

# MERCURY-CONTAINING LAMPS UNDER THE SPOTLIGHT

Brussels, 27 June 2008

DECEMBER 2008



EEB PUBLICATION NUMBER: 2008/010

**The European Environmental Bureau (EEB)** is a federation of over 150 environmental citizens' organisations based in most EU Member States, most candidate and potential candidate countries as well as in a few neighbouring countries. These organisations range from local and national, to European and international.

EEB's aim is to protect and improve the environment by influencing EU policy, promoting sustainable development objectives and ensuring that Europe's citizens can play a part in achieving these goals. EEB stands for environmental justice and participatory democracy. Our office in Brussels was established in 1974 to provide a focal point for our members to monitor and respond to the EU's emerging environmental policy. In 2004, EEB, working with the Mercury Policy Project/Ban Mercury Working Group, launched the 'Zero Mercury' campaign.

**The Zero Mercury Working Group** is an international coalition of over 75 Public-interest non-governmental organisations from around the world formed in 2005 by the European Environmental Bureau and the Mercury Policy Project. The group's aim is to reach 'zero' emissions, demand and supply of mercury, from all sources we can control, towards eliminating mercury in the environment, at EU level and globally.

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European Environmental Bureau (aisbl)

December 2008

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*The EEB gratefully acknowledges financial support from the Sigrid Rausing Trust, UK and the European Commission.*

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# REPORT FROM THE EEB CONFERENCE

## MERCURY CONTAINING LAMPS UNDER THE SPOTLIGHT

BRUSSELS, 27 JUNE 2008

Compiled by: Elena Lymberidi-Settimo, EEB  
Henriette Krimphoff

December 2008



**European Environmental Bureau**



**Zero Mercury Working Group**

Conference and report financed by the Sigrid Rausing Trust, UK, and the European Commission

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## I. Introduction

Mercury is highly toxic, causing damage to the nervous system, and is particularly harmful during the early development phases of children. Mercury can become more concentrated as it is ingested by bacteria and moves up the food chain, accumulating in the bodies of humans and wildlife. This can be a particular problem for those species, including humans, that consume certain types of fish. Mercury travels long distances through the atmosphere, and has contaminated global food supplies at levels that can pose a significant risk to human health.

One of the key objectives of the EU Mercury Strategy, adopted in January 2005, is to reduce the amount of mercury circulating in society by cutting both supply and demand. On the demand side the largest uses are in the chlor-alkali industry and dental amalgam. *Lighting* is the next biggest mercury use, equaling the total amount used in electric and electronic equipment and measuring and control devices – around 35 tonnes of mercury (out of 440 tonnes total in EU 25).<sup>1</sup>

The largest number of lamps that contain mercury are the energy-efficient compact and straight fluorescent lamps. These are increasingly promoted in the fight against climate change, and various initiatives are underway to increase their market share.

At EU level, the EC, in line with the Mercury Strategy actions 8 and 10, is currently conducting a study of the products and applications containing mercury circulating in society, with a view to eventually shifting to mercury-free solutions wherever possible.

In parallel two other EU directives are dealing with mercury in lamps:

- the EU Directive 2002/95 on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) (including mercury), which sets minimum allowed content of mercury in compact and straight fluorescent lamps, is currently under revision.
- The EU Directive 2005/32 establishing a framework for the setting of eco-design requirements for energy-using products, is currently in the process of detailing such requirements for street, office and domestic lighting.

Moreover the EU Directive 2002/96 on Waste Electrical and Electronic Equipment is currently under revision, which will deal with the need for separate collection and recycling of such products.

More importantly, however, it is expected that the EU will move to phase out incandescent lamps over the next several years. As a result, there will be an enormous increase in the number of lamps containing mercury, and even more mercury will be put into circulation if steps are not taken to further reduce mercury content and require best practices for those lamps manufactured and/or used in the EU. Furthermore, separate collection of such lamps becomes even more important because of the hazardous content and their fragility.

Given these policy developments, and the realisation that the ever increasing use of energy-saving lamps could increase overall mercury use and eventual risk of exposure, the EEB and the Zero Mercury Working Group organised this conference in June 2008, to engage more stakeholders in this important debate.

The objectives of the conference were:

- To discuss about the levels of mercury content per lamp types that can be achieved
- To discuss the issues around separate collection, recycling of lamps and available information
- To discuss experiences of stakeholders, and Member States on all above issues for further improvement of the current situation.

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<sup>1</sup> Mercury flows and safe storage of surplus mercury, Concorde East/West, for DG Environment, August 2006, p. 21

## II. Conference Results

Mercury is a necessary element that is added to lamps to form a vapour which produces light when current is passed through it under a vacuum. Mercury-containing lamps are already widely used, yet sometimes people do not realise that they contain mercury. In the coming years millions of these lamps are expected to flood the EU consumer market and be used in homes, businesses and institutions, since a ban is planned on the incandescent lamp which uses more energy.

### *Background*

- The available data tell us that in the EU a total of about 950 million mercury-containing lamps were sold in 2006. This is higher than most other estimates; in comparison, in the US a total of 668 million such lamps were sold in 2006. On the basis of these results, the following estimations have been made on the content of mercury in these lamps for the EU market in 2006:
  - Fluorescent tubes: 3.3 - 4.5 tonnes Hg
  - Compact Fluorescent Lamps (CFLs) and other hot cathodes: 1.9 - 2.6 tonnes Hg
  - High Intensity Discharge lamps (HID): 1 - 1.5 tonnes Hg
  - Other lamps: 1.6 - 2.1 tonnes Hg

Furthermore the EU consumption of mercury for backlighting (in computer screens, etc) is 3 – 4 tonnes, which can be compared to the mercury in the largest lamp category – the long linear tube fluorescent lamps.

The issue of mercury in lamps is multi-faceted, as explained in further detail below.

- Many different lamp types exist: long fluorescent, compact, non-linear fluorescent lamps, neon, backlights and other lamps for special purposes, as well as high intensity discharge lamps including mercury vapour, high pressure sodium and metal halide types.
- Mercury can be released during the manufacturing process, especially if hand-dosing of liquid Hg is used. It can also be released when lamps are transported from the factory to the retailer, to the consumer and eventually to disposal. When mercury-containing lamps are installed, stored or disposed, they can break and mercury can be released. During disposal of lamps in dumpsters, rubbish bins, incinerators and landfills, mercury can be released and enter into the atmosphere. Even if lamps get recycled, mercury can evaporate during crushing, mercury recovery, as well as metal smelting. All of these instances need to be addressed and solutions found so that mercury does not get released but instead is removed and recycled carefully.
- Addressing the so-called "mercury paradox" needs to be considered in the context of the broader perspective. Apart from the mercury which may be released from a mercury-containing energy saving lamp during its lifetime, mercury is a trace element in coal; therefore energy produced via coal combustion causes mercury releases. Hence lower energy consumption – via energy saving lamps – may lead to less mercury emissions via the energy production route. However, mercury releases vary with the percentage of coal and the mercury content of the coal in the fuel mix, the extent of mercury controls on coal combustion flue gases, the assumed lifetime of a CFL, the mercury content of the CFL, the rate of secure collection of waste CFLs, the disposal pathways for CFLs not collected, and other means.

As a result, reductions of mercury releases through the use of CFLs may not be overwhelming, depending on the region and country; the great benefit of using CFLs is energy efficiency. Therefore, to reduce overall mercury use and release, it is imperative to reduce the mercury content in CFLs to an absolute minimum, as well as to maximise the lifetime and lumens per watt of all mercury lamps. It is also crucial to ensure that mercury-containing lamps at the end of their lives are collected separately in order to maximise the recycling of all mercury lamps.

- When it comes to mercury content in lamps, different factors need to be considered. The age of lamps matters, since modern lamps contain less mercury. Lamp life may not matter, while shape, diameter, length, and brand do. Circular and u-bent lamps, wide or long lamps often have more mercury and there is sometimes a significant variation in mercury content among equivalent lamps offered by different manufacturers.
- Another type of lamp is now emerging. Light-emitting diodes or LEDs, sometimes called Solid State Lighting, 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.
- LEDs have many advantages; they are long lasting, 25.000 – 100.000 hours; they are mercury-free and they are significantly more energy-efficient than incandescent lamps in many applications. They are particularly good for directional lighting applications. Their cost is dropping while their performance is improving. On the other hand, however, LEDs are not fully developed and cannot currently be used for all applications. They are often not as energy-efficient as some other technologies such as T8 and T5 linear fluorescents, and they are not very good yet for general illumination since they are rather directional. Furthermore, many LED products suffer from poor colour quality and their initial cost can be high. Finally, it is not as straightforward as LEDs potentially replacing CFLs in future, since LEDs use a very rare metal, indium, for which there may not be enough available to satisfy the demand for LEDs.

LEDs can be used in 'exit signs', as is already being done in the US, and other low-wattage applications, as well as for traffic lights where they can save up to 80-90% of energy compared to incandescent traffic lights.

#### *Mercury content*

- From an industry point of view, it is very crucial to approach the whole debate on mercury in lamps in a holistic rather than an isolated approach. The market globally requires a huge variety of gas discharge lamps. A small amount of mercury in energy saving fluorescent lamps is needed to convert electricity into light more efficiently. So far, no other material has been found to replace mercury and reach comparable energy efficiency, lifetime and light quality. Industry is aware of the need to reduce mercury content in lamps. Over the decades it has worked toward this goal and is continuously working toward greater mercury reduction and eventual elimination.
- There is still a debate on what are the different levels of mercury required in different lamps. Industry proposes higher allowable levels of mercury, whereas NGOs and others, based on available data, believe that much lower levels can be reached without undermining lifetime and energy efficiency. As an example for CFLs, industry proposed that the maximum limit of 3.5 mg Hg per lamp should be allowed, whereas NGOs proposed 2 mg Hg/lamp, since lamps containing 1.4 mg Hg are already available on the market.
- No or very little detailed information concerning mercury content is present on websites of lamp manufacturers, in the companies' catalogues and on lamp packaging. Consumers are not aware that these lamps contain mercury and should be collected separately and recycled. Along with the lack of consumer awareness, the infrastructure for separate collection and recycling is generally insufficient. To that end there was a general view that details are necessary to make fully informed decisions about the need for specific exemptions relating to lighting equipment.
- The general feeling in the meeting was that fluorescent lighting should be considered as an intermediate rather than the final solution since mercury-free energy efficient lamps already exist and this technology should be developed further, such as the LED. It was noted by a few participants that such lamps (LEDs) could and should already be used for low wattage applications such as exit signs and traffic lights since they are mercury-free, more energy efficient and longer lasting.

- Industry, although committed to a continuous decrease of mercury content in discharge lamps, stressed that a regulatory approach with respect to the allowed mercury content is needed, which leaves room for a commercial individual company approach, not one-size-fits-all. Regulating the smallest details might hamper innovation and competition.
- It was pointed out that effective market surveillance is missing. Industry is currently involved in standardisation of product tests for market surveillance, in order to be able to demonstrate compliance with the least amount of effort and cost to both authorities and industry.
- It was noted that while the overall amount of mercury in lamps is going down, there are still some manufacturers that put significantly more mercury in their products than others because they are using outdated mercury dosing methods. For example, some companies put 30-60 mg of Hg into their U-bent T8 fluorescent lamp where other companies use only 3 mg.
- The issue of dosing techniques used and working conditions in China was discussed. Some industries support the Electronic Industry Code of Conduct (EICC), which considers many social and environmental aspects. Suppliers are audited, and working and environmental conditions are assessed. If needed, pressure is put on the suppliers to adjust and keep the working conditions at the right level. Nevertheless, this might not be the case for all companies, and therefore such issues should be considered and controlled.

#### *Separate collection and recycling*

- Lengthy discussions took place with respect to the need to collect separately energy-efficient mercury-containing lamps. Although different projects have been established by industry, and a forum of national collection companies has been set, the collection rates in Europe are still very low. The Waste Electrical and Electronic Equipment (WEEE) directive has been requesting the separate collection and treatment of such lamps, but clear guidance is not really given for lamps. As a result, there is a great disparity in lamp recycling rates around the EU. For instance the collection rate for Denmark is about 60%, whereas Sweden collects 80%. In central Europe, the collection rates vary enormously with the UK struggling to collect 30% and Poland with a 60% collection rate. Southern Europe reveals a different picture again: here only about 10-20% are collected. There are even some countries not able to provide performance figures (and therefore out of these statistics) because it is almost impossible to set up a collection system as legislation is not fully enforced.
- To collect as much as possible, three issues need to be considered: to have proper legislation, to create public awareness, and to provide country-wide collection systems. In addition, the right commitment from the partners involved is necessary to increase the collection rates.
- Consumer awareness campaigns for promoting separate lamp collection and recycling have been organised in different Member States including: films broadcasted on TV proposing gifts or other incentives for consumers who brought back their lamps; advertising campaigns in all modes of public transport indicating a telephone number which citizens can call to find where to bring the lamps and to get other information on the issue; communicating the benefits of recycling and energy saving; educational programmes in schools, etc. Some of these campaigns have brought good results, changed consumer behaviour and raised collection rates. These need to therefore take place in all Member States as part of WEEE and Waste Framework Directive implementation. National examples and campaigns were presented at the meeting.
- Further to this point, questions were raised concerning the overall cost effectiveness of these campaigns; it is suggested that the results are first evaluated to determine their overall effectiveness in relation to the funds expended.
- The wholesale sector also needs to be made aware of what they should do, and how they should treat lamps. They need to be involved in the overall discussion since they have to do extra work and they also need to raise awareness in their own customers.



- Collection systems should be convenient for the public, otherwise they may not work – for example having the recycling drop-off locations in shops are a way of showing that the store is a responsible business, it brings customers back to the store and turns visitors into customers – for instance 8 out of 10 visitors begin shopping soon after dropping off their recyclables. Since convenience is key, consumers do not need to make an extra trip to the recycling facility.
- Benchmarking figures need to improve; similar data on collection rates need to be developed in the Member States to make comparison possible. Information sharing including facts and data is needed so that cross-learning can take place. Regional collaboration for improving eco-efficiency and a better environmental performance, will also be crucial.
- Several improvements are needed, and were widely agreed upon by the conference participants. These include the following:
  - a level-playing field needs to be established ensuring that the EU-legislation is in fact Europe-wide, correctly enforced and not only in some Member States;
  - proper allocation mechanisms need to be put in place to collect as much as possible;
  - market surveillance needs to focus on the WEEE legislation;
  - more ambitious WEEE collection targets are needed for lamps.
- Finally, bulb breakage presents a risk initially if the breakage occurs in an area that is not well ventilated, especially to pregnant women and children. A recently completed study on breakage was also presented at the conference. The following steps should be taken in case of lamp breakage in hard surface: do NOT vacuum, ventilate for at least 15 minutes, scoop up fragments, pick up remaining pieces with sticky tape, wipe the area clean, place fragments and cleaning materials in a plastic bag/glass/rigid container with lid, ventilate as long as practicable. Such detailed handling instructions should be required to be communicated via packaging and other means.

