

Consultation Questionnaire Exemption No. 4(f) of RoHS Annex III

Current wording of the exemption:

Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex

Requested validity period: Maximum (5 years and 7 years (cat. 8 and 9) respectively)

ACRONYMS AND DEFINITIONS

UV	Ultra Violet
LED	Light-Emitting-Diode
Hg	Mercury
LEU	LightingEurope

1. INTRODUCTION

1.1. Background

Bio Innovation Service, UNITAR and Fraunhofer IZM have been appointed¹ by the European Commission through for the evaluation of applications for the review of requests for new exemptions and the renewal of exemptions currently listed in Annexes III and IV of the RoHS Directive 2011/65/EU.

VDMA and Lighting Europe submitted requests² for the renewal of the above-mentioned exemption. The request 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 consultation³.

The stakeholder consultation is part of the review process for the request at hand. 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.⁴

To contribute to this stakeholder consultation, please answer the below questions until the 27th of May 2021.

¹ It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017

² Exemption request available at [RoHS Annex III exemption evaluation - Stakeholder consultation \(biois.eu\)](https://biois.eu/rohs-annex-iii-exemption-evaluation-stakeholder-consultation)

³ Clarification questionnaire available at [RoHS Annex III exemption evaluation - Stakeholder consultation \(biois.eu\)](https://biois.eu/rohs-annex-iii-exemption-evaluation-stakeholder-consultation)

⁴ Directive 2011/65/EU (RoHS) available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32011L0065:EN:NOT>

1.2. Summary of the Exemption Request

According to VDMA: *"The application for prolongation of the existing exemption refers to mercury-containing UV discharge lamps which are used for curing (e.g. of layers of inks and coatings, adhesives and sealants), for disinfection (e.g. of water, surfaces and air) and for other industrial applications (surface modification, surface activation) The application includes the following lamp types:*

- **UV medium-pressure discharge lamps (MPL) for curing, disinfection and other industrial applications** (internal operating pressure > 100 mbar). The UV medium-pressure lamps can be doped with iron, gallium or lead in addition to the mercury they contain.
- **UV low-pressure discharge lamps for special purposes** in the high power range. [...]

Typical applications to be covered by this application include curing, e.g. of inks and coatings, disinfection of water etc., and other industrial applications like surface activation and cleaning.

It is technically not possible to replace mercury in special UV lamps with other materials/chemicals in order to achieve the same widespread radiation distribution. LED-based technologies are increasingly being used, which in certain applications (e.g. curing) also offer many advantages over mercury-containing UV lamps. Nevertheless, LED technologies cannot be used as an equivalent replacement in many applications. "

According to LightingEurope, "[...] The renewal application concerns lamps and UV light sources defined as:

- High Pressure Sodium (vapour) lamps (HPS) for horticulture lighting,
- Medium and high-pressure UV lamps for curing, disinfection of water and surfaces, day simulation for zoo animals, etc...
- Short-arc Hg lamps for projection, studio, stage lighting, microlithography for semiconductor production, etc...

Replacement of mercury and mercury containing lamps is impracticable:

- *The lamps covered by exemption 4(f) must remain available on the EU market:*
 - o *For new equipment for certain applications where no functionally suitable alternatives are available*
 - o *As spare parts for in-use equipment as replacing end-of-life lamps avoids having equipment become electronic waste before due time"*

General Statement

We are a producer of UV Lamp based in Northamptonshire, UK and Shanghai, China.
 We manufacture Medium Pressure Mercury Discharge UV Lamps and sell many other UV lamp based components and systems.
 We supply UV lamps for the following applications: UV curing, photochemical processes and disinfection of water, surface & air.
 Mercury based UV lamps are still required as alternative technologies have insufficient intensity for most bulk processes. The broad spectrum required for many applications is only possible with Medium Pressure lamps, some required wavelengths are simply not available from other light sources.

We see sustained growth in the demand for UV lamps for all applications. Therefore, in respect to our experiences with alternatives to UV lamps, we feel this is a clear indication of the market demand which if alternative technologies were viable would not be there.

2. QUESTIONS

1. VDMA and LightingEurope² requested the renewal of the above exemption for the maximum validity periods with the same scope and wording for all EEE of cat. 3 and 5 (VDMA) and cat. 1-10 (LEU).

a. Please let us know whether you support or disagree with the wording, scope and requested duration of the exemption. To support your views, please provide detailed technical argumentation / evidence in line with the criteria⁴ in Art. 5(1)(a).

