Perspectives of
Electronic Waste Management

Presentation by:

Dr. D.B. Boralkar

Member Secretary

Maharashtra Pollution Control Board

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WHAT IS ELECTRONIC WASTE

Electronic Waste (E-Waste) comprises of waste electronic goods which are not fit for their originally intended use. These range from household appliances such as refrigerator, air conditioner, cellular phone, personal stereos and consumer electronics to computers.

IS IT HAZARDOUS WASTE ?

E-Waste contains several different substances and chemicals, many of which are toxic and are likely to create adverse impact on environment and health, if not handled properly. However, classification of E-waste as hazardous or otherwise shall depend upon the extent of presence of hazardous constituents in it.

TOXIC CONSTITUENTS

CONSTITUENTS	COMPONENTS
Lead and cadmium	Printed circuit boards
Lead oxide and Cd	Cathode ray tubes (CRTs)
Mercury	Switches & flat screen monitors
Cadmium	Computer batteries
PCB	Capacitors and transformers
Brominated flame retardant	Printed circuit boards, plastic casings cable
PVC	Cable insulation / coating

ENVIRONMENT AND HEALTH HAZARDS

Computer / E-Waste Components	Process	Potential Occupational Hazard	Potential Environmental Hazard
Cathose ray tubes (CRTs)	Breaking removal of copper yoke and dumping	♦ Silicosis ♦ Cuts from CRT glass in case of implosion ♦ Inhalation or contract with phosphor containing cadmium or other metals	Lead, Barium and other heavy metals leaching into groundwater, release of toxic phosphor

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Printed circuit boards	De-soldering and removing computer chips	♦ Tin and lead inhalation ♦ Possible brominated dioxin, beryllium, cadmium, mercury inhalation	Air emission of same substances
Dismantled printed circuit board processing	Open burning of waste boards that have had chips removed to remove final metals	♦ Toxicity to workers and nearby residents from tin, lead, brominated dioxin, beryllium, cadmium and mercury inhalation ♦ Respiratory irriation	Tin and lead contamination of immediate environment including surface and ground waters. Brominated dioxins beryllium, cadmium and mercury emissions

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Chips and other gold plated components	Chemical stripping using nitric and hydro-chloric acid along riverbanks	◆ Acid contact with eyes, skin may result in permanent injury. ◆ Inhalation of mists and fumres of acids, chlorine and sulphur dioxide gases can cause respiratory irritation to severe effects including pulmonary edema, circulatory failure and death	◆ Hydrocarbons, heavy metals, brominated substances, etc., discharged directly into river and banks. ◆ Acidifies the river destroying fish and flora.

