

## EU consultation on continued use of mercury containing lamps

Orca GmbH ( [www.UVpro.com](http://www.UVpro.com) )

The Orca GmbH is a German company selling UVC equipment for over 20 years and producing since 2014 a wide range of UVC based products under the label *UVpro* for air, water and surface disinfection mainly for food industries. We have 14 employees in Kürten near Cologne and we are working with 15 distributors all around Europe. We are a recent part of the Halma´s UV Group.

Our purpose in our projects is to minor the risk of contamination of food with bacteria and other harmful microorganisms, to reduce the concentration of pathogens in hospitals, schools and offices. Our UVC based units are reducing the use of chemical products for conservation and cleaning.

For years the water sector has been the main sector of this technology, but in the last 20 years there has been a growth of a new marked with surface and air handling solutions. The switch to convenience products in food production with the demand for a longer shelf life and hygienic food product quality, opened a wide range of new solutions in UVC treatment.

The reduction of chemicals in and around the alimentary products in dairies, slaughterhouses and bakeries is one benefit. The food industry has been a major adopter where the ability to disinfect without having chemical residuals.

During the SARS CoV 2 pandemic UVC-air treatment is helping to protect the people in public space, so the focus is actually on those kinds of solutions. Surely this will not be the last virus in a global world easily reachable with UVC in air handling units.

All these units are not only helpful and necessary to protect products and humans, but they are also doing it in a highly effective way. Over 33% of electrical consumption are used as effective radiation in low pressure lamps. Comparing with upcoming LED solutions, mercury-based lamps are 15times higher in their efficiency. The lifetime of LED solutions is lower and the costs per Watt UVC are strikingly worse than mercury-based lamps. If one follows the development of UVC-LEDs in the last 5 years it seems to be realistic to have a comparable technique in 5 years at the earliest.

The impact of a ban on mercury use would be terribly significant. Having a revert to chemical and thermal techniques of disinfection would be a waste of energy and a very expensive step 20 years backwards. The reduction of mercury in a well-organized circuit of use, recovery and recycling will be changed in an even more negative impact due to toxic chemicals in and around food, harmful bioproducts and danger in storage. Even if one counts all

the mercury in our 14,000 yearly sold low pressure lamps, we are talking about not even 100 g of mercury over all!

All known alternative solutions like mercury free lamps and LED-based solutions will need at least another 5 to 10 years to reach the state of mercury-based lamps. The benefit of this technique to minimize the use of chemicals in food industry compared to the quantity of mercury used in a controlled circuit of recycling is significant.

A replacement of all installed solutions caused by a ban of mercury-use will lead inevitably to huge environmental damages and energy lost.

As a modern company we are always looking to optimize our products and to minimize the use of harmful chemicals such as mercury. We are testing LED solutions and mercury-free lamps and are optimizing all our systems in efficiency and a minimal ecological footprint.

If there are any possibilities to reduce or change the use of mercury in our daily work, we are prepared to do so it but till now it is absolutely impossible.

## **Our response to your questionnaire :**

### **Questionnaire**

1. VDMA 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).
  - 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 criteria<sup>4</sup> in Art. 5(1)(a).*

The wording should be maintained, and the extension requested at least until 2026 and beyond. The reason is that the alternatives to mercury for an environmentally friendly approach to disinfect air, surfaces and water without chemicals are still only available for smaller solutions and not for industrial scaled solutions.

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

The industry needs at least 5 years for the development of alternatives which can be compared with the actual technique of UVC. A shortening of the period is dangerous and does not make any sense from the industry´s point of view. The current wording of the exemption:

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

should therefore be retained unchanged.

Commercial air, surface and water treatment units using mercury UV-lamps are still the most efficient and environmentally friendly solutions for disinfection in industrial use because it displaces chemical products such as chlorine and is effective against all toxic and pathogenic microorganisms.

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.*

For UV disinfection in water, air and surfaces, there is currently no real replacement available with a similar cost efficiency. The affected markets include general (drinking) water treatment plants, the beverage industry, the food industry, fish farming plants, pharmaceutical industry, health industry, Covid-19-countermeasures, and ballast water treatment in ships.

