



Consolidated Environmental NGOs Response to Stakeholder consultation on mercury-containing lamps (Review of Annex to the RoHS directive)¹

31 August 2009

1 Introduction and summary

The European Environmental Bureau, and the Green Purchasing Institute² appreciate due notification for technical adaptation consultation, as well as the invitation to the two consultation meetings in June and September 2008.

Considering that the above-mentioned NGOs have been mainly focusing on the mercury debate, the comments provided below will refer to Group I, applications where mercury has been used up to certain limits until now, but for which our research demonstrates that the maximum levels should now decrease.

The NGOs are deeply concerned that the ROHS directive may be weakened by exemptions on the basis of article 5(1) without the necessary justification. The Commission's criteria for granting exemptions is based upon the following:

"Article 5(1)(b) of the Directive 2002/95/EC provides that materials and components can be exempted from the substance restrictions contained in Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health, and/or consumer safety impacts caused by the substitution outweigh the environmental, health and/or consumer safety benefits thereof.

It should be noted that during the last consultations most of the applications for exemptions were not at all justified and the necessary forms not correctly filled in, or were incomplete or not filled in at all. Until now more than 100 additional (to the initial RoHS directive exemptions) requests for exemptions have been submitted by industry. Public consultation and the analysis from the consultants have proven however that not all of these justify adoption. Only 20 have been approved so far, showing that many requests were not justifiable. It must be kept in mind that in drafting the RoHS Directive, the Commission fully intended that the burden of proof would explicitly rest with industry to demonstrate why any specific application should be

¹ This comments consolidate all previously published ones, namely:

010408 Environmental NGOs response can be found at http://www.zeromercury.org/EU_developments/080401NGOs-RoHSconsultation-Review-of-Annex.pdf, Annexes accompany the submission –

I : http://www.zeromercury.org/EU_developments/Annex%20I%20Philip%20Lamps%20-%20Mercury%20Content%202008.pdf

II: http://www.zeromercury.org/EU_developments/AnnexII_GE_viaOmega2007_4thQTR_REPORT_received3-3-08.pdf

III: http://www.zeromercury.org/EU_developments/Annex%20III%20Sylvania%20mercury%20content.1107.pdf

IV: http://www.zeromercury.org/EU_developments/AnnexIVMercury_inHPS_LampsEU_Recs.pdf

101108 Updated revised NGOs comments http://www.zeromercury.org/EU_developments/081110NGOs-RoHSconsultation-Review-of-AnnexHg-in-lamps.pdf

030409 NGOs' response to the consultant http://www.zeromercury.org/EU_developments/090403_EEB-GPI_response_to_Oeko_final_report_Hg-lamps.pdf

² NGOs include

The **European Environmental Bureau (EEB)**, www.eeb.org, is a federation of more than 140 environmental citizens' organisations based in all EU Member States and most Accession Countries, as well as in a few neighbouring countries. These organisations range from local and national, to European and international. The aim of the EEB is to protect and improve the environment of Europe and to enable the citizens of Europe to play their part in achieving that goal.

The **Green Purchasing Institute** is a non-profit organization based in the United States that helps government agencies, institutions and business to specify, evaluate and purchase environmentally preferable goods and services.)

exempted. Therefore, unless and until the applicants provide the detailed supporting data to demonstrate that an exemption for a specific application may be warranted, all other requests should be denied as a matter of course.

While responding to the present consultation, rather extensive research has taken place mainly through the internet, and also talking with experts. In addition a conference on the issue was organized by the EEB on the 27 June. All presentations are currently available on-line at http://www.zeromercury.org/080627_EEB_conf_lamps.html.

It is evident that the Commission lacks comprehensive data on the mercury content in different kind of lamps, although it has sufficient information to make decisions in this proceeding due to the data from the United States. For example, from the members of the European Lighting Companies Federation (ELC), only three out of eight members provide information on mercury content in lamps in their websites, and actually only one really specifies mercury content per lamp type.

In order for the Commission to make fully informed decisions about the need for specific exemptions relating to lighting equipment, it should require manufacturers to submit data documenting the maximum mercury content (in milligrams) of any products that are currently sold in the EU. A database could be set up at EU level containing such data. This will enable the Commission to set appropriate mercury content limits and monitor compliance with the standards that are ultimately adopted. It will also help prevent the Commission from adopting exemptions for specific product categories when they are not needed. This precautionary approach – requiring mercury content disclosure – has been used to guide US procurement decisions relating to lighting decisions in the United States.

The Commission could effectively use the mercury-content information to set exemptions that represent “best in class” for various lamp types and harmonize with proposed Ecodesign criteria (under the EuP directive) without undermining the energy efficiency requirements.

The Commission should also require the use of more accurate and protective mercury-dosing techniques such as pills, pellets, strips and amalgam, which more precisely deliver the needed mercury to the lamp (thereby ensuring that it will meet the standards) and minimize the potential for worker exposure to this neurotoxin during the manufacturing process.

The Commission should make every effort to reduce the mercury content of fluorescent, HID and neon lighting equipment. It should particularly look for opportunities to eliminate exemptions that enable antiquated lighting equipment – that are often inefficient, short-lived and high in mercury content – to continue to be sold in hardware stores and other distribution channels.

It is important to note that our review of existing mercury-content data for fluorescent and high-intensity discharge (HID) lamps, largely originates from manufacturers in the United States – many of which sell the same or similar products in the European Union as well.

The NGO recommendations are based on the extract of findings from the US and EU market as presented in this document. For high volume lamps we have in general chosen a maximum limit value which two or more of the main lamp manufacturers are meeting already today; for the smaller volume lamps we consider that the best/lowest level reached today by at least one main lamp manufacturer could be sufficient indicator to show what technology can allow for. For all cases it has to be considered however that new maximum limits will be required after a short transition period, which will suffice for such a change.

To that end, the NGOs recommended mercury content limits are summarized in the following table, **on the basis of the classification in the EC draft proposal of 27 July 2009:**

Summary of EEB/GPI recommendations

Exemption as per draft EC decision 27/7/2009		Proposal EC/consultant [maximum value][mg]	Proposal EEB/GPI [maximum value][mg]	Remarks
1. Mercury in single capped fluorescent lamps not exceeding (per burner):				
1 (a)	For general lighting purposes < 50W	3.5	2	It needs to be clarified that Cold Cathode CFLs fall under this category on basis of wattage and not under special purposes
1 (b)	For general lighting purposes ≥ 50W and < 150	5	4,5	
1 (c)	For general lighting purposes >150W	15	No specific recommendation proposed	To that stage we have not found any CFLs with wattages that high. Nevertheless considering the limits for the other categories, 15mg appears high.
1 (d)	For general lighting purposes with circular or square structural shape and tube diameter ≤ 17 mm	7	7	We have no further comments on those lamps. Recommendation for exemption as proposed (7 mg) could be accepted. However our limited data shows that square CFLs can be made with 4mg.
1 (e)	For special purposes:	5	3	It needs to be clarified that Cold Cathode CFLs do NOT fall under this category of special purposes
2 (a) Mercury in double-capped linear fluorescent lamps for general purposes not exceeding:				
2 (a) (1)	Tri-band phosphor with normal lifetime < 9 mm (e.g. T2)	4	No specific recommendation proposed	For the time being the EC proposed levels could be accepted. Note: the exemption should be '≤' rather than '<', otherwise the 9mm (T2) as such is not covered.
2 (a) (2)	Tri-band phosphor with normal lifetime > 9mm and ≤ 17 mm (e.g. T5)	3	2	
2 (a) (3)	Tri-band phosphor with normal lifetime > 17 mm and ≤ 28 mm (e.g. T8)	3.5	2	
2 (a) (4)	Tri-band phosphor with normal lifetime > 28 mm (e.g. T12)	3.5	No specific recommendation proposed	We have no further comments on those lamps. Recommendation for exemption as proposed (3.5. mg) could be accepted.
2 (a) (5)	Tri-band phosphor with long lifetime.	5	3	
2 (b) Mercury in other fluorescent lamps not exceeding:				
2 (b) (1)	Halophosphate all shapes	8	No exemption or 8	

2 (b) (2)	Non-linear tri-band phosphor lamps > 17 mm (e.g. T9)	15	6	The example of T9 is not correct. T9s are halophosphates and for all shape halophosphates we have proposed no exemption or 8 mg – see above). Even ELC is talking about halophosphate lamps in relation to the T9s. Therefore the example there should rather be T8 and the limit should be reduced.
2 (b) (3)	Lamps for other general lighting and special purposes (e.g. induction lamps)	15	<p>10 mg per lamp, unless otherwise specified.</p> <p>For induction 7mg</p> <p>For long length lamps 8mg</p> <p>Applications: Appliances, exit signs, neon laptop and LCD screens should be mercury free.</p>	<p><u>Special purpose</u> fluorescent lighting should be carefully defined to prevent this category from being abused.</p> <ol style="list-style-type: none"> <u>Special purposes need to be identified separately</u>, and maximum limit of Hg shall <u>not exceed 10 mg</u> per lamp, unless otherwise specified. <u>Pet care lamps</u> e.g. Aquarium lights, <u>Cold climate, UV</u> (blocks UV lights), <u>should be seen under the straight fluorescent lamps category</u> and not be included in the definition of specialty lamps. <u>Induction lamps</u> should have a limit of 7 mg <u>No exemptions should further be allowed on exit signs and neon signs</u>, which can use mercury-free neon or LEDs. <u>Long-length lamps (≥ 1800 mm)</u> (e.g. long T8 fluorescents), <u>should not be automatically considered special purpose lamps</u>. They fall under the category of general purpose lighting in the manufacturers' catalogues, and should have their own limit of a maximum limit of 8 mg Hg/lamp. <u>Appliance lamps</u> should not be included in specialty lamps, limits should be consistent with high-efficiency T5s and T8s (above) and look for opportunities to substitute by LEDs. <p>We would therefore propose that <u>for APPLICATIONS</u> such as: <u>for exit signs, neon, laptop and LCD screens</u>, the following text should be included in the Annex: <u>Exemptions [1-7] above of this annex shall not apply to exit signs (containing housing, fixture and light source) and exit sign retrofit kits, neon signs, and laptop and LCD screens.</u></p>

3 Mercury cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) not exceeding mg per lamp:				
3 (a)	Short length (not over 500 mm)	3.5	2	Mercury in laptop screens should be banned completely considering that most companies have already or are about to produce LED ones.
3 (b)	Medium length (over 500 mm and not over 1500 mm)	5	No specific recommendation proposed	We have no further comments on those lamps. Recommendation for exemption as proposed could be accepted.
3 (c)	Long length (over 1500 mm)	13	No exemption should be proposed	Since the product is still under development, no exemption should be allowed to ensure new products can be made without mercury, considering the advances of LED in the relevant categories of e-products.
4 (a)	Mercury in other low pressure discharge lamps	15		The lamps which will fall under this category should be listed to avoid confusion. An example could be neon lamps , for which we think that no exemption should be given since they can be easily replaced by LED.
4 (b) i.	Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding in lamps with improved colour rendering index > 60			
4 (b) – I (a)	P ≤ 155 W	30	25	
4 (b) – I (b)	155 < P ≤ 405 W	40	30	
4 (b) – I (c)	P > 405 W	40	40	
Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding in other High Pressure Sodium (vapour) lamps				<p>Within the HPS category, the limits have been set for the entire category to accommodate the older technology rather than setting limits that can foster innovation.</p> <p>We are most concerned that <u>the way the exemption is proposed, it appears that standard single burner HPS cycling lamps</u> be allowed to have significantly more mercury than necessary under the proposed limits – largely because <u>they are being lumped in with other specialty HPS models such the double-burner models – that typically have much higher mercury content levels</u></p>

4 (1) – I (d)	P ≤ 155 W	25	5	<p>In our last submission of 3/4/2009 we have also proposed instead:</p> <p>Therefore for the low CRI category (CRI ≤ 60), we propose, instead, that lower mercury limits be set on additional categories of HPS lamps: standard <u>cycling</u> (single burner) lamps ,and non-cycling models</p> <ul style="list-style-type: none"> • HPS (<u>cycling</u>) lamps (excluding high-CRI and double-burner models) ≤ 150W, shall not contain more than 15 mg/ lamp • HPS (<u>cycling</u>) lamps (excluding high-CRI and double-burner models) > 150W shall not contain more than 30 mg/lamp <p>Therefore the ECs & Consultant’s currently proposed limits for low CRI HPS should apply only to double burner models.</p> <p>Finally, we further urge the Commission and Member States to set separate, lower mercury limits for <u>Non-cycling HPS lamps</u>, because this subcategory of HPS lamps contains dramatically lower mercury levels.</p> <p>HPS Non – cycling, below 400W , shall not contain more than 10 mg Hg</p> <p>HPS Non cycling, above 400W, shall not contain more than 25 mg.</p>								
4 (a) – I (e)	155 < P ≤ 405 W	30	10									
4 (a) – I (f)	P > 405 W	40	25									
4 (b) – II	Mercury in High Pressure Mercury (Vapour) lamps except for general lighting (HPMV)	Blanket exemption – no limit.	No exemption	<p>We would rather propose, as the Consultant mentions, that the exemption on special purpose HPMV lamps is also deleted and industry submits separate notification for exemption if these are still needed. This measure could take place immediately and therefore the exemption is not needed.</p>								
4 (b) – III	<u>Mercury in Metal halide lamps (MH)</u>	Blanket exemption – no limit.	<table border="1"> <tr> <td>For <25W</td> <td>2.5</td> </tr> <tr> <td>For >25W, <100W,</td> <td>10</td> </tr> <tr> <td>For >100W, <200W</td> <td>15</td> </tr> <tr> <td>For >200W, <400W</td> <td>25</td> </tr> </table>	For <25W	2.5	For >25W, <100W,	10	For >100W, <200W	15	For >200W, <400W	25	
For <25W	2.5											
For >25W, <100W,	10											
For >100W, <200W	15											
For >200W, <400W	25											
4 (c)	Mercury in other discharge lamps for special purpose not specifically mentioned in this Annex	Blanket exemption – no limit.	No specific recommendation proposed									

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2 Background

Overall European industry estimates that approximately 40% of sales of mercury containing lamps in Europe are used in private households or small businesses. The market for mercury containing lamps in Western Europe (including Switzerland and Norway) is estimated by the European Lighting Companies (ELC) Federation at approximately 600 million pieces – over 90% of these lamps being manufactured by ELC members. There are eight ELC member companies, namely AURA Light International AB, BLV Licht- und Vakuumtechnik, GE Lighting Limited, LEUCI S.p.A., NARVA Lichtquellen GmbH, OSRAM GmbH, Philips Lighting BV and Sylvania Lighting International.

While the eight ELC members are European and North American companies, their lamps are manufactured worldwide, and not necessarily to the same standards in all countries. As for the 10% of the mercury containing lamps not manufactured by ELC members, it may be assumed that they are generally cheaper products with a lower standard and higher mercury content, likely imported from low-cost manufacturers in regions such as Asia.³

Lamps with mercury are efficient light sources, typically consuming up to 5 times less energy than incandescent (filament) lamps of comparable light output. Further, their useful life is typically 5-10 times the average 1000 hours lifetime of incandescent lamps.⁴

(Linear fluorescent lamps such as modern T8s and T5s can yield even greater energy savings and often last 20,000 to 30,000 hours.) Light Emitting Diodes (LEDs), which can replace some incandescent and fluorescent applications, are the most energy-efficient choice for some low-wattage applications such as exit signs, night lights, LCDs and indicator lighting; they are also very long lasting and mercury-free.

Mercury containing lamps include primarily fluorescent lamps (tubes and compact fluorescent lamps (CFLs)), high-intensity discharge (HID) lamps (mercury vapour, metal halide, (most) high-pressure sodium,) and cold cathode (ultraviolet and (some) “neon”) light sources. Fluorescent lamps include, among others, straight tubes of varying lengths, compact fluorescent lamps used to replace incandescent light bulbs, halo-shaped indoor lamps, and small fluorescent lamps found in backlit LCD displays in laptop computers and other devices, appliances, exit signs, navigational systems, etc. They are typically used in indoor office lighting and most other commercial applications, while CFLs are increasingly used in households. There are about 5,000 different fluorescent lamp products on the market. The straight tube lamp is the highest volume fluorescent lamp sold, accounting for approximately 70 percent of the market for fluorescent lamps used for general lighting purposes. High-intensity discharge (HID) lamps, which commonly use mercury as a starting aid and for voltage control, are typically used in security lighting, street lighting, outdoor and parking lot lighting, warehouses and other “high-bay” structures, etc. Metal halide lamps are often used for high-intensity lighting, such as stadium and parking lot lighting. While standard metal halide lamp tend to have among the highest mercury content per lumen hour, they are increasingly being replaced by more efficient ceramic metal halide lamps, which also tend to have a significantly lower mercury content. Low-pressure sodium lamps, increasingly used in street lighting as well, are generally mercury-free.

The present European market annually consumes approximately 389 million straight fluorescent tubes, 447 million CFLs, 42 million HID lamps and 75 million of other type of lamps, as can be seen below. Mercury used in lighting in the EU is estimated at 11-16 tonnes in EU -25 (2006)⁵

³ RoHS substances (Hg, Pb, Cr(VI), Cd, PBB and PBDE) in electrical and electronic equipment in Belgium, Final Report ,Brussels , November 2005, p. 35-36, from COWI and Concord East-West for Federal Public Service Health, Food Chain Safety and Environment Directorate-General Environment

⁴ [ELC 2004a] in “RoHS substances in EEE in Belgium” November 2005

⁵ Overview-Mercury lamps in the EU, Peter Maxson, Concorde East/West sprl, Presentation at the EEB conference “Mercury-containing lamps under the spotlight”, 27 June 2008, Brussels, http://www.zeromercury.org/EU_developments/Maxson_Hg%20lamps%20in%20the%20EU-Final_revised.pdf

EU27 market for mercury containing lamps (2006)⁶

EU27 market for mercury containing lamps (2006)		Units (million)	Hg content (g/unit)	Hg content (tonnes)	Estimated Hg range (t)
Fluorescent tubes	EU27_production	552	0.010	5.52	
	EU27_extra import	60	0.010	0.60	
	EU27_extra export	223	0.010	2.23	
	EU27_consumption	389	0.010	3.89	3.3-4.5
CFLs	EU27_production	255	0.005	1.28	
	EU27_extra import	247	0.005	1.23	
	EU27_extra export	55	0.005	0.27	
	EU27_consumption	447	0.005	2.23	1.9-2.6
HID lamps	EU27_production	39	0.030	1.18	
	EU27_extra import	15	0.030	0.44	
	EU27_extra export	12	0.030	0.35	
	EU27_consumption	42	0.030	1.27	1.1-1.5
Other lamps	EU27_production	81	0.025	2.03	
	EU27_extra import	29	0.025	0.72	
	EU27_extra export	35	0.025	0.88	
	EU27_consumption	75	0.025	1.86	1.6-2.1
TOTAL	EU27_production	928	0.011	10.01	
	EU27_extra import	350	0.009	2.99	
	EU27_extra export	325	0.012	3.74	
	EU27_consumption	953	0.010	9.26	7.9-10.7

Because mercury-containing lighting is more energy efficient than conventional incandescent lighting, less energy is needed to make the required electricity, thus translating to reduced mercury emissions from coal-burning power generating plants. The amount of mercury pollution that is offset using more efficient lighting depends on the type of lamps used and the fuel mix of the power plant generating the electricity.⁷

As analysed recently at the [EEB conference, June 2008](#), by Peter Maxson, according to the US EPA, CFL is a “drop-in” substitute for incandescent, consumes up to 75% less electricity, causes the generation of substantially less CO₂, has up to 10 times longer lifetime, is a quick return-on-investment, according to some USA estimates only 11% of Hg content would be released when a CFL is landfilled, and the total Hg release may be far lower when using a CFL than when using equivalent incandescent.

