



Toxics Link
for a toxics-free world

Sustainable Development and waste

Satish Sinha
Toxics Link

About Toxics Link



- Not for profit, non governmental organisation
- Engaged on environmental issues relating to toxics, chemicals and waste for over 15 years
- Hazardous, bio medical and municipal waste, e-waste, waste trade, food safety and chemicals management.
- Work on reducing heavy metals toxicity from our lives
- Active member of civil society international networks IPEN, HCWH, etc

Development & Environmental Challenges

- Developments linked to environmental impacts
- Environmental impacts:
 - Resource depletion, Climate Change
 - Contamination of soil, water, air, food
 - Pressure on urban land
 - Carrying capacity
- Production , Consumption and waste
- Multiple challenges in developing economies
- Marginalized and poor most impacted

Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

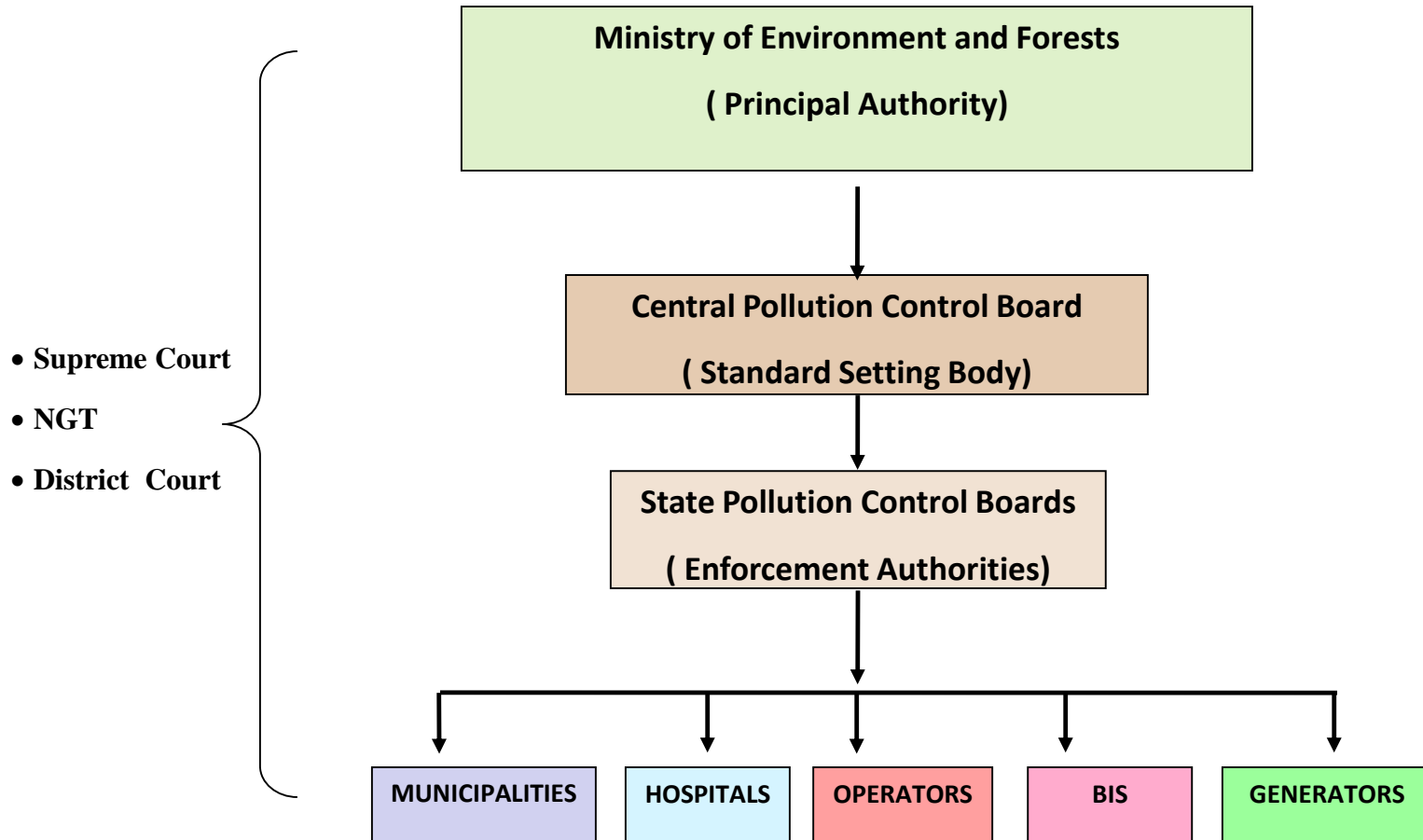
SCP

The use of services and related products, which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of future generations.

Environmental Conventions

- Basel Convention on Transboundary Movement of Haz Waste - 1989 (1992)
- Rotterdam Convention -1998
- Kyoto Protocol -1997
- Stockholm Convention on PoPs -2001 (2004)
- Minamata Convention: 2013

Environmental Governance



Waste can be defined....