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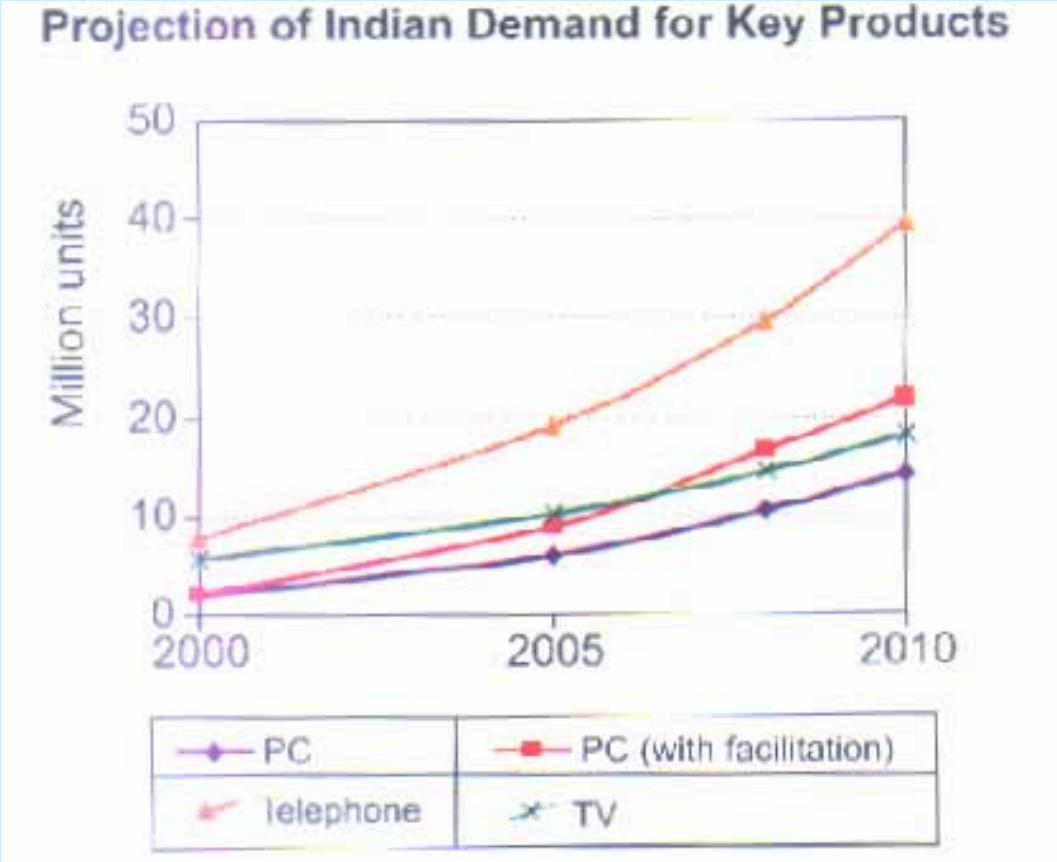
Plastics from computer and peripherals e.g. printers keyboards, etc.	Shredding and low temperatu-re melting to be reutilized in poor grade plastics	Probable hydrocarbon, brominated dioxin and heavy metal exposure.	Emissions of brominated dioxins and heavy metals and hydrocarbons
Computer wires	Open burning to recover copper	Brominated and chlorinated dioxin, polycyclinc aromatic hydrocarbons (PAH) (carcinogenic) exposure to workers living in the burning works area.	Hydrocarbon ashes including PAHs discharged to air, water and soil.

Contd..

Miscellaneo-us computer parts encased in rubber or plastic e.g. steel rollers	Open burning to recover steel and other metals	Hydrocarbon including PAHs and potential dioxin exposure	Hydrocarbon ashes including PAHs discharged to air, water and soil.
Toner cartridges	Use of paint-brushes to recover toner without any protection	♦ Respiratory tract irritation ♦ Carbon black possible human carcinogen ♦ Cyan, yellow and magenta toners unknown toxicocity	Cyan, Tellow and magenta toners unknown toxicity