Further we have to consider however, that Hg releases vary with the percentage of coal in the fuel mix, the Hg content of the coal in the fuel mix, the extent of Hg controls on coal combustion flue gases, the assumed lifetime of a CFL, the Hg content of the CFL, the rate of secure collection of waste CFLs, the disposal pathways for CFLs not collected, etc.

⁶ Overview-Mercury lamps in the EU, Peter Maxson, Concorde East/West sprl, Presentation at the EEB conference “Mercury-containing lamps under the spotlight”, 27 June 2008, Brussels, http://www.zeromercury.org/EU_developments/Maxson_Hg%20lamps%20in%20the%20EU-Final_revised.pdf

⁷ Background Study on Increasing Recycling of End-of-life Mercury-containing Lamps from Residential and Commercial Sources in Canada, Pollution Probe, 31 October, 2005, p.16

If we follow a US-EPA type scenario, the total Hg releases from electricity generation and disposal are estimated to be 1.7 mg if we use a CFL (with 4mg mercury content) and 5.8 mg if we use an incandescent.

If we follow an EU scenario, considering EU circumstances the total Hg releases from electricity generation and disposal are estimated to 2.4 mg if we use a CFL (5mg Hg content according to RoHS currently), versus 3.5 mg if we use an incandescent.

Therefore considering that the most important advantage of the use of CFLs is their energy saving capacity, in view of tackling also as effectively as possible the mercury emissions aspect, it is critical to:

- reduce to an absolute minimum the Hg content of CFLs, i.e. <2 mg, and other Hg lamps.
- maximize the lifetime and lumens/watt of all Hg lamps
- maximize the recycling or secure disposal of all Hg lamps

More details on the above suggestions will be provided in the following pages, mainly with respect to the mercury contains per type of lamp.

2.1 Data gaps

From the members of the European Lighting Companies Federation (ELC) only three out of eight members provide information on mercury content in lamps, in their websites and actually only one really specifies mercury content per lamp type.

- i. **Aura Light International AB**, Auralight.com, no content of mercury indicated. In the catalogue⁸ it says “In addition, our Long Life lamps use the lowest level of mercury per burning hour.” and “High Pressure Sodium lamps contain a small defined amount of mercury, necessary for proper operation.”
- ii. **BLV Licht- und Vakuumtechnik GmbH**, BLV-licht.de, no content of mercury indicated. In the catalogue http://www.blv-licht.com/blv/downs/BLV_USHIO_06-07_D_E.pdf, mercury is not mentioned at all.
- iii. **GE Lighting Ltd.** - [GElighting.com/eu](http://www.gelighting.com/eu)⁹ – general reference that ‘...T5s contain only 5mg Hg...., ‘precise mercury dosing system’, however no mentioning of Hg in CFL catalogue, no specific content/lamp type and not on the specialty lamps neither.
- iv. **LEUCI S.p.A** – <http://www.leuci.com/>, no mentioning of mercury at all.
- v. **Narva Lightquellen GmbH** - <http://www.narva-bel.de/> no mentioning of mercury at all
- vi. **Osram GmbH** – www.osram.com - general mentioning of mercury content in straight FL, T8 Luminux-3mgHg, T5 HE and HO lamps – 2.5mg. For CFLs, no specific content of mercury per model mentioned, only general mentioning for some models across, e.g. Dulux el all types <3mg, Dulux D, T/E, S, L, LSP < 5mg, Circolux EL <9mg but no further details per lamp-type in the product fact sheet.. No indication of mercury content is provided for the mercury-vapour lamps.
- vii. **Philips Lighting BV** – www.lighting.philips.com- Info on content for EACH TYPE of lamp, in each fact sheet. Also Philips includes the mercury content of many models of its lamps on its brochures that are posted online. See, for example: http://www.wescodist.com/healthcare/docs/alto_brochure.pdf.
- viii. **Sylvania Lighting Int.** – www.sylvania-lighting.com - no Hg mentioned at all in product catalogues, not in individual pages per product. On the other hand, Sylvania posts the mercury content of its lamps on a website designed to be used by architects and designers to secure US Green Building Council credits under its Leadership in Energy and Environmental Design (LEED) programs. Users must know the lamp model number or lamp description to use the calculator, which also provides the rated life and mean lumens of each lamp¹⁰.

⁸ <http://www.auralightgroup.com/images/products/int/AuraLongLifeCathalog2008.pdf>

⁹ http://www.gelighting.com/eu/resources/literature_library/catalogs/lamp_catalog/downloads/d_egc_spectrum_fluorescent_uk_07-08_1.pdf

¹⁰ <http://www.sylvania.com/AboutUs/EnergyAndEnvironment/EnvironmentalTrends/GreenBuildings/USGBCLEED/LEEDexistingbuilding>

For **Megaman**, <http://www.megaman.cc/global/index.php> ,which is not member of ELC, their website mentions that their lamps contain less than 3mg, but mercury content for the different lamps produced is not provided apart from the 11W one; a special section on mercury can be found including handling procedures of a broken energy saving lamp.

Considering the above we have the following suggestions for the Commission to follow that will enable more informed decisions to be made in this regard in the future.

First, the Commission should require manufacturers interested in selling mercury-containing lamps in Europe to provide the Commission with data on the maximum mercury content in each model in milligrams as well as the dosing method used.

Second, a database should be set up at EU level containing such data. This will enable the Commission to set appropriate mercury content limits and monitor compliance with the standards that are ultimately adopted. It will also help prevent the Commission from adopting exemptions for specific product categories when they are not needed.

Third, the Commission should then use this information to establish appropriate mercury restrictions based on “best in class” levels for each lamp category. Without this information, the Commission and the public will largely remain in the dark about the mercury content of various types of lighting products.

This process is consistent with the process some US state and local government agencies are following prior to establishing environmental standards for the lighting equipment they procure for their operations. For example, the State of California developed a lighting bid specification in 2005 that set mercury, lamp life and performance standards for the most popular lamps offered on state contracts¹¹. Similarly, the City of New York adopted a law in 2005, which requires that “any mercury-added lamp purchased or leased by any agency shall achieve no less energy efficiency than the minimum required by the director [of environmental purchasing] through rulemaking and, among lamps meeting such energy efficiency requirements shall contain the lowest amount of mercury per lumen hour.”¹²

2.2 Horizontal issues

Lamp manufacturers have made different progress lowering the mercury content of different types of lamps and that should be encouraged with the standards. For example, more progress has been made lowering the mercury content of T5s compared to T8s and linear T8s compared to U-shaped models. The standards should be set to represent best in class for each lamp type based on a technological evaluation of what has and can be achieved, without undermining the energy efficiency criteria that will be set. Combining different types of technologies is likely to result in weaker standards designed to accommodate all models in a category.

Nominal vs. Maximum values for Hg

In our view, the proposed mercury limits are generally set too high and can be reduced.

Industry’s claim that the variance in the dosing can have a 40% margin (p.19) does not show good accuracy and is contrary to our scientific evidence. With precise low-mercury dosing technologies, such as mercury capsules or amalgam strips, it is possible to achieve a high level of dosing accuracy and produce lamps with very low mercury content. Even amounts below 1.5 mg can be dosed with a variability of less

¹¹ State of California Department of General Services, California Lamp Contract, 1 06-62-31 (Effective 3/1/06 – 2/28/09); <http://www.documents.dgs.ca.gov/pd/contracts/lamps/6240-05BS-001.htm>.

¹² (Source: New York City Council, Local Laws of the City of New York for the Year 2005: No 120; “To amend the administrative code of the city of New York in relation to the reduction of hazardous substances in products purchased by the City; http://www.nyc.gov/html/nycwasteless/html/at_agencies/laws_directives.shtml#local120.)

than 10%¹³. From communication with one major lamp manufacturer, they mentioned that there can be a small variation of +/- 0.3 mg in the nominal values.

The safety margin ELC claimed is needed for market surveillance does not make sense. If a known quantity of mercury is added to a lamp using accurate modern dosing methods - even considering a safety margin how can it be possible that a lamp contains more mercury when it is tested than the amount added initially? Industry further argues that additional mercury is needed because some part may bond to the glass over time. But modern lamp manufacturing methods have devised coatings that prevent significant amounts of mercury from sticking to the glass. Lamp manufacturers already take this into consideration and no additional mercury is needed than the amounts we have presented based on actual mercury content of lamps currently on the market – plus a small (10-20% margin of safety). Allowing higher safety margins rewards inaccurate dosing methods that also unnecessarily expose workers and the environment to mercury emission.

Contrary to those of industry representatives, the NGO's arguments presented in this and previous documents are supported by scientific evidence. This is highlighted numerous times by the consultant: "ELC has not provided hard fact data supporting its request for a high variance compared to the NGO information which is at least supported by a scientific source." (page 20). On page 31 when discussing exemption 1: "[...]A comparison and the finding of a compromise are hindered due to the fact that hard fact data is lacking in most of the cases. Only environmental NGOs have done extensive data research...."

Industry representatives also claim that higher mercury content is required to maintain lamp performance over time and that the longer the burning time, the higher the amount of mercury is needed. However, they have not presented any data showing that modern low-mercury lamps have reduced lifetimes, lower lumen output or other performance problems. NGOs have presented several cases –based on data from the US and EU market -- where lamps with lower mercury content have equal performance in these areas. We have reviewed mercury lamp data to determine whether there was a trade-off between efficiency and **lamp-life** and have not found any. For example, Philips Alto II T8 Fluorescent lamps all contain less than 2 mg of mercury and include models that last 24,000, 30,000, 36,000 and 40,000 hours with no difference in lumen output.

NGOs support, in principle, the allowance of additional amounts of mercury for lamp models with extraordinary lamp life since that will reduce the number of lamps that must be manufactured and recycled over time. For example, we support allowing a 5 mg limit on lamps with a very long lamp life, such as the Osram XT and XXT, which last 75,000 and 90,000 hours, respectively. We believe that the definition of long life that has been established under the proposed RoHS Directive revision -- of >25,000 hours – is too short. Additional mercury has not been demonstrated to be necessary at that rated life. We could support the increased mercury-content of 5 mg only for lamps that have a rated life of 40,000 hours or more.

Our recommendations should be considered as maximum values since this margin is mostly built into our suggestions, and considering that there will be still enough time for industry to adapt to the new proposed values by utilising these new more accurate and safer dosing method.

NGOs' Basis for recommendation

The NGO recommendations are based on the extract of findings from the US and EU market as presented in this document. For high volume lamps we have in general chosen a maximum limit value which two or more of the main lamp manufacturers are meeting already today; for the smaller volume lamps we consider that the best/lowest level reached today by at least one main lamp manufacturer could be sufficient indicator to show what technology can allow for. For all cases it has to be considered however that new maximum limits will be required after a transition period, which will suffice for such a change.

¹³ 13 Corazza et al.- Mercury dosing solutions for fluorescent lamps, Journal of Physics, 4 July 2008.

Lifetime

On the basis of US measures long lifetime is considered as:

- >25,000 hours, tested on instant start ballasts with 3-hour starts (IS/3) or
- >30,000 hours on rapid or program start ballasts with 3-hour starts (PS/3);
- >30,000 hours on instant start ballasts with 12-hour starts (IS/12); or
- >36,000 hours on rapid or program start ballasts with 12-hour starts (PS/12).

In the EU the measure proposed is by installed luminous flux higher than 80% at 25000 hours with Electronic Start Gear (ECG) using 3h standardised cycle.

Until now, we have not been able to find out further data on the correlation between the US and EU lifetime data. If these EU data are equivalent or stricter than the US, then the EU measure could be accepted. In case new evidence comes to our knowledge we will communicate them to the European Commission.

Transition Period/Expiry Date

The new requirements indicating maximum mercury content per lamp type should be implemented as soon as possible.

The EuP Implementing measures for domestic and street lighting have now been approved (Regulations 244/2009 and 245/2009, 18 March 2009). Inefficient non-clear (non-transparent, frosted) lamps will be phased out as of September 2009, whereas inefficient clear (transparent) lamps will be phased out progressively, starting with the highest wattage (100W incandescent bulbs and above) in 2009. Starting September 2009, lamps equivalent in light output to 100W transparent incandescent bulbs and above will have to be at least class C (improved halogens instead of incandescent bulbs). By the end of 2012, the other wattage levels will follow, and the most commonly used bulbs, the 60W, will remain available until September 2011 and 40 and 25W bulbs until September 2012¹⁴.

Therefore, the mercury requirements should be applicable as soon as possible to follow these developments –most importantly for CFLs, linear fluorescent T5s, and T8s. HIDs should also follow the same transition period or soon after, since they are widely used and contain high amount of mercury, respectively.

On the basis of the above, and considering that a significant part of the market is already reaching the mercury limits proposed, we consider that the transition period for the discussed exemptions should be by 2010, if any, (and not by 2012 as proposed by the Consultant). Expiry date should then be set overall by 2014 at the latest or four years after adoption. The expiry date for 31 December 2012 should be considered and kept were relevant (e.g. for exemptions 3(a)(b)(c)), as well as for CFLs considering above developments.

As it has been discussed many times, LED/OLED or other mercury-free technology is developing rapidly for more and more applications. During the coming years it is expected that technology could readily replace many existing mercury-containing lamp applications. As a result, extending the expiry date until 2014 will delay the implementation of environmentally preferable lighting technology.

¹⁴ <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/113&format=HTML&aged=0&language=EN&guiLanguage=en>

The expiry dates should be included in the decision for the Annex, awaiting the finalisation of the RoHS recast, but this should not be used to delay the process.

3 Recommendations

Below are a series of recommendations that are largely based on data on the mercury content of lighting equipment sold in the United States. It was distressing to find scant mercury content data for lighting equipment manufactured in and for the European Union.

Considering the developments in discussions during the last months, and on the basis of the above, we would propose that exemptions for mercury containing lamps follow classification as below:

3.1 Compact Fluorescent Lamps (CFL)

There should be a clear definition of what constitutes a CFL in the RoHS Directive to ensure that there is no ambiguity about what does or does not fall under this category.

Compact fluorescent lamps can be broken down into three categories (based on US technology analysis):

- CFL models that have an integrated ballast (in the US these are usually screw-in models and regulated by the ENERGY STAR program)
- CFL models that have a separate ballast (in the US these are usually pin-based models); here is a memo describing these from European lamp manufacturers; [www.oekopol.de/de/themen/eup/druckversion_user/CFLni%20\(ELC\).pdf](http://www.oekopol.de/de/themen/eup/druckversion_user/CFLni%20(ELC).pdf)
- Cold cathode CFLs – the same technology that back-lights computer screens is making its way into decorative and area lighting with a line of cold-cathode compact fluorescent lamps (CC CFLs)¹⁵.

To our view all of the above categories should be under the term CFL.

3.1.1 CFL for general lighting purposes, < 50W

General lighting purposes should be defined to include both models with integrated and non-integrated ballasts. The following shapes should generally be considered general lighting applications: twists, loops, globes, A-shapes, reflector floods, candles and bullets.

No further distinction is needed within the group of CFLs between self-ballasted or pin based, since:

- In ELC’s submission of 31 March 2008, no difference is being made.
- Below is a summary of mercury content data for various types of lamps from major manufacturers, where range is more or less the same .

OEM	CFL Screw-in (Integrated ballast)	CFL Pin (separate ballast)	Notes
Sylvania*	1.5 mg-6 mg	2.5 mg – 4.5 mg	>25 watts = 6 mg (Integrated ballast models)
Philips**	Most 1.23 mg-2.64 mg (few 4-6 mg)	1.4 mg-4.4 mg	Most 2-pin models 1.4 mg; most 4-pin models 2.7 mg (some 1.4 mg); some “long CFLs 4.4 mg)

*Osram-Sylvania, “Mercury Quantity in Lamps for General Lighting Applications, 11/01/07;

http://www.zeromercury.org/EU_developments/Annex%20III%20Sylvania%20mercury%20content.1107.pdf.