The wording should be retained, and an extension should be given to at least 2026 and beyond. The reasons are:

There are no alternatives to the majority of current processes.

Ethical lamp disposal is well established and controlled, many of the materials are separatable and reused. Hazardous materials present are extracted and properly disposed of and in the case of mercury reclaimed.

b. If applicable, please suggest an alternative wording and duration and explain your proposal.

A short period of validity is unnecessary as the use of UV lamps is driven by the market, if viable alternatives become available then the market will switch to these without imposed legislation.

Alternative technologies have been around for many years and have not had significant impact on the growth of the UV lamp sector, so I would fail to see how within the next 10 years this would change. Legacy systems alone would sustain the current requirement for lamps for that period and beyond so I would propose extending the period in line with this.

We are aware of much research into UV based processes, most notably the current worldwide pandemic which has accelerated the development of products for the inactivation of Covid-19 amongst many other viruses. We should not limit the availability of mercury based light sources with so many areas yet to be investigated.

2. Please provide information concerning possible substitutes or elimination possibilities at present or in the future so that the requested exemption could be restricted or revoked.

a. Please explain substitution and elimination possibilities and for which part of the applications in the scope of the requested exemption they are relevant.

Much research has gone into alternative elements for discharge lamps that could perform as well or even surpass mercury. Any business manufacturing these light sources would be

motivated by the huge competitive advantage this would give so the fact mercury is still so widely used is testament that there are no reasonable alternatives for discharge lamps.

There are other UV producing technologies readily available, but these all have limitations which make them impractical for most applications.

Many processes simply cannot be undertaken with alternatives due to the inherent spectral output of mercury lamps; you can't change the laws of physics!

In current lamp-based equipment there is no alternative that could simply fill the 'lamp socket' due to the difference in power supply, cooling, and control systems requirements. Therefore, even if the process itself was capable of being adapted any legacy equipment would require extensive modification as well.

Even if in most cases where the hardware was to be replaced anyway the adoption of an alternative technology would still involve process adaption that would, at the very least, make the change cost prohibitive.

In the curing industry any change to an alternative technology would require a change to more sensitive inks and coating. This gives rise to many other process considerations such as the requirement for daylight shielding, UV measurement for process validation, pre-treatment requirements, inert atmosphere, changes to substrate and speed of process would be greatly reduced.

More importantly for disinfection application the stakes are very much higher and the risks to health and environment of getting this wrong are huge. UV lamps are supplied into many areas in this respect where no viable alternative exists either due to ability to initiate the required reaction or economic reasons.

Water treatment is by far the largest sector of disinfection applications which includes drinking and wastewater, leisure use (e.g. swimming pools and spas), beverage, aquaculture, shipping ballast water, ultra-pure water (e.g. semiconductor) to name a few.

Surface and air treatment are also important areas, where well proven lamp driven technologies are used in food, beverage and pharmaceutical production and packaging. There is growing demand for air disinfection in public areas to halt the spread of airborne pathogens due the current pandemic.

- b. Please provide information as to research to find alternatives that do not rely on the exemption under review (substitution or elimination), and which may cover part or all of the applications in the scope of the exemption request.

There are some very niche processes where alternatives to UV lamps are possible and are used. But in respect to UV LED's we see only marketing hype with no real substance for common applications with few exceptions. We have seen the system builders (our customers) move focus to these products making large investments based on the marketing information and interest only to return to wholesale investment in lamp driven technology.

- c. Please provide a roadmap of such on-going substitution/elimination and research (phases that are to be carried out), detailing the current status as well as the estimated time needed for further stages.

Currently I can see no route to the replacement of lamp driven processes other than in a handful of small-scale applications where if purchasing from new would make sense. I think more likely some other, yet undiscovered technology could potentially leapfrog all existing alternatives, but that's pure speculation.

3. Do you know of other manufacturers producing devices of comparable features and performance like the ones in the scope of this exemption request that do not depend on RoHS-restricted substances, or use smaller amounts of these substances compared to the applications in the scope of this exemption?

There are some processes such as small-scale Digital Printing that can utilize other technologies (e.g. UV LED) successfully and so are used. However, in most industrial applications to alter the device used to avoid the restricted substance is to alter the process and all that it entails. Retrofitting is not possible and alternative processes in most cases are not viable due to economics, performance or simply that the specific spectrum is not possible to achieve by other means.