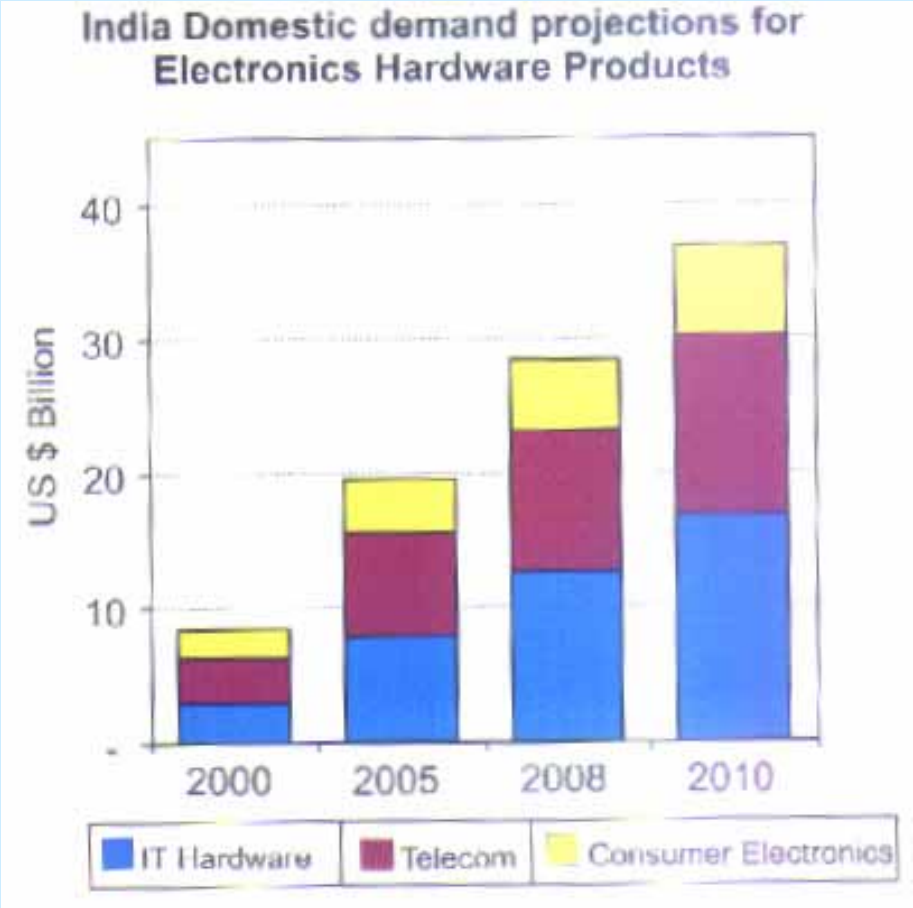
Secondary steel or copper and precious metal smelting	Furnace recovers steel or copper from waste including organics	♦ Exposure to dioxins and heavy metals	Emission of dioxins and heavy metals.

