



Roundtable Conference
on
Mercury Management in CFLs



March 13th, 2014

Conference Hall – 2

India Islamic Cultural Center

87-88, Lodhi Road, New Delhi-110003



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1. INTRODUCTION

Compact Fluorescent Lamps (CFLs) have been widely accepted as the substitute for incandescent lamps. CFLs find their applications across all end user segments in India now. Within a span of seven years, the CFL market has gone up from 67 million units (in 2006) to about 400 million units and still growing at a rate of 20%. It has been estimated that 60% of Indian households use CFLs including urban, semi-urban and rural areas.

It is a well known fact that CFLs contain mercury. Though the Central Pollution Control Board (CPCB) issued guidelines for environmentally sound mercury management in fluorescent lamp sector in 2008, however, very little headways have been made in the downstream mercury management of CFLs in India. As a result in most of the cases mercury from discarded CFLs is entering the environment and contaminating the ecosystem.

Further there is uncertainty on notification of mercury standard in CFLs by Bureau of Indian Standards (BIS) due to the prescribed standards for mercury in CFLs in **Chapter V** of the E-Waste Management and Handling Rules-2011.

2. CONFERENCE REPORT

Inaugural Session

Mercury (Hg) has been recognised as a major contaminant in CFLs which, in turn, contributes hugely to the lighting sector. Considering the importance of the issue of mercury in CFLs, Mr. Ravi Agarwal, Director, Toxics Link emphasised that the purpose of the meeting was to push for standards for CFLs and get familiar with the different views of various stakeholders.

European Union and E-waste rules under ROHS have standards on CFL as well as the new Minamata Convention has standards on use of mercury in CFLs. However, India till date has no mandatory standards on the same.

There are issues about certain categories of lamps. For instance, 150 W lamps and above can use only up to 5 mg of Hg under EU rules on CFLs. Similarly for 30 watt CFLs, the mercury limit has been reduced from 5 mg to 2.5mg. This signifies the global trend to reduce Hg in CFLs as governments have started to recognise the serious health effects of mercury both at the upstream and downstream level

Mercury in CFLs is a problem in multiple areas. India is the largest market in the world for CFLs requiring huge investments. However, there are huge investments required also in the public health sector to deal with the health impacts of mercury. Another issue related to CFLs is the matter of correctional re-cycling. This was initially included in the E-waste rules but later removed from the same. The collection of spent CFLs is an issue that will have to go along with some another waste issue. This recycling system has to come in at some point. Municipal Corporations will not have separate collection systems/rules for different wastes like in the case of





CFLs. They will have to be co-jointly recognised and treated. The collection of spent CFLs do not require huge investments, they are simple but just require the will. The e-waste collection responsibility is much larger than the lighting industry. The municipalities do not know what to do with the spent CFLs as it falls outside the purview of the municipal waste stream. It comes under the hazardous waste stream.

The spent CFLs are collected in some unseen manner, someone collects it, extracts something and when that is out no one knows what happens to it. All this is done by waste pickers who are now finding place mention in policy papers, mainstream etc. Lighting industry is a major player which is connected to all and is a national priority. Then why not make CFL standards a priority issue.

The comments by Mr. Agarwal were then followed by a power point presentation by Mr. Piyush Mahopatra highlighting the harmful health effects of mercury (Hg), the precautionary provisions set under the law, the upstream and downstream issues of Hg in CFLs and the studies done by Toxics link on the issue. Mr. Mahopatra further elaborated on the International provisions on CFLs which are as follows:

Minamata Convention:

- For general lighting purposes <30W :5 mg

EU RHOs Directives:

- For general lighting purposes < 30 W: 2.5 mg
- For general lighting purposes ≥ 30 W and < 50 W: 3.5 mg
- For general lighting purposes ≥ 50 W and ≤ 150 W: 5 mg
- For general lighting purposes ≥ 150 W: 15 mg



India's E- Waste Rule

- For general lighting purposes < 30 W: 5 mg
- For general lighting purposes ≥ 30 W and < 50 W: 5 mg
- For general lighting purposes ≥ 50 W and ≤ 150 W: 5 mg
- For general lighting purposes ≥ 150 W: 15 mg

BIS Standards are still in process. (Please see Annexe 1 for complete presentation)

The presentation was followed by a question and answer session where lot of queries were made regarding collection of CFLs.

Open Discussion

The discussion started with a positive note where the industry agreed to Toxics Link's stand on having standards set for the on lighting industry. Mr. Jindal from the Ministry of Environment and Forests assured the gathering that if there are issues on CFL, the ministry will take them up and work towards them.