4. As part of the evaluation, socio-economic impacts shall also be compiled and evaluated. For this purpose, if you have information on socioeconomic aspects, please provide details in respect of the following:

- a. What are the volumes of EEE in the scope of the requested exemptions which are placed on the market per year?

Our company alone manufactures 1000's of mercury based lamps per year and we are by no means the only producer. In our estimation the annual market worldwide must be well in excess of a million units and possibly multimillion.

We can only work from our own experience of the market, but we see consistent growth and new lamp manufactures still appear now and then so we can only surmise that the market is already very significant and growing.

- b. What are the volumes of additional waste to be generated should the requested exemption not be renewed or not be renewed for the requested duration?

Replacing the lamp alone is not possible so most of the machinery running in the market would become waste if they were no longer available. This would be a huge quantity on its own, but then also all related process materials would be obsolete. (e.g. ink, spare parts, etc).

Lamp manufacturing companies like ours and many system builders would be faced with overnight closure. This would require large stockpiles of lamps, equipment, and associated process materials to be disposed of.

- c. What are estimated impacts on employment in total, in the EU and outside the EU, should the requested exemption not be renewed or be renewed for less than the requested time period? Please detail the main sectors in which possible impacts are expected – manufacturers of equipment in the scope of the exemption, suppliers, retail, users of MRI devices, etc.

If a ban on mercury was enforced ours and many other companies would be forced into closure. We can only estimate the number of companies in the EU that rely on mercury-based products, but it must number in the thousands. As there are no viable alternatives there would be significant job losses that would amount to an absolute minimum of tens of thousands.

Less directly lamps require specialised material and power supplies so these producers would also face very questionable futures due to the volume created by lamp industry keeping them viable.

The largest effect though would be the companies that rely on lamp driven processes.

During the recent pandemic we had what was effectively begging letters from customers pleading that we carry on producing through our local lockdowns due to the criticality of their activities. Just take the effects of the removal of UV disinfection from water treatment, there are harmful microorganisms that cannot be effectively removed by any other known technology so we would face a huge step backwards in respect to public health.

Other areas seriously affected:

Sterilisation in food & beverage production and packing.

Inactivation of microorganisms from ship ballast water preventing invasive species affecting ecosystems.

All other non-chemical-based disinfection e.g. the removal of UV systems and the return to chlorine-based disinfection in leisure facilities and water park.

Ultra-pure water applications e.g. semiconductor and pharmaceutical manufacture.

UV coated products e.g. packaging, magazines, furniture

Curing in the production of electronic equipment.

Surface pre-treatments for other coating techniques.

All to name but a few!

If this ban were only considered within Europe, then we would simply hand the rest of the world a huge competitive edge. Considering we are already becoming less cost effective due to the high social costs I believe this would seriously weaken our position.

- d. Please estimate additional costs associated should the requested exemption not be renewed, and how this is divided between various sectors (e.g. private, public, industry: manufacturers, suppliers, retailers).

It would be almost impossible to estimate the huge financial impact of a ban, these costs would come from:

Burdening many businesses with the high cost of replacing existing viable equipment.

Loss of productivity as many UV based processes would have to be slowed to cope with alternative ones (loss of business to other more efficient companies where the ban is not enforced).

Social costs of large-scale unemployment.

Cost of litigation through the removal of effective disinfection processes.

Our business would be forced to cease trading.

5. Any additional information which you would like to provide?

A ban on mercury containing products would have a huge impact on so many areas. We believe, as many of these processes are unseen, they are massively underestimated, but impact on our day to day lives in so many ways. Just as examples, we all expect clean water to run from our taps that doesn't make us ill, that fragile ecosystems will not be decimated by invasive organisms by the use of shipborne transportation, that our food comes in sterile packaging, that items we purchase come in attractive practical packaging and that furniture is resilient to day to day wear and tear but do many of us stop to consider how this is achieved?

Importantly as an economic community we need to remain competitive and if alternative processes are successfully development that will drive the change alone. In the case of mercury based light sources it is no different if a viable substitute can be found then industry will use them and our reliance on mercury will naturally reduce.

In our company we see new application regularly considered in both industrial curing and disinfection, medical and photochemical applications, with many becoming adopted. Why risk the future breakthroughs of UV based processes?

The recycling of lamp materials is well established I would question the manufacturing processes and disposal of alternative products as this is far less developed and seems to get ignored.

Please note that answers to these questions can be published in the stakeholder consultation, which is 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.

Please do not forget to provide your contact details (Name, Organisation, e-mail and phone number) so that the project team can contact you in case there are questions concerning your contribution.

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