Indian Scenario



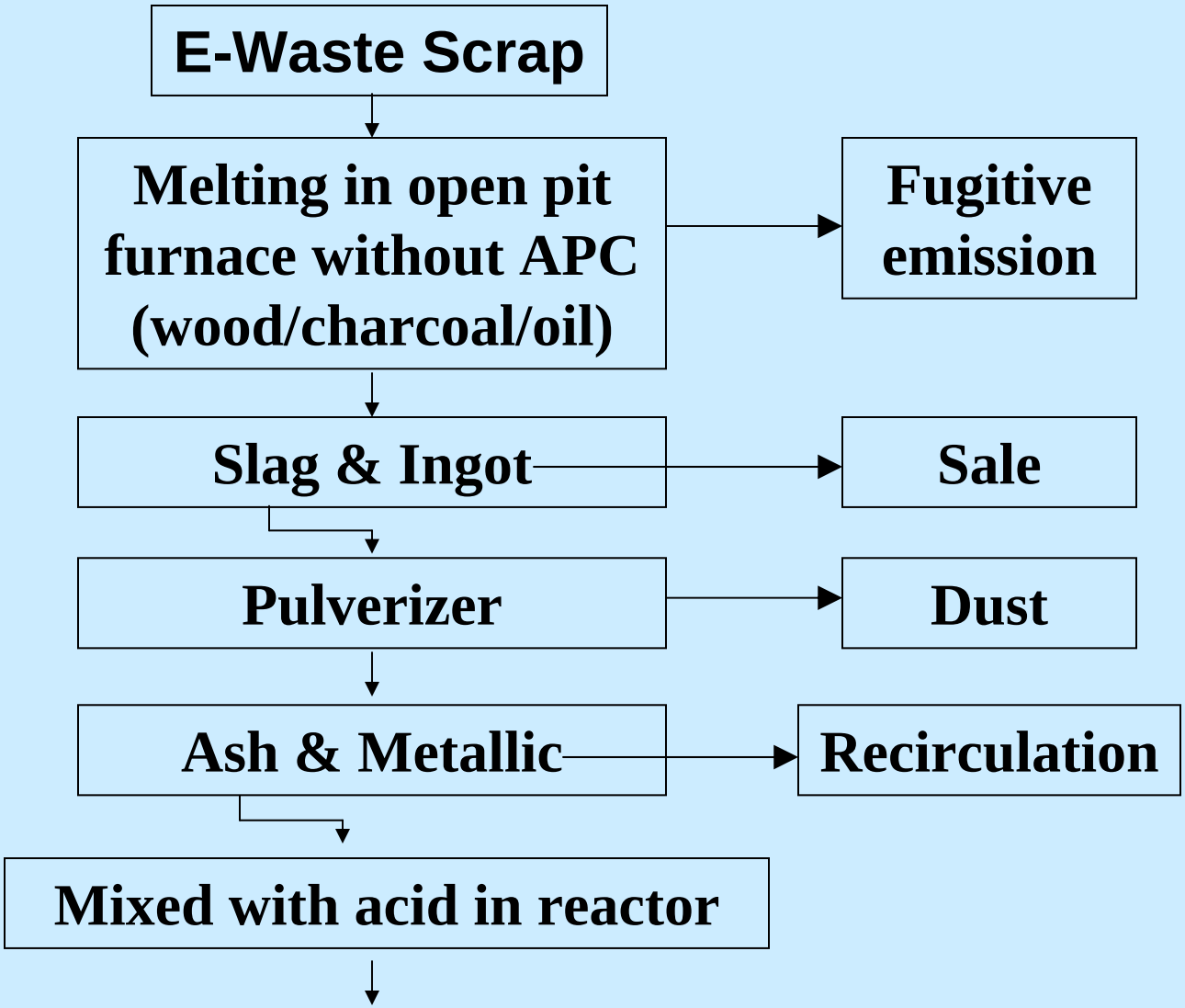
Source : MAIT

Indian Scenario