The European Environmental Bureau and the Zero Mercury Working Group hope that this conference has contributed towards giving a clearer picture of the scope of the mercury and lamps problem, options for addressing the issue, and the importance of all stakeholders coming together to share in the responsibility of developing and implementing solutions. The EU with its proposed measures should ensure that all companies are reducing mercury levels in different types of lamps. Rewarding, for example, companies that have made investments in reducing the mercury content of their lamps while maintaining high efficiency and lamp life, could be a way to do so. It is further imperative that measures are taken to improve collection rates for these energy-efficient mercury-containing lamps, supported by both cost-effective and wide-reaching awareness-raising and information campaigns, to reduce the risk of exposure to human health and the environment from this dangerous neurotoxin.

Elena Lymberidi-Settimo  
Project Coordinator 'Zero Mercury Campaign'  
European Environmental Bureau

### III. Agenda

Time schedule	Title of presentation	Speakers
8.30	Registration	
9.00	Welcome	EEB and Chair- Mr. Stefan Scheuer
9.10	Mercury containing lamps – EU Overview	Mr. Peter Maxson, Director, Concorde East/West sprl
9.30	Mercury content in lamps	Ms Alicia Culver, Green Purchasing Institute
9.50	EU approach – current state of play (EuP, RoHS, Mercury Strategy)	Mr. Gernot Schnabl, DG ENV European Commission
10.10	Industry position	Mr. Gerald Strickland, Secretary General , European Lamp Companies Federation
10.30	NGOs position	Mrs. Elena Lymberidi-Settimo, Project Coordinator, Zero Mercury Campaign, EEB/ZMWG
11.00	Coffee break	
11.30	<i>Panel discussion</i>	
11.35	The future of mercury-containing lamps Lamp manufacturers	Mr.Frank Altena, Philips
11.45		Mr. Rudy Geens, Havells-Sylvania Europe
11.55		Mr. Laszlo Balazs, General Electric
12.05		Mr. Wolfgang Gregor, Chief Sustainability Officer, OSRAM.
12.15	Mercury containing lamps – a view from the Lighting Design Community	Mr. Kevan Shaw, Director for Sustainability, Professional Lighting Designers' Association
12.20	Mercury in special lamps/ mercury-free lamps	Alicia Culver, Green Purchasing Institute
	Discussion with all morning speakers	
13.00	Lunch Break	
14.30	EU Lamp Collection, infrastructure, transport and best practices in the EU – Overview	Mr. Rob Koppejan, ELC - Philips
		Mr. Pascal Leroy, Director, WEEE Forum
14.50	Best practices in Member States collection schemes	Mr. Jan-Olaf Eriksson, Managing Director, EI-Kretsen, Sweden
15.10		Mr. Zdzisław Janeta, Director of Lamp department, ElektroEko, Poland
15.30	International examples of retail collection of FLs- and breakage	Mr. Michael Bender , Director MPP/ZMWG
15.50	NGO position	Ms. Nathalie Cliquot, Policy Officer Waste, EEB
16.10	Q & A with speakers on collection practices...	
16.30	Summary of the day	Chair
16.45	End of conference	

## IV. Presentations of the Conference and discussions

### 1. Overview – Mercury Lamps in the EU

(Presentation by Mr Peter Maxson, Concorde East/West sprl)

This is an overview on the different issues about mercury in lamps, and an introduction to the debate from a macro point of view.

In 2004 it was estimated that 35 metric tonnes of mercury (henceforth referred to as the chemical abbreviation of Hg) were consumed for lamps in the EU. In 2008, while carrying out a study for the European Commission, the data on mercury content of lamps was updated, using two different databases (COMEXT and PRODCOM), as detailed information from the European Lamp Companies Federation (ELC) on import and export was not available. The COMEXT database gives reasonably reliable Customs data on imports and exports; the PRODCOM database gives EU production statistics - as reliable as national reporting. Both data sheets provide different information but if used in combination, one can see that there is a general trend of increasing imports into the EU from non-EU countries. More specifically, in nearly all lamp categories EU imports have increased by 2-3 times over a 6 year period. Regarding the export side it is observed that only in the category of metal halide lamps have EU exports increased as much.

COMEXT code & lamp types		2000	2003	2006
8539 31 10 –(tubes) DISCHARGE LAMPS, FLUORESCENT, HOT CATHODE, WITH DOUBLE ENDED CAP	EU27_extra import	3,482	3,081	7,175
	EU27_extra export	22,441	20,548	26,759
8539 31 90 – (CFLs) DISCHARGE LAMPS, FLUORESCENT, HOT CATHODE (EXCL. WITH DOUBLE ENDED CAP	EU27_extra import	6,680	9,201	22,200
	EU27_extra export	6,181	5,920	4,945
8539 32 10 – (HID-1) MERCURY VAPOUR LAMPS	EU27_extra import	594	393	1,065
	EU27_extra export	1,030	838	317
8539 32 50 – (HID-2) SODIUM VAPOUR LAMPS	EU27_extra import	130	349	481
	EU27_extra export	924	773	567
8539 32 90 – (HID-3) METAL HALIDE LAMPS	EU27_extra import	372	773	1,029
	EU27_extra export	516	513	1,392
8539 39 00 – (other) DISCHARGE LAMPS (EXCL. FLOURESCENT, HOT CATHODE LAMPS, ULTRAVIOLET LAMPS, ETC.)	EU27_extra import	1,349	2,562	2,062
	EU27_extra export	1,036	1,728	802

Source: COMEXT database

For the estimate of mercury content, the volumes of lamps imported and exported have been converted to lamp units, then import and export data were combined with production data from the PRODCOM database; and finally the EU consumption of different lamp types was calculated as in the table below. Additionally, exports and imports of mercury lamps can be derived from these.

What the data tell us is that in the EU a total of about 950 million mercury-containing lamps were sold in 2006, which is higher than most other estimates; in comparison, in the US a total of 668 million mercury-containing lamps were sold in 2006.

On the basis of these results, the content of mercury in these lamps in the EU can be estimated and is shown below for 2006.

- Fluorescent tubes 3.3 - 4.5 tonnes Hg
- Compact Fluorescent Lamps (CFLs) and other hot cathodes 1.9 - 2.6 tonnes Hg
- High Intensity Discharge lamps (HID) 1 - 1.5 tonnes Hg
- Other lamps 1.6 - 2.1 tonnes Hg

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

It has to be noted that the Hg lamps sold in a given year contain far less mercury than lamps going into the waste stream of the same year. This is due to better technology with less mercury used in the newer fluorescent tubes and CFLs.

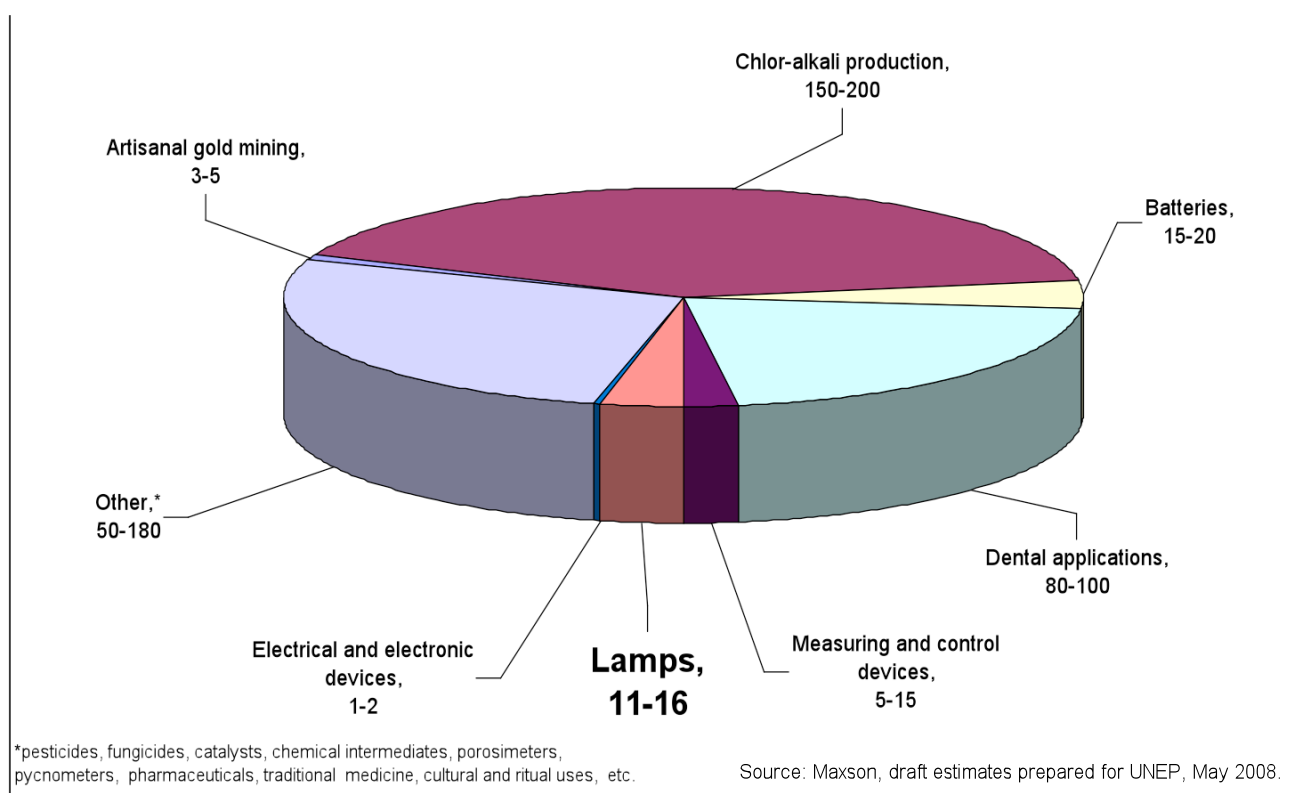
The table above does not, however, include cold cathode fluorescent lamps used for backlighting. These FLs have been the industry standard for most backlighting applications such as in cameras, laptops, scanner/fax, etc. Since these have been considered 'special purpose' lamps under the RoHS directive, they were exempted from the restriction on mercury, and as a result less attention was paid by the manufacturers to a lower mercury content. If we look at the mercury content of this type of lamp, in the UK the mercury consumption was around 400kg of Hg per year for 2007, on the basis of the figures on demand and mercury content, as shown below

Recently a shift is seen toward the use of Light Emitting Diode (LED) technology for such applications, mainly the smaller screens, but also increasingly for larger screens.

Device	UK total demand 2007 (millions)	Mercury content product range (mg)
Multi-media monitor	0.2	75.0
LCD display monitor	10.5	2.5
		7.5
		30.0
LCD TV flat panel	3.0	2.5
		7.5
		30.0
Digital picture frame	0.5	2.5
LCD projector	0.1	75.0
Laptop/notebook	8.0	2.5
		30.0
Fax/copier/printer	2.5	2.5
		30.0
Fax	0.1	2.5
Scanner	0.5	2.5
		30.0
Copier	0.5	2.5
		7.5

Extrapolating the UK demand to the EU on the basis of population and relative purchasing power, the EU consumption of Hg for backlighting is 3 – 4 metric tonnes, and it can be compared to the mercury in the largest lamp category – the long fluorescent lamps.

Overall, the mercury consumption within the EU 25 is as follows:



The data above include historic lamp and Hg consumption in the EU – there is an estimated “inventory” of 4-4.5 billion general purpose Hg lamps installed in the EU, and these contain around 50 tonnes Hg, plus around 15 tonnes in lamps used for backlighting. It also indicates how much Hg is recycled from collected lamps: It is estimated that 30-40% of general purpose lamps are collected, and 40-60% of the lamps collected are recycled.

With respect to the CFL vs incandescent lamp debate – lots of attention has been given to the different trade offs involved between total energy consumption, CO<sub>2</sub> emissions and mercury releases.

According to the US EPA, CFLs have the following advantages:

- CFL is a "drop-in" substitute for incandescent
- They use up to 75% less electricity
- Cause substantially less CO<sub>2</sub> generation
- They have up to 10 times longer lifetime
- Are a Quick return-on-investment
- Only 11% of Hg content would be released when a CFL is landfilled
- The total Hg release is far lower when using a CFL than when using equivalent incandescents

While improved energy efficiency is the over-riding benefit of CFLs, a better balanced perspective will encourage a more healthy debate.

In particular, the issue of Hg releases has received wide press coverage.

However, 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 and other.

On the basis of the scenario that has been developed for the US, as viewed on the US EPA website, a scenario reflecting EU circumstances has been developed.

<b>US EPA-type scenario (see EPA website)</b>	<b>CFL</b>	<b>Incandescent</b>
CFL Hg content (mg Hg)	4	0
CFL watts to produce lumens equivalent to 60w incandescent lamp	13	60
CFL lifetime (hrs.)	8000	8000
Average Hg emissions generating electricity, after emissions controls, using 100% coal (mg Hg/kwh)	0.024	0.024
Average coal/fuel mix for actual electricity generation (% coal)	50%	50%
CFL recycling and secure disposal rate (% of total CFLs marketed)	22%	0%
Other CFLs to incineration (% of total CFLs marketed)	14%	0%
Other CFLs to landfill (% of total CFLs marketed)	64%	0%
% Hg released from incineration (% of total Hg in CFL)	30%	0%
% Hg released from landfill (% of total Hg in CFL)	11%	0%
<b>Total Hg releases from electricity generation &amp; disposal (mg)</b>	<b>1.7</b>	<b>5.8</b>

<b>EU scenario - reflecting EU circumstances</b>	<b>CFL</b>	<b>Incandescent</b>
CFL Hg content (mg Hg)	5	0
CFL watts to produce lumens equivalent to 60w incandescent lamp	18	60
CFL lifetime (hrs.)	8000	8000
Average Hg emissions generating electricity, after emissions controls, using 100% coal (mg Hg/kwh)	0.024	0.024
Average coal/fuel mix for actual electricity generation (% coal)	30%	30%
CFL recycling and secure disposal rate (% of total CFLs marketed)	30%	0%
Other CFLs to incineration (% of total CFLs marketed)	16%	0%
Other CFLs to landfill (% of total CFLs marketed)	54%	0%
% Hg released from incineration (% of total Hg in CFL)	70%	0%
% Hg released from landfill (% of total Hg in CFL)	30%	0%
<b>Total Hg releases from electricity generation &amp; disposal (mg)</b>	<b>2.4</b>	<b>3.5</b>

*Illustration 1: Overview. Mercury containing Lamps in the EU. Slide 23.  
Source: Maxson, P. 2008*

Based on calculations made by the US Environment Protection Agency (EPA), the typical CFL is responsible for releases of about 1.7mg of Hg from electricity generation and disposal, whereas the typical incandescent is responsible for releases of 5.8mg of Hg.

