Response To Öko-Institut

regarding the

1st Questionnaire Exemption Request No. 1(f) (renewal request)

Exemption for "Mercury in single capped (compact) fluorescent lamps not exceeding (per burner) For Special purposes: 5 mg"

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Name and contact details

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Abbreviations and Definitions

LED	Light Emitting Diode
OLED	Organic Light-Emitting Diode
UV	Ultraviolet

Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract[1] 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.[1]

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. On page 4 of your application you state "*Single ended (compact) Fluorescent lamps for special purposes can be applied both in professional and consumer applications. They differ in construction from general lighting lamps by the use of different glass and phosphors (for some no phosphor), typically emitting in UV or blue wavelength bands, as to fulfil special purposes*". A list of relevant lighting applications is also included. Please clarify exhaustively the scope of exemption 1(f) in terms of lamp type sub-groups that fall under this request so that it is clear what applications fall under the term "special purposes" and what the respective characterisations of lamps are. For example, what types of UVA lamps benefit at present from this exemption aside from UVA lamps with BSP phosphors?

   Answer of LightingEurope: The applications under the special purpose exemption are in majority applications that are not meant for general illumination. This means that these applications that are in majority not aimed directly or indirectly at the human eye sensitivity (illumination and vision). We are producing several lamp types that are falling under this exemption: insect trap lamps, to attract insects, medical lamps to treat skin conditions, applications for curing of ink, paint, glue and polymers, water purification and many others. For some of these applications dedicated lamps are marketed, like medical reprography and insect traps, but other lamps are sold in general with a special spectral characteristic and it is unknown for us who is using which lamp type in which applications. There are a small number of special purpose lamps that generate visible light. These have special applications like colour comparison, lamps with high colour rendering >CRI 90, or lamps with special spectra for poultry farms.

2. This request concerns single-capped (compact) fluorescent lamps for special purposes where an efficient source of UV light is needed. In your application document some figures of lamp spectra are shown (see page 6) with different characteristics (e.g. an efficient source of UV light, tanning effectiveness or blue wavelength bands etc.). Please provide in comparison with the general lighting lamps:

[1] Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

a. An exhaustive list of all relevant characteristics regarding the lamp spectra (where relevant associated with the various sub-groups of lamps falling under this request).
Answer of LightingEurope: The graphs provided show the sensitivity curves of the eyes of insects, the ability to break DNA important for inactivating viruses and bacteria, the human skin sensitivity for sunburn and pigmentation (tanning), psoriasis treatment and hyperbilirubine sensitivity. These are examples of the applications we are aware of mentioned in the answers to question 1.

b. More detailed information, graphs or explanations to clarify aspects that are relevant to describe the requirements in quantitative terms – Please provide explanations to data and figures to ensure that the information can be followed.

Answer of LightingEurope: Requirements in quantitate terms besides the spectral sensitivity are very hard to make and mostly depend on the application. Most of the special purpose radiation is dose related. This means that the applied energy during a certain time leads to the desired effect but also undesired side-effects might occur. The dose is a combination of output and time, where time is completely determined by the application and output is the irradiance which depends on the distance, the amount of lamps in the appliance (reflector design) and the used drivers to provide the electrical power. This means that the lamp manufacturers have only control on the nominal output measured under standardized circumstances and the spectral shape.

3. A description of the relevant criteria for determining whether a new technology can replace existing fluorescent lamps (using mercury) in existing equipment, as well as in new equipment has been detailed. However, there is no performance data provided which quantify these criteria especially in regard to compare the performance of single capped (compact) fluorescent lamps versus LED lamps and (as applicable) other types of lamps. Please provide such data.

Answer of LightingEurope: LED spectra are typical Gaussian shaped curves with a 12-15 nm width at the half maximum of the spectrum. These curves have different shapes compared to the spectra of the used phosphors in fluorescent lamps. Some are narrower, some are wider. Also the manufacturing of LED's leads to variances in the spectral output maximum wavelength. For fluorescent spectra this is a physical parameter that cannot shift.

4. You state that halogen and OLED lamps cannot produce radiation in the range that is required for applications of lamps for special purposes.

a. Please describe these alternatives (not only LED) in regard to technical parameters in such a way that the performance differences are clear.

Answer LightingEurope: Halogen lamps are so called solid radiators which emit in the infrared and visible spectrum. Similar to a normal incandescent lamps. These radiators have close to no radiation in the UV part of the spectrum (black body radiation, a law of physics) and therefore not suitable for special purposes in the UV. OLED material are designed to function in the visible light part for display or general illumination purposes. These material are optimized for that purpose. In order to create UV light other material need to be invented. The bad thing is that OLED's are made from organic materials (the O of OLED means organic). Most of the organic

material are very unstable under UV and rapidly degrade. Therefore currently OLED is a technology not suitable for creating UV radiation.

b. Please clarify if there are any differences regarding the viability of substitutes between professional applications and consumer applications.

Answer of LightingEurope: There is no difference in our opinion.

5. You have claimed that LED technology performance is developing and feasible for special purposes, however the balance between cost price, lifetime and efficiency and the speed in which such a phase in could take place is not yet clear. Additionally you have claimed that LED is not suitable for Disinfection/purification of air/water/surfaces, broadband and Narrowband UVB Phototherapy, PUVA phototherapy and tanning. Please provide a roadmap for substitution for special purpose lamps to estimate when products without the relevant RoHS substance can be made available on the EU market.

a. What efforts have been realised since the last review of this exemption?

Answer of LightingEurope: There are serious efforts in and outside the different lighting companies to develop LED based UV sources for the growing market of UV sources. Shared roadmaps are not available they would violate the code of conduct of LightingEurope.

b. Are there specific subgroups where substitution has been successful?

Answer of LightingEurope: Not yet.

c. An estimated time or time range should be provided for each stage along with a short explanation that should allow following why the estimated time is needed;

Answer of LightingEurope: Several years of development needed. Most difficult is to overcome the differences in spectral shapes. If it is not possible to overcome these differences, new application releases are needed. For different applications the efforts and times needed for the releases differ a lot. For example medical treatment, with the risk of side effects, releases could be extremely costly, time consuming and difficult.

d. Where relevant, it should be stated what stages could run in parallel and what stages need to take place on a linear basis

Answer of LightingEurope: This is unknown at this moment.

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.