Source : MAIT

POLLUTION PROBLEMS



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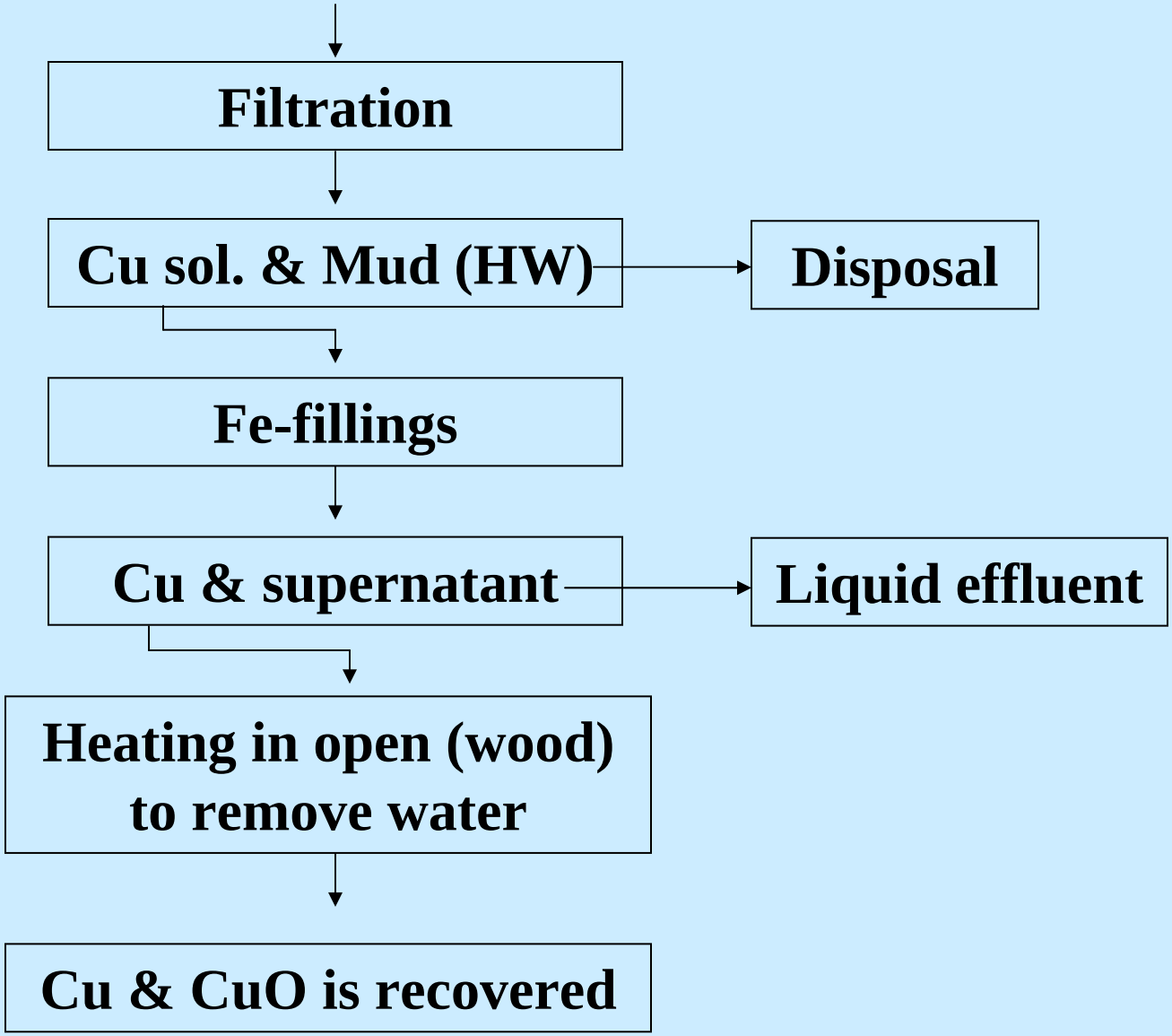
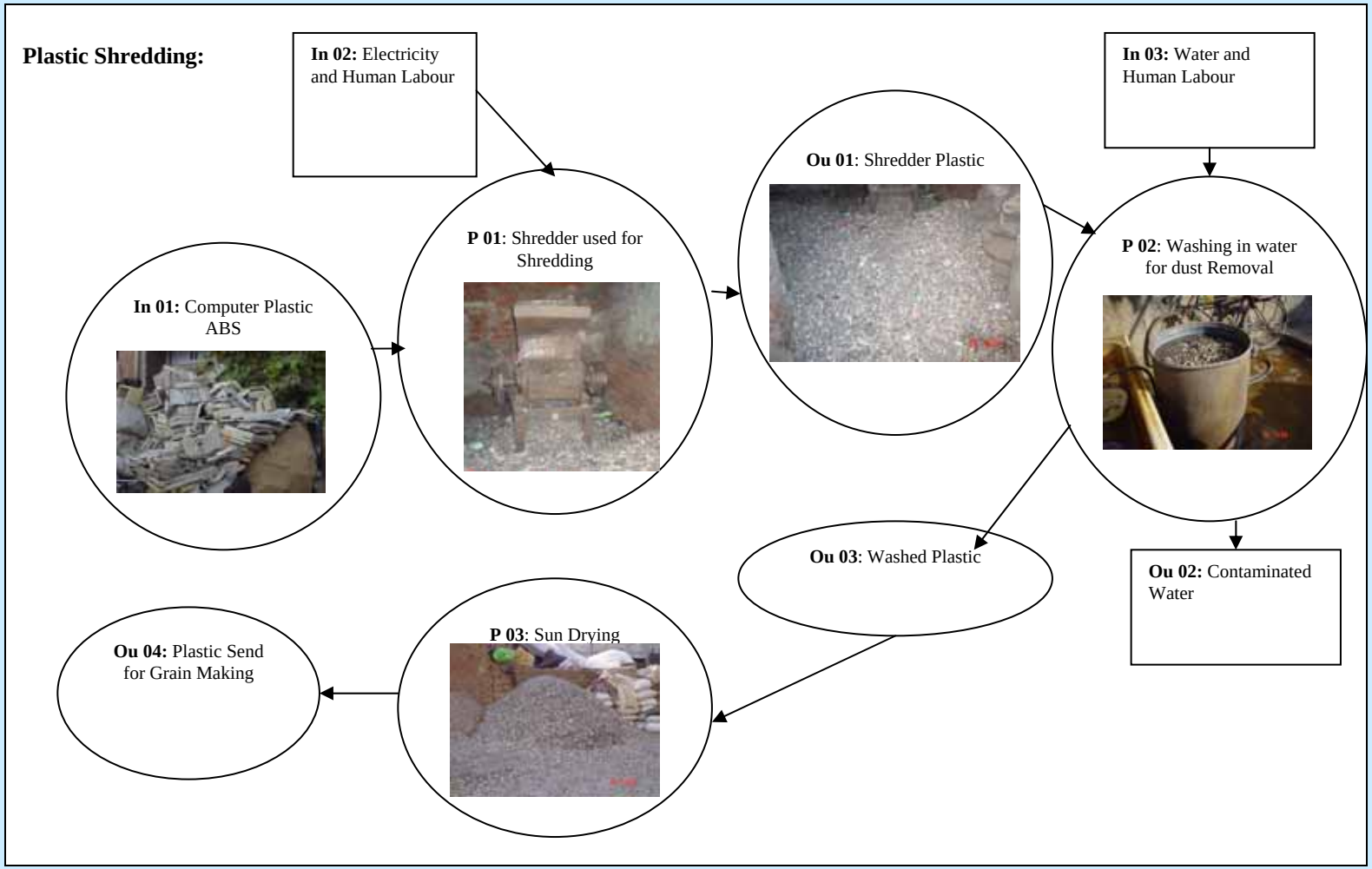