A representative from the industry recapped the main issues to be discussed on CFLs as of health, awareness, reduction of mercury (Hg) content in CFL and the issue of recycling. Recognising the harmful health effects of Hg, the industry, instead of liquid dosing in CFLs has now shifted to pill dosing. In pill dosing, there is a solid amalgam, the size of a pen's tip, containing mercury and some other metals which help it solidify. Thus, even if a lamp breaks inside the house, it will not be as hazardous as liquid Hg spill. The industry said they also mention on the packaging that the product contains Hg which has harmful health effects. For information, he referred to the company's website www.alcoma.com. Regarding collection of the spent lamps, the industry representative said that after consultation with the concerned government bodies, the industry gives directions about the collection

process of the spent lamp which is to be put in a polythene bag and handed over to a pickup guy (rag picker or *kabadiwala*), who will then hand it over to a authorised dealer and get Rs. 2-3 per lamp.

The ALCOMA representative mentioned that the standard set by the BIS is that of 5mg, however, it is yet to be printed. But the industry is already following the international standards of 3.5 mg dosing. All the big players have shifted but there is a need to streamline the small players. He further mentioned that the industry had stopped the manufacture of T-12 tube lights which have the capacity of a 40W tube. This, contained Hg dosage of about 30-35 mg. The industry will only manufacture T-5 and T-8 tube lights in India containing 5mg mercury.

Mr. Sinha from Toxics Link mentioned that after so many years and a number of meetings, India still does not have standards on CFLs till date. And it is not a question of economy, availability or technology. The problem is that some many of these companies who are also players in the international market have shifted to 2.5 mg and 3.5 mg in other countries but still continue to use more than 10 mg Hg in CFLs in India. These companies do not have to find or invest in technology, they already have it. And even if we manufacture CFLs with 1.5 mg, where is the facility to test it?

Speaking about the standards on CFLs, the Bureau of Indian Standards (BIS) said that India has about 26,000 standards on various issues but only 10% of these are mandatory. To make any standard, 1/3rd of the BIS committee consists of manufacturers while 2/3rd consists of government officials, NGOs etc. In case of CFLs, before fixing any limit for Hg content for the lamp, BIS needs to have authentic data on the safe limits.

About 8-10 years back when CFLs were made mandatory by the government, the MoEF did not send any guidelines for restricting the Hg limit in the lamps. But no consensus was reached by the stakeholders. Thus this was not addressed back then. Only 2013, it was decided to have 5 mg of Hg for 30 W. This was also seen in the research carried out to check the measurements. Now BIS has made amendments in line with MoEF to have CFLs to have less than 5mg of Hg in lamps up to 26 W. For above 26 W, things are yet to be looked into.



As the BIS representative mentioned that the making of standards was also delayed as the committee failed to reach a consensus on limits by the industry, Mr. Agarwal asked if the BIS was ment to have industry consensus? From experience he mentioned that the industry always resists having any bindings on itself. How does BIS evaluate the best technology available or achievable? What represents the consumer protection limit?

Mr Jindal Addl director of MoEF raised concerns about the collection strategy of the industry which mentions depositing the spent CFL in a plastic bag. By following one rule made by the industry, one is breaking another rule, i.e. use of plastic bags which is banned in many states in the country. And Delhi is not India. Which city in the country has a CFL collection system, Mr. Jindal asked. To this Mr. Agarwal added that the industry had not yet given any information on bottlenecks like technology or costing. To this, BIS mentioned that once MoEF gives standards, BIS will come up with it.



The Central Pollution Control Board, added to the arguments the efforts it had made towards addressing the issue of CFLs. They said the board had standards on air, water, emissions and effluents. The lighting industry is the most omnipresent industry. As for mercury, it attracts attention only of policy makers or NGOs but not of public. She further mentioned that CPCB visited manufacturers who informed that they had already shifted to pill dosing of 3-7mg but pill dosing was also a late step adopted in India but at least the shift happened. CPCB asked the industry to put up a recycle facility which can be demonstrated across all states as an example. To this the industry mentioned that they had put up a facility (pilot) in Baroda.

The MoEF again questioned about the collection strategy of the industry. If they have a pilot facility in Baroda, what is the mechanism it is functioning upon? What is the supply chain of spent CFLs? How much is being collected? What is happening to the supply and mechanism and the consumer and mechanism aspect of the whole procedure?

A representative from BEE shared their experience of having about 30000-400000 spent CCFLs stored with them. On the issue of what to do with them, how to handle them, BEE has been contacting CPCB and MoEF continuously but are yet to receive any guidelines on the same. To this CPCB said that they had not received any request of this nature from BEE.