**Philips Lamps – Mercury Content 2008; spreadsheet provided by Philips USA.

Furthermore, see below more details on mercury content in pin-based and screw in CFLs

¹⁵ <http://greensource.construction.com/products/articles/070503Coldcathode.asp>

A. Pin-based CFLs: See data showing many models contain 3 mg or less of mercury.

Philips	PL-S Short Fluorescent Lamps	Mercury
146811	PL-S 13W/827/2P/ALTO 10PK	1.4 mg
146829	PL-S 13W/827/2P/ALTO BULK	1.4 mg
146837	PL-S 13W/830/2P ALTO 10PK	1.4 mg
146845	PL-S 13W/835/2P/ALTO 10PK	1.4 mg
146852	PL-S 13W/841/2P/ALTO 10PK	1.4 mg
146860	PL-S 13W/841/2P/ALTO BULK	1.4 mg
146878	PL-S 13W/850/2P ALTO 10PK	1.4 mg
146886	PL-S 13W/850/2P/ALTO BULK	1.4 mg
146712	PL-S 5W827/2P/ALTO 10pk	1.4 mg
148684	PL-S 5W/841/2P/ALTO 10pk	1.4 mg
148718	PL-S 7W/827/2P/ALTO 10pk	1.4 mg
148726	PL-S 7W/835/2P/ALTO 10pk	1.4 mg
148734	PL-S 7W/841/2P/ALTO 10PK	1.4 mg
148742	PL-S 7W/850/2P/ALTO 10PK	1.4 mg
148676	PL-S 9W/827/2P ALTO 10PK	1.4 mg
148692	PL-S 9W/835/2P ALTO 10PK	1.4 mg
148700	PL-S 9W/841/2P/ALTO 10PK	1.4 mg
146803	PL-S 9W/850/2P ALTO 10PK	1.4 mg
13-26 watt	PL-C Cluster 2-pin Fluorescent Lamps	
383141	PL-C 13W/27/ALTO 10PK	1.4 mg
383109	PL-C 13W/27/USA/ALTO 10PK	1.4 mg
383158	PL-C 13W/30/ALTO 10PK	1.4 mg
383117	PL-C 13W/30/USA/ALTO 10PK	1.4 mg
383125	PL-C 13W/35/USA/ALTO 10PK	1.4 mg
383133	PL-C 13W/41/USA/ALTO 10 PK	1.4 mg
383166	PL-C 18W/27/ALTO 10PK	1.4 mg
383174	PL-C 18W/30/ALTO 10PK	1.4 mg
383182	PL-C 18W/35/ALTO 10PK	1.4 mg
383190	PL-C 18W/41/2P/ALTO 10PK	1.4 mg
383216	PL-C 26W/27/ALTO 10PK	1.4 mg
383224	PL-C 26W/30 ALTO 10PK	1.4 mg
383232	PL-C 26W/35 ALTO 10PK	1.4 mg
383240	PL-C26W/41/ALTO 10PK	1.4 mg
	PL-C Cluster 4-pin Fluorescent Lamps	
383257	PL-C 13W/27/4P/ALTO 10PK	1.4 mg
383265	PL-C 13W/30/4P/ALTO 10PK	1.4 mg
383273	PL-C 13W/35/4P/ALTO 10PK	1.4 mg
383281	PL-C 13W/41/4P/ALTO 10PK	1.4 mg
383349	PL-C 26W/27/4P/ALTO 10PK	1.4 mg
383299	PL-C 18W/27/4P/ALTO 10PK	1.4 mg
383307	PL-C 18W/30/4P/ALTO 10PK	1.4 mg
383323	PL-C 18W/35/4P/ALTO 10PK	1.4 mg
383331	PL-C 18W/41/4P/ALTO 10PK	1.4 mg
383356	PL-C 26W/30/4P/ALTO 10PK	1.4 mg
383364	PL-C 26W/35/4P/ALTO 10PK	1.4 mg
383372	PL-C 26W/41/4P/ALTO 10PK	1.4 mg
	PL-T Triple 4-pin Fluorescent Lamps	
384370	PL-T 18W/27/4P/ALTO 12PK	2.7 mg
268029	PL-T 18W/30/4P/ALTO 12PK	2.7 mg

268201	PL-T 18W/35/4P/ALTO 12PK	2.7 mg
268227	PL-T 18W/41/4P/ALTO 12PK	2.7 mg
384404	PL-T 26W/27/4P/ALTO 12PK	2.7 mg
268235	PL-T 26W/30/4P/ALTO 12PK	2.7 mg
268243	PL-T 26W/35/4P/ALTO 12PK	2.7 mg
268250	PL-T 26W/41/4P/ALTO 12PK	2.7 mg
384438	PL-T 32W/27/4P/ALTO 12PK	2.7 mg
268326	PL-T 32W/30/4P/ALTO 12PK	2.7 mg
268334	PL-T 32W/35/4P/ALTO 12PK	2.7 mg
268722	PL-T 32W/41/4P/ALTO 12PK	2.7 mg
384503	PL-T 42W/27/4P/ALTO 12PK	2.7 mg
268730	PL-T 42W/30/4P/ALTO 12PK	2.7 mg
268755	PL-T 42W/35/4P/ALTO 12PK	2.7 mg
134882	PL-T 42W/835/4P/HTA ALTO 12P	2.7 mg
134874	PL-T 42W/830/4P/HTA ALTO	2.7 mg
268763	PL-T 42W/41/4P/ALTO 12PK	2.7 mg
136598	PL-T42W/841/4P/HTA ALTO 12PK	2.7 mg
146316	PL-T 57W/830/4P/A 10PK	3.0 mg
146324	PL-T 57W/835/4P/A 10PK	3.0 mg
146332	PL-T 57W/841/4P/A 10PK	3.0 mg
Sylvania		
5W to 57W	DULUX [®] pin base (excl. some T, and F and L)	<2.5
18W to 36 W	DULUX [®] F, pin base	<3
70W	DULUX [®] pin base, T/E/IN	<3

B. Self-ballasted (screw in) CFLs

Mercury content of reflector flood CFLs

Brand	Watts	Initial Lumens	Initial Lumens/Watt	Rated Life (Hours)	Models	Max Mercury Content
Philips	16	630	39.4	8,000	EL/A BR30 16-watt ALTO	1.23 mg
	20	930	46.5	8,000	EL/A R40 20-watt ALTO	
	20	940	47.0	8,000	EL/A PAR38 20-watt ALTO	
Sylvania	16	750	50.0	8,000	CF16EL/BR30/827	3 mg
	19	950	50.0	8,000	CF19EL/PAR38/830	
	20	900	45.0	8,000	CF20EL/BR40/827	
	23	1250	54.3	8,000	CF23EL/BR40/830/BL	
	23	1200	52.2	8,000	CF23EL/PAR38/827	
GE	15	750	50.0	10,000	FLE15/2/R30/XL	5 mg
	26	1300	50.0	10,000	FLE26/2/R40XL	
	26	1300	50.0	10,000	FLE26/2/PAR38/XL	

Data on mercury content of CFLs with an integrated ballast from Philips (2008) with 3 mg or less

COMPACT FLUORESCENT INTEGRATED		
REFLECTOR FLOODS		
139394	16W Med BR30 1CT	1.23
139410	20W Med BR40 ALTO 1CT	1.23
139436	20W Med PAR38 ALTO 1CT	1.23

	A SHAPE	
130708	A-Shape 16W Med EL/A mH 1BC	1.23
128082	A-Shape 16W Med EL/A mH 1BC	1.23
139733	A-Shape 16W Med EL/SWP ALTO 1CT	1.23
140665	A-Shape 16W Med EL/SWP ALTO 1CT	1.23
20080-8	A-Shape 20W Med EL/SWP ALTO 1CT	1.23
	GLOBE SHAPE	
21106-0	16W Med EL/A G30 ALTO 1CT	1.23
145151	20W Med EL/A G40 ALTO 1CT	1.23
139527	Outdoor 15W Med EL/O ALTO 1BC	2.64
139402	12W Med R20 ALTO 1BC	2.64
139428	12W Med R20 ALTO 1CT	2.64
164459	12W Med R20 ALTO 1BC	2.64
	12W Med EL/A ALTO 1CT	2.64
139543	9W Cand EL/A MCAN ALTO 1CT	2.64
146910	SLS 14	2.64 mg
130773	SLS 20	2.64 mg
135749	SLS 25	2.64 mg
137869	EL/O 15	2.64 mg
135780	EL/O 18	2.64 mg
	EL/O 15 BAW	2.64 mg
287813	Outdoor 15W Med EL/O ALTO 1CT	2.64
371187	Outdoor 15W Med EL/O ALTO 1CT	2.64
371195	Outdoor 15W Med EL/O ALTO 1BC	2.64
371211	Outdoor 15W Med EL/O ALTO 1BC	2.64
137869	Outdoor 15W Med EL/O ALTO 1CT	2.64
287813	Outdoor 15W Med EL/O ALTO 1CT	2.64
371237	Outdoor 18W Med EL/O ALTO 1CT	2.64
135780	Outdoor 18W Med EL/O ALTO 1CT	2.64
371525	Outdoor 18W Med EL/O ALTO 1BC	2.64
371344	Outdoor 18W Med EL/O ALTO 1BC	2.64
371484	Outdoor 15W Med EL/O Bug-A-Way 1CT	2.64
371492	Outdoor 15W Med EL/O Bug-A-Way 1BC	2.64
371559	Outdoor 15W Med EL/O Bug-A-Way 1BC	2.64
220038	Universals 14W Med SLS ALTO 1CT	2.64
371047	Universals 15W Med SLS ALTO 1CT	2.64
371054	Universals 15W Med SLS ALTO 1BC	2.64
371054	Universals 15W Med SLS ALTO 1BC	2.64
371070	Universals 15W Med SLS 1BC	2.64
373357	Universals 15W Med SLS ALTO 1BC	2.64
373381	Universals 15W Med SLS ALTO 1BC	2.64
130757	Universals 15W Med SLS ALTO 1CT	2.64
220087	Universals 20W Med SLS ALTO 1CT	2.64
371088	Universals 20W Med SLS ALTO 1CT	2.64
371096	Universals 20W Med SLS ALTO 1BC	2.64
373365	Universals 20W Med SLS ALTO 1BC	2.64
373399	Universals 20W Med SLS ALTO 1BC	2.64
371112	Universals 20W Med SLS ALTO 1BC	2.64
130773	Universals 20W Med SLS ALTO 1CT	2.64
371146	Universals 25W Med SLS ALTO 1CT	2.64

371153	Universals 25W Med SLS ALTO 1BC	2.64
135749	Universals 25W Med SLS ALTO 1CT	2.64
371153	Universals 25W Med SLS ALTO 1BC	2.64
373373	Universals 25W Med SLS ALTO 1BC	2.64
373407	Universals 25W Med SLS ALTO 1BC	2.64
371179	Universals 25W Med SLS ALTO 1BC	2.64
220350	15W Med SLS/R30 1CT	2.64
372466	15W Med SLS/R30 1CT	2.64
227884	20W Med SLS/R30 1CT	2.64
372482	20W Med SLS/R30 1CT	2.64
220376	15W Med SLS/R40 1CT	2.64
372565	15W Med SLS/R40 1CT	2.64
372623	20W Med SLS/R40 1CT	2.64

Technology has advanced since the maximum limits for mercury content in CFLs were set, and there is now evidence that lamps can contain a lot less than 5mg of mercury – the currently set RoHS limit, but being as efficient or even more efficient than in the past.

Reducing the content of mercury per lamp is technically practicable. According to publicly available data from US lamp manufacturers, there are many CFL models currently that have mercury content of 3 mg or less and others that are below 2 mg. Further to the examples above, see some further examples below:

- Philips Lighting has CFL models ranging from 1.4 mg to 4 mg, according to 2008¹⁶ data provided directly from this manufacturer to the Green Purchasing Institute (see Annex I)
- Osram Sylvania, which has posted its mercury content data online, reports that many of its integrated and non-integrated (pin-based) CFLs contain 3 mg or less of mercury. (Annex III)¹⁷
- MaxLite reported in its January 2008 newsletter, that it uses 1.2 to 2.5 mg per compact fluorescent lamp.¹⁸

In May 2007, Wal-Mart announced that it had negotiated new contracts for low-mercury CFLs sold through its stores as well as Sam's Club. All CFLs sold will be ENERGY STAR-qualified. In addition, according to the Wal-Mart news release, "To reduce the amount of mercury in its CFLs, Wal-Mart worked closely with its manufacturers GE, Royal Philips, Osram Sylvania and Lights of America. All four suppliers committed to achieving a greater reduction in mercury content than the 5 mg standard recently set by the National Electrical Manufacturers Association (NEMA). These suppliers will also adhere to clean production techniques that will minimize mercury pollution from factories manufacturing CFLs."

Wal-Mart's supplier commitments include the following¹⁹:

- GE Consumer & Industrial will reduce CFL mercury content up to 50 percent from NEMA levels in new products, while maintaining the excellent light quality and long life that GE customers expect.
- Philips currently supplies Wal-Mart with CFLs that have mercury contents 40 to 60 percent below the NEMA level of 5 mg per unit (for CFLs less than 25W). Philips utilizes pellet dosing versus liquid mercury to ensure safe and accurate levels of mercury per bulb, and continues to look for ways to reduce the amount of mercury in its CFL, while still maintaining the lamps' high quality and performance characteristics.

¹⁶ Philips Lighting, http://www.prismaecat.lighting.philips.com/ecat/Light/Landing.aspx?fh_location=//prof/en_GB/categories<{fepplg}/countries>{en_GB}&left_nav=gb_en&

¹⁷ Osram Sylvania, "Mercury Quantity in Lamps for General Lighting Applications, 11/01/07, <http://www.sylvania.com/content/display.scfx?id=003690938>).

¹⁸ www.maxilite.com

¹⁹ News Release: "Wal-Mart Announces Major Mercury Reduction in Compact Fluorescent Light Bulbs," May 10, 2007, <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/05-10-2007/0004585479&EDATE>

- OSRAM SYLVANIA CFLs currently meet the NEMA standard of 5 mg of mercury, with reflector lamps that are 40 percent lower at 3 mg. Sylvania has committed to reducing the mercury content in all of its CFLs to 4 mg or less by the end of 2007, and to 2.5 mg by the end of 2008.
- Lights of America will reduce the amount of mercury in its CFLs by up to 50 percent. Wal-Mart's new standards have resulted in Lights of America identifying a different metal alloy technology that improves bulb performance while requiring less mercury per bulb. This technology is currently being added to Lights of America CFLs and the company expects all of its bulbs to have no more than 2 mg of mercury by the end of 2007.

In addition, the European VITO study draft lot 19 on domestic lighting, page 18, recommends a 2 mg limit on CFLs.²⁰

We can further point out that the European data supports the mercury limits that we are suggesting.

Philips lists several self-ballasted and pin-based CFLs that can meet a 2 mg limit. For example, its Master PL line of self-ballasted screw-in CFLs contain 1.41 mg of mercury; see http://www.primaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/66e6e0ff-60e1-4cf6-bb16-0f00d0085366/MASTER_PL_Electronic_33W_827_E27_230_240V_1CT.pdf. Similarly, its pin-based models can meet a 2 mg limit.

Several pin-based CFL lines that also can meet our proposed 2 mg limit, including but not limited to:

- 4-pin long fluorescent (including high-wattage models up to 80-watts) have 2 mg of mercury: http://www.primaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/f33c93ef-ae41-4105-9ee0-c3337c6a9c8f/MASTER_PL_L_80W_840_4P_1CT.pdf
- 4-pin triple tube models contain 1.4 mg of mercury; see http://www.primaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/402def6f-0eab-4bc4-9586-7c132ad95fd7/MASTER_PL_T_57W_840_4P_1CT.pdf

Furthermore, no additional distinction is needed within the group of CFLs between normal or long life ones. Average lifetime of CFLs is between 8.000 and 20.000 hours, with no difference on mercury content between models of different lifetime, on the basis of different companies' catalogues.

Recommendation Exemption:

CFLs for general purposes, < 50W, should not contain more than 2mg Hg per lamp


Cold cathode CFLs

It should be made crystal clear that cold cathode CFLs, which tend to have less mercury than conventional CFLs, do not fall in the special purpose category. This would not be justified based on the data and because they are used for general illumination, typically as replacements for low-wattage incandescent lamps. NGOs have provided substantial data showing that much lower levels of mercury are contained in CCFLs, thereby justifying a far lower maxim limit to be set – far below 5mg (if considered special purpose VFL) and even below 3.5 mg -limit proposed for conventional CFLs (or even below the 2 mg as in NGO proposal).

²⁰ http://www.ebpg.bam.de/de/ebpg_medien/019_studyd_08-01_part1-4.pdf

Below is some data on CC CFLs that are made by major manufacturers:

Examples of Cold Cathode CFLs that meet these specifications

Brand	Watts	Initial Lumens*	Initial Lumens/Watt	Rated Life (Hours)	CRI	Models	Max Mercury Content
Philips	None listed						
Sylvania	23	1100	47.8	15,000	82	Dura-One CF23RC/BR30/827 (Reflector Flood)	1.8 mg
Sylvania	20	1200	60.0	15,000	82	Dura-One CF20RC/A19/827	1.8 mg
GE 	23	1100	47.8	15,000	82	Genura E23/R25SW Electrodeless/Cold Cathode)	Not avail

We reported initial lumens for this lamp category because it is much more frequently reported than mean (design) lumens.

Information about Sylvania’s Dura-one electrodeless CFLs can be found at <http://www.sylvania.com/AboutUs/Pressxpress/Pressnews/DuraOneExpands.htm>.

Information about GE’s Genura CCFL can be found at http://www.energyfederation.org/consumer/default.php/cPath/25_44_171_216

Examples of Cold Cathode CFLs that are made by other US lamp

Brand	Watts	Initial Lumens*	Initial Lumens/Watt	Rated Life (Hours)	CRI	Models	Max Mercury Content
Litetronics Micro-Brite	3	130 (20-watt)	43.3	25,000	82	Micro-Brite (MB-300) Non-dimmable	1 mg
TCP, Inc.	3	120	40.0	25,000	82	8R2002CL	Not avail
Litetronics Micro-Brite	5	200	40.0	25,000	82	5W G16.5 CL PW	1 mg
TCP, Inc.	8	300	37.5	25,000	82	8R3008CF	Not avail
Litetronics	8	380	47.5	18,000	82	Par38 MB-851DP	1 mg

In addition, Betterbulb.com, a distributor of CC CFLs wrote on its website that they have “a fraction of the mercury content of compact fluorescents”; see www.betterbulb.com/index.html#products and that CC CFLs “reduce mercury up to 90% over the life of the bulb.” See www.betterbulb.com/products.html#ccfl.

Furthermore, one article from the UK reports that, “although CCFL bulbs still some require **mercury** content to operate, they need less than half that contained in conventional CFL bulbs. A CCFL bulb operating for 25,000 hours will therefore use just 15% of the mercury that the 3 or 4 CFL equivalents would get through during that lifetime.”; see “Cold Cathode Fluorescent Light Bulbs,” by Renewable Energy UK, www.reuk.co.uk/Cold-Cathode-Fluorescent-Light-Bulbs.htm.

Recommendation for exemption:

Cold Cathode CFLs should be considered as CFLs for general purposes - Maximum allowed content for Cold Cathode CFLs should be 2 mgHg/lamp.

3.1.2 CFL for general purposes, ≥ 50W and < 150W

For high-wattage PIN-based CFLs, all three major lamp manufacturers can meet 4.5 mg for pin-based CFLs up to 85 watts.