Filtration
Cu sol. & Mud (HW)
Disposal
Fe-fillings
Cu & supernatant
Liquid effluent
Heating in open (wood) to remove water
Cu & CuO is recovered

Examples of Pollution

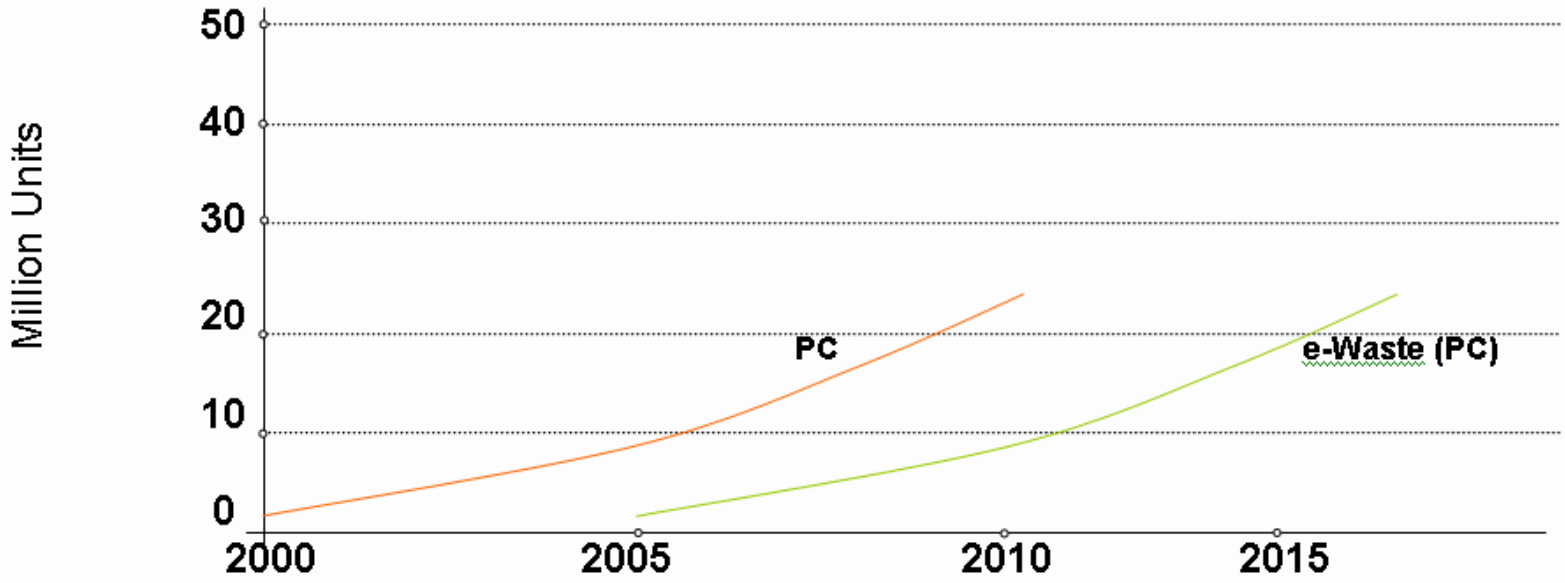


Status

	2003	2004
Existing PC Base	9 million	11 million
e-Waste Total	414,000 *	
e-Waste Domestic	40,000	
e-Waste Outside	374,000	

* **Toxics Link Report**

Expected trends



Assumption: Obsolescence rate as 5 years

International Scenario

FINDINGS STATED IN REPORT BY *BAN*

- 50 to 80% E-wastes collected are exported for recycling by U.S. Export is legal in U.S.
- Export is due to cheaper labour and laxed standard in poor countries.
- E-waste recycling and disposal in China, India and Pakistan are highly polluting.
- China has banned import of E-waste.
- Lack of responsibility on the part of Federal Government and Electronics Industry, Consumers, recyclers and local governments towards viable and sustainable options for disposal of E-wastes.

POSITION OF ELECTRONIC WASTES

(a) HW Rules, 1989

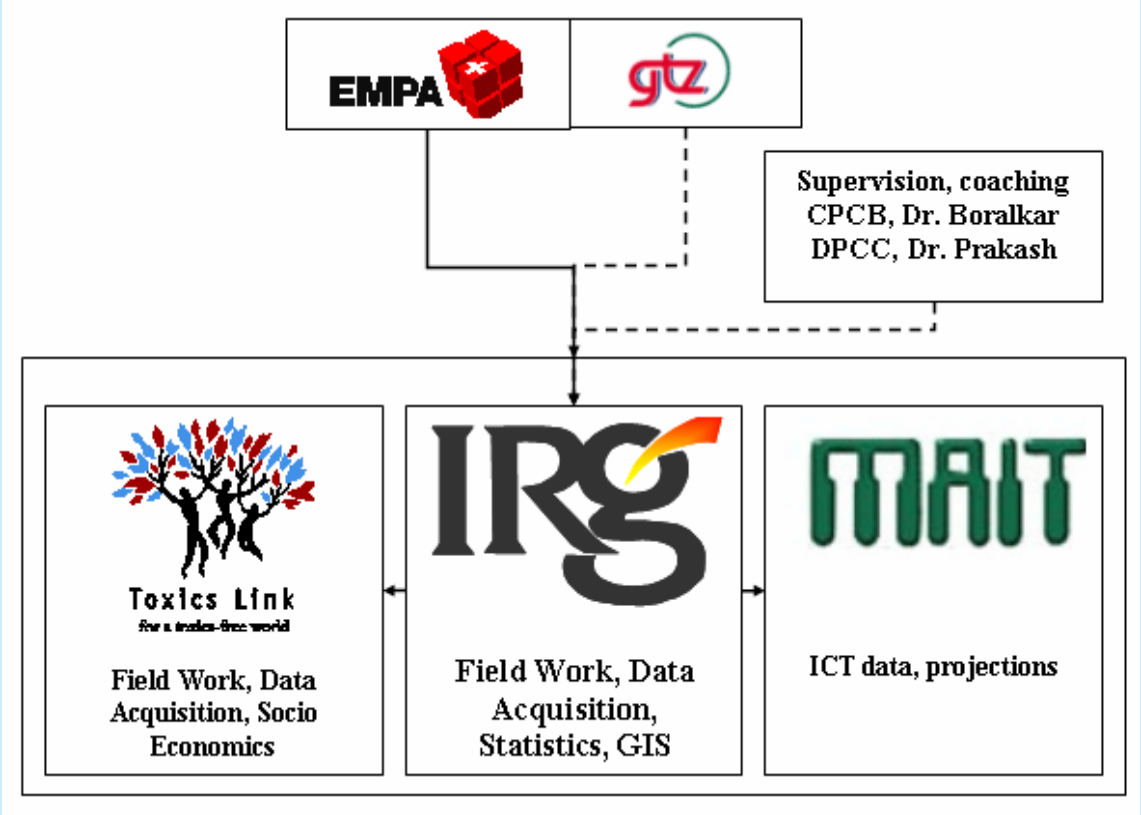
- Not covered in Schedule 1. Schedule 2 can be applied in case of their disposal.
- Schedule 3 entry at Sl.No. A1180 : waste electrical and electronic assemblies (For EXIM).
- Schedule 3 entry at Sl.No. B1110 : electrical and electronic assemblies not valid for direct reuse but for recycling (For EXIM).

