g. additional luminaires of exactly the same type to be able to realize the desired solution.
  
- b. If this is not possible at present, please specify if a short term transition period would enable such a change (for example, for lamps placed on the market before 2017).

**Answer LightingEurope:** As explained above also a short term transition period would not enable such a change and would not be justified. Such a change is also not necessary as the market is already in transition towards LED solutions.

There are many lamp cap and lamp holder standards that accept lamps of different technologies. This allowed LED lamps in the first place to grow because of the large basis of existing luminaires. Limitation of the use of discharge lamps can only happen at the luminaire level by changing the fit system to allow only LED sources.

Also technically a short term transition period is not possible at the lamp level.

**Please note that answers to these questions are to be published as part of the available information relevant for the stakeholder consultation to be carried out as part of the evaluation of this request. If your answers contain confidential information, please provide a version that can be made public along with a confidential version, in which proprietary information is clearly marked.**