

Study for Master Plan for Collection, Recycling and Safe Disposal of End-oflife Mercury Bearing Lamps and Associated Electronics

Shyam Sujan

ELCOMA



# **Chronology of Actions**

- MoEF in August 2007 sets up Task Force on "Environmentally Sound Management of Mercury in Fluorescent Lamps"
- Formation of Inter Ministerial Sub Group consisting of MoP, BEE, CPCB & Elcoma to evolve a system considering following aspects:
  - Finance
  - Logistics
  - Technology
  - Responsibility of the various stake holders
  - Legislation & Enforcement
- Elcoma volunteered to sponsor a comprehensive study that would be the basis for a "National Level Master Plan"





- Collection and transport mechanism (retail vs. household)
- Disposal technology (landfill vs. recycling)
- Cost recovery (cess vs. fee on consumer)
- Role of Manufacturers, Govt.
- Role of informal sector
- Policy options new legislation vs. existing
- Standard for Hg dose and dosing method
- Performance standard (life span)
- Residual mercury in the EOL lamp
- Availability of alternatives like LED at competitive rate



# **Study Objectives**

To develop a master plan for the safe management of end-of-life mercury bearing lamps.

### It encompasses detailed analysis of the

- a) Baseline status of use, recovery and disposal of spent FLs using secondary and primary survey data
- b) International practices and proposed management options for India and
- c) Institutional framework for collection and management



### Methodology approach



### Tasks

### Desk research

- Lighting industry in India
- Mercury in Fluorescent lamps
- Evaluation of collection, disposal mechanism, legal and regulatory framework and institutional structure in India
- Management and Regulation case studies from across the world
- Policy options international policy review
- Review of safe disposal technologies
- Design of a primary survey
- Design and development of feasible business models
- Develop an appropriate policy framework



## Proposed Collection and Recycling Mechanism



# **Closed-loop Flow for Lamp Recycling**



# **Producer Responsibility Organization**

- Any NGO, private firm or ULB may form a PRO. The selection through a bidding process in response to a call for proposals
- Several such PROs nationwide (at least one per region) with in-built flexibility for each PRO to design and operate their C&R mechanism according to the region's needs
- The PROs to enter into contracts with collection agents to establish a reliable flow of EOL FLs
- Collection through decentralized DTCs and incentivised to enhance collection beyond the minimum targets
- The collection agents to integrate the informal sector into their operations
- The PRO to enter in a contract with a recycler for recovery glass, aluminum caps, mercury and phosphor powder
- The recycler to charge a gate rate from PRO on volume of waste FLs delivered to cover recycling cost. Part of the cost to be met by sale of recovered material
- Other incentives may include capital subsidy, land at concessional rates, etc.
- State level monitoring system to be in place to monitor the operation of PROs and utilization of funds
- PROs may also have added responsibility such as education and training of producers and consumers



### **Preliminary costs**

System component	Indicative Cost @ recycling target (Rs. in crores)			Suggested source of funding
	35%	45%	60%	
Size of the Producer Responsibility Fund (PRF)	138	138	138	Producers
Collection system (DTC)				
Capital cost	42.5	54.6	72.8	PRF
O&M per year	31.0	39.9	53.2	PRF
Lamp Recycling Units				
Capital cost	64.4	82.8	110.4	PRF & Government (central and state)
O&M per year	0.8	1.0	1.3	PRF
Cost recovery (from glass and metal)	19.2	24.6	32.8	Flow back into the system

### **Implementation of Master Plan**

- A pilot run of the model in two cities to derive specific cost and logistic inputs – Delhi and Bangalore
- Comprehensive public awareness campaign needed to sensitize the range of actors and stakeholders
- The fine tuned model to be rolled out in phases for rest of the country with a 35% capture rate in first years reaching to 45% and 60% subsequently
- Necessary regulatory back up to be provided to implement the proposed system under the E (P) Act, 1986.



# Delhi Pilot – Phase I

#### Domestic consumer:

- Pilot will start with support of Residential Welfare Associations
- Portable crushing drums will visit on pre-arranged date to on-thespot crushing of pre collected lamps.
- The association offices will issue circulars to residents to deposit spent lamps at their offices where a specially supplied cardboard box will be placed to collect such lamps.
- The Vans will carry the crushing drums and move from one colony to another and crush lamps on the spot.
- A drum will be able take about 3000 CFL lamps per filling.
- The Vans, when all drums are full, shall carry them to the Mother Recycling Plant where phosphor powder, glass, metal, plastic and mercury will be separated, packed and resent to manufacturing plants for reuse.