Awareness was a major issue among the consumers who are not even aware of CFLs having Hg which can be harmful. Also on part of the manufacturers, the disposal technology was missing.

Other participants again questioned the industry's collection mechanism and their capacity to deal with the spent CFLs in an efficient manner. The industry down played the harmfulness of the Hg by saying that they had played with the Hg as kids.

Mr. Sinha enquired about the industry's position on 30 W lamps to which the industry mentioned that they were being imported at present. Mr. Sinha further said that the pill technology cannot be taken as a counter argument for reducing the content of Hg in CFLs. The formation and enforcement of standards was an important issue to be dealt with by all.

As the discussion grew intense, Mr. Jindal countered the industry by saying that it should encourage the use of best technology to reduce Hg in CFLs and handling them after life rather than downplaying the health hazards the chemical poses. Also pill dosage cannot be used as a counter argument.

BIS said that the meeting should not focus only on CFLs as there are other kinds of lamps too in the market like LED which has many heavy metals and can cause serious eye problem. Now the question arises that why is BIS not making standards for LED right now when it is aware of the harmful effects. For BIS, technology precedes the standards. BIS only has one testing lab in the country where testing of lamps can be carried out. However, there are many manufacturers who are not registered. In Delhi itself, about 100 small industries are making CFLs in their backyards.

Mr Sinha mentioned that two large manufacturers (Phillips & Crompton) are based in Baroda who might be dealing with manufacturer base and not consumer base at all. There is no dearth of legislations in the country, the problem is with implementation. There are examples across the world where targets have been met when introduced. For this, the focus should be on ground level. It is to be noted that E-waste system failed because of lack of transaction counters and CFL rules lack collection strategy.



To this Ms. Lakshmi Ragupati shared her experience from Singapore back in 1990s, which had a CFL take back policy in place. People were not allowed to carry the CFLs out of the country as they could not be returned. In India, such transaction counters for collection are required.

The country needs a take back policy which needs to be implemented stringently, an issue that was raised by many at the meeting from time to time. Also focus should be on the ground level, i.e. collection centers.

The gathering emphasised on the role of industry which is not ready to take as much responsibility as needed. Many said that even the ministry was not very keen. The industry's latest argument is that with new lamps, like LED taking over the market, why should they invest in technology for CFLs. which they are hesitant as LED is also finding a foothold in the lighting industry fast, replacing CFLs. Lamp standards directly come from EU RoHS, we only need to build capacity for testing. It was mentioned that Delhi Metro has about 2 tonnes of spent





CFLs but they do not know what to do with them, where to dispose them off. Earlier it was predicted that with CFLs introduction in the market, incessant bulbs will be wiped out from the market. This never happened. Today, both share equal market. Same will happen with LED.

The applicability of any new product or technology in the country specific scenario was also discussed by the group. We usually introduce new technology without thinking about the afterlife of the product. Thus in case of CFLs too, the ministry needs to be pressurised in order to get the necessary standards. If India signs the Minamata Treaty, the mercury waste will have to be dealt with as suggested by the treaty and not how things are going on right now. The MoEF needs to be convinced for getting the required regulations.

The recycling plants cost about 2-3 crores which is peanuts for the industry which makes profits in dual digits. For India, 2 or 3 recycling plants can help deal with the problem. For example between Norway and Sweden, they share one plant for CFL recycling. For India, we need to build strategic ways to collect the spent CFLs. We not only need recycling plants but also sensitisation and training of waste pickers to collect spent CFLs in the right way.

China has been manufacturing and supplying CFLs to European countries and the USA which follow strict standards. But for India, they manufacture CFLs with 20 mg Hg content just because the country lacks mandatory standards. Manufacturers are smart enough to adjust costs depending on demand and supply. The argument of Hg being used in an amalgamated form is a negative argument as it is still going into the environment.



3. **PRESENTATION** By Mr. Piyush Mohapatra, Project Coordinator, Toxics Link



Mercury Management in CFLs

Toxics Link

About Toxics Link



- Not-for-profit Delhi-based group
- Working on issues of environmental health and toxicity and towards

Key engagements

- Chemicals safety and management (POPs, pesticides, heavy metals, EDS, asbestos etc.)
- Waste – Urban, e-waste, radioactive waste, waste trade etc
- Outreach and campaign