Non-integrated ballast/pin-based CFLs. The EU/UK lamp catalogues and US lamp catalogues include some high-wattage pin-based CFLs.

In the US, Philips offers high-wattage pin-based CFLs, which contain 3-4.4 mg of mercury; see table below, which is derived from 2008 mercury content data supplied by Philips Lighting USA

Order #	Lamp Description	Mercury Content
	PL-T Triple 4-pin Fluorescent Lamps	
146316	PL-T 57W/830/4P/A 10PK	3.0 mg
146324	PL-T 57W/835/4P/A 10PK	3.0 mg
146332	PL-T 57W/841/4P/A 10PK	3.0 mg
	PL-H High Performance Fluorescent Lamps	
133728	PL-H 120W/830 ALTO 10PK	4.4 mg
133736	PL-H 120W/841 ALTO 10PK	4.4 mg
133686	PL-H 60W/830 ALTO 10PK	4.4 mg
133694	PL-H 60W/841 ALTO 10PK	4.4 mg
133702	PL-H 85W/830 ALTO 10PK	4.4 mg
133710	PL-H 85W/841 ALTO 10PK	4.4 mg

A similar version of the 85-watt pin-based CFL can be found in the UK Philips lamps catalogue; it lists 4 mg of mercury on its specifications sheet²¹.

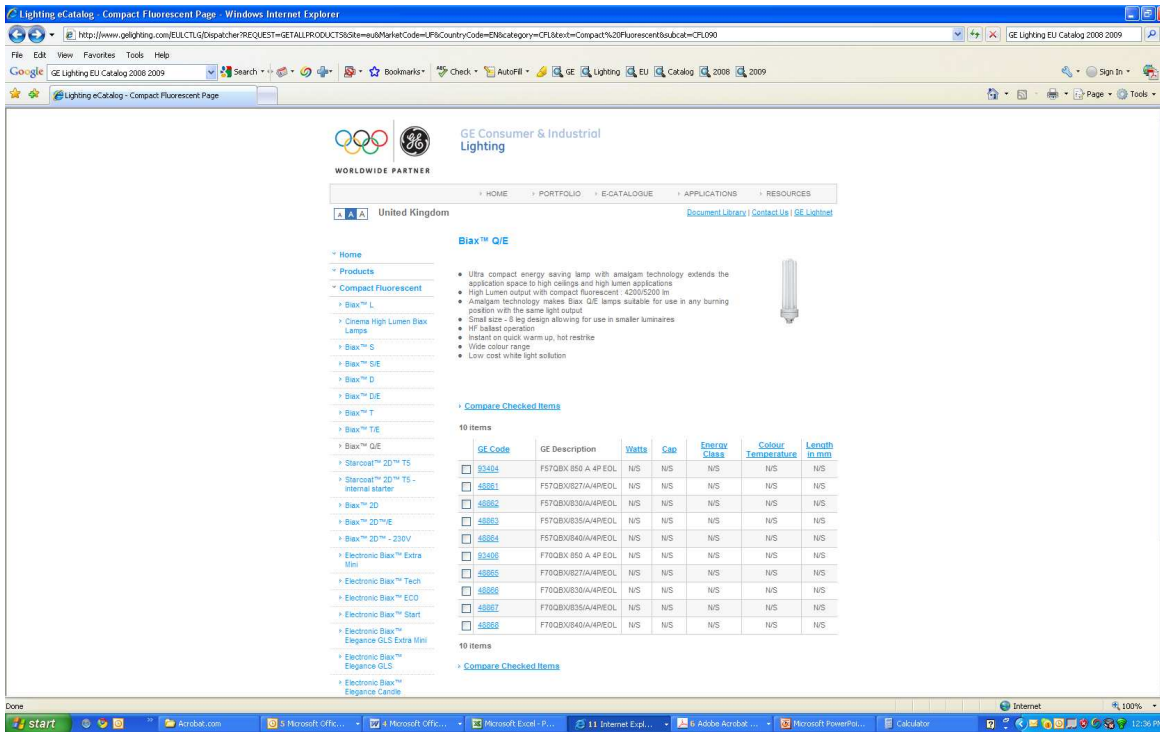
In the US, Osram Sylvania offers high-wattage, pin-based CFLs with the following mercury contents:

- DULUX pin base (excluding some T, F and L models) up to 57 watts <2.5 mg
- DULUX pin base, 70-watt T/E/IN model <3 mg
- DULUX pin base L models up to 55 watts <4.5 mg

In the US, GE offers several high-wattage pin-based CFLs, including 57-watt and 70-watt models. One example is F57QBX/827/A/ECO, which has approximately 4 mg of mercury according to the GE's online picogram per lumen hour calculator. Another example is F70QBX/827/A/ECO, which also has approximately 4 mg of mercury.

In GE's EU catalog, there are similar high-wattage pin-based CFLs – also in 57- and 70-watt quadruple-bi-ax models. See screen shot below. While no mercury content is provided for the EU models, we can assume it would be similar to the US models, which have the same shape, size and wattage.

21
http://www.prismaecat.lighting.philips.com/ecat/Light/ApplicationRouter.aspx?fh_secondid=927932484003_2&fh_reftheme=promo_75141119%2cs_eall%2c%2f%2fprof%2fen_GB%2fcategories%3c%7bfepplg%7d%2fcountries%3e%7ben_GB%7d%2fstatus%3e%7bact%7d%2fcategories%3c%7bc_0002fepplg_75_ep01%7d%2fcategories%3c%7bc_0032fepplg_1156_ep01lcn%7d&fh_location=%2f%2fprof%2fen_GB%2fcategories%3c%7bfepplg%7d%2fcountries%3e%7ben_GB%7d%2fstatus%3e%7bact%7d%2fcategories%3c%7bc_0002fepplg_75_ep01%7d%2fcategories%3c%7bc_0032fepplg_1156_ep01lcn%7d%2fcategories%3c%7bc_0052fepplg_1625_ep01plh%7d&fh_edc=%c3%9f&fh_refview=list&tab=&family=&&le_ft_nav=gb_en&



There is less information about high-wattage self-ballasted/screw-in CFLs. These products are rarely used in the US but also in the EU. High-wattage >50 watts self-ballasted CFLs listed in the EU or US lamps catalogs for either GE or Philips could not be found. Metal halides are more often used for those types of high-bay applications where you would need a lamp that bright.

Recommendation Exemption:

CFLs for general purposes, ≥ 50W and < 150W, should not contain more than 4,5 mg Hg per lamp

3.1.3 CFL for general purposes, ≥ 150W

To that stage we have not found any CFLs with wattages that high. Nevertheless considering the limits for the other categories, 15mg appears high.

3.1.4 Square CFLs

The proposed limit for 7mg for square and circle CFLs may sound reasonable at this stage. However from our limited available data it appears that the Philips Square CFLs²² contain only 4mg of mercury. More data should be requested by the Commission.

For circular CFLs please look under section [3.2.3](#).

3.1.5 Special purpose CFL.

The lamps which are considered as special purpose CFLs should be individually named and limits should be set. No blanket exemption should apply.

The European catalogue recently circulated by Philips, includes long-life and cold-temperature CFL models, which could potentially fall under special purpose CFL. At the recent consultation meeting (24 September 2008) the industry representatives argued that high-wattage CFLs should also have a higher mercury content. There does not seem to be a consistent pattern of higher mercury content for higher-wattage CFLs. As noted above, Philips' 80-watt CFL only contains 2 mg of mercury which they have a CFL line with a 120-watt model that contains 4 mg of mercury.

We will note that the extra-long life versions of several CFLs did report a somewhat higher mercury content of 3 mg; see

http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/5c59766d-1d2a-4983-8c6b-ba49479d5789/MASTER_PL_T_Xtra_57W_840_4P_1CT.pdf and
http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/1c75f9da-da24-4d0d-9660-e3b253de6b00/MASTER_PL_C_Xtra_26W_840_2P_1CT.pdf.

Here's a cold-temperature rated, long-life pin-based CFL line that contains 2 mg of mercury, http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/9149092b-5311-4d9b-bdcd-5f11efff7b26/MASTER_PL_L_Polar_55W_840_4P_1CT.pdf, while another contains 3 mg of mercury; http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/ba362269-119c-4610-bf70-9363a449e996/MASTER_PL_L_Xtra_Polar_55W_840_4P_1CT.pdf

Recommendation Exemption:

CFLs for special purposes (such as cold temperature, long-life and high-wattage models) shall not contain more than 3mg Hg/ lamp

No further distinction is needed within the group for CFLs as for general or special purposes. Or specific models/types should be identified and on the basis of the data submitted by industry, separate limits could be considered for those categories.

For example, reflector flood lights. These are generally just regular CFLs with a cover. They lose some efficiency when they are covered but there does not appear to be a reason why a higher mercury content is needed as it can be seen from data submitted above.

3.2 Tube fluorescent lamps

Classification of tube (shaped) fluorescent lamps can take place by certain criteria or their combination: tri-band phosphor vs. halophosphate, length, diameter, lifetime, shape, purpose. Until now under the RoHS directive a distinction was made between straight fluorescent, halophosphate (< 10 mg Hg) or triphosphate of normal (< 5mg Hg) or long life time (< 8mg Hg).

These characteristics are described and analysed further down under our respective proposals for exemptions:

3.2.1 Linear triband phosphor fluorescent lamps for general purposes, standard lifetime

Standard life would mean that a lamp can last:

- ≤25,000 hours, tested on instant start ballasts with 3-hour starts (IS/3) or
- ≤30,000 hours on rapid or program start ballasts with 3-hour starts (PS/3); or

- ≤30,000 hours on instant start ballasts with 12-hour starts (IS/12); or
- ≤36,000 hours on rapid or program start ballasts with 12-hour starts (PS/12).

3.2.1.1 Lamps ≤ T2s (≤ 9mm)

T2s are likely to be considered a special purpose lamp. They could be found in the Osram catalog in the EU (and Sylvania catalog in the US). In the US, linear T2s are listed under specialty fluorescents (along with aquaria and plant fluorescent lamps). Fluorescent T2s often have an M in their ordering code, which stands for miniature. They are often used for task and under cabinet lighting. Common T2s include, but may not be limited to:

- FM6T2 (8.6 inches)
- FM8T2 (12.6 inches)
- FM11T2 (16.6 inches)
- FM13T2 (20.6 inches)

Therefore for the time being the proposed levels could be accepted.

3.2.1.2 Lamps > T2 (9mm) and ≤ T5s (17mm)

This category shall include T5 and high Output T5 (T5HO)

Brand	Mean Lumens	Rated Life (PS/3)	Watts	Models	Max Mercury Content (mg)
Philips	2750	25,000	28	F28T5/800/ALTO	1.4 mg
Sylvania	2418	20,000	28	FP28/800/ECO	2.5 mg
Philips	4750	25,000	54	F54T5/800/HO/ALTO	1.4 mg
Sylvania	4138	25,000	54	FP54/800/HO/ECO	2.5 mg
GE	2660	30,000	28	F28W/T5/800/ECO	5 mg
GE	4600	30,000	54	F54W/T5HO/800/ECO	5 mg

The limit of 3 mg, proposed by ELC, is more than twice the 1.4 mg amount that Philips has been able to meet in its T5 product line (both in the US and the EU) with the use of mercury-pills. Assuming a 10% variation, a 2 mg limit is easily achievable. The 3 mg limit is consistent with what Osram can meet in the EU (and Sylvania in the US) For example, according to the Osram catalog, "LUMILUX[®] fluorescent lamps from OSRAM are increasingly kind to the environment....the LUMILUX[®] T5 HE and HO lamps [contain] only 2.5 mg". Assuming a 10% variation, a 3 mg limit is achievable. The Commission would not be encouraging most of the market to make any improvements over what is currently available if it adopts a 3 mg limit instead of 2 mg.

See

<http://catalog.myosram.com/zb2b/b2b/start.do?browsername=mozilla%2F4.0%2520%2528compatible%253B%2520msie%25207.0%253B%2520windows%2520nt%25205.1%253B%2520.net%2520clr%25201.1.4322%253B%2520.net%2520clr%25202.0.50727%2529&browsermajor=4&browserminor=4>

Recommendation Exemption:

A maximum limit of 2 mg Hg/lamp should be allowed for lamps smaller or equal to T5 for general lighting purposes, of standard life.

3.2.1.3 Lamps >T5(17mm) and ≤ T8s(28mm)

The data on the mercury content of linear fluorescent lamps shows that lamps longer than 6 foot tend to have higher mercury content. Reasons may be that a certain amount of mercury and phosphor is needed to ensure performance, and/or that since fewer of these longer length lamps are manufactured, it has not been economically attractive for some manufacturers to switch over to low-mercury dosing methods for these models.

Below is a summary of US data of the mercury content of linear T8s of various lengths.

OEM	2-foot T8 (80 CRI)	4-foot T8 (80 CRI)	6-foot T8 (80 CRI)	8-foot T8 (80 CRI)
Sylvania	3,5 mg	3,5 mg	8,5 mg	8,5 mg
Philips	1,7 mg	1,7 mg	3.5 mg	4.4 mg**
GE	6 mg	5 mg	No info available	31-65 mg (Not Ecolux only available)**

It is therefore proposed that this category of standard life, T8s for general lighting purposes is further split to

- a. below 6-foot
- b. equal or above 6 – foot.

a. for T8 lamps below to 6-foot (183 cm)

This category should include all straight tri-band phosphor fluorescent lamps with a length below or equal to 6-foot (therefore 2,3, and 4 foot models). It should be clear whether certain straight fluorescent lamps are excluded because they will not meet new energy-efficiency standards and will therefore not be sold (reference should be made to the EuP proposed Implementing measures).

The EC proposed Implementing Measure for office lighting²³ recommends that the RoHS exemptions revises and reduces the maximum allowed limit of mercury to 2 mg per lamp.

ELC's proposal of 3.5 mg for this category is more than twice the limit that has been achieved by Philips (1.7 mg using the mercury-capsule dosing method).

The 3.5 mg limit represents what Osram has already been able to meet. For example, its current catalog states that "LUMILUX® fluorescent lamps from OSRAM are increasingly kind to the environment. The T8 LUMILUX® lamps now contain only 3 mg of mercury...so they fall far below the RoHS threshold of 5 mg. In systems with ECGs from OSRAM these lamps make an ideal contribution to environment protection - not only because of the very small quantities of hazardous substances but also because of their very high efficiency and long reliable life (with consequently lower consumption of resources)."

This proposed level is also consistent with what Sylvania (US) has been able to meet, so again, it will not drive the most of the market to lower the mercury content of their T8 lamps.

High-efficiency 4-foot watt T8s, except older preheat models (Tri-band phosphor)

The current RoHS exemption allows up to 5 mg of mercury in these highly popular lamps when they have a standard lamp life but 8 mg when they have an undefined long life. A lower mercury limit is justified across the board because more than one manufacturer has been able to successfully manufacture high-efficiency, long-lasting models (including high-lumen Super T8s) with less than 5 mg of mercury. For example, most of Philips' US 4-foot T8s now have only 1.7 mg of mercury. Sylvania, which has also made progress in this area, has lowered the mercury content of its high-performance (i.e., high-lumen, high CRI, long-life) 4-foot T8s to 3.5 mg. A tighter standard relating to this lamp type is achievable and could drive further innovation.

²³ http://ec.europa.eu/energy/demand/legislation/doc/2007_12_18_working_document_fluorescent_lighting.pdf, p. 11

Other T8s (except older preheat models)

2-foot and 3-foot Tri-band phosphor T8s (F17T8s and F25T8s)

Like the 4-foot T8s mentioned above, there has been sufficient innovation in this category of lamps to support a tighter RoHS exemption. The vast majority of Philips' models in this category have 1.7 mg of mercury. Sylvania's high-performance (high-efficiency, long-life, high CRI models) have 3.5 mg of mercury.

4-foot T8s Standard Life

Brand	Watts	Mean (Design) Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips	25	2425	24,000	30,000	85	F32T8/ADV800/XEW/ALTO	1.7 mg
	28	2645	24,000	30,000	85	F32T8/ADV800/EW/ALTO	
	30	2765	24,000	30,000	85	F32T8/ADV800/EW/ALTO	
Sylvania	25	2350	24,000	36,000	85	FO32/25W/800/XP/SS/ECO	3.5 mg
	28	2590	24,000	36,000	80-85	FO28/800XP/SS/ECO	
	30	2710	24,000	36,000	85	FO30/800XP/SS/ECO	
GE	28	2585	18,000	18,000	80-85	F28T8/SP/UMX/ECO	5 mg
	30	2675	20,000	20,000	80-84	F32T8/SP/IS/WM/ECO	
	30	2625	24,000	24,000	80-84	F32T8/XL/SPXS/WM/ECO	

17-watt 2-foot T8s (US)

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	Models	Max Mercury Content (mg)
Philips*	1330	24,000	30,000	F17T8/TL800ALTO	1.7 mg
	1450	24,000	30,000	F17T8/ADV/ALTO	
Sylvania**	1240	15,000	20,000	FO17T8/800/ECO	3.5 mg
	1305	18,000	24,000	FO17T8/800XP/ECO	
	1330	18,000	30,000	FO17/800XPS/ECO	
GE***	1280	20,000	20,000	F17T8/SPX/ECO	6 mg

Recommendation Exemption:

Lamps >T5(17mm) and ≤ T8s(28mm) for general lighting purposes, of standard life, with length below 6-feet should have a maximum limit of 2 mgHg/lamp.

b. for T8 lamps equal or above 6-foot (183 cm),

59-watt 8-foot T8s that meet 8 mg mercury limit (except those with shaded boxes)

Brand	Mean Lumens	Rated Life (IS/3)	Models	Max Mercury Content (mg)
Philips	5490	24,000	F96T8/TL800/PLUS/ALTO	4.4 mg
	5190	24,000	F96T8/TL700/PLUS/ALTO	
Sylvania	5795	18,000	FO96/800XP/ECO	8.5 mg
	5428	15,000	FO96/800/ECO	
	5130	15,000	FO96/741/ECO 24	
GE	5650	15,000	F96T8/SPX (Not ECO)	31-65 mg
	5650	24,000	F96T8/XL/SPX (Not ECO)	

Standard-output 8-foot T8s that meet 10 mg limit (except those with shaded boxes)

Brand	Watts	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	Models	Max Mercury Content (mg)
Philips	51	4940	24,000	No info	F96T8/ADV800/XEW/ALTO	4.4 mg
Sylvania	55	5415	18,000	No info	FO96/800/XP/SS/ECO	8.5 mg
GE	54	5450	24,000	No info	F96T8/XL/SP/WMP	31-65 mg*
GE	57	5450	24,000	No info	F96T8/XL/SP/WM	31-65 mg*

*No ECO (TCLP-compliant models offered). Mercury-content data extrapolated from Omega Pacific's Q4 2007 report to San Francisco Department of the Environment based on amounts in other F96T8/SPX models. Both the 54-watt and 57-watt models report the same lumen output in the GE catalog.