In Europe on the other hand, the typical CFL is responsible for releases of about 2.4 mg Hg whereas the typical incandescent is responsible for releases of about 3.5mg Hg. The main reason for the difference between the US and the EU is the fact that in the US some 50% of the general electricity derives from a coal/fuel mix, whereas in the EU, (mercury-containing) coal is around 30% of the fuel mix used for electricity generation.

As a result, reductions of mercury releases through the use of CFLs may not be overwhelming, depending on the region and country; however the great benefit of using CFLs is energy efficiency. Despite that, if mercury savings are small and unclear, it will be much more difficult to sell CFLs to the public. Hence clear labelling is needed, since CFLs could only achieve their market potential if they are not saddled with such an image.

Therefore it is imperative to reduce the Hg content in CFLs to an absolute minimum of i.e. <2mg and also other Hg lamps, as well as to maximise the lifetime and lumens/watt of all Hg lamps. Furthermore, it is also crucial to maximise the recycling or secure disposal of all Hg lamps.

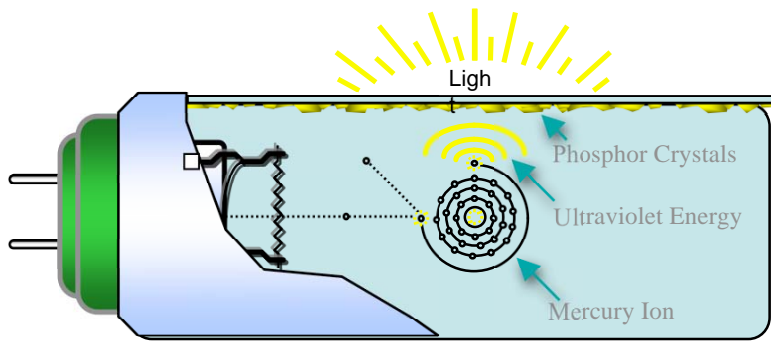
## **2. Mercury in Lighting Equipment**

*(Presentation by Alicia Culver, Executive Director of Green Purchasing Institute, USA)*

Whereas the former presentation provided a general overview, this presentation gives the micro-perspective on mercury in lamps. The Green Purchasing Institute<sup>2</sup> studied the amount of mercury that can be found in various types and brands of lamps; it reported data covering fluorescent, high-intensity discharge (HID) and neon lighting products sold largely in the US. The Institute collected data from several sources including manufacturers' marketing materials and website, as well as databases provided by lamp manufacturers and government agencies. For example, the City of San Francisco and the State of New Jersey requires all vendors to disclose the mercury content of all lamps sold through their contracts.

<sup>2</sup> The Green Purchasing Institute is the co-founder of the "Green Lighting Campaign" in the US which is promoting CFLs and other 'green' lamps with regard to their energy efficiency, waste prevention (long life), toxicity reduction (mercury lead), recycling ("take-back") sustainable manufacturing.

Mercury (Hg) is added to lamps to form a vapor which produces light when current is passed through it under a vacuum.



(Source: Philips Lighting Co.)

Mercury can be released during the manufacturing process, especially if hand-dosing of liquid Hg is used. It can also be released when lamps are transported from the factory to the retailer, to the consumer and eventually to disposal. When mercury-containing lamps are installed, stored or disposed, they can break and Hg can be released. During disposal of lamps in dumpsters, garbage cans, incinerators and landfills, Hg can enter into the atmosphere. Even if lamps get recycled, mercury can evaporate during crushing, mercury recovery, as well as metal smelting. All of those instances need to be addressed and solutions found so that Hg does not get released but recycled and removed carefully.

When it comes to mercury content of lamps different factors need to be considered. For example:

- Age matters: modern lamps (such as T8s and T5s that run on electronic ballasts) contain less mercury than older models (such as T12s that run on magnetic ballasts).
- Lamp life doesn't matter: long-life lamps do not tend to have more mercury; mercury is rarely the determining factor; long-life lamps reduce replacement and disposal costs.
- Shape often matters: circular and u-bent fluorescent lamps often have more mercury than linear models of the same wattage.
- Size matters: odd-sized fluorescent lamps (such as 6", 18", 5-, 6- and 7-foot models) often have more mercury than more commonly used 2-, 3- and 4-foot linear fluorescents. That happens because manufacturers have more often reformulated their most-popular lamp production lines with low-dosing technology.
- Brand matters: there is sometimes a significant variation in mercury content among equivalent lamps offered by different manufacturers; it is best for consumers to shop around.

With respect to mercury content versus energy efficiency, usually there is a "win-win" situation since the most efficient types of fluorescent lamps (such as T5s and T8s) often have the lowest mercury content. win".

The different categories of lamps which contain mercury can be seen below:

### Tubular Fluorescent Lamps

There are many different shapes and sizes of tubular fluorescent lamps including linear models (LFLs), as well as u-bent and circular models. The LFLs are identified by a code: F##T## where F is for fluorescent, the T indicates that the shape of the bulb is tubular with different diameters in eighths of



an inch. For instance, T12s have a diameter of 1.5 inches or 3.81cm; T8s have a diameter of 1 inch or 2.54 cm; and T5s have a diameter of 5/8" or 1.59 cm. Lessons can be learned to avoid high mercury-content in lamps if consumers consider the following aspects when choosing a FL.





Specialty lamps, such as T2 fluorescents used in exit signs, UV/Disinfection lamps, black lights, tanning lights, natural spectrum fluorescents, colored fluorescent lamps, aquarium and plant lamps, and LCD backlights for TVs, computer monitors, copiers, etc., tend to have higher mercury content than general purpose fluorescents. Some manufacturers have been successful in cutting down the mercury in some types of specialty fluorescent lamps and this should therefore be encouraged more in under the RoHS directive since it has not been demonstrated that the barrier to doing so is technological.

### Compact Fluorescent Lamps

Current RoHS limit (EU) is 5 mg

Many models of CFLs sold in US have less than 5 mg, including:

- Philips: Many models contain 1.23 to 2.7 mg
- Osram-Sylvania: Many models contain 1.5 to 3 mg
- MaxLite: 1.2 to 2.5 mg (reported in its Jan 2008 newsletter)
- Litetronics: 1 mg of mercury listed on package



### Cold Cathode CFLs



These lamps are typically long-lasting (15,000-25,000 hours) and dimmable and have low mercury (some 1 mg). They are generally used for low-watt, small-size applications such as bathroom vanities, marquees, sconces and chandeliers. Some CC CFLs are less efficient than standard CFLs (40 LPW vs 60 LPW) but all are more efficient than incandescents.



Induction lamps: Also called "electrodeless", they tend to have low mercury per lumen-hour and be very long-lasting (up to 100,000 hours or 11.4 years of continuous operation). They are generally used for high-bay applications such as warehouses or other places where it is difficult to change lamps (e.g., jails), but they may have high initial cost.

High Intensity Discharge (HID) lamps: There are four types of HID lamps: Mercury vapour, High Pressure Sodium, Metal Halide and Low pressure sodium (which contain no mercury).

Mercury Vapour: These lamps are considered obsolete because of their low efficiency, poor light quality, and rapid lumen depreciation. They also have a relatively high mercury content.

### High Pressure Sodium (HPS)

These lamps give off a yellow colour, and are used extensively for street lighting. Their mercury content varies by wattage, type and brand; however, low- and zero-mercury models are available in the US.



Metal Halide (MH) lamps can be divided into Standard (Probe Start) and Pulse Start. Standard Metal Halide lamps are relatively energy-efficient and are often very bright (used in stadiums, parking lots), and emit a crisp white light. They have the highest mercury content per Lumen-hour: 1500-watt MH lamps can have up to 1000 mg. On the other hand, Pulse Start Metal Halide lamps (which include, notably, ceramic metal halides) are more efficient than standard MHs



and have lower mercury content (ceramics typically contain 2.5 mg – 30 mg). Because of their high color quality, ceramic metal halides are often used in retail but may have high initial cost and are not available in very high wattages.



Neon signs can have an extremely high mercury content (up to 500 mg/4-foot). They are sometimes made by artisans who use hand-dosing of liquid mercury. They are relatively inefficient compared to LEDs (30-100 watts versus 10-30 watts) and often use leaded glass. Blue and yellow colours usually have more mercury than red and orange.

Consumers can prevent higher Hg by avoiding lamps with odd shapes and sizes in favour of models with normal shapes and sizes. Attention should be paid to brands and lamps with the least mercury content should be preferred. Luckily, there is generally no trade-off between energy efficiency and mercury content: older fluorescent lamps with higher Hg have to be pushed out of the market and newer technology with less Hg should be preferred.

In general, it is technically possible to have lower mercury in the different types of lamps than what has been proposed by the RoHS Directive until now. Philips, Sylvania and other lamp manufacturers have shown this for some of their lamps and other companies should follow their example. Strategies to reduce Hg in lamps could include the following:

- o Require disclosure/better labelling of lamps for mercury content
- o Set mercury caps (best in class)
- o Increase energy efficiency of lamps
- o Support research and development (R&D)
- o Establish minimum rated life standards
- o Require safe dosing of lamps
- o Improve lamp recycling infrastructure

#### Discussion:

- OSRAM clarified the linkage between mercury amount and long lifetime of a lamp.
- The Green Purchasing Institute (GPI) noted, however, that there is no connection of lifetime of a lamp and the amount of mercury used in the models it has studied in the US. For example, Philips has been able to manufacturer T8 lamps with a rated life of above 40,000 hours which has the same mercury content as its standard-life T8. GPI challenged manufacturers to explain why extra-long-life lamps need more mercury and to indicate the point at which more mercury is needed so that the RoHS standard for long-life lamps can be better defined and established based on technological need.
- The European Lamp Companies Federation (ELC) further underlined that indeed there is a link between mercury content and lifetime, and also mentioned that if there were lower dose techniques for specialty lamps they would have used them. With respect to the information- they considered that there might be room for improvement on information requirements for consumers and customers although they expressed concerns on the practicalities/means to reach that.

### **3. Current State of Play in the EU**

*(Presentation by Gernot Schnabl, European Commission, DG Environment)*

When the Eco-design of Energy-Using Products Directive (EuP) was adopted , the mercury controversy was not an issue yet, and therefore it does not really address it, although lamps in general (and lamps with mercury) are energy using products. At the moment the EC is in the middle of its thinking process where to position itself. The EC provided preliminary information, where two strands of legislation are followed.

On the one hand there is the EuP Directive (Directive 2005/32EC). Under this directive, products will only be allowed on the market, if they meet minimum requirements. The scope of the EuP Directive is quite ambitious, and does not only look at energy efficiency, but addresses all

environmental aspects (listed in Annex I) throughout the life cycle, from material selection to end-of-life management, so it takes mercury into account. It provides for product specific implementing measures (IM) or voluntary agreements. The eco-design requirements of implementing measures address the significant environmental aspects of the examined product. So far three IMs have been produced, one of them on ballasts for fluorescent lighting (Directive 2000/55/EC).

With respect to the adoption of the IMs – First the product requirements are introduced through IMs where a working plan identified candidate products. Preparatory studies identify the environmental aspects. Proposed draft IMs or voluntary agreements are first discussed with stakeholders in the Consultation Forum. An impact assessment is carried out, and then the EC proposes draft measures. Stakeholders participate throughout the whole process.

New measures planned to be adopted by the EC in 2008 or early 2009 concern HID lamps and street lighting products, fluorescent and office lighting products, as well as others. Domestic lighting products I-measures (including incandescent light bulbs) are planned to be adopted by EC in spring 2009.

When looking at the lamp mercury content limit under the EuP directive, the preparatory studies concluded that mercury in lamps is a significant environmental aspect. Hence, there are two ways to react to this, directly and indirectly:

- Indirectly: by using minimum energy efficiency requirements to phase out lamp technologies with high mercury content, as they are also relatively inefficient (such as halophosphate lamps and high pressure mercury vapour lamps)
- Directly: by setting requirements on maximum lamp mercury content as these are proposed in the working documents:
  - FLs without integrated ballast: 2mg requirement, 1.4mg benchmark
  - CFLs with integrated ballast: benchmark of 1mg or less.

On the other hand, we also have the Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (RoHS) (2002/95) which bans the use of heavy metals, including mercury, but also provides for exemptions and set maximum concentration values in different kind of lamps. The EC works on a Proposal for the revision of this Directive.

The direct requirements in Ecodesign implementing measures would overlap with the RoHS Directive's exemptions. Furthermore, The RoHS exemptions cover more lamps than the Ecodesign measures: e.g. special purpose lamps such as LCD screen backlights.

Furthermore, the review of the RoHS exemptions is more or less parallel to the adoption process of the different Ecodesign measures on mercury containing discharge lamps. Therefore for consistency of product legislation, it could make sense to set all lamp mercury content requirements and exemptions under the RoHS Directive

The RoHS Directive deals, *inter alia*, with the ban in the use of heavy metals (Pb, Hg, Cd, CrVI,) and brominated flame retardants (PBB and PBDE) in Electrical and Electronic Equipment (EEE) placed on the market after 01/07/06. The scope of products is based on the Waste Electrical and Electronic Equipment Directive (2002/96) (WEEE) and it covers lighting equipment, electric light bulbs and luminaires for households. As mentioned above, there is a list of applications exempted from the ban – and maximum values for these applications are set and tolerated regarding compliance. Additionally there are no maximum content for some specific lighting equipment yet.

Currently the RoHS Directive is under review, and presumably a Proposal for its amendment will be adopted by the EC in 2009. The objectives are:

- To clarify the concepts and facilitate implementation and enforcement
- To increase environmental benefits
- To enhance legal certainty by streamlining mechanisms for granting exemptions and enforcement by national authorities
- Review of the exemptions

Concerning the review of the exemptions – there will be dealt with under the Regulatory Comitology procedure .

Discussion:

- The chairman explained that Comitology is a complicated procedure where the Commission decides over the technical issues in the directive. To assist the Commission, a committee consisting of experts in that field from the various Member States (MSs) is set up, and is voting on the measures the Commission proposes. Due to the fact that the European Parliament has a rather limited function during the decision-making-process this is not a well supported method. The Parliament can veto the procedure only in three cases: a) if the Commission exceeds the delegated powers, b) if the IMs are not in line with the overall aim of purpose of the of the basic instrument or c) if the principle of subsidiarity and proportionality (the keys of the whole architecture of the EU) are not respected.
- OSRAM clarified that to their understanding RoHS covers nearly all lamps for general lighting as well as for special purposes in the market.

#### **4. Industry Position**

*(Presentation by Gerald Strickland, European Lamp Companies Federation)*

The European Lamps Companies Federation (ELC) has 7 members which are all in all the leading lamp manufactures in Europe: General Electrics (GE), Sylvania, Aura, Naava, Philips, OSRAM, BLV. Overall those companies produce 95% of total European lamps, with an employment of about 50.000 people and a turnover of 5 billion Euro a year.

