

Consultation Questionnaire Exemption No. No. 4c(I-III) (renewal request)

Exemption for „Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):

- I) $P \leq 155 \text{ W}$: 25 mg per burner**
- II) $155 \text{ W} < P \leq 405 \text{ W}$: 30 mg per burner**
- III) $P > 405 \text{ W}$: 40 mg per burner“**

Abbreviations and Definitions

Hg	Mercury
HPS	High Pressure Sodium
LEU	LightingEurope
PCA	Poly-crystalline alumina

Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract¹ 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 (LEU) has submitted a request for the renewal of the above mentioned exemption, which has been subject to a first completeness and plausibility check. The applicant has been requested to answer additional questions and to provide additional information, available on the request webpage of the stakeholder consultation (<http://rohs.exemptions.oeko.info/index.php?id=228>).

The exemption is explained to cover High Pressure Sodium (HPS) lamps, which are designed for different purposes in the professional market. LEU explains that HPS lamps consist of a cylindrical discharge tube made of poly-crystalline alumina (PCA), in which two electrode assemblies are mounted at each side. The lamps are designed to avoid the generation of thermal stresses during the heating and cooling cycles present during starting and shut-down. Additional details are provided in the LEUs application. Mercury and sodium are dosed in the burner as an amalgam of mercury and sodium in the form of a pill. After ignition the heat released by the discharge warms up the discharge tube and part of the sodium and mercury evaporates. A liquid pool of sodium-mercury amalgam remains at the coldest spot in the discharge tube during operation.

LEU explain HPS to be characterized with *“very long life (30,000 to 50,000 hours) and very high luminous efficiency (from 80 lm/W to 150 lm/W). They also typically have a lumen maintenance of more than 80% at end of life. Their ability to render colours is low (CRI around 20). The majority of High Pressure Sodium lamps are single-capped with Edison screw caps (E27 and E40 for Europe) but there exists also a double-capped range with R7s and Rx7s caps... Most manufacturers have both lamps in tubular clear glass format and in ovoid shape with a light diffusing coating. The wattage range is 35W to 1000W.”*

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

LEU further explains that the product characteristics make HPS lamps the perfect choice for applications that require long life, high efficacy and very good lumen maintenance but where colour rendering is less important. Typical applications are outdoor lighting: street lighting, parking's, city squares, flood lighting of buildings. Sometimes these lamps are also used indoors, like in warehouses where colour rendering is not important.

LEU present various data, explaining that *“despite the fact that some new HPS applications are still installed, the installed base is decreasing rapidly in EU28: from 72 million in 2016 to 37 million in 2020 and decreasing rapidly. Also the number of HPS replacement lamps will drop drastically between 2016 and 2020: from 23 million to 12 million. These numbers show that LED solutions are entering the market rapidly.”* In parallel, where replacements lamps are needed for existing HPS installations, LEU explain that *“Replacing HID lamps with LED lamps is limited because fully compatible retrofits are not available and will also not be available in the near future... The dynamics behind this change is as follows. Although the lifetime of HPS lamps is very long (18K to 48K hours), the lamps are group replaced about every 4 years (before a certain fraction of the lamps fail). It is not always commercially feasible for the owners of these professional lighting systems to invest in new LED luminaire solutions when lamps need to be replaced. Such a change requires not only changing the light source but the whole lighting system including luminaire, its optics and magnetic or electronic driver system.”*

LEU provide a *“projection for the replacement of High Pressure Sodium installations by new LED systems... It is concluded that this substitution is in process but that due to environmental (vast additional waste due to premature replacement of lighting installations) and financial constraints it will take 15 to 25 years for the substitution to be completed.”*

On this basis the renewal of the exemption is requested for the maximum available duration and with the current exemption formulation listed I Annex III of the Directive.