Mercury: A Health Hazard

- Mercury vapor is highly toxic via inhalation.
- It can cause severe respiratory tract damage
- Ingestion (through mouth) of mercury may cause burning of the mouth and pharynx
- Contact of mercury with skin causes irritation and burns to skin.
- Contact of mercury with eye causes irritation and burns to eyes.
- May cause serious and permanent eye damage depending upon the exposure
- Chronic exposure of mercury through any route can produce central nervous system disorders.
- May damage the developing fetus and decrease fertility in males and females

Source: CPCB Guidelines on mercury management in CFLs

Precautionary Provisions

- As per Factories Act 1948, in workspace air is 0.1 mg/m³;
- IDLH (Immediately Dangerous to Life or Health Concentration) value is 10 mg/m³
- Food safety & standards (Contaminants, toxins and Residues) Regulation, 2011

Mercury Standards

Fish : 0.5 ppm

Other foods: 1 ppm

Methyl Mercury Standards

All food: 0.25 ppm

Issues of Mercury Management in CFLs



Upstream

- Reduce Mercury in lamps.
- Standards for mercury in lamps
- Alternatives to mercury

Downstream

- Environmentally sound management of waste
- Compliance to the guidelines
- Consumer awareness



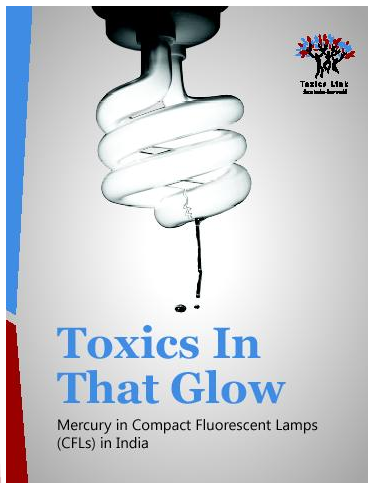
Upstream Issues

CFL Growth as Energy Efficient Lamps



- CFL growth - avg @36% over last 5 years .>400m by 2012
- FL growth- 180 million
- Introduced 1985...commercial production 1996 -OSRAM
- Approximately 15 established brands + several local brands
- Being promoted by government under BLY
- Lighting industries use approx. 16 tones of mercury per annum(major chunk CFLs)

Toxics Link Study - Sep 2011



Key Findings

- Average mercury content – 21.21mg/cfl (alarming)
- Range – 2.27 to 62.56mg
- 50% samples between 12 – 40mg
- 11 watt samples have highest mercury – 31.5mg
- Mercury content in lamps ?

International Provisions / EU RHOs Directives/ Indian Standard

Minamata Convention:

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India' E- Waste Rule

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BIS Standard (In process)

China's regulations

Stage	Timetable (starting)	Product of Fluorescent Lamps	Target (mg)	Mercury Content Reduction Compared to Current Standard
1	1 June 2013	compact	2.0	60%
		Others	2.5	75%
2	1 June 2014	Compact	1.0	80%
		Others	1.5	85%
3	1 June 2015	Compact	0.6	88%
		others	0.8 ↓	92%

EEB evidences – from EU and US (1)

- Philips non-integrated pin-based CFL with 5W, 7W, 9W, 13W, 16W, 20W, 26W contain - 1.4 mg Hg
- Philips integrated screw in CFLS with 16W, 20W - contain 1.23 mg Hg
- Osram/Sylvania integrated CFLS of 13W, 20W and 23W contain - 1.5 mg Hg
- Osram/Sylvania pin based 5W-57W contain < 2.5 mg Hg

Downstream Issues

CPCB Guidelines of Mercury Management in CFLs

Manufacturers level

- Provisions of on storage as per the provisions of hazardous waste rule
- Provisions of treatment and disposal of mercury bearing waste
- Setting up of Lamp Recycling Units (LRUs)

Consumers level

- Handover to Kabari-Collection agency identified by authorized recyclers
- Bulk consumers need to hand over to the authorized LRUs
- Bulk consumers need a special type of bin
- Proper method should be followed for the clean up of broken CFLs
- Consumers awareness

Collection:

- LRUs should arrange proper collection system in a proper vehicle
- Efforts should be made to minimize breakage of used FLs

TL Findings

- There is increasing demand of CFLs in domestics and bulk consumers
- Consumers are bit aware that CFLs content mercury also fee the need of the proper disposal
- Domestic consumers gave it to the Kabadiwala or throw in the dust bin
- Bulk consumers gave it to big Kabadiwala
- There are no authorised LRUs
- The mercury bearing glasses of CFLs are being entered into the municipal waste stream
- No awareness on the provisions of the guidelines among the consumers