From an industry point of view, it is very crucial to approach the whole debate on Hg in lamps in a holistic rather in an isolated approach. The market globally requires a huge variety of gas discharge lamps. A small amount of mercury in energy saving fluorescent lamps is needed to convert electricity into light more efficiently. No mercury is emitted while the lamp is in use which makes them very safe, both in regard to human health as well as the environment. So far, no other material has been found to replace mercury – the 'necessary evil' - and reach comparable energy efficiency, lifetime and light quality, and this has been recognised by those responsible for regulating mercury in the EU. Industry is aware of the need to reduce mercury amounts in lamps, and has dealt with that demand already over decades. Over the past 25 years, lamp manufacturers have developed innovative ways to increase lamp performance while minimising the use of mercury. The mercury content of lamps has therefore been reduced by more than 90% in that time, with the emphasis that ELC members continuously work towards decreasing mercury in lamps.

The question for industry currently is where they stand with regard to the review of the RoHS Directive. For the Directive, regulating, inter alia, Hg and other substances in lamps, ELC members are committed to reduce existing levels of mercury, where (according to Art. 5 (1b) this is practicable from a technical, scientific and environmental point of view. Actually ELC has proposed substantial reductions in mercury content as part of the review.

Industry clarified that different levels of Hg are required in different lamps because the amount of Hg depends on technical characteristics of each lamp group concerned such as lamp technology, size, length, diameter, wattage and current density, as well as lifetime, production process, phosphor (type, amount), barrier coating, glass type and last but not least the purpose of the lamp's functioning. A one-size-fits-all approach is misleading. There is also a difference between the limit and average of Hg amounts estimated for lamps. An average mercury amount for a certain lamp type needs to vary from a mercury limit value. While the average value represents the mean amount of mercury per lamp regarding all produced lamps a limit value has to cover variances in the production processes and also market surveillance requirements (eg. Sampling, testing), because it is the maximum allowed mercury amount for every single lamp. Henceforth, in order to reach and communicate a certain average value a higher limit value is necessary.

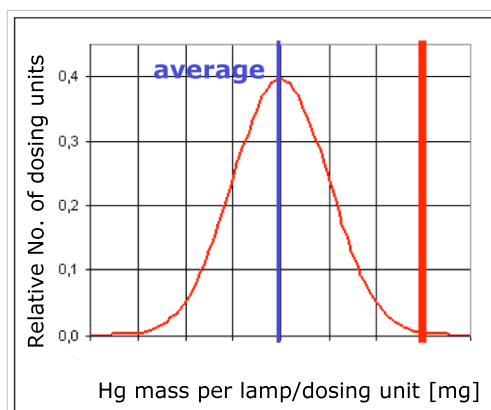


Illustration 2: Industry Position. EEB Conference 27/06/08. Slide9. Source: Gerald Strickland.

Over ambitious mercury limits could have the following consequences, according to industry:

- Reduced lamp lifetime (leading to higher Hg usage overall)
- Reduced innovation potential (caused by e.g. trade-off between energy efficiency and mercury amount)
- Potentially higher product prices (caused by higher R&D and reduction costs)
- Niche products would probably have to disappear from the market with immediate effect (UV disinfection & healthcare lamps)."

On the other hand, the paradox about mercury is the fact that incandescent lamps also cause mercury emissions into the environment indirectly in coal fired energy production plants. From this point of view energy saving lamps containing levels of mercury reduce mercury emissions into the environment in comparison to incandescent lamps. LCA Data from the "Umberto & Ecoinvent" data-base show that 1 kWh of generated power represents an average emission of 0,015 mg Hg (Note. Source Energy Mix Germany 2000 BMWi). Calculations based on this data result in the following mercury emissions:

Wattage	Lamp type	Hours of operation	Mercury emission
60 Watt	incandescent	10.000h	8,8 mg
12 Watt	Energy saver	10.000h	1,76 mg

Lastly the industry position touches upon the severe issue of recycling mercury-containing lamps. An absolute key issue is the EU's WEEE Directive (2002/96/EC) as it aims to minimise the impact of electrical and electronic goods on the environment. In response to its obligations, the manufacturers established a pan EU take-back infrastructure for mercury containing lamps. This allows the various materials they contain (for instance Hg) to be recovered and recycled or disposed of in an environmentally sound way. Around 80% of the material from those lamps is recycled, resulting in fewer resources being needed to produce new goods.

Concluding, the European lamp industry stated that it is working towards reducing the amount of mercury needed. They reiterated that different mercury limits are needed depending on the technical characteristics of each lamp group concerned. Last but not least it is pointed out again that mercury should not be regulated in isolation, other affected parameters should be considered when regulating mercury, and a more holistic approach is needed.

#### Discussion:

- EEB asked for a clarification on why the Hg limits in lamps are not really indicated on the lamps, packaging and not available on companies' websites.
- Professional Lighting Designers' Association (PLDA) further questioned the fact that nothing was mentioned about mercury free lamps which will be placed on the market soon, since there are technologies available meanwhile, without mercury.

- ELC responded that they are not the only stakeholder in this discussion. In fact end of March 2008 the Commission held its consultation form on domestic lighting, there was a serious debate with the stakeholders (also Member States) on whether the Commission should allow non-mercury containing lamps/ alternatives on the consumer market at all. From an ELC's point of view, efficient, low voltage light sources should be allowed on the market as alternatives like CFLs. Furthermore there is an issue about transparency and consumer information and it also depends on the requirements on the energy labelling; ELC would really like to have a discussion on it.

## **5. Mercury-containing lamps – NGOs Proposals**

*(Presentation by Elena Lymberidi-Settimo, European Environmental Bureau/ZMWG)*

The EEB has submitted extensive comments as a contribution to the consultation process of the review of the RoHS directive. EEB provided detailed information about the mercury content in different kind of lamps (mainly based on the US market) and observed that in general information is lacking in the EU, on mercury content as well as on the dosing techniques. Furthermore no or very little detailed information is present on websites of lamp manufacturers (only Philips provides information on mercury content per lamp type), no or little information is provided in the companies' catalogues and no or little information is provided on packaging of each lamp.

One of the major concerns for NGOs is the fact that the public does not know that certain lamps such as FLs contain mercury. On the packaging of the lamps there is a little sign to be found, delivering the idea that this product should be thrown somewhere different than into the normal bin, but it is not particularly outlined that the lamp contains mercury. People are not aware that those lamps should be collected separately and recycled and the infrastructure for this, is insufficient.

The NGOs believe that to make fully informed decisions about the need for specific exemptions relating to lighting equipment:

- manufacturers should submit data documenting the maximum mercury content (in milligrams) of any products that are currently sold in the EU
- a database should be set up at EU level, containing such data
- use of more accurate and protective mercury-dosing techniques should be requested (eg. pills, pellets, strips and amalgam) which deliver more precisely 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 could effectively use these data to set exemptions that represent "best in class" for various lamp types and harmonize them with the proposed Eco-Design criteria (under the EUP Directive).

The NGOs proposals with respect to mercury content are the following:

For CFLs for general lighting – maximum limit should be 2mg Hg per lamp: RoHS limit is currently 5mg Hg. However, there are many CFL models currently that have mercury content of 3 mg or less and others that are below 2 mg. For example:

- Philips Lighting has CFL models ranging from 1.4 mg to 4 mg, according to 2008 data provided directly from this manufacturer to the Green Purchasing Institute,
- Osram Sylvania, reports that many of its integrated and non-integrated (pin-based) CFLs contain 3 mg or less of mercury.
- Osram has announced recently at a Worldwatch Institute Meeting that will cut in half mercury content in CFL from 2.5-3 mg, to 1.3-1.8mg Hg
- MaxLite reported in its January 2008 newsletter, that it uses 1.2 to 2.5 mg per CFL.
- Also the European VITO study draft lot 19 on domestic lighting, recommends a 2 mg Hg limit on CFLs.

Given the foreseen transition period, such a level could be met, and drive innovation.

For the halophosphate lamps the RoHS Directive sets limits at 10Hg per straight lamp for general purposes. EEB believes that inefficient halophosphate lamps should be banned as it is proposed

by the EC working document on office lighting supported by the European VITO study on Lot 8: Office lighting. In case energy/lumen related criteria set by the EuP are met, all (straight, U-shaped, circular etc) halophosphate lamps should meet a mercury cap of at maximum 8 mg initially, since many of these lamp types also have higher mercury content than equivalent triphosphate models such as high-efficiency T8s and T5s.

Examples include:

- Philips Lighting, (US) 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).
- Sylvania U-bent T12s have 8 mg of mercury.

Once more given the transition period such a level could be met. A tighter standard relating to this lamp type is achievable and could drive further innovation.

For example Philips Lighting (US) uses 3.5mg of Hg for nearly every type of T12 lamps (including 2- and 3 foot) offered, U-bent as well as 4-foot standard high output use 4.4 mg Hg, and for 6-8 foot standard and high-output lamps 6.8mg Hg is used. In comparison to this Sylvania (US) use 8mg of Hg for U-bent T12s.

For triphosphate linear fluorescent lamps (tLFLs) for all purposes the RoHS Directive dictates the current limit of 5mg Hg in each of those lamps with normal lifetime. Presently tLFLs are divided by lifetime. The EEB proposes that those lamps should rather be divided by length: below or above 6-feet. The proposal is therefore that t-LFLs below 6-foot should not contain more than 2mg Hg.

In accordance to this proposal, the Commission proposed IM for office lighting under the EuP Directive recommends that the RoHS exemptions be revised and reduces the maximum allowed limit for Hg to 2mg per lamp.

Further examples to support this proposal are:

- Philips, Linear T5 (standard output) , 20-24000 h, 1,4mg Hg
- Philips, Linear T5HO (high-output), 20-25000h, 1,4 mg Hg
- Sylvania, Linear T5 (standard output), 20000h, 2,5 mg Hg
- Sylvania, Linear T5HO , 20-25000h, 2,5mg Hg
- Philips' US 4-foot T8s , 1.7 mg of Hg
- Sylvania, high-performance (i.e., high-lumen, high CRI, long-life) 4-foot T8s, 3.5 mg.

Triphosphate LFLs which are longer or equal to 6-foot shall not contain more than 8mg Hg.

Examples include:

- Philips, 8-foot T8 with 4.4mg of Hg
- Sylvania 8-foot T8s with 8.5 mg of Hg
- GE has 1-10mg of Hg in some models and in others 31-65mg of Hg.

In Non-linear fluorescent lamps for all purposes (circular and U-bent) Hg content shall not exceed 8mg

Examples include:

- Philips Lighting (US) 32w U-bent T8s with 3mg of Hg
- Sylvania equivalent models have 1-10 mg of Hg
- GE lamps vary from 1-10 mg to 10-50 mg of Hg (this variance is due to the use of imprecise mercury dosing technology that also may increase exposure to workers and the environment)

For lamps for special purposes no limit was included in the RoHS proposal. Such lamps are considered to include black light lamps, disinfection lamps, medical /therapy lamps, food lighting applications, pet care lamps (e.g. aquaria lamps), lamp designed for UV emission (e.g. sun tanning lamps), Cold Cathode Fluorescent lamps (CCFL), LCD backlights, Light sources in scanners, printers, photocopiers, fax machines, High Intense Discharge lamps (HID), Neon lights (which can have as much as 1.5gram Hg per 4-foot stick). Xenon lamps sometimes contain mercury; they are often used for projectors and camera flash lights.

The NGOs believe that there is no need that a separate maximum level of mercury should be set for those – since these are not different to the lamps described above. Special purposes should be CLEARLY defined, otherwise lamps should fall under previous categories, since most of them are

either linear or compact FLs. For instance lamps being used for aquariums (categorised as pet care lamps) should be handled as normal linear FLs.

Some other categories (e.g. HID) should be separated out of this group and limits should be set. A maximum limit should be set for those special purpose lamps, to further drive innovation.

For the High Intensity Discharge (HID) lamps (including Mercury Vapour lamps, High Pressure Sodium (HPS) lamps, and Metal Halide (MH) lamps) the EEB proposals are:

- Mercury vapour should be banned since they are not energy efficient
- HPS should have  $\leq 5$ mg of Hg for all models apart from the 1000w which could have 15mg of Hg
- Standard MH lamps although being relatively energy efficient have the highest Hg 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 lower mercury content as well.

The Commission should establish Hg limits for this class of lamps, that will encourage the use of this new generation lamps and discourage the use of traditional standard MHs.

Further to the special purpose lamps, EEB noted that no exemptions should be allowed for preheat FLs or CFLs used in 'exit signs' or other low-wattage applications. Especially 'exit signs' can easily be replaced with LEDs which usually only use 1w per sign. Appliance lamps (F8T5 and F13T5 preheat fluorescents) largely used in office furniture, cabinets and appliances should be phased out. 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. They can be replaced by more efficient lamps such as LEDs or T5 and high-efficiency T8s. No exemptions should further be allowed on neon signs, which can use mercury-free neon or LEDs. Neon contains very high amounts of mercury; many have in the gram range and substitutes are available.

Overall the suggestions made by the EEB could be met considering that there will be a transition period.

It is the NGOs view that energy saving lamps containing mercury is an intermediate solution, since technology is advancing and legislation should further drive it towards energy-efficient mercury/hazardous substances -free lamps. Exemptions should be time limited to drive innovation. Mercury-free alternatives include Light Emitting Diodes (LED) and Organic Light Emitting Diode. Furthermore GE has announced that they are developing an energy efficient incandescent lamp which will be ready by 2010. Industry needs to find a way of reaching these goals in the best and most economical way.

#### Discussion:

- The Swedish Chemicals Agency – KEMI announced that they are working with the RoHS Directive in Sweden and they asked a technical consultant to do a report in line with the review of the RoHS exemptions. They looked at best available technologies (BAT) regarding the content of mercury without losing the efficiency of the lamp. One of their main conclusions of the report, is that it is technically possible already today to reduce the amount of mercury in FLs to 1 mg without reducing the efficiency of those lamps. According to their sources used in the report the technology already exists and they believe, sharpening the exemptions in the RoHS Directive would impel this development. They argued that to their understanding industry is not promoting this technology because fluorescent lamps are not the future technology but LED is. As well different companies, which perhaps not have this technology yet, they do not see any impetus in investing into an older technology which will be marginal in the future.
- Sierra Club (NGO) emphasised that with respect to labelling, they would like to see a manufacturing date printed on the lamp, because the newer products are better for the consumers to purchase as they have the lower mercury. It would also help the consumers' ability to tell when in-service dates start. So that they can go back to the manufacturer if there is a short lived lamp.



- ELC agreed with the point raised by KEMI that industry have a very good reason not to focus further on the mercury reduction in lamps but that industry should focus in LED technology, although T5 technology is relatively new and is still improving. They were not sure however whether they were on the same line with KEMI with respect to the timeline as to when LED technology would be ready to become the status quo; according to industry another 5-10 years may be needed. ELC further clarified that lamps which are supplied on the EU market are already date-stamped. In theory if costs were not an issue one can find out in which generation of the RoHS Directive this lamp was put on the market and can further assess if that lamp is in conformity with the new limits; physically this would be possible, but from an economic point of view it would not make sense.