(b) Basel

- A 1180: Annex I (Cd, Hg, Tb, PCB) to exhibit Annex III.
- B 1110: Mirror entry of A1180

THANKS

Delhi Case Study



Next Steps

NEED ASSESSMENT STUDY ON E-WASTE

- Assessment of current scenario : quantification, characteristics, existing disposal practices, environmental impacts etc.
- Projections for next 10 years regarding consumption and waste generation of electronic goods particularly PC & its accessories, fax, photocopiers etc.
- Regulatory mechanism in other countries (OECD and Non-OECD) and comparison with Indian conditions particularly with regard to regulation of import.
- Possibility of collection system and requirement of legal instruments.

Next Steps

NEED ASSESSMENT STUDY
ON E-WASTE

- Environmentally sound technologies and methods for recycling and recovery.
- Suggestions for fiscal incentives to promote recycling.
- Technical feasibility of setting up of model facility (demonstration project).
- Areas of bilateral / multilateral cooperation.
- Training and field visits.

Intervention Required

1. **Policy**
2. **Technical**
3. **Financial**
4. **Implementation & capacity building**

Policy Level Interventions

- **Definition of e-waste for regulation**
- **Import and Export regulatory regime**
- **Access to EST & ESM**
- **Facilitation & development of infrastructure**

Technical Interventions

- Restriction for use of toxic material
- Use of environmentally friendly material
- Development of criteria for recovery and disposal
- Design and engineering interventions
- Adoptability for up-gradation

Financial Interventions

- **Incentives for collection**
- **Subsidies**
- **Advance Recovery Tax**
- **MODVAT**

Implementation & Capacity Building

1. Legislation for collection, recycling and disposal
2. Institutional capacity building
3. Bilateral & multilateral cooperation

Agenda 2004-05

National Workshop on e-waste, March 15, 2004

"THINK"

Task Force:
- Policy
- Technical
- Financial
- Capacity Bldg
- Regulation

"FIND"

Assessment:
- Mumbai
- Bangalore
- Pune
- Hyderabad
- Ahmedabad
- Kolkata
- Chennai

"DO"

Pilot Impl. :
- Collection
- Demo. plant
- Existing infr. (Use)

THANK YOU