The assessment of state-of-the-art available UVC light source for disinfection (Source: Halma PLC, UV Group, John Ryan personal communication)

	<i>Contain Mercury</i>		<i>Mercury free</i>	
	<i>Low pressure</i>	<i>Medium pressure</i>	<i>Excimer</i>	<i>UVC LED</i>
<i>Efficiency [%]</i>	<i>25 – 40</i>	<i>10 – 20</i>	<i>1 – 5</i>	<i>1 – 3.5</i>
<i>Power density [W/cm]</i>	<i>0.5 – 2</i>	<i>5 - 200</i>	<i>0.5 - 5</i>	<i>0.5 – 2</i>
<i>Power per lamp [W]</i>	<i>15 - 1000</i>	<i>200 - 40000</i>	<i>15 - 1000</i>	<i>0.05 - 0.2</i>

The step backward to use chemical disinfection like chlorine and ozone instead of UV, would be a huge step backward and would pose significant hazards in human safety.

- 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.*

Replacing existing UV lamp systems with alternatives would pose a variety of problems including quality issues, process interruptions, productivity losses, high capital costs and higher overall operating costs in particular energy use and the CO<sub>2</sub> footprint.

Nevertheless, Orca GmbH is a part of the Halma UV Group which is constantly working to find alternative solutions to replace mercury in existing lamps. One approach is our ZEROHg UV project, a follow on from ECO UV, with the objective of bringing to market a highly innovative mercury free

UV lamp capable of purifying water for critical applications in the food & beverage and drinking water disinfection industries.

We aim to commercialize a lamp and power supply by optimising the Hg-free discharge lamp technology and establishing a production, however efficiencies are still too low and there is no guarantee of success.

- 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.*

We are just at the beginning of comparable LED based solution in some niches of our portfolio. We are able to disinfect small volumes of water in industrial coffee machines or dentist's chairs. Spot irradiation of seals and small surfaces such as control buttons can be configured with LEDs. An industrial sized solution is not available and it is too early to give a timeline as the optimisation path needs to be confirmed, it means that it will take several years until the first serial industrial product replacement. Even at this state there will be a long ramp up required to match the huge variety of lamps or LEDs needed and to provide a retrofit solution. The only thing that is definite is that this will take longer than the 5-year review period under ROHS.

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?*
  - a. Till now we have no knowledge of such a manufacturer who is able to produce UV generating emitter in a comparable power range, price or efficiency. In each point of this enumeration the performance of existing mercury free solutions is tenfold less performance.
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?*

In 2018 the Boston Consulting Group (BCG) estimated the global market just for UV disinfection equipment at \$2bn per annum exhibiting a rapid CAGR of 16%, driven by population growth, urbanisation,

industrialisation, water scarcity, pollution, and a desire to move away from chemical disinfection. We know disinfection of Covid significantly increased quantities above and beyond this reported value.

- 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?*

Most of the equipment on the market use mercury discharge lamps and would have to be treated and disposed as waste. In many cases it is not economically and/or technologically feasible to retrofit existing equipment with alternative light sources. For our customers of the Halma group alone this would scrap close to 50000 systems that will have to be replaced with chemical solutions, with huge environmental impact. Loss of the technology would heavily impact critical sectors for drinking water, food and beverage and wastewater. The water sector relies heavily on UV to handle chlorine resistant organisms such as *Cryptosporidia*.

Additionally, to these water treatment systems the Orca GmbH installed around 40.000 solutions for surface and air treatment in the European food industry the last five years.

- 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.*

We and all companies with the same scope would be confronted with a professional ban resulting in a huge amount of unemployment and loss of products and productivity. A heavy EU-based supply chain of manufacturing companies would be negatively impacted and, in some cases, go out of business completely. As mercury-free alternatives are not yet technically and financially viable for disinfection application, at the current stage without an exemption of the further use of mercury in or product our company would most probably need to close in consequence of the ban.

- 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).*

With BCG estimating the market at \$2 billion per annum, and installed systems lasting around 10 to 20 years, the cost to both the current suppliers in loss of business, and the size of retro fit required to remove existing mercury-based UV technology is significant.

I hope my statement and the following answers are helpful to demonstrate that the replacement of mercury in this special segment of UV emitters would be dangerous.

The consequences are a loss of hygienic security, an increase of chemical disinfection products and residues, the end of a complete branch of industry with big economic and ecological damage.



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