## **6. Panel Discussion - The Future of Mercury Containing Lamps**

### **The discussion began with short interventions from the panellists:**

Panelists: Philips (Mr. Frank Altena), Havells-Sylvania Europe (Mr. Rudy Geens), General Electric (Mr. Laszlo Balazs), OSRAM (Mr. Wolfgang Gregor), Professional Lighting Designers' Association (Mr. Kevan Shaw), Green Purchasing Institute US (Ms. Alicia Culver)

### **The Philips perspective**

Mr. Frank Altena, outlined where Philips comes from, and showed that efforts in the area are to be looked at from a historical perspective. Already in 1891 Philips has been manufacturing incandescent lamps. They started, together with other companies, to replace them by fluorescent lamps in the 80ies, and even now they are still busy in phasing out the incandescent lamps. They were the first to start 'banning the bulb' campaign. Nowadays Philips is the largest lighting company in the world, they take up leadership in solutions and energy saving. Lighting is a small part of the whole energy stream but a significant part of the total of the electricity bill. As well, did they shift from only offering lighting products to including sustainability in their system solutions. Considering all relevant aspects, not only mercury, you have to balance different elements in your company's strategies. The perspective is to take the whole product life-cycle or even the application life cycle into consideration. They achieved milestones. Philips can claim with the other companies that they can save up to 40% in the energy reduction by replacing all the old non energy-efficient lamps with, among others, energy-efficient lamps and also by LED technology.. Last year they hit the level of 1.7mg of Hg in fluorescent lamp products in the US. One can see the milestones they have achieved for example from 1990-1995 to go from 8 to 4mg of Hg at a time when Philips was in a deep financial crises. But they saw then environmental improvements, combined with the need for new products to support future business, at a time when money was really scarce.

On the other hand, major efforts are needed to come to a low mercury level in all lamp fluorescent families. It requires investment into manufacturing, in processing, in the mercury dosing, where investment really pay out in developing new products. For instance the T5 lamp is one of the new products, where very low mercury levels could be build into the lamp design from the start. One of the strategic drivers behind Vision 2010 is a commitment to sustainability and making a difference in energy efficiency. Committing to Sustainability means also commitment to continuous improvement in environmental product performance.

One hint to follow up the content of mercury is the website [www.asimpleswitch.com](http://www.asimpleswitch.com) where Philips show scientists, and consumers what they can achieve and do themselves to cut down energy levels.

Philips stressed that what is needed is a regulatory approach, which leaves room for a commercial individual company approach, not a one-size-fits-all one. What they miss is effective market surveillance. A company wants to have innovation in order to profile itself with regard of the competition. If one would regulate the smallest details, it might hamper innovation and competition. The public can be assured that what Philips publishes is what they deliver. Regarding LED, yet, the technology is just not there yet to replace on a large scale mercury containing lamps: they are

neither efficient enough nor affordable, but development is very rapid. Last but not least Philips stated that fluorescent technology is very effective and still the leading technology for a good time.

**The Havells-Sylvania perspective**

Dr. Rudy Geens, started by underlining once more that indeed there is a large variety of discharge lamps, and obviously the amount of mercury in them is not the same. The following slide explains in a clear-cut way what is on the market.

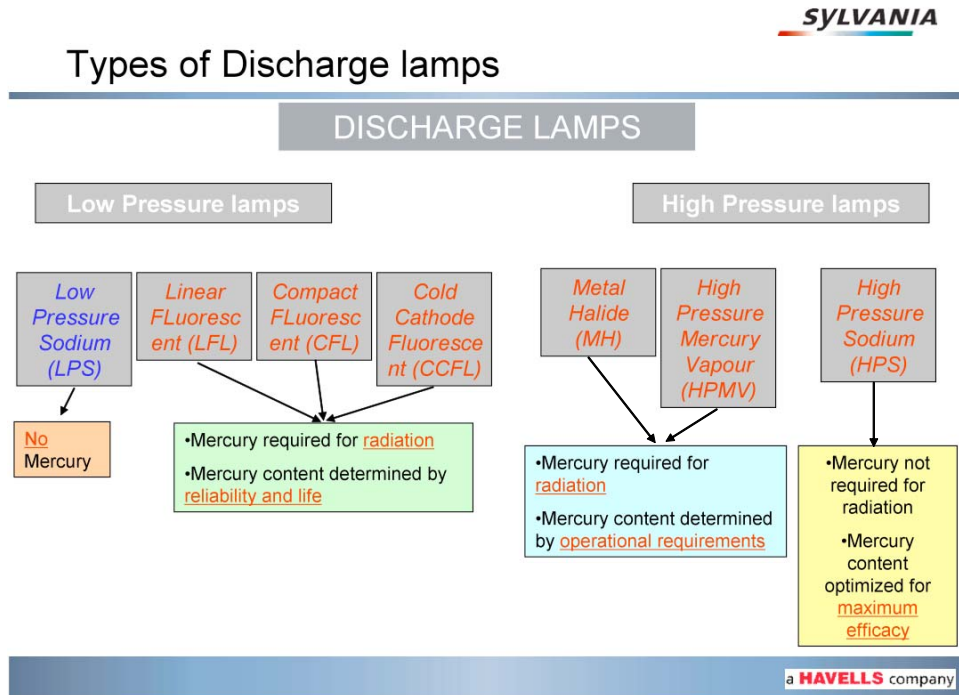

a HAVELLS company

Illustration 1: Mercury in Lamps. Slide: 2. Source: Rudy Geens. Havells-Sylvania, 2008.

The amount of mercury in FLs needed for radiation is not really determined by the amount of light one needs but it is more determined by the liability and the lifetime, among other things, from the lamp. For high pressure lamps though, the role is very different as it can be seen above.

The LEDs for the time being are just as efficient as the lowest discharge lamp; the general categories of the discharge lamps are still by far the most efficient lamps on the market. Of course for better alternatives, research has been conducted for quite a long time already, but at the moment these lamps are not as efficient as the mercury containing ones. Industry research has managed to continuously decrease the amount of mercury in the lamps and simultaneously increase the energy efficiency or operational life of the lamps. In summary, zero mercury levels are not yet possible without loss of luminous efficacy. In view of the energy efficiency requirements under the EuP, these alternatives are therefore not recommended, just because of the mercury paradox as well as CO<sub>2</sub> emissions.

Havells-Sylvania is committed to the gradual and continuous decrease of mercury content in discharge lamps without loss of energy efficiency. The danger which has already been mentioned a few times before is that by imposing too strict limits the light, the efficiency or the lifetime of the lamp will be reduced because manufacturers are forced to stay below a certain arbitrarily low mercury limit. Simply, this is not realistic. Hg-free discharge lamps are currently still lacking energy efficiency and are therefore not a viable alternative for most applications of mercury containing discharge lamps. A complete environmental approach is required, taking all aspects into account and not just the mercury level.

### **The General Electric (GE) perspective**

Mr. Laszlo Balazs, pointed out that General Electric is committed to deliver eco-friendly products to the market. The Lighting business focuses on the development of energy saving solutions and minimization or elimination of hazardous materials from lamps.

The short-term priority for GE Lighting is to meet customer's demand for energy saving lamps. In long-term GE Lighting is investing in emerging mercury-free technologies, like OLEDs.

The total environmental impact of a light source consists of the mercury content of the lamp released to the environment at the end of life and the mercury emitted by coal burning power plants throughout lamp life. The higher the lamp efficiency the lower is the power plant emission. This is the reason why the mercury containing compact fluorescent lamp has less overall mercury impact than the low efficiency incandescent bulb with zero mercury content.

In this year GE Lighting has launched a wide range of energy saving products offering 5-12% energy saving relative to industry standards. The WattMiser and LongLast range lowers Hg release to the environment because of the lower energy consumption or the longer life.

GE Lighting stressed that it is not only the technical performance (such as efficiency or mercury content), which is important to the customers. GE Lighting's goal is to remove design barriers limiting the applications of energy saving lamps.

### **The Osram perspective**

Wolfgang Gregor, Chief Sustainability Officer, stated that OSRAM is committed to energy efficiency, low carbon emissions and a clear strategy towards lower mercury usage. Energy saving lamps with integrated electronic ballast were invented 25 years ago by OSRAM, which can be seen as a starting point for the "ban of bulbs". While substantial progress in mercury reduction has been made in the last 20 years (e.g. within the last several years mercury was able to be reduced in some compact fluorescent lamps stepwise to 4mg, then 2.5mg, and today 1.3 mg Hg on average). On the other hand a 'one-size-fits-all' solution does not exist. OSRAM as well as all other manufacturers need the margin to be efficient and competitive and so far optimisation of mercury is the best one can do rather than limiting it. OSRAM believes that market surveillance is needed though.

OSRAM also brought into the discussion the aspect of recycling and a holistic cradle to cradle/cradle to grave approach. The Mercury strategy is also driven by take back activities. While in some countries, up to 80 % of certain, mostly professional lamps (fluorescent) are collected and recycled in an environmentally sound way, many consumers in Europe are still wrongly disposing of CFLs in household bins.

We all have to close the recycling loop by educating consumers regarding recycling. In terms of reducing mercury emission, right now the highest focus must be on consumer products with low return rates, e.g. compact fluorescent lamps. On the other hand OSRAM pointed out that investments in new lamp technology are needed. They emphasised, following previous presenters, that mercury levels should not be seen isolated from other aspects such as energy savings, hence only a holistic approach is sustainable. Technically different lamps, which are necessary to meet the customer expectations, may need different mercury amounts.

The best example for a holistic optimization as opposed to overambitious Hg reduction is the "mercury mileage" aspect. Longer lifetime needs only a little more mercury per single lamp than lamps with short lifetime but reduces the overall mercury use. Mercury mileage is 2,5 fold better in a 15000 h lamp than in a 6000 h lamp with the same mercury amount. In addition this saves production resources.

In summary, OSRAM follows a "no step backwards" approach:

- Optimization of lamps, including mercury reduction as one of several aspects, e.g. energy efficiency, climate mitigation, lifetime, light quality

- Highest focus on most innovative products
- Phasing out and replacement of halophosphate lamps, inefficient T12 lamps and mercury vapour lamps
- Closing the recycling loop and education of consumers
- Address the need for much better market surveillance

### **Professional Lighting Designers' Association (PLDA)**

Mr. Kevan Shaw, on behalf of PLDA, viewed the debate from a different angle and argued with the phrase "Stop the Switch, Save the Bulb!" He explained that if all incandescent lamps (GLS) are replaced with integrated CFLs the problem will be the following: 2.1 billion incandescents are sold each year in Europe which equate 350 million of CFLs assuming that on average they last 6000h per life. At the same time this means as many CFLs will be disposed every year because of the difficulty to persuade the public to recycle unfortunately often those CFLs end up in landfills which is the worst method of disposal. Once the lamp is there, microbes will transform mercury to methyl mercury which is 20 times more toxic than metallic mercury.

PLDA further criticised recycling of the lamps itself because according to them in the end only a minimum of the lamp can be recycled and mercury is not among it and glass on the other hand only fills up roads during construction or is processed as glass wool. The plastic and the circuit are shredded and less than 1 gramm out of 80 grams (weight of a lamp) can be fully re-used. Furthermore PLDA argued that the common industry argument that incandescents use more mercury from energy generation is only true (as well heard in the first presentation) if all incandescents are supplied by coal fire generation. The following numbers show how much energy is generated by which resource:

- UK 30% coal fire
- France 80% nuclear
- Poland almost 100% coal
- China 80% Coal

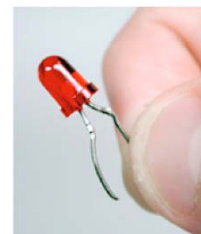
Therefore the emissions of mercury deriving from energy production are unknown, and they do not believe they cause a significant risk in comparison to the known risk in the disposal of CFLs. The incandescent lamp does not cause major problems in landfills.

The Association thinks much misinformation derives from manufacturers, as they use quite "convenient" figures for CFLs – that they are 6 times more energy intensive in manufacture than incandescents. Here the actual figures they provide from VITO are different and state that CFL requires 12 times the energy in manufacture than a conventional incandescent lamp.

Another huge problem PLDA identified, was that a lot of LFLs and CFLs are delivered in boxes from China which may mean that these are not safely produced, nor transported in order to avoid mercury disasters. Newer technologies for incandescent lamps, for instance Sulphur Plasma Lamps, although having greener light than normal lamps, should be promoted as they are less harmful to the environment.

### **Mercury-free Lighting Equipment, Green Purchasing Institute**

Ms. Alicia Culver gave a brief overview of mercury-free lamps, such as LEDs. Light-emitting diodes or LEDs, sometimes called Solid State Lighting, 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.



LEDs have many advantages, which need to be seriously considered. They are long lasting, 25.000 – 100.000 hours; they are mercury-free and they are significantly more energy-efficient than incandescent lamps in many applications. They are particularly good for directional lighting applications (such as task and spot lights). Their cost is dropping while their performance is improving. On the other hand, however, LEDs are not fully developed and cannot be used for all applications. They are often not as energy-efficient as some other technologies such as T8 and T5 linear fluorescents, and they are not very good yet for general illumination since they are rather directional. Furthermore, many LED products suffer from poor color quality and their initial cost can be high.

LEDs can be used in 'exit signs', as it is done so already in the US, and other low- wattage applications, as well as for traffic lights where they can save up to 80-90% of energy compared to incandescent traffic lights.

**Exit signs – comparative example**

Incandescent light bulbs	- Inefficient, use about 40 watts, - Bulbs last about 3000 hours (~4-6 months)
Fluorescent lamps	- More efficient than incandescent (5-15 watts) - Contain mercury (5-30 mg) - Bulbs last about 7,500 -10,000 hours (9-12 months)
LEDs	- Even more efficient (<1-5 watts) - Bulbs last up to 100,000 hours (up to 10 years)
Self-luminescent	- Use no energy



**Open Discussion**

- OSRAM observed that a lot has been said about reducing mercury levels in lamps, but experts do not admit the fact that lamp manufacturers have been voluntarily optimising the mercury content of lamps for the last 20 years, initially without legal limitations on mercury content. For instance, the T5 lamp is already below 2mg of mercury, however for more reductions further R&D must be completed. On the record of past reductions, the public should put a bit more faith in industry efforts – low mercury content is a positive selling point, so competition exists anyway to reach ever lower levels.
- Green Purchasing Institute commented that it is crucial to note that while the overall amount of mercury in lamps is going down, there are still some manufacturers that put significantly more mercury in their products than others because they are using outdated mercury dosing methods. For example, some companies put 30-60 mg of Hg into their U-bent T8 fluorescent lamp where other companies use for the same size only 3 mg of Hg. What they would like to see is that all companies are reducing mercury levels in different types of lamps, and that is where the EU directive can help reward the companies that have made investments in reducing the mercury content of their lamps while maintaining high efficiency and lamp life.
- Philips directly argued that one has to recognise the need for global-level-playing field here, and competitive positioning. The question is who would pay for an adaptation in mercury levels, that could make existing products more expensive. They do not think that, in general, the consumers are willing to do so. Also professional users are not inclined to pay more, but better environmental performance can very well be a differentiator. Education of customers and consumers in energy efficiency and other environmental performance factors like mercury content and recycling opportunities, is seen as very important and instrumental to be able to promote having them take the best environmental choice.
- On a question on market surveillance, the European Commission representative, explained that the idea is to ban the incandescent light bulb. Industry and NGOs emphasised that the Commission should take an integrated approach which looks at all aspects and ensure

coherence between the legal instruments. It should be clear that most of the mercury being in the lamps should best be recovered. For the Commission the question is how much they can do without over-regulating the market. Lastly the Commission wants to point out the consumers' information aspect. Apparently the conference showed, that information about mercury content is not very well known and the fact that they need to recycle FLs and CFLs by the public and neither is it clarified to them. This has to be changed in the future.