Mercury Content of High-output 8-foot T8s (US)

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	Models	Max Mercury Content (mg)
Philips	7625	24,000	No info	F96T8/TL800/HO/PLUS/ALTO	4.4 mg
Sylvania	7710	18,000	No info	FO96/800/HO/ECO	9.5 mg
GE	7800	18,000	No info	F96T8/SPX/HO (Not ECO)	50-100 mg

This 10 mg mercury limit is consistent with the State of California's 2005 fluorescent lamps bid.

In the US, 8-foot T8s have tended to have a somewhat higher mercury content than most shorter models. While one company, Philips, has been able to meet a 5 mg limit (theirs contain 4.4 mg), other companies' equivalent models have a higher mercury content. Sylvania's 8-foot T8s contain 8.5 mg and GE's have 1-10 mg in some models and 31-65 mg in others. To prevent the procurement of 8-foot T8s with an extremely high mercury content, the State of California issued a bid specification that included a 10 mg limit on the mercury content of 8-foot T8s. A copy of the CA bid specification can be found at <http://www.documents.dgs.ca.gov/pd/contracts/lamps/6240-05BS-001.htm>.

Similarly a 10 mg limit on the mercury content of 6-foot T8s could be easily justified currently. This would keep off the market models with extremely high levels; see table below for data on the mercury content of 6-foot linear T8s made by major US lamp manufacturers.

Manufacturer	Mercury Content (in mg)
Philips	6.8 mg
Sylvania	8.5 mg
GE	90 mg

Here's what Philips has been able to do with extra-long (8-foot) lamps (note this is similar to our argument that longer lamps need more mercury; the question is how much). While some of their models have mercury above 20 mg, there are a substantial number that are under 8 mg. This shows that halophosphates (even high-output, 8-foot models) can meet the standards proposed.

High Output Fluorescent Lamps (800ma)		
T12 Recessed D.C. Linear Fluorescent Lamps		
26660-1	F96T12/CW/HO/EW/ALTO	6.8 mg
High Output 800 Series Fluorescent Lamps (800ma)		
14277-8	F96T12/830/HO/EW/ALTO	6.8 mg
14278-6	F96T12/835/HO/EW/ALTO	6.8 mg
14279-4	F96T12/841/HO/EW/ALTO	6.8 mg
14280-2	F96T12/850/HO/EW/ALTO	6.8 mg
Slimline Fluorescent Lamps		
T12 Single Pin Linear Fluorescent Lamps; Instant Start		
36633-6	F96T12/30U/ALTO	6.8 mg
36634-4	F96T12/35U/ALTO	6.8 mg
36635-1	F96T12/41U/ALTO	6.8 mg
36636-9	F96T12/50U/ALTO	6.8 mg
36647-6	F96T12/SPEC30/ALTO	6.8 mg
36648-4	F96T12/SPEC35/ALTO	6.8 mg
36650-0	F96T12/SPEC41/ALTO	6.8 mg

Here is Philips' data on the mercury content of their 8-foot T8 lamps (standard and high-output), which shows you can reach low mercury levels in such models as well.

US Slimline T8 8-Foot Fluorescent Lamps		
T8 Single Pin; Featuring ALTO® Lamp Technology; Instant Start		
38800-9	F96T8/TL830/PLUS/ALTO	4.4 mg
38801-7	F96T8/TL835/PLUS/ALTO	4.4 mg
38802-5	F96T8/TL841/PLUS/ALTO	4.4 mg
38803-3	F96T8/TL850/PLUS/ALTO	4.4 mg
38805-8	F96T8/TL735/PLUS/ALTO	4.4 mg
38806-6	F96T8/TL741/PLUS/ALTO	4.4 mg
PLUS High Output T8 8-Foot Fluorescent Lamps		
T8 Recessed D.C.; Featuring ALTO® Lamp Technology		
38826-4	F96T8/TL830/HO/PLUS/ALTO	4.4 mg
38827-2	F96T8/TL835/HO/PLUS/ALTO	4.4 mg
38828-0	F96T8/TL841/HO/PLUS/ALTO	4.4 mg
38831-4	F96T8/TL741/HO/PLUS/ALTO	4.4 mg

This category should be set separately in the classification and not be included under the special purposes lamps, since as it can be shown that lower levels of mercury can be reached.

Recommendation for exemption:

T8s for general lighting purposes, of standard life, with length equal or above 6-feet (183 cm) should have a maximum limit of 8 mg Hg/lamp. These should not be considered special purpose lamps.

3.2.1.4 Lamps > T8s(>28mm)

We have no further comments on those lamps. Recommendation for exemption as proposed (3.5. mg) could be accepted.

3.2.2 Linear fluorescent, long life lamps, for general lighting purposes

Long life would mean that a lamp can last:

- >25,000 hours, tested on instant start ballasts with 3-hour starts (IS/3)or
- >30,000 hours on rapid or program start ballasts with 3-hour starts (PS/3);
- >30,000 hours on instant start ballasts with 12-hour starts (IS/12); or
- >36,000 hours on rapid or program start ballasts with 12-hour starts (PS/12).

Mercury Content of Long-life T5s (US, Korea)

Brand	Mean Lumens	Rated Life (PS/3)	Watts	Models	Max Mercury Content (mg)
GE	2660	30,000	28	F28W/T5/800/ECO	5 mg
GE	4600	30,000	54	F54W/T5HO/800/ECO	5 mg
Kumho Sequoia (Korea)*	4600	100,000	54	F54T5HO/830/SQ-HL	Requested

* This appears to be a cold cathode/induction fluorescent in a T5 housing, rather than a traditional T5HO linear fluorescent. This accounts for the 100,000 hour rated life. For more information on this Kumho Electric lamp, see http://www.kumhoelectric.com/products_gl_sequoia.

Below is a table that shows mercury content data for 4-foot T8s with a long life.

Brand	Mean (Design) Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips US	2660	24,000	30,000	85*	F32T8/TL800/ALTO	1.7 mg
	2800	30,000	36,000	85*	F32T8/TL800/PLUS/ALTO	
	3000	24,000	30,000	85*	F32T8/ADV/ALTO	
	2800	36,000	40,000	85*	F32T8/TL800/XLL/ALTO	
Osram-Sylvania US	2802	24,000	30,000	85*	FO32T8/800/ECO**	3.5 mg
	2850	24,000	36,000	85*	FO32/800XP/ECO***	
	2945	24,000	36,000	85*	FO32/800XPS/ECO	
GE (US)	2800	20,000	20,000	80	F32T8/SPX/ECO	5 mg
	2800	24,000	24,000	86	F32T8/XL/SPX/ECO	
	2915	24,000	24,000	82-85	F32T8/XL/SPX/HL/ECO	
	2800	30,000	30,000	81-84	F32T8/SXL/SP/ECO	

*Models with a color temperature of 5000 or more have a lower CRI in the 80s but should still be allowed on the contract because they are scotopically enhanced, which increases the eye's visual acuity.

***See footnote #21 of Sylvania's 2008 Lamps Catalog, which states: "The life rating of FO32/800/ECO OCTRON® lamps operated on rapid start ballasts is 30,000 hours. The life rating of FO32/800/ECO OCTRON lamps operated on instant start ballasts is 24,000 hours."*

****See in footnote #20 of Sylvania's 2008 Lamps Catalog, which states, "The 36,000 hour average rated life of the FO32/800XP/ECO, FO30/800XP/SS/ECO, FO28/800XP/SS/ECO and FO32/25W/800XP/SS/ECO OCTRON(R)lamps is based on operation at 3 hours per start on a QUICKTRONIC(R) programmed start ballast. If operated on other ballasts for T8 OCTRON lamps, lamp life will be 36,000 hours for programmed rapid start operation and 24,000 hours for instant start operation at 3hours per start.*

*****See footnote #19 of Sylvania's 2008 Lamps Catalog, which states, The 36,000 hour average rated life of the FO32/800XPS/ECO OCTRON(R) lamp is based on operation at 3 hours per start on a QUICKTRONIC (R) programmed start ballast. If operated on other ballasts for T8 OCTRON lamps, lamp life will be 36,000 hours for programmed rapid start operation and 24,000 hours for instant start operation at 3 hours per start.*

US Long-life T8 Lamps

OEM	Watts	Mean (Design) Lumens	Rated Life (IS/3)	Rated Life (PS/3)	Length	Models	Max Mercury Content (mg)
Philips (US)	32	2800	36,000	40,000	4-ft	F32T8/TL800/XLL/ALTO	1.7 mg
	32	2800	30,000	36,000	4-ft	F32T8/TL800/PLUS/ALTO	
	25	2330	36,000	40,000	4-ft	F32T8/ADV800/XLL ALTO 25-watt	
	25	2300	30,000	36,000	3-ft	F25T8/ADV841/ALTO	
	25	2050	30,000	36,000	3-ft	F25T8/TL841/PLUS/ALTO	
	17	1450	30,000	36,000	2-ft	F17T8/ADV841/ALTO	
	17	1330	30,000	36,000	2-ft	F17T8/TL800/PLUS/ALTO	
GE (US)	32	2800	30,000	30,000	81-84	F32T8/SXL/SP/ECO	5 mg

Note: Sylvania does not offer any lamps that are considered long-life by this definition in the United States. It does offer XP and XPS lamps, which last 36,000 hours only when operated in program start ballasts.

European Long-life T8 Lamps

OEM	Brand	Rated Life (ECG)	Model	Watts	Initial Lumens	Mercury content (mg)
Osram (Germany)	Lumilux T8	18,000	L 36W/840	36	3300*	<5
	Lumilux XT T8	42,000	L 36W/840 XT	36	3300	<5
	Lumilux XXT T8	75,000	L 36W/840 XXT	36	3250	<5

Source: Osram, *Osram Lumilux XT and XXT: A Clear Run for Lower Costs*, O3/08; http://www.osram.com/global/pdf/Professional/General_Lighting/Fluorescent_lamps/103S023GB_LUMILUX_XT_XXT.pdf.

In its European eCatalogue, Philips lists several long-life lamps that meet EEB's proposed mercury limit of 3 mg, including its:

- Master High-output T5 Xtra Models that are advertised as having "extra long lifetime and high reliability" (see http://www.primaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/540a9648-f520-4f82-a35a-b3a2ee96d377/MASTER_TL5_HO_Xtra_54W_840_1SL.pdf), which has 3.0 mg of mercury;
- Master TL-D Extreme line of T8 linear fluorescent lamps whose product features include "extreme long and reliable lifetime". These Philips Green Flagship products are promoted as a "Good environmental

choice because of long reliable life (380% better than T8 standard)”; see http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/6f2b6ced-570a-4767-abf9-2a0b0f6cc6b7/MASTER_TL_D_Xtreme_70W_840_1SL.pdf, which also contains 3 mg of mercury; and

- Secura Xtra TL D line of coated T8 lamps that contain 3 mg of mercury. (While coated lamps are sometimes considered lamps for special purposes, this demonstrates that they too can meet the lower 3 mg limit of other long-life lamps.) See http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/c52e21fa-30c1-4b1f-9c67-6b1b3020748b/MASTER_TL_D_Xtra_Secura_58W_840_1SL.pdf

While the Philips European catalogue does not provide the rated life of these lamps, it does show that linear T8s and T5s with extra-long and extremely long life ratings can meet a 3 mg limit. Without the rated life listed, it is impossible for us to determine when a higher mercury content is justified based on longer lamp life.

With respect to the 5mg level proposed by ELC for this category, of greater concern is that this proposed limit on long-life T8s and T5s is higher than the NGO proposal, with no documentation that a higher mercury level is justified. EEB and GPI have asked for data showing that these types of lamps need to have a higher mercury content as our data shows that the normal life and long life T8s and T5s have the same amount of mercury. For example, Philips XXL (extra-long) T8s have the same 1.7 mg of mercury. See information below:



ALTO II™ means 50% less mercury than the original ALTO T8 lamps†

† Original 2', 3' and 4' T8 lamps featuring ALTO® Lamp Technology had 3.5mg of mercury. New 2', 3' and 4' T8 lamps featuring ALTO II™ Technology have 1.7mg of mercury.

Extra long life, extra low mercury
Philips T8 32W Extra Long Life lamps are environmentally responsible and offer extra long life.

Extra long life

- Significantly reduce maintenance and recycling costs by extending the relamping cycle
- Up to 67% longer life than an industry standard T8 lamp
- Warranty period: 48 months

Outstanding lumen performance

- 95% lumen maintenance and reduced lamp-end blackening

Better for the environment

- Only 1.7mg of mercury with ALTO II™ Technology
- Reduced impact on the environment without sacrificing performance

While we support the concept of allowing for higher mercury content for long-life lamps if there is a documented need to do so, to date, ELC has not demonstrated that mercury is the limiting factor in long-life lamps or that the point that more mercury is needed at 25,000 hours using tests on electronic ballasts with 3-hour starts. Philips's T8 (both US and EU) meet a 2 mg limit and are designed to last much longer than 25,000 hours (36,000 to 40,000 hours) under the same conditions. The Osram Lumilux long-life T8 models (XT and XXT) claim to last up to 90,000 hours and report having 4.5 mg +/- 0.5 mg of mercury²⁴ The Commission should require the ELC to demonstrate the point at which additional mercury is needed since allowing it for lamps that last only slightly longer than most of the lamps on the market will undermine the directive. In addition, the EC should require lamp manufacturers to print the rated life of their lamps on their product packaging and marketing materials (along with mercury content) to ensure that any higher allowable mercury content is applied only to qualifying lamps.

Recommendation Exemption :
Long life fluorescent lamps shall not contain more than 3 mgHg/lamp.

²⁴ (see http://www.osram.cz/_global/pdf/Professional/General_Lighting/Fluorescent_lamps/103S023GB_LUMILUX_XT_XXT.pdf).

3.2.3 Non-linear fluorescent lamps for general lighting purposes

U-bent and circular fluorescent lamps should be in separate categories because their mercury content levels may need to be higher due to technological constraints. Combining them with straight linear fluorescents could result in the limits being set higher.

Some appear to be classified under compact fluorescent lamps but in most cases are to be found in catalogues under non-linear fluorescent. U-bent and circular fluorescent lamps should be seen under this category, including T8 U-bent and T5 circular fluorescents.

As mentioned above, energy efficiency limits that will be set by the EuP directive should be respected.

Below is a table summarizing the mercury content of 32-watt linear T8s versus 32-watt u-bent T8s and linear T5s with circular T5s. There are other issues associated with u-bent and circular fluorescent that make them less environmentally preferable than linear fluorescents. For example, they tend to be less energy efficient and tend to have a shorter lamp life. Some of these differences may be inherent (i.e., based on technological limitations) and some may be economic.

Maximum Mercury Content of Common Types of T8 and T5 Lamps

OEM	32-watt linear T8 4-foot	32-watt u-bent T8	46" T5	Circular T5
Philips	1,7 mg**	3 mg	1,4 mg**	5 mg
Sylvania	3,5 mg	10 mg	2,5 mg	9 mg
GE*	5 mg	10 - 50 mg (Non-Ecolux models) and 8 mg (Ecolux models)	5 mg	No info available

*Information on the mercury content of GE lamps was provided by 2007 data supplied to the City of San Francisco's Department of the Environment by a vendor of GE lamps.

** EU data the same for these lamps according to the Philips EU catalogue.

U-Bent T8s (Tri-band phosphor)

Currently, there are no restrictions on the mercury content of U-bent T8s (or T12s) that can be sold in the European Union. Data from major US lamp manufacturers supports the establishment of mercury limits since there is a significant difference among equivalent products made by different manufacturers and some manufacturers have been able to achieve low-mercury content in high-efficiency and long-life models. For example, Philips Lighting offers 32-watt U-bent T8s with 3 mg of mercury with no difference among models with higher lumen output. Sylvania's equivalent models have 10 mg of mercury and GE's vary among models from 1-10 mg to 10-50 mg (ranges are due to the use of imprecise mercury dosing technology that also may increase exposure to workers and the environment). A 10 milligram limit on lamps in this category is easily achievable and is consistent with the State of California's 2005 fluorescent lamps bid specification. Data gathered from EU-based lamp manufacturers may support a lower standard in the future, of 5 mg or lower, since there is no technological barrier to achieving it.

Mercury Content of U-bent T8s with 6" spacing

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips	2535	20,000	24,000	84-85	FB32T8/TL800/6/ALTO	3 mg
	2535	24,000	30,000	84-85	FB32T8/TL800/PLUS/6/ALTO	
Sylvania	2622	15,000*	20,000	82	FBO32/800/6/ECO	10 mg
	2755	18,000**	24,000	85	FBO32/800XP/6/ECO	
	2660	18,000**	24,000	85	FBO30/800XP/6/SS/ECO	
GE	2630	20,000	20,000	86	F32T8/SPX/U/6 (Not ECO)	10-50 mg or 31-65mg***
	2622	N/A	20,000	85	F32T8/SPX/U/6/ECO	8 mg****

Mercury Content of U-bent T8s with 1 5/8" spacing

Brand	Watts	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Sylvania	31	2507	15,000	20,000	82	FBO31/800/ECO	10
	31	2636	18,000	24,000	85	FBO31/800XP/ECO	8
	30	2660	18,000	24,000	85	FBO30/800XP/SS/ECO	8
	29	2636	18,000	24,000	85	FBO29/800XP/SS/ECO	8
	24	1771	15,000	20,000	82	FBO24/800 (not ECO)	10
	16	1035	15,000	20,000	82	FBO16/800 (not ECO)	10
GE	None listed						
Philips	None listed						

However further to the above which were recorded in November 2008, new data now demonstrates that many models of T8 U bent lamps e.g. from Sylvania contain 3.8 mg or 6 mg of mercury (see Annex IV). Philips has already lowered the mercury content of the U-bent to 3 mg²⁵.