CFL Disposal Practices in Government Institutions

- **Ram Manohar Lohia (RML Hospital) in Delhi and the Hamidia Hospital in Bhopal.**
- **Awareness about CFL Mercury Content:** RML Hospital is aware that CFL contains mercury whereas Hamidia Hospital of Bhopal does not have any awareness about CFL containing mercury.
- **Safe Handling of CFL:** RML Hospital of Delhi show that they are aware about that CFL should be used and disposed-off carefully as it contains mercury whereas Hamidia Hospital of Bhopal is not aware that CFL containing mercury should be handled safely.
- **Disposal Practice Adopted for CFL Bulbs:** RML Hospital of Delhi contract big Kabadiwalas to take away the CFL and other waste materials. Hamidia Hospital employ their cleaning staff to collect the waste materials including CFL in containers and give them away to local Kabadiwalas or government sweepers and municipal vans cleaning the locality.

Downstream Concerns

- Public clueless about how to dispose of spent lamps
- Collection / recycling by the unorganized sector
- Backyard operations / Poor resource recovery
- Child Labor
- Occupational health issues
- Lack of proper technology
- Mercury emissions in environment

Global drive – downstream management

Country	Regulation	Collection of spent CFLs	Disposal/recycling
Taiwan	Waste Disposal Act (Mandatory Fluorescent Lamp Recycling Programme, 2000)	Retailers as collection centers (highest disposal / recycling rate – 87%)	Authorized mercury reclamation facilities
EU	WEEE / RoHS	<u>Producers set up collection system for households and other end users.</u> Big retail stores coming forward through collection-boxes. Collection rate in household low	Authorized recyclers and plants by manufacture or a group of manufacturers

Cont...

Country	Regulation	Collection of spent CFLs	Disposal/recycling
USA	Universal Waste Rule (1995/1999) - under 40 CFR Part 273 <u>National Lamp Recycling Outreach Program (mid 2000)- for bulk users</u>	Authorized Recycler, retailers, designated government buildings/libraries.	A number of authorized recyclers in each state. NEMA developed <u>lamprecycle.org</u> for information sharing about recycling lamps
China	No specific law but "China Green Lights for All" program, an independent joint U.S.–China Cooperation on Clean Energy was China's first CFL recycling programme for consumers that were launched in 2009.		
Hong Kong	No specific law but.... “Save the Earth Energy Saving Lamp Recycling Campaign” initiated by SUNSHINE Lighting Ltd (a lamp manufacture in Hong Kong and China) in 2007. Informal as of now. <u>Japan Home Centre</u> (a local hardware store chain) <u>collects spent CFLs for recycling.</u> SUNSHINE also provided \$5.00 cash vouchers to consumers.		

Cont...

Country	System
New Zealand	New Zealand Lighting Industry Product Stewardship Scheme (Ministry for the Environment) is being implemented in the country. The baselines studies have been made and international experiences have been studied. As of 2009, about 10 % of CFLs were recycled while rest went to landfills. The stewardship and EU-WEEE directives to guide NZ's law
Australia	Waste Avoidance and Resource Recovery Act 2007 guides the present efforts to CFL waste management. Product stewardship, Public private partnership such as between manufacturers and Environment Protection and Heritage Council, and the EPR model, are being tried out for this.
Japan	As a follow up, the 3R Initiative was officially launched at the 3R Ministerial Conference hosted by the Government of Japan in April 2005, with an aim to promote global action on 3R. The 3RKnowledge Hub, an initiative of ADB, UNEP, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and Government of Japan promotes recycling of wastes including CFLs.
Canada	Main regulation- British Columbia Waste Management Act. About 10 big recyclers, also provide recycling services to households and bulk users.

Way Forward

- Need stringent regulations at the upstream and down stream level
- Suitable monitoring mechanism in place
- May need a separate regulation for used CFLs as recommended by task force
- Innovative approach for promotion of take back/buy back
- Adoption of proper technology
- Awareness of the stakeholders



4. CONFERENCE AGENDA

Roundtable Meeting on Mercury Management in CFLs
Indian Islamic Cultural Center
13/03/2014 (9.30 AM-1.30 PM)

Time	Program	
9.30-10.15	<p>Setting the Agenda</p> <p>Challenges of Mercury Management in CFLs in India (PPT)</p>	<p>Mr. Ravi Agarwal,</p> <p>Piyush Mohapatra</p> <p>Toxics Link</p>
Tea		
10.30- 12.45	<p>Open Discussion</p> <p>Way Forward</p>	<p>Moderated</p> <p>by</p> <p>Mr. Satish Sinha</p> <p>Associate Director</p> <p>Toxics Link</p>
Lunch		



Toxics Link
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(13th March, 2014)

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