- The German League for Nature and Environment (DNR) (NGO) expressed concerns about consumer information which is missing on the product as well as on packaging about mercury. It would be helpful to include a little leaflet on how much mercury is in the product and what are the figures, as well as information that the lamps need to be collected separately and recycled. In general a lot of information is missing. They would like to know what each of the adherent companies do to give information to consumers. Furthermore on a documentary broadcasted in Germany it was shown that the conditions for workers in China are terrible for producing lamps since they are getting exposed to the toxic metal from releases during production.
- The German Environment Aid (NGO) emphasised as well that people do not see or know that there is mercury in the lamps. It should be mentioned and the link made that the lamps contain small amounts of mercury, but that they can be recycled carefully, so the consumers know that buying FLs and CFLs is still alright.
- KREIOS bvba observed we cannot be comparing only a few items out of the CFL with incandescent lamps. Furthermore with respect to the LEDs, it is difficult to compare them with CFLs; LEDs have pure lumens, but CFLs are calculated in maintained lumens. One cannot compare both types of lamps really and the LED quality is not as good as the in the CFLs. A100.000 hours lifetime of LEDs is an old information and it is not really possible currently; they believe that LEDs rather last for 50.000 hours. A remark was also made that industry should advertise their recycling systems as it happened for the batteries.
- OSRAM said that they are planning to advertise more the recycling systems for lamps. They also added with respect to the working conditions in China, that all industries that are members in the UN Global Compact provide minimum working standards for their workers. Working conditions in China are similar to working conditions in Germany or in other countries. They also added, that with regard to information for example in Germany the local CRSO (Lightcycle) puts approx. 5 – 6 million Euro into education projects for sound disposal of lamps, e.g. in the "scool tour" (<http://www.scooltour.info>) educating kids. Concerning missing information on labelling, OSRAM outlined that there is physically little space on each lamp as well as the packaging and this is why they do not put the word mercury in more than 20 different languages on them. Lamps are already marked with the crossed out wheelie bin signifying: "I don't belong in the normal bin. I belong in a special bin!"
- Philips stated that they are very much involved in standardization of product tests for market surveillance, in order to be able to demonstrate compliance with the least amount of effort and cost to both authorities and industry. Concerning working conditions in China, Philips supports the Electronic Industry Code of Conduct (EICC), which considers many social and environmental aspects. Suppliers are audited, and working and environmental conditions are assessed. If needed, pressure is put on the suppliers to adjust and keep the working conditions at the right level.
- GE noted that measuring mercury content of lamps requires sophisticated analytical techniques. GE Lighting plays an active role in the standardization of the Hg measurement. The standard procedure is an important prerequisite for introducing effective market surveillance in the future.
- Havells-Sylvania emphasised that there is quite a misunderstanding by the minimum standard of the amount of mercury in a lamp. The value has to have a reasonable margin and it cannot be possible that one level of mercury amount deriving from one company is put as an overall level for other companies as well.

- EEB rounded up the discussion expressing the hope that industry will stick to their promises and put the information about mercury contents in lamps on their websites.
- The chairman summarised the discussion by noting that there is a common approach not to stick to Hg-levels which have been discussed at the conference but to cut down even further. Setting standards is only one step in the right direction. One idea is to promote the best in class where a transparency labelling is needed. The mentioned level-playing field is needed and has been coming up in global discussions in any panel. He further underlined that he does not believe that many other companies (globally) will set lower standards as in this particular conference the biggest global companies in lighting production were present anyway, so industry does not need to wait but these companies can set them directly as they are the leaders in the business.

## **7. EU lamp Collection, infrastructure, transport and best practise in the EU**

*(Presentation by Rob Koppejan, Director of Philips Lighting)*

The focus in the following presentation lies on policies such as WEEE and its history, what is important to Philips when you look at the environment, collection and recycling, as well as the WEEE legislation; finally an overview was drawn on transport and recycling.

The ambitions of Collection Recycling Service Organisations (CRSOs) are the schemes Philips uses to comply with legislations. To comply with legislation Philips looks at collective schemes that fulfil legal responsibility in a financially sustainable way. Systems need to be to create higher collection rates, they need to be eco-efficient and environmental effects need to be taken into account for the best prices available. Furthermore collection systems need to provide sustainable infrastructure and help to create a level playing field. Those systems need however, to take into consideration legislation especially with competition law, or confidentiality of data.

The history of WEEE was late-awakening and Philips (and other companies) were totally surprised by this legislation which gave a lot of liabilities and it was not in any way specific with respect to lamps. In the past and still now, there are a lot of problems with being environmentally efficient with the collective schemes. After 3-4 years of working on this project Philip still is encountering challenges with the WEEE legislation.

In 2003 a team was set up by the lamp industry to deal with the WEEE legislation but from the side of lamps specifically. The team consisted of project leaders, logistic and recycling experts, people with financial and legal backgrounds. The programme ran for 5 years and about 60 people participated. At the end 25 companies were set up across Europe to comply with this the WEEE legislation. WEEE seems to have been made rather for household appliances, including TVs and refrigerators – however, collecting lamps is very different to collecting refrigerators, as they are fragile, and are subject to hazardous waste legislation. They have low weight and extreme high volumes. In Europe alone 700 million relevant lamps are to be found on the market each year, and the numbers are growing. Due to those characteristics the price to manufacturing the lamp is almost equivalent to the price for collecting and recycling it. Lamps are the only product under the WEEE, where clear guidance is not really given.

Furthermore Philips said that collection is important for the environment in this debate. One cannot say a lot about recycling, if one does not collect it beforehand. The current collection rates are an average estimate, since they trying to get the right numbers, but in some cases it is hard to compare the collection data from different Member States (MSs). For instance the collection rate for Denmark is about 60%, whereas Sweden collects 80%. In central Europe, the collection rates vary enormously with the UK struggling to collect 30% and Poland with a 60% collection rate. Southern Europe reveals a different picture again: here only about 10-20% are collected. There are even some countries completely out of these statistics because it is close to impossible there to set up a collection system as legislation is not fully enforced. The best Philips can do in those countries is to become a member of the government scheme.

But how can one make sure to collect as much as possible? Three issues need to be considered: to have proper legislation, to create awareness and also to provide countrywide collection networks.

Proper legislation does not mean that producers need to pay and need to collect. The playing field is a bit more difficult than that and the roles of the stakeholders need to be clarified. Philips would expect from stakeholders that:

- Producers should collect correctly and support sustainable systems.
- Consumers need to change their behaviour and hand in all products.
- Retailers need to support collection, which is not happening yet. Philips entered into huge discussions about square metres needed to put up a collection box.
- Municipalities have to enable cheap collection where so far there are a lot of financial problems with municipalities, which also has to be put into legislation.
- From the CRSOs they should design awareness programmes to maximise collection amounts and they should inform stakeholders.
- Governments should provide a clear framework, monitor compliance, leave execution to the chain and make sure that they do not create a one-size-fits-all approach as that does not work.
- NGOs should help to focus on the whole picture not to pick out only one part, but rather help with a holistic view and focus on real environmental aspects.

What is very important for the environment is raising Awareness in the Member States. Philips presented a few campaigns as examples that could take place in the different Member States.

In one film broadcasted in the Netherlands it is promoted that consumers can win a weekend in Paris, if they bring back their lamps. The other film broadcasted on German television appeals that FLs should really not go into the waste bin. For an advertising campaign in Hungary they used all the public transports where they put a telephone number, where citizens can call up to find where to bring the lamps and to get other information on the issue. One raising awareness campaign in Spain sponsoring the Saragossa EXPO 2008 explains energy savings doing a major tour throughout Spain to inform people on recycling and energy saving possibilities. Furthermore a lot of focus in all countries was given to educational programmes telling children how to save energy and to recycle not only in lighting but also in more general ways.

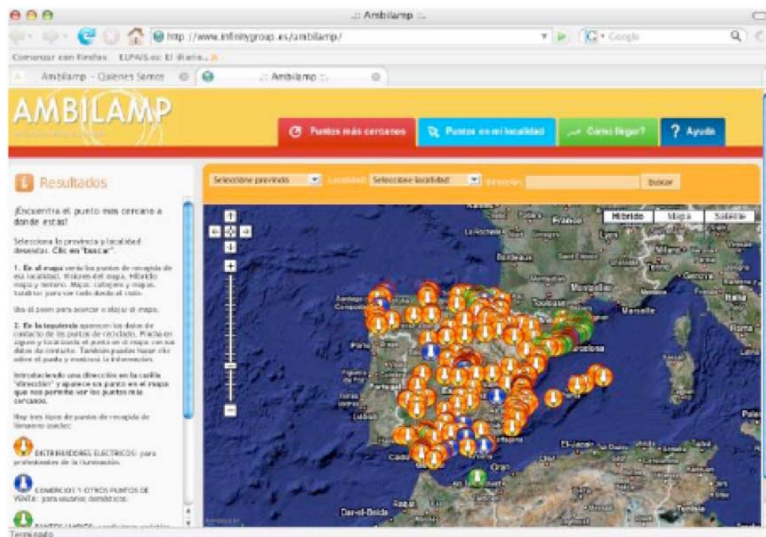


Another important partner is the wholesale sector, with examples coming from Germany and Hungary. They need to be educated what they should do, and how they should treat lamps. They need to be involved in the overall discussion since they have to do extra work and they also need to educate their own customers. This is an example of a partner programme developed in Hungary and Germany.





Overall it is not only about running a campaign but you need the right commitment from those partners to increase the collection rates. With regard to countrywide networks (Spain was taken as an example among all others) programmes on the internet are found where not only consumers can find information but also professional users where they can bring their lamps.



Other parts need an additional focus in the countries. In the beginning it started with the municipalities and the big users because there was the biggest gain, but now more awareness is coming from retail-chains which are cooperating more and more. For transportation proper containers for reliable collection and transportation are needed. On the picture one can see the containers which are being installed.



With regard to recycling, Philips briefly explained that their main focus is on eco-efficiency: maximising the recycling potential of lamps, with the aim for 90% recycling targets at a competitive price.

The ambitions for Philips are to improve and continue awareness campaigns in MSs for longer periods as Philips is aiming to change behaviours; the comparison to batteries and their collection is in a sense a benchmark for Philips. The examples found in Switzerland, the Netherlands and Belgium specifically on a consistent basis, advertised and hence changed behaviour of the public and in that way increased collection rates, tremendously. Another issue which needs improvement is benchmarking figures; but first of all similar data on collection rates need to be developed in the MSs to make comparison possible. In order to get there sharing facts and data is needed so that cross-learning can take place. Related to that is the ambition to have regional collaboration for improving eco-efficiency and a better environmental performance.

As a last point Philips stressed their ambitions for legislation. Three concerns need to be understood:

- The current financial scheme needs to be prolonged, as it seriously helped in getting transparent systems and cost in place having a simple way of paying for waste and avoiding free-riding.
- To bring the unions into the EU; which means under article 95 a Member State cannot make a lot of differentiation on that specific point. The reason Philips requests this is that there are huge problems with different scopes with regard to the Directive. In some cases Philips is fighting with collection schemes that have no environmental performance whatsoever, meaning that basically no lamps get collected. Here Philips emphasised that a level-playing field needs to be established where it is made sure that the EU-legislation is in fact European wide correctly enforced and not only in some MSs.
- Proper allocation-mechanisms need to be put in place, to collect as much as possible; not collection schemes are looking at how to avoid costs which one can see in practise. Some of the mechanisms in place cause systems to stop and make it very difficult for collective schemes. For instance the advertising film which was shown in Germany, under the current legislation would be very hard to implement on the British market.
- Market surveillance needs to focus on the WEEE legislation. Philips thinks that market surveillance is important and so far it is not in place yet.

#### Discussion:

- Philips clarified that the collection and recycling costs are almost the same as the production costs and not the retail sales costs. Then one needs to look at running costs which can be very much depended on the size of the country, the maturity of the recycling and the transportation; it costs typically from 0,25 Euro up to 0,40-0,60 Euro. If you talk about costs of retail lamps then one can go up to over 1 Euro.
- Philips further clarified that with respect to the collection data and the ranges presented of 10-20%, 30-60% and 60-80%, these are based on the average lamps which were on the market

for six years. So it is the put-on-the-market data; in real terms the sales from 6 years ago. Philips also has figures from current sales but that is basically not a correct representation of collection rates.

Philips' overall collection rate is estimated and lies between 40 and 50% related to products sold on the basis of their own figures, and indeed does not agree to a UN report figures where it is mentioned that only 27% is collected.

The budget Philips has for collection is around 118 million Euros a year and is financed by price per piece (of lamp) put on the market and currently a visible invoice line is used.

- On a question on whether the energy that is needed for the collection and also for the recycling of the mercury, is included in the estimates of the figure shown for the lamps, Philips replied that those data were not available and were not included. Normally when they collect data they look at the whole lifecycle analysis. So if the part for recycling is taking into account, then through the lifecycle analysis also the energy costs for recycling is taken into account. But obviously one will be able to find lifecycle analyses which do not include the energy costs for recycling. If you look at the total impact of recycling in those lifecycle analyses, the conclusion is the same; 90% or more of the lifecycle impact is in the use phase. So energy for recycling is a negligible part of the total.

### **8. The WEEE Forum's 2007 "key figures" related to waste lighting equipment**

*(Presentation by Pascal Leroy from the WEEE Forum: European Association of Electrical and Electronic Waste Take Back Systems)*

The WEEE Forum is a community of 40+ e-waste collection and recovery systems. Some member organisations collect and provide for recovery of waste lighting equipment. Systems have been set up to recover mercury-containing lamps. The Forum represents Norway and Switzerland and all member states of the European Union except Bulgaria, Lithuania, and Malta. All systems are run on behalf of the producers' community. The Swiss system was already established in 1990, and also the Dutch systems were set up really early. A web-based tool, the so-called "Key Figures", allows members to compare quantities placed on the market and collected, and costs of operations. The quantities of lighting collected amount to an average of 0,15 kg lighting equipment per person per year (in 14 systems) and the total quantities collected were 20.495 tons (in 15 systems).