Circular T5s (Tri-band phosphor)

Circular T5s are an environmentally preferable alternative to circular T9s, which are less efficient, shorter in lamp life and higher in mercury content.

Circular T5s in the EU Philips e-Catalogue, have 7 mg of mercury; see http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/d5fc6cc3-d4a7-4f5c-bf50-46f580c019f3/MASTER_TL5_Circular_60W_840_1CT.pdf

Examples of 22-watt circular T5s that meet this limit (US)

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips	1530	NA	16,000	85	TL5C 22W/800	5 mg
Sylvania	1585	NA	12,000	82	FPC22/800	9 mg
GE	None listed in catalogue					

Examples of 40-watt circular T5s that meet this limit (US)

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips	2805	NA	16,000	85	TL5C 40W/800	5 mg
Sylvania	2815	NA	12,000	82	FPC40/800	9 mg
GE	None listed in catalogue					

Examples of 55-watt circular T5s that meet this limit (US)

Brand	Mean Lumens	Rated Life (IS/3)	Rated Life (PS/3)	CRI	Models	Max Mercury Content (mg)
Philips	3580	NA	16,000	85	TL5C 55W/800	5 mg
Sylvania	3520	NA	12,000	82	FPC55/800/HO	9 mg
GE	None listed in catalogue					

Recommendation Exemption:

Non linear triband phosphor fluorescent lamps ≤ T5 (≤ 17mm), shall not contain more than 7 mg Hg per lamp.

²⁵ http://applications.nam.lighting.philips.com/us/sustainability_calculator/sustain_calc.php

Recommendation Exemption:

Non-linear triband phosphor fluorescent lamps > T5 (> 17mm) shall not contain more than 6 mg Hg per lamp.

3.2.4 Halophosphate fluorescent lamps

The comments below refer to all halophosphate fluorescent lamps, irrespective of the length or shape.

Halophosphate fluorescents, which largely include older type fluorescent lamps such as linear and U-shaped T12s and circular T9s, are being phased out in the EU (and elsewhere) due to energy efficiency and light quality concerns. Many of these lamp types also have higher mercury content than equivalent tri-band phosphor models such as high-efficiency T8s and T5s. In the meantime, it is important to make sure that models with an extremely high mercury content are not put into circulation.

Under the EuP directive, the EC-proposed Working Document on possible ecodesign requirements on fluorescent lamps for office lighting, proposes criteria on lamp lumen maintenance factor.²⁶ In the explanatory notes of the same document, it is clarified that by adopting the proposed lamp lumen maintenance factor requirements, halophosphate lamps will actually be phased out. This proposal is supported by the VITO study on Lot 8: Office lighting²⁷,

However there may be some halophosphate lamps that will not be prohibited for sale in the EU because of a variety of exemptions in the EcoDesign (EuP) Directive. While it seems²⁸ that the EU is mostly going to allow only high-efficiency T8 and T5 tri-band phosphor linear fluorescent lamps (along with compact fluorescents) to be sold throughout Europe, there are some exemptions that could allow some halophosphate lamps to be sold. For example, there are exemptions for coloured lamps and lamps used for special applications, reflector lamps, and those with diameters less than 0,8 T5 (e.g., T2 fluorescents) and “lamps with an external ignition”. In addition, luminaires (fixtures) containing lamps that initially emit under 1000 lumens will be exempted from the requirements in Annex 2.²⁹ As a result of these (limited exemptions), some halophosphate could remain on the market. Fixtures, for example, that contain 15-watt preheat T8s, which typically emit less than 1000 lumens would be exempted.

See the following for an example of such lamp: http://www.alibaba.com/product-gs/51634208/T5_Standard_Halophosphate_Fluorescent_Lamp.html.

Furthermore, for the halophosphates which may still fall under the proposed EuP directive lumen criteria, the following information should be considered. This information refers not only to straight fluorescent halophosphate lamps but also to U shaped and circular ones.

While industry, according to the VITO study on office lighting says it is not possible to produce halophosphate lamps with less than 10 mg of mercury, at least one company, Philips Lighting, has done so in the United States for nearly every type of T12 lamp it offers including 2- and 3-foot (3.5 mg), U-bent as well as 4-foot standard and high-output (4.4 mg), 6- and 8-foot standard and high-output (6.8 mg). See Annex I from Excel spreadsheet, Mercury Content 2008 provided directly to the Green Purchasing Institute by Philips Lighting Company. (While every individual lamp model does not meet the 8 mg limit, there generally is at least one model in every lamp category that does. Often, low-mercury dosing technology is not used on older models because manufacturers don't feel that it is economically beneficial to retool lamps that are less popular or in the process of being phased out.) While most of Sylvania's T12s (with the exception of high and very high output models) meet the current EU limit of 10 mg, its U-bent T12s have 8 mg of mercury. See <http://www.sylvania.com/content/display.scfx?id=003690938>.

²⁶ http://ec.europa.eu/energy/demand/legislation/doc/2007_12_18_working_document_fluorescent_lighting.pdf, p. 10

²⁷ <http://www.eup4light.net/assets/pdf/Files/Final/VITOEuPOfficeLightingFinal.pdf>

²⁸ under Annex 2 of implementing measures for fluorescent lighting,

http://ec.europa.eu/energy/demand/legislation/doc/2007_12_18_working_document_fluorescent_lighting.pdf.

²⁹ See page 6 of Annex 2: *Working document on possible ecodesign requirements for fluorescent lamps without integrated ballast, for ballasts and luminaires used with these lamps, and on the conditions for the indication of suitability of lighting products for office lighting;* http://ec.europa.eu/energy/demand/legislation/doc/2007_12_18_working_document_fluorescent_lighting.pdf.

GE's T12 lamps (manufactured for sale in the US) have mercury content that varies greatly. A few of their 2-foot models have precisely 4.9 mg of mercury but their standard 4-foot T12s report up to 10 mg. Some of GE's other T12 models use older dosing technology (which results in the mercury being reported in an imprecise range) and report significant higher mercury levels. For example, its 8-foot T12s contain 11-30 mg of mercury while its 5-foot (F60T12) and 6-foot (F72T12) report 31-65 mg of mercury and some of its high-output models report up to 100 mg of mercury. (Note: GE's data can be found in the attached Annex II from Excel spreadsheet, GE Via Omega 4th Quarter Report, 03-03-08 that was submitted by a vendor of GE Lamps to the City of San Francisco, CA.)

Furthermore information on Circular T9s (halophosphate) indicates that these lamps have a relatively low efficiency rating, short life and high mercury content compared to equivalent T5 circular (triphosphor) fluorescent lamps. By adding a tighter mercury standard in the RoHS exemption on circular fluorescent lamps, the Commission could drive the transition to the more efficient, longer-lasting, lower mercury models.

Summary of data for Circular Fluorescents (based on US data)

Manufacturer	Lamp Type	Typical lamp life (rated hours)	Typical Color Quality (CRI)	Mercury Content (mg)
Philips	T9 (Halophosphate) also these should be banned...	12,000	60s	20 mg
Philips	T5 (Tri-band phosphor), including high-output	16,000	85	5 mg
Sylvania	T9 (Halophosphate)	12,000	60s	Mostly <15 mg
Sylvania	T5 (Tri-band phosphor)	16,000	Mid-80s	<9 mg
GE	T9 (Halophosphate)	12,000	60s	10-50 mg
GE	T5 (Tri-band phosphor)			No data

Therefore, similar to the discussion above on straight fluorescent halophosphate lamps T12 vs T8 (Tri-band phosphors), the T9 circulars are not only less efficient than the T5 circular tri-band phosphor but they also have shorter lifetime and a significantly high mercury content, and therefore these should be banned.

To summarise, although it is likely that all (or most) halophosphate lamps (such as T12s, T10s and circular T9s) will be phased out due to poor energy-efficiency, some may still be allowed on the market due to exemptions.

We don't think that the SAME mercury limit should be applied to all fluorescent lamps sold throughout the EU – whether they are halophosphate or tri-band phosphor.

Generally, more modern tri-band phosphor lamps, such as T8s and T5s that run on electronic ballasts tend to have a lower amount of mercury than halophosphate lamps. For example, many linear tri-band phosphor T5s have a mercury content of 2.5 mg or less (and T8s can have 3.5 mg or less) while many halophosphate T5s and T8s (preheat lamps) typically have a higher mercury content. Therefore, it would not make sense to water down the exemptions for tri-band phosphors (which are likely to represent the vast majority of lamps on the market, simply to accommodate the halophosphates.) At the same time, it does not make sense to leave them out of the standard altogether. If halophosphates meet the energy efficiency standards (or are exempt from the standards) and continue to be sold in the EU, the models with the extremely high mercury content (above 10 mg) should be prohibited. Some models of linear T12s and T10s and circular T9s as well as preheat T5s, T8s and T12s, which are halophosphates have mercury content much higher than 10 mg, while many models can meet this mercury cap.

Recommendation Exemption:

Inefficient halophosphate fluorescent lamps should be phased out. For those halophosphate fluorescent lamps (straight, U-shaped, circular etc) that meet the energy efficiency/lumen criteria as specified by the EuP directive, a mercury cap of at maximum 8 mg should be initially set. The existing 10 mg cap has been effective at keeping halophosphate lamps, which are relatively inefficient and have a very high mercury content out of the EU markets, Adopting an 8 mg cap is technically feasible and would help continue to drive the transition to more efficient technologies, which can more easily meet the EU mercury limits. Information should further be provided by industry to drive these limits further lower

3.2.5 Linear fluorescent lamps for special purposes

There are currently no restrictions on the amount of mercury that can be added to lamps used for special purposes. This category considered to include lamps used in exit signs, appliances, LCD screens, projectors, for germicidal purposes, coloured lamps, and other applications.

All lamps should be considered general purpose except in cases where there is a special purpose identified. A different size should not be considered a special purpose.

To our view, special purposes should be strictly identified and defined, since many could be considered as linear or non-linear fluorescent lamps and could be falling under the exemptions as proposed above. The need for potentially higher mercury limits must be documented and justified as to why they cannot meet limits in other categories

Many of these mercury-containing lamps could be replaced with mercury-free light-emitting diodes (LEDs), which are not only practical because they are so long-lasting; they are also mercury-free. Others could be replaced by high-efficiency T5s and T8s, whose limits are discussed above.

See below comments and examples of different lamps which are currently considered as specialty lamps:

From the draft Swedish study Draft Final (June 2007) (p.13) it can be seen that most content of such lamps is below 5mg already, as it table below, and should not actually be considered as a specialty lamp necessarily, since they could fall under the categories/limits as above:

Manufacturer	Application area	Type of lamp		Luminous efficacy (Lm/W)	CRI index	Mercury content (mg)	Lifetime (hours)
Osram, Biolux	Aquariums terrarium	18-58W	T8	56-64	>90	<5	16000
Osram, Fluora	Aquariums, plants	15-58 W	T8	27-39	>70	<5	13000
Osram, Eversun	Solarium	40-80-100W		-	-	<5	500
Osram XXT longlife	Special purpose/general	18-36-58W	T5	75-90-89	>80	<5	75000
Philips TUV	Disinfection	11-40-75W	T5	-	-	-	9000
Philips master TL-D Reflex	Lamps with special components (integrated reflectors or external protection sleeves)	18-36-58W	T8	75-93-90	>80	5	15000
Philips TL-D extra polar	Cold climate	18-36-58W	T10/T12	75-93-90	85	3	25000

GE, Sylvania and Philips	Exit sign lamps	4-6W	T5	-	-	1-20	5000-7500
GE, Sylvania and Philips	Appliance lamps, i.e. office furniture	8-13W	T5	-	-	1-30	5000-7500

In principle, there is therefore no need to provide different limits for special purpose lamps if these are considered as such. Pet care lamps, disinfection, medical/therapy, tanning germicidal, black lights, should meet the different criteria by diameter, length, lifetime as above.

Recommendation Exemption:

Special purposes (beyond those listed below which can fall under other categories as above) need to be identified separately and maximum limit of Hg shall not exceed 10 mg per lamp, unless otherwise specified.

Some more examples of mercury content in different types are listed below:

Pet care lamps e.g. Aquarium lights

These lamps look like Preheat T8s with special phosphors for “natural” light: <http://www.aquariumguys.com/reefsun-fluorescent-24.html> , to our view these should be seen under the straight fluorescent lamps category and not be included in the definition of specialty lamps.

Cold climate

Sometimes lamps that are designed to operate in cold temperatures are put into the specialty lamps category and allowed to have a higher mercury limit (or none at all). Please note that Philips Polar line of T8s, which are marketed as a “Good environmental choice because of highest energy efficiency in colder conditions (<10 °C)”, are available in long-life models, which are “380% better than T8 standard” also contain only 3 mg of mercury and therefore can meet our proposed long-life limit. See Philips Master TL D Xtra Polar line http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/a0e9e5b8-2d17-411c-a37c-2324856354e1/MASTER_TL_D_Xtra_Polar_58W_840_T12_1SL.pdf and its Master TL D Xtreme Polar line: http://www.prismaecat.lighting.philips.com/FredhopperPDFWebServiceInter/docts/d1f8746e-8501-4972-a78e-a8d9d204679d/MASTER_TL_D_Xtreme_Polar_58W_840_1SL.pdf.

Therefore such lamps should be seen under the long-life linear fluorescent lamps and not under the special purpose category.

UV (blocks UV lights)

Gold fluorescent is a fluorescent lamp with a gold coating which serves as a UV filter.

Gold Fluorescent Lamps		
Blocks UV Emissions		
14746-2	F32T8/GOLD	3.5 mg

Appliance lamps

Appliance Lamps (F8T5 and F13T5 Preheat Fluorescents)

Like the shorter preheat fluorescent lamps that are typically used in exit signs, these models are largely used in office furniture, cabinets and appliances. They can easily be replaced by more efficient technologies such as LEDs, T5s and high-efficiency T8s. Appliance lamps typically contain a significant amount of mercury – up to 30 mg in some models, are relatively inefficient, and have a shorter life than equivalent replacements.

Manufacturer	Lamp Model	Nominal Watts* (excluding ballast)	Rated (hours)	Life*	Mercury Content
GE	F8T5	8	5,000		1-10 mg
Sylvania	F8T5	8	6,000		>15 mg
Philips	F8T5	8	6,000		20 mg
GE	F13T5	13	5,000		11-30 mg
Sylvania	F13T5	13	7,500		>15 mg
Philips	F13T5	13	7,500		20 mg

Preheat Fluorescent Lamps		
T12 Medium Bipin Linear Fluorescent Lamps		
27328-4	F20T12/D/ALTO	1.9 mg
27332-6	F20T12/CW/ALTO	1.9 mg
27349-0	F20T12/WW/ALTO	1.9 mg
Appliance Fluorescent Lamps		
T8 Medium Bipin Linear Fluorescent Lamps; For Use With Starters		
38302-6	F18T8/CW/30/ALTO	1.9 mg
37823-2	F15T8D/ALTO	1.9 mg
38298-6	F15T8/WW/ALTO	1.9 mg
36720-1	F15T8/CW/ALTO	1.9 mg
26063-8	F30T8/D	1.9 mg
38691-2	F30T8/CW/ALTO	1.9 mg

Recommendation Exemption:

Appliance lamps should not be included in specialty lamps, limits should be consistent with high-efficiency T5s and T8s (above) and look for opportunities to substitute by LEDs

Induction lamps

Induction Fluorescent lamps have a rated life of 50,000 to 100,000 hours and are increasingly being used for street lighting and other difficult-to-reach applications. See description of Sylvania's induction lamp at <http://www.sylvania.com/BusinessProducts/LightingForBusiness/Products/Lamps/Fluorescent/Icetron/>.

According to Sylvania, its induction (electrodeless Icetron) lamps have a maximum mercury content of 18 mg

Below is some new data on induction lamps, showing at least two manufacturers who are making them below 10 mg.

Brand	Watts	Initial Lumens*	Initial Lumens/Watt	Rated Life (Hours)	CRI	Models	Max Mercury Content
Philips	55	3,500	63.6	100,000	80	QL 55W/800	5.4
Philips	85	6,000	70.6	100,000	80	QL85W/800	5.4
Philips	165	12,000	72.7	100,000	80	QL165W/800	7.3
Kumho (Korea)	40	2,800	70.0	100,000	80	Ecoenergy 40W	6
Kumho (Korea)	70	5,250	75.0	100,000	80	Ecoenergy 70W	6
Kumho (Korea)	100	7,500	75.0	100,000	80	Ecoenergy 100W	6
Kumho (Korea)	150	11,250	75.0	100,000	80	Ecoenergy 150W	6
Kumho (Korea)	200	15,000	75.0	100,000	80	Ecoenergy 200W	6
Kumho (Korea)	250	18,750	75.0	100,000	80	Ecoenergy 250W	6
Sylvania/Icetron	70	6,200	88.6	100,000	80	ICE70/800/2P/ECO	18

Sylvania/Icetron	100	8,000	80.0	100,000	80	ICE100/800/2P/ECO	18
Sylvania/Icetron	150	12,000	80.0	100,000	80	ICE150/800/2P/ECO	18

For more information about Kumho induction lamps, see www.kumhoelectric.com/products_i_econergy.

Philips Lighting Company in the EU offers induction fluorescent lamps with the same amount of mercury as the US models. See http://www.primaecat.lighting.philips.com/ecat/Light/ApplicationRouter.aspx?fh_sec&onid=928069008302_2&fh_reftheme=promo_83971035%2cseeall%2c%2f%2fprof%2fen_GB%2fcategories%3c%7bfepplg%7d%2fcountries%3e%7ben_GB%7d%2fstatus%3e%7bact%7d%2fcategories%3c%7bc_0002fepplg_75_ep01%7d&fh_location=%2f%2fprof%2fen_GB%2fcategories%3c%7bfepplg%7d%2fcountries%3e%7ben_GB%7d%2fstatus%3e%7bact%7d%2fcategories%3c%7bc_0002fepplg_75_ep01%7d%2fcategories%3c%7bc_0082fepplg_1146_ep01lind%7d&fh_edc=%c3%9f&fh_refview=list&tab=&family=&&left_nav=gb_en&

Recommendation Exemption:

Induction lamps shall not contain more than 7 mg Hg/lamp.

LCD backlight - Cold Cathode Fluorescent Lamps (CCFL)

CCFLs are rapidly being replaced by LEDs for backlighting:
http://www.eetindia.co.in/ART_8800481209_1800010_NT_20be8751.HTM.