For details, please check the applicant's exemption request at:

<http://rohs.exemptions.oeko.info/index.php?id=237>

The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. 5 (1) (a) of Directive 2011/65/EU (RoHS II), which can be found under:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

If you would like to contribute to the stakeholder consultation, please answer the following questions:

Questions

1. The applicant has requested the renewal of Ex. 4(c)(I-III) of Annex III, with the same wording formulation
 - a. Do you agree with the scope of the exemption as proposed by the applicant?
 - b. Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.
 - c. Please explain why you either support the applicant's request or object to it.
 - d. If relevant, please clarify if certain application sub-groups could be excluded from the exemption (e.g., where alternative lamps can be used as replacements in existing luminaries providing the required performance and reliability or where alternatives can be used through the replacement of installations);

To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a) to support your statement.

2. A study “from the Renselaer Polytechnic Institute in Troy, NY, is mentioned by LEU explaining that *“comparing street layouts with several HPS and LED light points finds that, in order to guarantee uniformity and sufficient illuminance levels in accordance with the relevant regulations, the poles on which the fixtures are mounted also have to be replaced and the spacing changed. The spacing has to be decreased so that more poles are required. The reason for this is basically that LED luminaires are efficient or available below 6000 lumens only. Under these conditions the LED streetlight layouts on average resulted in a slightly lower power demand than the average HPS streetlight layouts. The LED layout with the lowest power demand had 81% of the power demand of the HPS layout with the lowest power demand. However, the power demand per kilometre of street for individual layouts varied significantly. Only 2 of the 8 LED luminaires gave a power reduction when compared to the best HPS luminaire. Regarding life cycle cost calculated over a period of 27 years and 113,000 burning hours (average life of an HPS installation) the authors find that even when the LED luminaires have a life of 100,000 hours the cost to own and operate the LED installation is still twice as large as an HPS installation. This life cycle cost is heavily influenced by their initial capital costs, due mostly to the increased number of poles per kilometre”*. The studies referenced however are from 2010 and 2011.
 - a. Please provide data and information to clarify how the performance of LED alternatives in this application segment have improved in terms of energy savings and life cycle costs, as it is expected that the LED alternative product range to have changed in the ~5 years to have passed since the completion of the cited studies.
 - b. Please state in what cases LED alternatives available today are comparable or possibly better than HPS applications and explain in this respect if certain application sub-groups could be excluded from the exemption.
 - c. In your answers, please clarify what information is relevant for drop-in LEDs that could be used in existing HPS installations and what information is relevant for alternatives that are to require installation in a new luminaire.
3. According to LEU *“As explained before, there are no one-to-one true replacement lamps for the HID family available. There are LED lamps that are claimed in advertisements to be retrofits. These lamps are easily available (can be ordered from dozens of websites) but they never supply the required lumen output and are too large to be a universal solution. Moreover, the price for these claimed retrofits presents a problem as they are often priced as high as a full LED luminaire”*.
 - a. Do you agree with this statement? Please explain why or why not, and provide information and data to support your views;
 - b. If you do not agree, please provide detail as to the LED alternatives available in terms of their performance specifications and comparability with the required performance of HPS lamps and installations;
4. Please provide information concerning possible substitutes or developments that may enable reduction, substitution or elimination, at present or in the future, of lamps falling under Ex. 4(c)(I-III);

- a. In this regard, please provide information as to alternatives that may cover part or all of the applicability range of relevant exemption application sub-groups;
 - b. Please clarify in your response in what cases (application sub-groups) alternatives are available as replacement lamps for existing installations, originally designed for HPS lamps. If relevant, please detail the scope of technical adaptations that such replacement would require in the installation to allow compatibility with the alternative.
 - c. In parallel, please clarify for what part of the application range relevant to Ex. 4(c)(I-III), alternatives are available, which would require a full replacement of the installation.
 - d. Please provide quantitative data as to application specifications to support your view.
5. Please provide information as to research initiatives which are currently looking into the development of possible alternatives for some or all of the application range of lamps falling under Ex. 4(c)(I-III);
- a. Please explain what part of the application range is of relevance for such initiatives (in what applications substitution may be possible in the future).
 - b. Please provide a roadmap of such on-going research (phases that are to be carried out), detailing the current status as well as the estimated time needed for further stages.

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.