The figures for "lighting" [see below and in slides] cover both lamps and luminaires. The average amount of lamps collected was 0,08kg/inhabitant(served) per annum (15 recovery systems). The minimum collected was 0,001; the maximum 0,28.<sup>3</sup>

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<sup>3</sup> WEEE Forum, 2007 Key Figures on quantities of electrical and electronic equipment put on the market, of quantities of WEEE collected, and on costs related to WEEE management, July 2008, [http://www.weee-forum.org/att/news/2007%20Key%20Figures\\_Final.pdf?weeeforum=e508a179dc9cdf3cbe2812fd2e0b2867](http://www.weee-forum.org/att/news/2007%20Key%20Figures_Final.pdf?weeeforum=e508a179dc9cdf3cbe2812fd2e0b2867)

<b>specific amounts of WEEE collected 2007 [kg/inh(served).a]</b>				
<i>values higher than 1000 % or lower than 1 % of WEEE Forum average excluded</i>				
<b>WEEE cat.</b>	<b>average</b>	<b>min.</b>	<b>max.</b>	<b>num data</b>
	[kg/inh(served).a]	[kg/inh(served).a]	[kg/inh(served).a]	[#]
large household appliances (ex C&F's)	1,63	0,03	5,88	23
cooling and freezing appliances (incl. air con)	0,95	0,01	3,44	25
small household appliances	0,37	0,004	2,20	24
IT&T equipment (ex monitors)	0,45	0,01	2,47	26
all monitors - IT&T	0,36	0,02	1,45	23
consumer equipment (ex TV's)	0,30	0,0035	1,68	24
all television sets - CE	0,58	0,006	2,30	23
luminaires	0,08	0,0025	0,58	13
lamps	0,08	0,001	0,28	15
electrical and electronic tools	0,07	0,001	0,33	21
toys, leisure and sports equipment	0,02	0,001	0,18	19
medical devices	0,01	0,0001	0,08	19
monitoring and control instruments	0,007	0,0003	0,06	16
automatic dispensers	0,03	0,0006	0,07	8
other WEEE	0,19	0,11	0,28	2
<b>total</b>	<b>4,00</b>	<b>0,08</b>	<b>17,52</b>	<b>29</b>

Further data about e-waste collection and recovery can be found online ([www.weee-forum.org](http://www.weee-forum.org)). The total cost of the whole collection system adds up to €13.7m (in 15 systems).

#### Discussion:

- Philips emphasised that the Forum tries a lot to make the numbers in the different countries look the same. Philips is not completely convinced that all figures are confident and valid. In the end a comparison of the figure is very hard as the collection systems in all countries vary immensely.
- Sierra Club questioned how can the Forum be sure that they get the right information if MSs are allowed to set up different systems, and if the surveys given to people differ from country to country.
- The WEEE Forum clarified that the data for lamps and luminaires are indeed comparable for the simple reason that they are based on harmonised data structures and definitions. Of course, the tool currently does not allow to distinguish further between different types of lamps, for example. The Key Figures provide a tool for member organisations to understand why costs of their own operations differ from those of others and for learning from others on how to improve the business and regulatory framework. If all framework parameters were the same, it would be pointless to do the benchmarking exercise. Further analysis of data can be obtained upon request.

### **9. Best Practise in Member States collection schemes**

#### **EI-Kretsen - Sweden**

*(Presentation by Jan-Olaf Eriksson, Managing Director of EI-Kretsen)*

The following presentation is about the collecting mercury containing lamps in Sweden which has started already in 2001. Before that time historically, fluorescent lamps have been landfilled, until the late 90ies FLs have been put into carton boxes and those have been trashed in landfills. Nowadays Sweden proceeded much further and targets have shifted. Already in 2001 Sweden established a separate collection system of light bulbs (incandescents). Sweden faces a major logistic challenge due to the relatively few inhabitants (around 9 million) related to the size of the South-poled country. Therefore an efficient collection system is needed which addresses all challenges. Treatment facilities are set up now in Denmark and Norway.

The focus in Sweden on collection and recycling lies on the hazardous components, the logistics - CO<sub>2</sub>, transport, the recycling rates and the costs.

Hazardous components - means treatment technologies such as on the one hand the wet method where the mercury gets stabilised via a sulphide component. Here the mercury sulphide together with the fluorescent powder is landfilled. On the other hand EI-Kretsen uses the dry method of treatment technology. The fluorescent powder is extracted and the mercury is heated and vaporized. Afterwards the pure mercury is being condensed out of the compound to a very pure fraction.

For the logistics, the treatment facilities are located out of Sweden due to economical and ecological reasons. Sweden concentrated to focus upon the collection points in all municipalities, and large scale consumers of FLs. Transportation of FLs are limited due to the volume not the weight, so one challenge in the future is to lower volume in return to freight.

In general the minimum level of recycling of the FLs is about 80%; in Sweden they try to recycle 100% of one FL. So far they get very close to the 100%. From the lamps themselves metals, fluorescent powder and glass can be recycled. Especially in cold winters in Sweden, incineration of waste is an important issue for heating.

In order to cut down costs the aim is to combine of economy and ecology. For that purpose a well managed tender process is the tool Sweden uses. In this respect optimisation of transport and treatment is of a vital importance. For the rest of Europe there will be fewer and larger facilities for treatment of FLs. In the future in Sweden the tender processes will be coordinated.

Below one can see pictures on the collection sites in a municipality in Sweden:



#### Discussion:

- EI-Kretsen clarified that as they are also collecting incandescent lamps, when recycling those, the glass is used as a ground-construction material. On this comment, PLDA noted that there is a higher proportion of recovery of the incandescent than of the CFL.

With respect to separate figures for collection of straight FLs in Sweden, 8,5 million pieces (1700 tons) were collected during 2007. Within these, the estimated number of broken SFL was 10 %. Also are collection points in Sweden open on Sundays, too.

- EI-Kretsen further noted that overall, time is an important issue. EI-Kretsen spends a lot of time just informing people, giving practical advice, mainly when the consumers buy a new lamp. To get more attraction from consumers, EI-Kretsen uses simple pictures on informing people.
- Philips pointed out however, that one has to pay attention and cannot copy-paste success stories from one Member State to another.

#### **Elektro-Eko - Poland**

*(Presentation by Zdzislaw Janeta, Director of Lamp Department at Elektro-Eko)*

ElektroEko is an umbrella organisation dealing the collection of mercury containing lamps with other electrical equipment like white goods, small domestic appliances, TV & IT and others. The company started its first operational activity in July 2006.

In Poland the following legislations with regard to collection of FLs were enacted:

- Waste Act has been put into force on 20/06/2001
- the Producers Obligation Act was put into force on 22/06/2001
- the Polish WEEE Act was enforced on 29/07/2005

According to these regulations, following obligations were set:

- Producers and importers of gas discharge lamp (excluding compact fluorescent lamps ) – ensure collection and recycling at the level shown in the table bellow. C&R levels were defined as % of put on the market quantities in respective years.

Year	2002	2003	2004	2005	2006	2007
Collection Target	7%	12%	18%	25%	32%	40%

- Poland professional waste owners – ensure return of wasted lamps only to licensed collectors.
- Collectors and processors - to get licenses for providing services respectively.

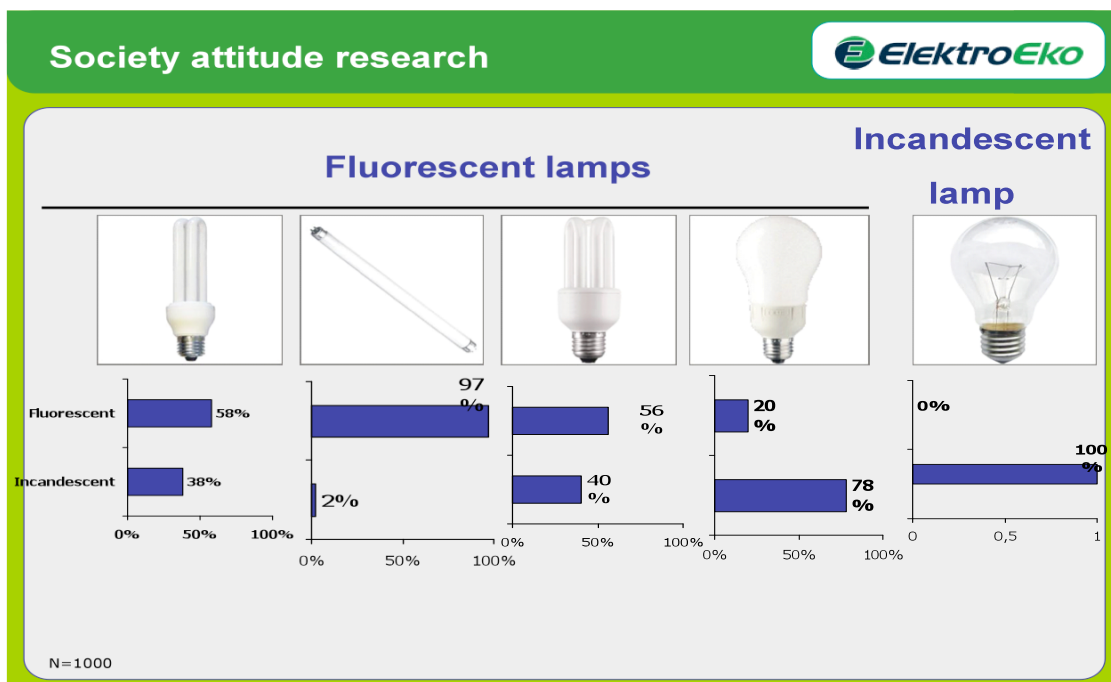
The collection and recycling costs till year 2006 were covered by professional waste owners. Since April 2006 after introducing visible fee, costs are covered by Elektroeko.

Under the obligations from the WEEE Act the collection of all available waste gas discharge lamps have to take place. In the act no binding collection target is set, however 80% of the collected lamps have to be recycled. Furthermore the Act requires educating society about collection of all electrical equipments.

The obstacles with the establishment of the effective collection system in Poland are:

- almost lack of collection infrastructure in municipalities
- negative attitude for collection obligations in trade organisations
- low motivation for collection in professional channels
- low awareness about waste in Polish society

When ElektroEko started their activities there was almost no conformity at all, and they also found out that little information about the matter was available. Thereafter they did a survey in society and asked people (over 1000 people were questioned), if they have ever heard about the WEEE Act. 30% answered yes, whereas 64% said no and 6% did not have an opinion. The survey further showed that only about 16% of people would return the CFL back to the shop, which is not much in comparison to 68% who would dump the lamp in the normal trash. Another question of the survey dealt with the recognition of the two lamp types (FLs and incandescent). The result here was that almost 50% of the people cannot recognise the difference between compact fluorescent lamp and standard incandescent lamp (not including mercury ).



Based on these research results, ElektroEko formulated short term and long term the activities plan.

Hence, in the short term the main purpose of was to reach the collection and recycling target through:

- Intensive co-operation with professional waste owners
- Building a collection infrastructure
- Creation of a collectors and processors net
- Education of professional waste owners.

For example after ElektroEko introduced a visible fee, started education campaign for professional waste owner informing that they can return their waste without charges.



The long term goals of ElektorEko are:

- To develop an education programme for households
- To predict market trends
- To establish a collection infrastructure with municipalities
- To establish a collection infrastructure with retailers

So far they already realised an education campaign for households.



The most important is to able ensure in the future collection of compact fluorescent lamps, which sales is growing very fast ( over 20% a year ) especially in households.

This means that in 5 years time collection from households should increase two times, that is a real challenge taking into account over 13 mio households in Poland. The conclusions coming from the market trend survey, were, that society attitude needs to be created, society has to be involved in the collection of gas discharged lamps, and that it has to be ensured that collection points are available for households (municipal & retailers).

Collection of CFL's is as follows:

Collection of fluorescent compact lamps				
	Year			
	2006	2007	Fc 2008	
Put on the market	6 600	8 593	11 200	
Historical put on the market	4 220	4 600	5 000	
Collection	135	1 295	2 200	
C&R as % current put on the market	2,0%	15,1%	19,6%	
C&R as % historical put on the market	3,2%	28,1%	44,0%	



Currently ElektroEko signed collection agreements with 29 licensed collectors and with 6 processors.

With respect to the collection infrastructure, ElektroEko, signed agreements with 205 wholesalers and retailers, agreed and established 1840 collection points with trade organizations and participated in the creation of 102 municipal collection points. ( over 300 at the end year 2008 )

Till November 2008 they delivered over 9100 receptacles for collection and transportation waste of gas discharged lamps

Achieved collection results of Elektroeko are visible below:

Collection & recycling Y2006.				
Kind of lamps	Put on market	Target (32%)	Realization	%
TL	18 500	5 920	6 496	35,1%
HID	1 500	480	913	60,9%
CFL	6 600	X	135	X
Total	26 600	6 400	7 544	X

Collection & recycling results			
	Year		
	2006	2007	Fc 2008
Put on the market	26 600	30 287	34 700
Historical put on the market	19 800	21 000	22 250
Collection	7 544	15 855	18 600
C&R as % current put on the market	28,4%	52,3%	53,6%
C&R as % historical put on the market	38,1%	75,5%	83,6%

Discussion:

- ElektroEko clarified that there are various waste streams and one of them is household waste. ElektroEko started a campaign a year ago for households, which is completely financed by them, although they are not-for-profit organisation. Elektro Eko is a joint stock company but the shareholders signed the agreement that they do not take any advantage, therefore ElektroEko is a non-for-profit company.
- Philips additionally mentioned that the financial situation of ElektroEko is similar to that one in other countries and the lamp parks used by the collectors are funded by ELC members. ElektroEko is a typical collection system for Philips and they are very proud of what the Polish company has achieved.



## 10. International Examples: Retail Mercury / Lamp Collection and Bulb Breakage & Clean Up

(Presentation by Michael Bender, Director of MPP/ZMWG, USA)

The Mercury Policy Project (MPP) was formed in 1998 to reduce mercury uses, releases and exposure to mercury at local, national and international levels. The Zero Mercury Working Group (ZMWG) was formed in 2005 to achieve 'Zero' emissions, demand and supply of mercury, with the aim of reducing mercury in the environment nationally and globally.

In the US the collection of the mercury containing lamps started in the 1990's yet progress at increasing recycling rates has been slow. Only about twenty three per cent (23%) of LFLs from businesses, governments and institutions are currently recycled. Twenty two per cent (22%) of all lamp users are not regulated under federal rules in the US, therefore only 2% from resident lamps are recycled. It really must be convenient for the consumers otherwise they do not recycle the lamps. Hence, while there are no federal requirements for the collection of household and small business lamps, increasingly the states are promoting retail collection of lamps. Also, at the Federal level there is more attention on lamp recycling, given the passage of national legislation that will essentially phase out the use of most incandescent light bulbs by 2012-2014. For instance the Environment Protection Agency (EPA) in the US explored that collection possibilities at US Mail Post Offices are a good spot to receive lamps.