In the future all backlights should be LEDs. Here are some articles describing CCFLs used for LCD backlights: http://www.pacificdisplay.com/lcd_backlights.htm and http://www.j-right.com/html/ccfl_lcd_backlighting.htm.

Data on mercury content for LCD TVs and monitors are also provided under the US Northeast Waste Management Officials' Association (NEWMOA) website, <http://www.newmoa.org/prevention/mercury/imerc/notification/search.cfm> (search for LCD.TVs/Monitors)

Lots of CCFLs for LCD screens have content of 5 mg or less (with some of the larger ones at 5 mg to 10 mg), showing that the lamps themselves contain most probably a lot less.

Data provided in the study submitted by Swedish Chemical Inspectorate (KEMI) in June 2007(draft final version), show that the current level achieved is already quite low.

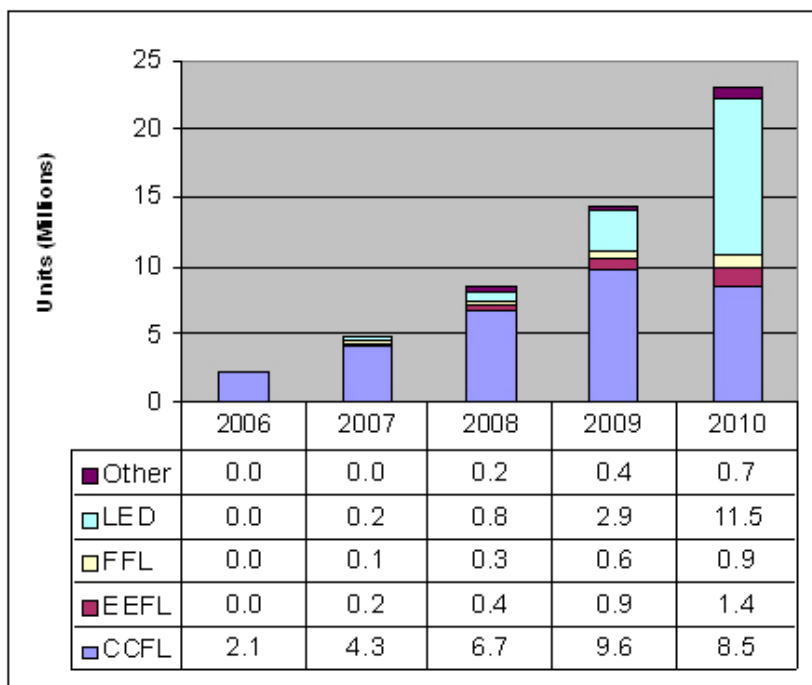
Application area	Luminous efficacy (Lm/W)	Mercury Content/lamp (mg)	Mercury Content/ display (mg)	Lifetime(hours)
Monitors	60-80	2.5-5	10	20000-60000
TVs	60-80	2.5-5	75	20000-60000
Notebooks	60-80	2.5-5	2.5	20000-60000
Scanners	60-80	1.3.3	1-13.2	10000

Furthermore, very recently Dell³⁰ has announced that all new laptops will be 100-percent mercury-free by October 2009. The company plan to reach this green target by switching from using cold cathode fluorescent lamp (CCFL) to light-emitting diode (LED). Soon after Dell, HP³¹ announced that by 2010 their laptops will be mercury free. In addition the new MacBook family also uses mercury-free light-emitting diode (LED) displays, with arsenic-free display glass. See <http://www.apple.com/environment/>.

Furthermore, based on in-depth analyses done by Insight Media, LED backlights will be adopted much faster than previously thought. The following graph shows the backlight unit forecast for the 40-44" segment by backlight technology through 2010, with the expected penetration of LEDs into the market.

³⁰ http://asia.cnet.com/blogs/high-on-a-hill/post.htm?id=63006608&scid=rvhm_ms
³¹ <http://www.maximumpc.com/tags/mercury-free>

While CCFL will continue to be an important and substantial backlight technology, the bulk of the growth after 2009 will be in LED-based backlights.³²



Recommendation Exemption:

CCFLs should be considered as linear fluorescent tri-band phosphor lamps and should fall under the respective proposed exemption as above, and therefore mercury content shall not exceed 2mg per lamp.

Considering the above an exemption should be added to ensure that laptop and LCD screens are mercury free by 2012 at the latest.

Exit signs

Linear fluorescent lamps used for **exit signs** are typically either F4T5s or F6T5s. Some exit signs also contain compact fluorescent lamps. Despite their small size, these “preheat” linear fluorescent lamps often contain between 10 mg and 20 mg of mercury and tend to have a short lamp life of about 5,000 hours; (see table below based on US lamp data).

Manufacturer	Lamp Model	Nominal Watts* (excluding ballast)	Rated (hours)	Life*	Mercury Content
GE	F4T5	4	5,000		1-10 mg
Sylvania	F4T5	4	6,000		>15 mg
Philips	F4T5	4	6,000		20 mg
GE	F6T5	6	5,000		1-10 mg
Sylvania	F6T5	6	7,500		>15 mg
Philips	F6T5	6	7,500		20 mg

*Based on information in manufacturers’ printed and online catalogues.

³² <http://www.insightmedia.info/emailblasts/ledbacklights.htm>

Exit sign lamps (both fluorescent and incandescent) can easily be replaced with LEDs, which typically use only about 1 watt per exit sign. In contrast, fluorescent exit signs often contain two fluorescent lamps and can use 5-15 watts. Eliminating the mercury exemption for this lamp type and for the signs themselves would further facilitate the transition to a technology that is more efficient, long-lasting and mercury-free easily making them fall into the category of “Best Available Technology”.

LEDs are considered best available technology for exit in the US by the US ENERGY STAR program http://www.energystar.gov/ia/business/small_business/led_exitsigns_techsheets.pdf

Recommendation Exemption:

No exemption should be allowed for preheat fluorescents (or CFLs) used in exit signs or other low-wattage applications.

This exemption should rather be addressed to the exit sign manufacturers rather than the lamp manufacturers.

Neon lamps

Neon contains very high amounts of mercury; many have in the gram range and substitutes are available. For example the State of Vermont has banned the use of neon signs because of the mercury and the availability of mercury free alternatives.³³

Recommendation Exemption :

No exemptions should further be allowed on neon signs, which can use mercury-free neon or LEDs.

As above, this exemption should rather be addressed to the ‘neon’ sign manufacturers rather than the lamp manufacturers.

Exemptions for applications

All above applications (laptop computer and LCD screens, exit signs, etc), although they use lamps which could potentially be used also for other applications, concern products that are electrical or electronic equipment and fall under the scope of the RoHS directive.

We welcome the conclusion of the Consultant that exemptions for certain applications should not be granted if better, safer, environment friendly alternatives are available (p.26). The annex of the RoHS Directive could include exemptions which address these particular products/applications (e.g., exit signs, neon signs, and laptop and LCD screens). It has to be noted that the exemptions on mercury in lamps will be addressed to lamp manufacturers, whereas exemptions on other product/applications will be addressed to the respective manufacturers.

As a result, an exemption from the mercury-in-lamps related exemptions could be proposed in cases where certain products/applications, which fall under the RoHS directive, can use mercury-free and more energy-efficient lamps/lighting technologies.

We would, therefore, propose that for exit signs, neon-lit products, and laptop and LCD screens, the following text should be included in the Annex:

Exemptions [1, 2a,2b, etc,]³⁴ of this annex shall not apply to fluorescent-lit exit signs and exit sign retrofit kits, neon signs, laptops and other products containing LCD screens.

We call on you this wording to be included in the Annex.

³³ <http://isa.files.cms-plus.com/PDFs/Vermont%20Mercury.pdf>

³⁴ Mercury in lamps related exemptions

3.3 High Intense Discharge lamps

These include:

- High-pressure sodium (HPS) typically used for street lighting, parking lots and high-bay lighting applications such as warehouses and garages (e.g., LU100), both standard and with special features (such as non-cycling or standby)
- High Pressure Mercury Vapour
- Metal halide (both standard and ceramic); these are used for indoor and exterior lighting applications including stadiums and vehicle head lights

3.3.1 High Pressure Mercury Sodium lamps (HPS)

In Annex V is a memo detailing the mercury content of high-pressure sodium lamps. However looking at the mercury content for some of the lower wattages we need to consider that these are not so much used and as a result industry has not invested in them to lower the mercury content as much.

Philips has come out with a new line of low-mercury high-pressure sodium lamps; see http://caproductstewardship.org/assets/ppt/04-30-08_Ric_Erdhiem_Phillips_lamp.ppt#937,7,HID MERCURY REDUCTION. For example, Philips' 400-watt HPS lamp recently went from 29 mg of mercury down to 3 mg; and its 70-watt HPS lamp recent went from 16 mg down to 0.8 mg.

Sylvania has a line of low-mercury and mercury-free HPS lamps that range from 0.0001 mg of mercury up to 6 mg (for models up to 400 watts). Its 1000-watt model contains 16 mg.

Within this category, there are several types for which low-mercury technology has been developed and is in relatively wide use. For other categories, low-mercury technology is not available but there may be technical reasons to allow these technologies to stay in existence.

Although we support in general the consultant/ELC's decision to include a separate exemption for HPS lamps, we are concerned about the high margin mercury content limits proposed.

The consultant/ELC/EC have proposed:

Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes:

- not exceeding in lamps with improved colour rendering index > 60
 - P ≤ 155 W: 30 mg per burner
 - 155 < P ≤ 405 W: 40 mg per burner
 - P > 405 W: 40 mg per burner

- not exceeding in other High Pressure Sodium (vapour) lamps
 - P ≤ 155 W: 25 mg per burner
 - 155 < P ≤ 405 W: 30 mg per burner
 - P > 405 W: 40 mg per burner;

We understand that, as with other HIDs, the mercury content of HPS lamps tends to increase with wattage. We also understand that specialty HPS lamps – such as models that have a high colour rendering index, which enable them to deliver a white (rather than yellow) light – may require a higher mercury content and are justified because they offer safety improvements. Nevertheless, EEB and GPI compared HPS lamps in the US and Europe and found substantial similarities in terms of lumen output, lamp life and other features. Therefore, the use of US HPS data seems applicable to this product category (as it is with most others as well). According to data provided by the US lamp manufacturers Philips, Sylvania and GE, HPS lamps (with a typical CRI in the 20s) can meet much lower mercury levels than those proposed by the ELC as presented in the consultant's report. These models not only have comparable lumen output, they have a longer lamp life (typically 30,000 hours). The only models that we have seen with substantially higher mercury content are dual arc models (i.e., those with two burners). This category of HPS lamps are sometimes also called standby, instant re-strike, or dual arc HPS. As with the ELC, we understand that

those types of HPS lamps, which have two HPS lamps as a safety precaution to prevent a roadway from becoming completely dark if one burns out, need to have a higher mercury content.

Therefore, although we might be supportive of the proposed low CRI limits we would nevertheless see those apply only for low CRI dual arc models. Based on our analysis of available US data, the limits on this category should be similar (and could be even lower) to what the ELC proposed.

Model	Manufacturer	Watts	Lumens	Rated Life	ELC Hg Proposal (proposed level x2)	Maximum Mercury Content (mg)
Lumalux Standby LU70/SBY/XL	GE	70	6.400	40.000	50	30 (11-30)
C70S62/2	Philips	70	5.600	24.000	50	34
Lumalux Standby LU100/SBY/XL	GE	100	9.500	40.000	50	65 (31-65)
C100S54/2	Philips	100	9.100	24.000	50	44.4
LU100/SBY	Sylvania	100	9500	40.000	50	21.6
Lumalux Standby LU150/55/SBY/XL	GE	150	16.000	40.000	50	65 (31-65)
C150S55/2	Philips	150		24.000	50	34
LU150/55/SBY	Sylvania	150	15.700	40.000	50	21.6
Lumalux Standby LU250/SBY/XL	GE	250	27.500	40.000	60	50 (10-50)
C250S50/2	Philips	250	27.500	24.000	60	63.8
LU250/SBY	Sylvania	250	27.500	40.000	60	21.6
Lumalux Standby LU400/SBY/XL	GE	400	50.000	40.000	60	Not avail
C400S51/2	Philips	400	49.000	24.000	60	61.9
LU400/SBY	Sylvania	400	47.500	40.000	60	21.6
	GE	1000	127.00	40.000	80	Not avail
C1000S52/2	Philips	1000	140.000	24.000	80	88
LU1000/SBY	Sylvania	1000	127.000	24.000	80	36 or 43 ³⁵

Rather than watering down the single-burner HPS lamps for which substantial progress has been made to develop models with very low mercury content (which are offered by three major lamp manufacturers), this type of HPS lamp should be evaluated separately and given its own limits. Consequently we don't support that low CRI single burner models should fall under the proposed ELC limits, and we propose lower separate limits for these latter models.

So for low CRI single burner models we would propose:

- P ≤ 155 W: 5 mg
- 155 < P ≤ 405 W: 10 mg
- P > 405 W: 25 mg

The data below demonstrates that these are available by many manufacturers.

Below is a summary of Sylvania's (US) low-mercury, long-life HPS lamps, which can meet the NGOs' proposed mercury limits.³⁶

³⁵ The mercury content of this lamp is reported differently on the Sylvania LEED EB calculator and the Sylvania mercury content fact sheet dated May 2008.

³⁶ Source: Osram Sylvania, "Mercury Quantity in Lamps for General Lighting Applications," May 30, 2008;

HPS Lamp Type	HPS Lamp Description	Wattage(s)	Rated Life (Hours)	Maximum Mercury Content (mg) Per Lamp
HID 26 (Low-mercury Long-life Models)	High Pressure Sodium, PLUS, ECO	50W to 400W	30.000	<1 to 6
HID 27 (Low-mercury Long-life Models)	High Pressure Sodium PLUS	1000W	30.000	<15

Below is a summary of available data about the mercury-content of GE's (US) low-mercury, long-life HPS lamps.³⁷

Model Number(s)	Watts	Lumens	Rated Life	Maximum Mercury Content (mg)
LU70/ECO/NC	70W	6.300	30.000	2
LU100/ECO/NC	100W	10,500	30.000	2
LU150/55ECO/NC	150W	16.000	30.000	4
LU200/ECO/NC	200W	22.000	30.000	5
LU250/ECO/NC	250W	29.000	30.000	5
LU400/ECO/NC	400W	54.000	30.000	7

GE's high-wattage HPS contains only 25 mg of mercury, which is far lower than the 40 mg limit proposed by the ELC for HPS lamps >405W

LU1000/ECO	1000W	130.000	24.000	25
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Below is a summary of available data about the mercury-content of Philips' (US) low-mercury HPS lamps, which all can meet our proposed RoHS limits.³⁸

Model Number	Watts	Lumens	Rated Life	Maximum Mercury Content (mg)
C70S62/ALTO NC HPS	70	6.300	30.000	1.2
C100S54/ALTO NC HPS	100	10.000	30.000	2
C150S55/ALTO NC HPS	150	16.000	30.000	2
C250S50/ALTO NC HPS	250	28.500	30.000	3.5
C400S51/ALTO NC HPS	400	50.000	30.000	5.4
C1000S52/ALTO NC HPS	1000	130.000	30.000	44

All of the Philips models, except the 1000 watt model would meet our proposed mercury limits. The HPS of two other major lamp manufacturers (GE and Sylvania) would meet our proposed limit for high-wattage (single burner) HPS models (without a high CRI).

Our limited data on high-CRI HPS lamps shows that the mercury limits proposed by the ELC (30 mg for lamps ≤155 watts) may also be high. Below is a summary of available US data on high-CRI HPS lamps. More data is needed on this lamp type to set a limit that reflects the upper end of the market.

³⁷ SF Approved Lamps,

³⁸ SF Approved Lamps,

Model Number	CRI	Manufacturer	Watts	Lumens	Rated Life	Max. Mercury (mg)
SDW-50/LV/D	85	Philips	50	2350	10.000	3.8
SDW-100W/LV/D	85	Philips	100	5000	10.000	11
LU70DX/MED	65	GE	70	3800	10.000	22
LU150/DX/MED	65	GE	150	10.500	15.000	19

Recommendation Exemption:

HPS CRI :>60, more data would be needed- ELC proposal seems high.

Recommendation Exemption - [see also below alternative]:

HPS CRI < 60 ,double burner (although there is margin for lower levels as it can be seen above):

P ≤ 155 W: 25 mg per burner

155 < P ≤ 405 W: 30 mg per burner

P > 405 W: 40 mg per burner

Recommendation Exemption:

HPS CRI < 60, single burner

P ≤ 155 W: 5 mg

155 < P ≤ 405 W: 10 mg

P > 405 W: 25 mg

Further to the above however, within the HPS category, the limits have been set for the entire category to accommodate the older technology rather than setting limits that can foster innovation.

We are most concerned that the way the exemption is proposed, it appears that standard single burner HPS cycling lamps be allowed to have significantly more mercury than necessary under the proposed limits – largely because they are being lumped in with other specialty HPS models such the double-burner models – that typically have much higher mercury content levels.

Alternatively therefore, for the low CRI category (CRI ≤ 60), we propose, instead, that **lower mercury limits be set on additional categories of HPS lamps: standard cycling (single burner) lamps ,and non-cycling** models, since they have substantial lower mercury levels (1/20th of other HPS technologies) and are more long-lasting. As also mentioned by the consultant (p.43) data is available for these categories as well as the double-burner low CRI HPSs.

Standard cycling HPS lamps are typically available in regular and low-mercury (“Eco” models. Some companies, including Philips and GE in the US, have already phased out the high-mercury models completely. Our proposed mercury-content levels for **standard cycling HPS lamps** would be the following:

Alternative recommendation for HPS low CRI category (CRI ≤ 60):

- **HPS (cycling) lamps (excluding high-CRI and double-burner models) ≤ 150W, shall not contain more than 15 mg/ lamp**
- **HPS (cycling) lamps (excluding high-CRI and double-burner models) > 150W shall not contain more than 30 mg/lamp**

As it can be seen from above, NGOs could accept the Consultant’s/ELC proposal of 30 mg for cycling HPS lamps of wattages >155 to 405. At least two US manufacturers can currently meet a 30 mg limit on these.

However, we also support including the 30 mg limit on the wattages above 405 watts, contrary to the 40mg proposed, since at least two manufacturers can meet that limit as well.

See in the Annex VI of this document a table showing which standard cycling HPS lamps would be allowed to be sold if the NGO proposed mercury limits are adopted.