### Phase - I

### Bulk users:

- All bulk users like Railways, Electric Supply Companies, Municipality, Airport Authority, CPWD, PWDs, Metro Rail, large factories etc will be advised to buy a portable crushing drums and collected their used lamps in this drum
- The vehicle from recycling plant will visit when informed that the drum is full, will pick up the drum and replace with another empty drum.
- The list of bulk users can be prepared by Delhi Government after considering the quantity of such lamps used by these bulk users.



### Estimated cost of man and machine to establish the Pilot

#### a. Recycling machinery (Rs. Crores)

с.

	Grand Total – a + b + c	Rs. 13.138 Crores
	Sub-Total	Rs. 1.49
	iv) Overhead / unforeseen expenses	Rs. 0.25
	iii) Publicity / PR etc	Rs. 1.00
	ii) Fuel and Vehicle maintenance	Rs. 0.12
	i) Plant (Elec., Maintenance, Communication, Staff welfare etc)	Rs. 0.12
c. Othe	er Operational Cost	
	b. Total I + ii + iii	Rs. 2.028
		Rs.0.348
		Sub-total
•	Assistants / Clerks / Peons etc (app.)	Rs. 0.06
•	Managers / Supervisors (2) @ Rs. 20,000 per p.m	
•	Senior Manager (1) @ Rs. 50,000 p.m.	Rs. 0.06
	iii. <u>Administrative Staff</u>	
		Rs. 0.18
	Sub-total	
•	Helpers 10 @ Rs. 5.000 per p.m.	Rs. 0.06
•	ii. <u>Field Statt</u> Driver-cum-operator for drums (10) @ Rs. 10,000 p.m.	Rs 0.12
		Rs.1.5 Cr.
	<ul> <li>Sub total</li> </ul>	
•	Guards (2) @ Rs. 5,000 x 3 shifts	Rs. 0.36
•	Assistants (3) @ Bs. 15.000 p.m.	Rs.0.54
	Supervisor (one) @ Rs 20,000 per month Supervisor (one) @ Rs 20,000 n m	Rs 0.24
в. O	i. <u>Recycling Plants</u> Napagor (Opo) @ Br. 30,000 por month	Pc 0.26
<b>L</b>		
	Sub-total	 Rs.9.8 Cr.
•	Cost of 10 Vehicles @ Rs. 4 Lakhs each	Rs. 0.4
•	Cost of 40 portable drum crushers @ Rs. 6 Lakhs each	Rs. 2.4
	Cost of one recycling unit	RS. 1.0 RS. 6.0
_	- to be provided by Defin Government	RS. U
•	Land - minimum 1000 to 1500 sq. meters	Bc O

### **Cost Recovery**

Since this Pilot Project is applicable to Delhi only, the National Cess for recycling cannot be applied here.

- It is recommended that for this pilot, additional sales tax can be levied at around 5 or 6% to recover the project cost. Following calculation may be considered for imposing additional tax:
  - Expected sale of CFL and Fluorescent Lamps in year 2012 (Jan Dec) 35 million pieces
  - Considering the additional tax can be collected on 25 million pieces (due to overflow from other states) @ 5% with an average value of a lamp being Rs. 70, this will work out to around Rs.3.50 per lamp making total of Rs. 8.75 Crores.
  - Additional cost will recovered from sale of scrap from crushed lamps i.e. plastic, glass, phosphor, mercury, wire metal etc. which may be about 1.25 crore per annum.
  - This leaves a gap of around 3.2 Crores. Since next year, there is no capital cost involved, the gap deficit will be recovered very easily.



# **Initial funding**

- Since the project amount calculated, will be collected in one year, it is recommended that Delhi Government will invest the amount to start the project.
- The Delhi government will be able to recover most of the invested amount within one year
- The government will also have to give a grant (fund) of difference between cost of project and recovered amount.



# Delhi Pilot – Phase II

After successful launch and operation of Phase I for at least 6 months, the new program will be started:

- Using "Kabariwallas".
  - Here additional cost will incur of giving incentives to consumers, kabariwallas and super kabariwalas.
  - This will cost around Rs. 4 to Rs. 5 per lamp.
  - This proposal will ensure at least 50 to 60% recovery of used lamps.
  - The additional cost will be recovered from 2<sup>nd</sup> year onward when there will not be any capital cost incurred and the sale of CFL will also increase by about 20%



# **Promotion and Public awareness**

- News Paper advertisements informing users about the program and the process required to be followed to reach products to the recycling unit – the ads to be regularly repeated
- FM Radio coverage Some of the local TV channels can also be used to carry the message
- Workshops for Residential welfare associations / large users
- Messages on Electricity bills / Telephone bills etc.
- Creation of website to carry process of operation and also to attend to queries. Important links to websites of Delhi government, BEE, Ministry of Power, Min of Forest and Environment etc.





# Thank you!