On the national level more retailers are beginning to collect lamps. In 1990's, Minnesota implemented the first hardware store collection of lamps, paid through utility bills, at hundreds of retail outlets. Retail collection also take place in Vermont (over 60 stores), including Ace and TruValue hardware store retail locations and in a number of other New England states. Also at the national level, regional retailers are beginning to collect. IKEA collects bulbs at all of its stores worldwide and has free drop-off programs at all of its 234 stores, 29 of which are in the United States.



According to Ikea – the benefits for having the recycling spots in their shops are a part of showing that they are a good business, it brings customer back to the store; turns visitors into customers - 8 out of 10 visitors begin shopping soon after dropping off their recyclables; and since convenience is the key - consumers don't need to make an extra trip to the recycling facility.

Most recently, Home Depot, another large national chain, has started collection of lamps at all of their store in the U.S. Previously, they had started a program in Canada where there stores serve as collection points for lamps from consumers.

With respect to the labelling, MPP observed that there is enough space on the lamp to place an "Hg" symbol, showing that the product contains mercury. In the US lamp makers are required by state law to label their lamps and the packaging as it can be seen in the pictures below.



Illustration10: Retail Mercury/ Lamp Collection and Bulb Breakage Clean Up kits  
Slide 7. Bender, M. 2008. Director MPP/ZMWG

Stores in the US, now more frequently, sell set up kits which explain how to recycle the lamps, and how to store them, or trash them appropriately.

Furthermore, there is a steady increase of campaigns for collecting FLs through retailers. For instance, Wal-mart, which is one of the largest retailers in the US, has hosted one day collection events and is considering doing more.



Illustration 11: Retail Mercury / Lamp Collection and Bulb Breakage & Cleaning up. Slide 13.  
Source: Bender, M. 2008. MPP/ZMWG

The second part of the presentation given was referred to as lamp breakage. MPP/ZMWG and the NGOs published a report bringing attention to a report conducted by the State of Maine called "Maine Compact Fluorescent Lamp Breakage Study Report, Feb. 08" to advise people what they should do once a lamp breaks in buildings.

In the Maine study, they not only tested releases of mercury from broken CFLs, but also did some testing with vacuum cleaners. What they found out is that it is not recommended at all to vacuum broken lamps. From breakage of a single CFL, mercury concentration often exceeds the Maine Ambient Air Guideline (MAAG) of 300 nanograms per cubic meter (ng/m<sup>3</sup>), with short excursions over 25,000 ng/m<sup>3</sup>, sometimes over 50,000 ng/m<sup>3</sup>, and possibly over 100,000 ng/m<sup>3</sup>. In that case ventilation can significantly reduce the mercury air concentrations after breakage. During/after vacuuming, concentrations can sometimes rebound when rooms are no longer vented, particularly with certain types of lamps. All flooring surfaces tested retain mercury sources even when visibly clean. Therefore it is not advisable to vacuum over an area where bulbs have broken for at least 3-4 weeks.

Further findings of the study include that flooring surfaces that still contain mercury sources emit more mercury when agitated than when not agitated. Mercury readings at the one foot height tend to be greater than at the five foot height in non vacuumed situations and mercury source in carpeting presents significant risks for children on a floor, babies crawling, or non mobile infants placed on the floor.

In summary, here are some of the recommendations to follow when a lamp breaks inside:

When a lamp breaks – DON'T use the vacuum cleaner. Cleaning up a broken lamp by vacuuming can elevate mercury concentrations which linger for hours. A vacuum cleaner can become contaminated by mercury such that it cannot be de-contaminated. Vacuuming a carpet where a lamp has broken, even weeks after the cleanup, can elevate the mercury readings in an un-vented room.

What can someone do when a lamp breaks in a hard surface?

- Ventilate the room by opening windows, exterior doors and leave room (restrict access) for at least 15 minutes.
- Scoop up fragments with a stiff paper or cardboard
- Pick up any remaining pieces using sticky tape, wipe the area clean with a damp paper towel or wet wipe.
- Place cleanup materials in a plastic bag (and double bag), seal it, or preferably, place into a glass or rigid container with a lid.
- Store the bag or container outside of the house in an area inaccessible to children and wash hands
- Leave windows in room open as long as practical

What can someone do when a lamp breaks on a carpet?

- Follow steps 1 through 6 above; for removable, rug take it outside for as long as practicable
- Consider removal of carpeting section where the breakage occurred as precaution when infants, small children and pregnant women present.
- Added precaution: don't use CFLs in infant rooms where fixtures can be easily broken

More information can be found at the report at

<http://www.maine.gov/dep/rwm/homeowner/cflreport.htm> as well as at [www.mercvt.org](http://www.mercvt.org)

Discussion:

- **Philips** and **OSRAM** re-affirmed that to their point of view, there is no space on the packaging nor on the lamp itself, to put a sign showing that the lamp contains mercury, and consumers should be informed by campaigns. OSRAM tried to put a sticker on the waste bins in a municipality in Bavaria, saying that no FLs should go in them, but the municipality refused this sticker by arguing that the bins would be covered with too many stickers in the end which is confusing for the consumers
- **NGOs** and other participants insisted that consumers should be informed through labeling on the lamp and packaging that mercury is used in the product. And since some companies have already used the crossed out Hg sign on their lamps, it is evident that there is space for it.

### **11. NGO Position on collection**

*(Presentation by Nathalie Cliquot, Policy Officer at EEB)*

The collection of FLs and all other mercury containing lamps legally falls under the WEEE Directive, but so far the implementation of WEEE only shows slow progress for the collection of lamps. According to UNU report<sup>4</sup> only 27.9% of waste lamps arising (category 5B) are actually collected in the EU (28 kttons were collected and treated in 2005). Furthermore the study says that "full implementation" of the WEEE directive could lead to collection of 87kttons or 60% of waste lamp arising in 2011 (based on estimation and benchmarking between the different schemes).

<sup>4</sup> 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (UNU, REC,TUD, August 2007)

Hence EEB concludes that there is the need to improve collection rates and efforts to strive to collect more lamps.

Surely, the current WEEE Directive is not enough. Another reason why so little lamps get collected is a lack of public awareness in society on separate collection of lamps. The UNU study for instances outlines that in an UK poll (HERALD 2007) and an UK survey (Comet) 71% of people have no idea what the logo from WEEE- crossed out bin- means, and around 20% of the people asked think it means "no wheelie bin collection in this area". Sixteen per cent (16%) thought that the logo means "please do not leave your wheelie bins in the street".

In the case of lamps the little awareness particularly is problematic, as there is confusion because not all lamp types are required to be collected separately. The small size of CFLs makes it convenient to dispose them in the municipal bin. Additionally EEB believes that there is lack of knowledge or information on the need to avoid breaking of the lamps. EU legislation does not require overall collection and this confuses consumers.

The present WEEE collection target (of 4kg of electronic waste per inhabitant per year) is inadequate for lamps because the level of ambition of the target is too low. Some MS already collect over 10kg per person per year. Furthermore, the target is based on weight which lowers the incentives to collect lighter appliances such as lamps or small household appliances. The target does not take into account the high differences in WEEE arising between MS. As a result, the EEB supports modifications of current WEEE collection targets, for instance should it be differentiated pre product category to ensure that lighter appliances also get collected.

In general EEB thinks the WEEE Directive should keep its principles. The NGO's recommendations for the directive (which is currently under review), with regards to requirements on lamps are:

- Ambitious collection target should be set specifically for lamps (WEEE targets differentiated per product category – and possibly based on the amount of EEE put on the market at national level)
- The directive should include requirements for general steering towards design for durability, design for recycling with Individual Producer Responsibility
- Requirements should be set for risk minimisation measures (limiting breaking) in collection systems
- Better implementation of awareness raising campaigns for separate collection of lamps should take place, and also to reduce breaking before and during collection.

Besides this, other EU instruments (EuP Directive) should take care of other requirements for lamps such as energy efficiency/ life span/ resistance to frequent switching requirements. Additional information requirements are needed on mercury content, the need for extra care to avoid breaking of lamps during life-time and collection. In general NGOs urge policy-decision makers to limit the mercury content under the RoHS and EUP directives.

## **12. Question and Answers with Speakers on Collection Practises**

- OSRAM pointed out that practical information from the NGOs, on what can be done in each Member State would be useful to improve the situation.
- Sierra Club reiterated their earlier issue of problems associated with magnetic material used in amalgam strips for mercury dosing. Both manufacturers and recyclers need to be aware of this issue and work to find a solution that prevents amalgam strips present in the lamps from getting source-separated with the other magnetic metallic materials destined for recycling and not treated as mercury-containing waste.
- The Green Purchasing Institute (GPI) pointed out that NGOs could recommend a label that would be effective and understandable in showing what consumers should do with spent mercury-containing lighting products instead of showing only what they shouldn't do. The US is struggling to find a positive label instructing consumers about how lamps should be handled at the end of their useful life. GPI also stressed that it is crucial that consumers receive full and

accurate information about the mercury content of the products that are offered in the marketplace so they can make decisions about which products they buy and use. Finally, GPI recommended that the Commission require lamp manufacturers submit information to them about the mercury content of the products they are offering to the EU marketplace so they can set mercury limits under the RoHS Directive based on data on available products.

- ELC-Philips agreed that what the NGOs are trying to achieve is similar to their objectives, however the approach to reach those targets are in some cases diametrically opposite. All stakeholders involved need to improve implementation. The content from the WEEE Directive is acceptable as it is, but it needs to be implemented correctly. ELC further questioned the figure of 27.9% waste lamps arising – from the UNU report, and expressed concerns about the source. Philips numbers from their own system differ from it; they have a higher collection level. What they experience with those records is that they do compete with systems that do not collect. ELC-Philips certainly wants to discuss how to make those comparable and competitive and how to improve legislation. About targets, ELC-Philips thinks targets are not the optimum solution and should be dealt with caution for two simple reasons: targets are either too low, or too high and in both cases systems stop collecting as they basically avoid costs in that way. So if they have reached the target, as a consequence the system stops and if they cannot reach the target the system also stops. Therefore ELC-Philips rather liked to have an allocation mechanism where you bring in competition, on the basis of collection. So you would have systems that are pro-actively collecting lamps on the market. They get competitive cost-advantages against systems which are not collecting everything.

Individual payments of wastes for the producers, will be offsetting of costs by minimising awareness and a lot more in-transparency than we have now.

The things one wants to achieve regarding recycling are not in relation to the actual costs for recycling. If one wants lower mercury in lamps or less breakage of them these factors are not triggering costs on the recycling site. A 1.4mgHg containing CFL is not less costly to recycle than one with higher mercury in it. On the other hand a lamp which is not breakable is more expensive to recycle than a breakable lamp. So here there is an inherent conflict. If one is looking at design changes to trigger recycling costs, it is better to look at the EUP Directive than at the RoHS Directive.

Lastly ELC-Philips emphasised that they are open to discuss their view while the directives are reviewed.

- In terms of practical improvements of legislation, EEB reiterated that current legislation already offers a lot, as long as it is implemented properly. Until now a lot of delays have taken place putting in place systems, etc. Still, a lot needs to be done to firstly transpose the law in the MSs correctly. With regard to the WEEE Directive producers need to register at local authorities, so overall there are lots of complications with the enforcement of the laws. In order to change this, all stakeholders together need to work on implementation. With respect to the positive labelling – EEB noted that needs to further reflect on that, but information is not only about labelling. Surely part of the information can be carried to the consumers through a label, but other type of information can be requested on spots of sales etc. EEB supports mandatory information requirements on mercury content. However, labelling only, is insufficient to solve the problem of low awareness of risks and of proper management of mercury containing lamps during end-of-life.

- The Mercury Policy Project (MPP), pointed out that some experiences of what NGOs can do, can be gained from what was done in the USA, where for example, where retailers were assisted in establishing a system of collecting (cp. Walmart, IKEA etc.) In particular, this transpired after state and/or local government interventions. It has to be seen however how this could be applied in Europe; an educational conversation between the governments, manufacturers and the retailers could be triggered, because there is something to be gained by the retailers since their voluntary interest in collection may be motivated in view of bringing customers back to the stores.

The Chairman summarised that from the conference discussions it is evident that a basic consensus can be found. Five to ten years ago, the picture was quite different. Energy and Climate Change discussions paid their contributions and made important steps in the right direction. This was also clearly recognised by industry, which made a further move to a reduction of mercury content in lamps. A further question to be answered now is how quickly and through which means one can further reduce the mercury levels. It is yet to be questioned if we really have established a common vision on the mercury free lamps, which some participants doubted. Here also a tricky aspect is put in the discussion - how far should the legislator step in –this came up with the discussion about standards being too ambitious or not too ambitious enough.

Finally, one aspect that was not really tackled, is that we should keep in mind that we look at a global issue. We have to look at the totality - how many lamps do we use, what is our overall energy consumption. Lighting for instance is also about the eco-efficiency of the whole structure of buildings.

## V. List of Abbreviations

<b>Abbreviation</b>	<b>Meaning</b>
CFL	Compact Fluorescent Lamp
CRSO	Collection and Recycling Services Organisations
EC	European Commission
EEB	European Environmental Bureau
EEE	Electrical and Electronic Equipment
ELC	European Lamps Companies Federation
EPA	Environment Protection Agency
EU	European Union
EuP Directive	Ecodesign of Energy Using Products Directive (Directive 2000/55EC).
FL	Fluorescent Lamp
HID	High Intensity Discharge Lamp
Hg (Chemical sign)	Mercury
HPS	High Pressure Sodium Lamps
IM	Implementing Measures
LCD	Liquid Cristal Display
LED	Light Emitting Diode
MPP	Mercury Policy Project
MS	Member State
OLED	Organic Light Emitting Diode
PLDA	Professional Lighting Designers' Association
R&D	Research and Development
RoHS Directive	Restriction of Hazardous Substances in EEE Directive (2002/95/EC)
WEEE Directive	Waste Electrical and Electronic Equipment Directive (2002/96/EC)
ZMWG	Zero Mercury Working Group

## VI. Pictures from the meeting



General views of the conference, Cenelec, Brussels



(from left) Alicia Culver (GPI), Peter Maxson (Concorde East/West), Gernot Schnabl (European Commission)



Alicia Culver (GPI)



Gernot Schnabl (European Commission)



Gerard Strickland (ELC)



Elena Lymberidi-Settimo (EEB/ZMWG)



Göran Gabling (KEMI)



REPORT FROM THE EEB CONFERENCE "MERCURY-CONTAINING LAMPS UNDER THE SPOTLIGHT"



Eric Uram (Sierra Club)



Rudy Geens (Sylvania)



(from left) Kevan Shaw (PLDA), Gernot Schnabl (EC), Stefan Scheuer (Chairman), Frank Altena (Philips), Wolfgang Gregor (Osram), Laszlo Balazs (GE)



Rob Koppejan (Philips)



(from left) Zdzisław Janeta (ElektroEko)  
Jan-Olof Eriksson (El-Kretsen, SWE)



Maria Elander  
(German Environment Aid)



Michael Bender (MPP/ZMWG)



Nathalie Cliquot (EEB)

## VII. Participants List

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