Therefore the EC/Consultant’s currently proposed limits for low CRI HPS should apply only to double burner models.

Although there had been no reference to non-cycling models in the debate until now, the industry provided table (p. 43), chose to compare EU models with non-cycling US models. Even if the argument that EuP efficiency levels may not be met for the higher wattage (> 150W) non-cycling HPS lamps, the NGOs initial recommendation of a 5mg limit HPS should be considered at least for those models that do meet the EuP energy-efficiency levels, which currently includes models of 150 watts or less.

Finally, we further urge the Commission and Member States to set separate, lower mercury limits for **Non-cycling HPS lamps**, because this subcategory of HPS lamps contains dramatically lower mercury levels. While it is true that some of the non-cycling HPS lamps do not meet the EuP efficiency ratings, many of the low-wattage models (below 100W) do and some of the medium-wattage models are very close – and are likely to improve over time. These have less mercury and last longer, so there are environmental benefits. It is not unreasonable to assume that these models could enter the EU marketplace in the future due to these benefits and therefore should have a mercury limit established as we propose below:

Additional Recommendation on Non-cycling HPS lamps

HPS Non – cycling, below 400W , shall not contain more than 10 mg Hg

HPS Non cycling, above 400W, shall not contain more than 25 mg.

In Annex VII examples of non-cycling lamps that meet this limit can be found.

3.3.2 High Pressure Mercury Vapour lamps

We are happy to see that exemption for the HPMV for general purpose has not been included in the EC/Consultant’s recommendations since this class of lamps has both high mercury content and low efficiency. Given, however, that data has not been provided by industry – we would rather propose, as the Consultant mentions, that the exemption on special purpose HPMV lamps is also deleted and industry

submits separate notification for exemption if these are still needed. This would not cause hardship since higher quality light is emitted with less energy usage by other HID and fluorescent replacements. This measure could take place immediately and therefore neither the exemption nor the proposed expiry date are needed.

We agree with the Consultant recommendation that all mercury vapour lamps and luminaires should be labelled: 'For specialty applications only, not for general illumination' as it was decided in the US by NEMA, the US lamp manufacturers association.

We further strongly urge the Commission to also eliminate the exemption for luminaires containing mercury vapour lamps since they do not represent BAT. In fact, they represent the worst available technology. In the United States, ballasts for mercury vapour lamps have been banned from manufacture and import as of January 1, 2008 due to energy efficiency concerns, under the 2005 Energy Policy Act.

A draft fact sheet³⁹ explaining this that was published by the US National Electrical Manufacturers Association states:

Metal halide and fluorescent lighting systems offer the ability to save energy by reducing connected load and to also provide a much better quality of light and color for the end user. For example, a 250 watt pulse start metal halide lamp/ballast system provides the same initial and mean lumens as a 400 watt mercury vapor lamp/ballast system with a savings of 160 watts per luminaire.

Even the ELC argues that mercury vapour high pressure discharge lamps should be widely replaced. Their fact sheet on environmentally preferable street lighting states:

ELC members believe that by changing purchasing behavior in the European Street Lighting sector, significant reductions in CO2 emissions can be achieved. The energy saving potential from making the switch from Blended & High Pressure Mercury lamps (b/hpm) to High Pressure Sodium or Metal Halide lamps in Europe could approach up to 50% of the total energy consumed over the use phase. This could amount to a saving of 4.5 Mtons of CO2 per annum – enough to fill 12 million double decker buses!

Furthermore, as discussed in the VITO study on Street lighting⁴⁰ - the use of High Pressure Mercury Vapour lamps should be phased out due to poor efficiency.

Below some information on these lamps: According to the most recent online Osram lamps catalogue⁴¹, a 125-watt mercury vapour lamp emits 6300 to 6800 initial lumens while a high-pressure sodium replacement lamp – which is readily available as a retrofit kit, emits 8000 lumens using only 110 watts. The Osram catalogue warns readers that, "Because of their low efficiency, mercury vapour lamps consume much more electrical energy than, for example, metal halide lamps or high pressure sodium lamps."

According to Sylvania (US), which has released extensive amount of data on the mercury content of its lamps, its 400- to 1000-watt mercury vapour lamps contain 58 to 165 mg of mercury, while its 400 to 1000-watt standard HPS lamps contain only 18-25 mg of mercury and its Ecolux (low-mercury/long-lasting) HPS lamps contain only 6 to 15 mg of mercury.

Mercury vapour retrofit kits are readily available, consumers will be able to find replacement lamps for their existing mercury vapour fixtures.

³⁹ See "Effects of EPC Act 2005 on Mercury Vapor Lamp Ballasts and Lighting Systems: Frequently Asked Questions," Prepared by Lighting Systems Division, National Electrical Manufacturers Association, Rosslyn, Virginia 22209; Date to be determined; www.eyelighting.com/LSD_37_EPC Act_2005_for_Hg_Ballasts_V2_0_01-14-2008.pdf.

⁴⁰ <http://www.eup4light.net/assets/pdf/Files/Final/VITOEuPStreetLightingFinal.pdf>

⁴¹ Go to www.catalog.myosram.com.

Recommendation Exemption:

No exemption should be given for High Pressure Mercury Vapour lamps. These should be banned due to high mercury content and low energy efficiency.

3.3.3 Metal Halide lamps (MH)

We feel that it is imperative that all HIDs – including all metal halide lamps -- have some mercury limit established. The proposal to give a blanket exemption to all metal halides leaves a huge gap. We understand that the mercury content of metal halides is not as well understood as that of fluorescent lamps. Although we agree with the ELC that more mercury is needed as the wattage of metal halides increases., the analysis fails to acknowledge that there is a subcategory of metal halide lamps that should be encouraged through the RoHS Directive because they are lower in mercury content as well as longer in rated life and higher in efficiency. This category of metal halides includes ceramic metal halides and other “pulse” start models and excludes high-mercury, less-efficient probe start metal halides.

The data on metal halides provided in the final Consultant’s report (p. 44) by one lamp manufacturer, support the mercury limits we proposed. (e.g., a 10 mg limit on metal halides between 25 and 100 watts). The NGOs have provided mercury content information on categories of metal halide lamps that was supplied by US manufacturers (Philips, Sylvania and General Electric), which are the same companies that make the same categories of lamps in Europe. The Commission can, therefore, use this data, as we did, as a guide as to what is technologically available within this lamp category.

We are, therefore, opposed to the proposed blanket RoHS exemption for metal halide lamps; instead, the Commission should set mercury limits that represent the best available technology within the metal halide family of lamps. EEB and GPI reviewed the lamp catalogues of several ELC members and found a very large number of ceramic and other pulse start metal halides within these wattages. Further data on this family of lamps can be found below:

Standard Metal halide (MH) lamps, while relatively efficient, have the highest Hg content per lumen hour. For many applications there is a new generation of MH called ceramic metal halides that are not only more efficient but tend to have a lower mercury content as well. Standards should be set that will result in a shift to ceramic metal halides as much as possible. For example:

Metal halide lamps come in a variety of wattages, shapes and sizes. The oldest models, which are the least efficient in this category and also have the highest mercury content are standard (probe or switch) start metal halides. In many instances they can be replaced by ceramic and other pulse start metal halides.

Below are some examples of lamps that can meet the proposed limits as below. This list is not exhaustive.

Philips offers a 150-watt ceramic metal halide (MasterColor CDM 150W/830 Med ED17 CL ALTO) that has only 15 mg of mercury. This lamp emits about 14000 lumens. The equivalent standard “pulse start” metal halide, uses 175 watts to emit 16,000 lumens and contains almost twice as much mercury, 28 mg. Similarly, the Sylvania ceramic metal halides are available with <15 mg of mercury in models up to 150 watts.

Ceramic metal halides (CMHs) are pulse-start metal halide, high-intensity discharge (HID) lamps that are relatively energy-efficient and have a high CRI and low mercury content compared to other pulse start and probe start metal halide lamps. They can replace halogens as well as other types of HIDs. Low-mercury models are available from many types of CMHs, including PAR CMH lamps and R-111 models. For those types of CMHs, the following EPP specifications are recommended:

70-watt Par-38 Ceramic Metal Halide with Screw-in Base

Brand	Watts	Initial Lumens	Initial Lumens/Watt	Rated Life (Hours)	CRI	Models	Max Hg Content
Philips	70	5000	71.4	12,500	85	CDM70/PAR38/SP3K/ALTO	6.5
Sylvania	70	6500	92.8	12,000	88	MCP100PAR38/U/930/SP/ECO	7
GE	70	6500	92.8	10,000	81	CMH100/PAR38/830SP15/ECO	8

100-watt Par-38 Ceramic Metal Halide with Screw-in Base

Brand	Watts	Initial Lumens	Initial Lumens/Watt	Rated Life (Hours)	CRI	Models	Max Hg Content
Philips	100	6200	62.0	12,500	85	CDM100/PAR38/SP3K/ALTO	7.2
Sylvania	100	6500	65.0	12,000	88	MCP100PAR38/U/930/SP/ECO/PB	15
GE	100	6500	65.0	10,000	81	CMH100/PAR38/830SP15/ECO	8

The Commission should not issue a blanket RoHS exemption for **metal halide lamps**; instead, it should set mercury limits that represent the best available technology within the metal halide family of lamps. Metal halide (MH) lighting technology, like fluorescent lighting technology, has improved over time with respect to energy efficiency, rated life and mercury content. Like fluorescent lamps, which have both halophosphate and triband phosphor technologies, metal halide lamps can be divided into conventional standard MH models (which are also called probe start metal halides) and more advanced metal halide pulse start technology (which includes ceramic metal halides). Standard metal halides not only have more mercury than pulse start metal halides, they also are less efficient and have a shorter lamp life. The Commission can help hasten the transition to more efficient, lower-mercury metal halides by establishing limits that this BAT can meet. It is important to note that all of the major manufacturers offer lines of these lower-mercury, energy-efficient metal halides; therefore, the availability of these technologies are widespread.

We noted that in the US ceramic metal halides are available in low wattages (up to about 200 watts). In Europe, which has even more advanced metal halide technology, ceramic metal halides are available in wattages ranging from 20 watts to 400 watts according to the ELC.⁴² A review of Philips and Sylvania (US) mercury-content data for ceramic and other pulse start metal halide lamps demonstrates that the following mercury-content MH limits could be met if added to the RoHS Directive:

Recommendation Exemption:
Proposed limits for Metal Halide Lamps

Wattages	Proposed Mercury Limit	Companies that can meet this
<25	2.5 mg	Sylvania, Philips
>25 <100	10 mg	Sylvania, Philips, GE
>100 <200	15 mg	Sylvania, Philips,
>200 <400	25 mg	Philips. Sylvania
>400	No limit	All

⁴² See "Environmental Information on Quartz and Ceramic Metal Halide Lamps," European Lamp Companies Federation, http://www.elcfd.org/documents/070901_GPSD%20Quartz%20Ceramic%20Metal%20Halide%20Lamps.pdf.

Our recommendation for setting mercury limits for metal halide lamps, is consistent with the direction of the EuP regulation adopted on 26 September 2008 on tertiary lighting. By following the above recommendation, the Commission would have the opportunity to accelerate the adoption of more environmentally – low mercury/high efficiency lighting equipment.

EEB and GPI reviewed the lamp catalogues of several ELC members and found a very large number of ceramic and other pulse start metal halides within these wattages.

4 Mercury – free lamps

Despite the provision of data from NGOs and research, such as the Swedish study, the NGOs regret that the Consultant's recommendations do not really emphasize and promote LEDs (or other mercury free technologies) as a possible substitute for lighting applications in general.

Considering the rapid developments of this technology, fluorescent lamp technology should only be seen as an interim development. The target should be mercury-free and energy-efficient lamps. LEDs have the ability to replace many low-wattage fluorescent lamps with more efficient products that are also much longer lasting and mercury-free. Therefore, the limits and expiry dates set for mercury use should drive the market in that direction and further innovation.

Mercury free efficient lamps like Light Emitting Diodes are becoming more and more available for different applications in the market.

Light-emitting diodes or LEDs, sometimes called Solid State Lighting (SSL), are illuminated by the movement of electrons in a semiconductor. There is no filament to burn out, so they tend to last a long time.

During the last five years or so, new types of diodes with colours closer to a "white" colour mix have become commercially available, and beginning in Northern Europe, these diode types have become available for general lighting purposes with standard sockets (authors' on-site observations; Jula (2007); Harald Nyborg (2007); Trenden; (2008); Dioder.dk (2008)⁴³.

Nano-scale LEDs have been produced in labs at the University of Lund, Sweden, featuring lifetimes up to 100,000 hours (about double that of current commercially available LEDs), with half the energy consumption of straight fluorescent lamps, and with a power efficiency equivalent to normal consumer CFLs (Bergdroff 2007). LEDs can be used with dimmers (which standard CFLs cannot). By the end of 2007 nano-scale LEDs were under development for marketing.⁴⁴

As discussed above, LEDs are definitely applicable as replacements for exit signs and other applications for illuminating pathways. It can often replace low-wattage CFLs and linear fluorescents such as T2s used in exit signs. Increasingly, LEDs are replacing high-pressure sodium (HPS) lamps in street lights. LEDs are also used widely in traffic signals (replacing incandescent). They are also used in backlighting for electronics and in vehicles.

More information on LEDs can be found at the presentation by the Green Purchasing Institute (EEB conference – June 2008):

http://zeromercury/EU_developments/LEDsandOtherMercury-freeTechnologiesGPI.pdf

Also the information provided at the Draft Final Swedish study (June 2008) should also be considered.

Additional information on LED/SSL- can also be found and were presented at the American Council for Energy-Efficient Economy⁴⁵ (ACEEE) Summer Study on Energy Efficiency in Buildings, mainly under Panel 6 – paper 'Magical Mystery Devices or not: How td LED Lamps and Luminaires really measure-up?'.⁴⁵

⁴³ "Options for reducing mercury use in products and applications and the fate of mercury already circulating in society"
http://ec.europa.eu/environment/chemicals/mercury/pdf/study_report2008.pdf

⁴⁴ ditto

⁴⁵ <https://www.aceee.org/conf/08ss/panel6.htm>

Evidence on the better efficiency/efficacy of the use of LEDs vs. fluorescent lamps, for low wattage applications such as appliance lamps but also others can be found in this paper.

Furthermore it is clear that mercury-free efficient LED lamps are becoming more and more available for different applications in the market. The US Energy star programme recently came out with new standards for LED which are commercially available⁴⁶.

As mentioned above, in areas of low wattage applications where LEDs are currently utilized, last longer and are equally or more efficient than fluorescent lamps, these should be preferred and no exemption should be granted for those applications. They can often replace low-wattage CFLs and linear fluorescents such as T2s used in exit sign; are increasingly, replacing high-pressure sodium (HPS) lamps in street lights, and are also used widely in traffic signals (replacing incandescent), backlighting for electronics and in vehicles.

High-efficiency incandescents: In 2007, GE announced it would start selling a high-efficiency incandescent bulb in 2010 that would be nearly twice as efficient as existing incandescent bulbs (GE 2007). Ultimately, the company said, these new bulbs would be comparable in efficiency to compact fluorescents. Though major improvements have made them broadly acceptable, CFLs continue to have drawbacks for some consumers; for instance, their colour still isn't the same as incandescents (Deutsch 2008; Weise 2008). Thus, an incandescent bulb with the efficiency of a compact fluorescent could attract a sizeable market.⁴⁷

5 Other issues

Efficiency/Lumen Output:

On discussions on the relationship between efficiency and lumen output, to our view, there has not been a tradeoff between mercury content and energy efficiency. In fact, there has been an inverse relationship between lumen output and mercury content in many cases.

T8s: At least two companies have reported similar or LOWER mercury content among their most efficient lamps. Sylvania, for example, reports a 8 mg mercury content for its standard grade T8 with an initial lumen output of 2800; meanwhile, high-lumen T8s, with lumen outputs of 2950 to 3100, have lower mercury content of 3,5 mg.

Lamp Description	Initial Lumens	CRI	Maximum mercury (mg)
FO32/741/ECO	2800	78	8 mg
FO32/841/ECO	2950	85	3.5 mg
FO32/841XP/ECO	3000	85	3,5 mg
FO32/841XPS/ECO	3100	85	3,5 mg

All of US Philips T8s (with the exception of 6-foot and 8-foot models) have the same mercury content, no matter how many lumens they put out.

Lamp Description	Initial Lumens	CRI	Maximum mercury (mg)
F32T8/TL741/ALTO	2800	78	1,7 mg
F32T8/TL841/ALTO	2950	85	1,7 mg
F32T8/ADV841/ALTO	3100	85	1,7 mg

Even within other categories such as 8-foot T8s, for example, Philips' standard grade and high-performance models have the same mercury content.

⁴⁶ http://www.energystar.gov/index.cfm?c=ssl_res.pt_ssl

⁴⁷ ditto

Lamp Description	Initial Lumens	CRI	Maximum mercury (mg)
F96T8/TL741/PLUS/ALTO	5700	78	4,4 mg
F96T8/TL841/PLUS/ALTO	5900	85	4,4 mg

Finally, at least one company, Philips has been able to achieve the same mercury content for its regular-output and high-output (HO) fluorescent lamps. For example, Philips reports a 4.4 mg mercury content for its regular-output and HO 8-foot T8s. See table below.

Lamp Description (Philips)	Initial Lumens	CRI	Maximum mercury (mg)
F96T8/TL841/PLUS/ALTO	5900	85	4,4 mg
F96T8/TL841/HO/PLUS/ALTO	8200	86	4,4 mg

T8s and T5s are not always interchangeable.

T8s are the most popular fluorescent lamp because they are often more energy efficient when combined with ballasts; they tend to have a longer lamp life; and they are more versatile. T8s can also be used both with instant start ballasts (the most efficient) and program start ballasts (while T5s only work with program start ballasts). T8s can be used with both direct (downlights) and indirect lighting (where lamps point toward the ceiling). T5s are extremely bright so they tend to only be used in indirect lighting. T5s have a much more narrow temperature range than T8s. T5s are available in a much narrower range of sizes and shapes. For example, there are no u-bent T5s or 8-foot T5s. Since both types of lamps are likely to continue being sold in the EU, exemptions should be set for each. T5s tend to have a lower mercury content than T8s.

In conclusion, the NGOs respectfully request that the European Commission and Member States examine carefully all comments and references above before deciding on proposed mercury limits, for the review of the annex.

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