- "Wastes" are substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law (**Basel Convention**)
- "Waste" shall mean any substance or object in the categories, which the holder discards or intends or is required to discard (**EU directive**)

Categories of Waste: India

- Municipal Solid Waste
- Biomedical Wastes
- Lead Acid Battery Waste
- Hazardous Waste
- Electronics Waste (E-Waste)
- Radioactive Waste
- Plastic Wastes
- (Currently under discussion – Mercury Waste)
- House hold hazardous waste
- Liquid waste or effluents

Waste regulations, India

- Hazardous Waste Management and Handling Rules-1989
- Bio Medical waste handling and Management Rules- 1998
- Municipal Solid Waste Management and Handling Rules - 2000
- Plastic Waste Management and Handling Rules 2003
- E Waste Management and Handling Rules -2011
- Lead Acid Battery Management rules

Municipal Solid Waste

- 1,27,486 TPD (Tons Per Day) of MSW generated in India on 2011-2012 (CPCB data)
- Of the total waste generated, approx. 89,334 TPD (70%) of MSW was collected and only 15,881 TPD (12.45%) was processed or treated
- Per capita generation of 0.11 kg to 0.6 kg per day
- Class -I cities account three -fourth of wastes generated in urban areas
- Big cities collect about 70 - 80% of MSW generated
- Smaller cities and towns collect less than 50% of waste generated

Source: Ministry of Urban Development; GoI

Municipal Solid Waste (Management & Handling) Rules: 2000



- Indian Constitution recognizes the role of local bodies (74 Amendment)
- Responsibilities largely lies with the State Department /municipality

Management steps

- Collection , Segregation, Storage, Transportation and Disposal
- Disposal (Biomethenation, Composting, Incineration,)

Agencies responsible

- MOEF, MOUD, CPCB, SPCB, State Urban Department and Municipalities
- Submission of the Annual report to CPCB.

Important Provisions:

- Land Fill Siting, Standard for Composting, Leachates and Incineration

“Swachh Bharat Abhiyan” Oct 2014

Sanitation & Waste Management., Behaviour change, MOUD and MOEF.

Municipalities and state governments

Challenges in MSW

- Poor compliance record of municipalities
- Source Segregation, collection and recycling
- Landfill space and its management
- Fixing accountability of agencies (SPCB & Municipality)
- Choice of technology ????
- Capacity of implementers and regulators
- Waste minimization
- Recycling drivers.
- Tipping Fees

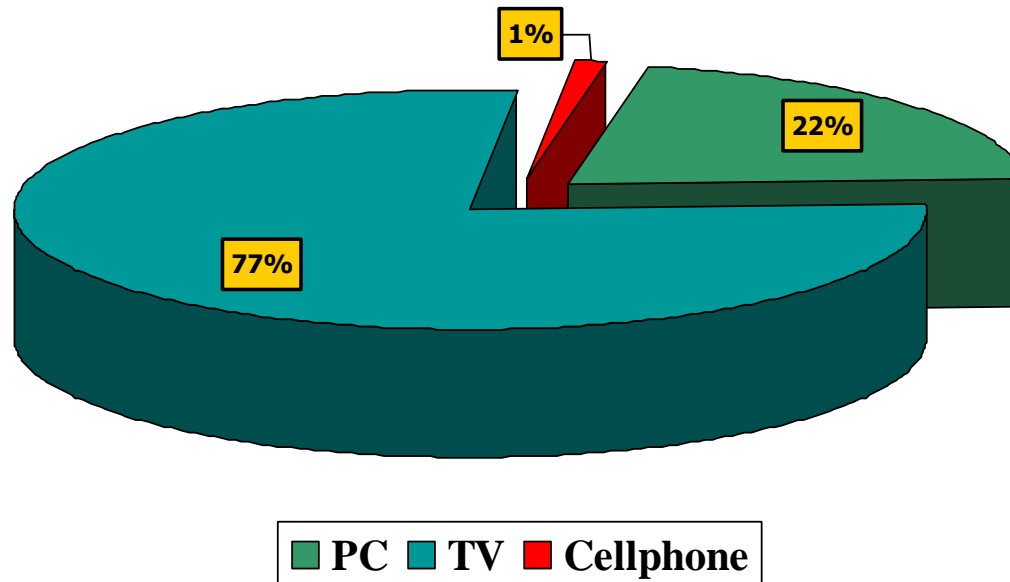
Scope of Improvement

- Inadequacy of data
- Finalisation of contracts
- Technology evaluation/ experts
- Role of SPCB
- Systems management at Municipality
- Monitoring of PPP projects.

Contd..

- Lack of data on waste generation and composition is coming in the way of churning out deficiencies in the system
- Total quantity of waste generated in the country is not reported by SPCBs
- Characterization of waste is necessary to know changing trends in composition of waste
- Based on composition/ characterization of waste, appropriate selection of waste processing technologies could be selected.

Electronics Waste



- India generates 2.7 million tons of e-waste annually

E-waste as Resource

Electronics have a significant impact on metals demand: Worldwide sale 2008

a) Cell phones:



1300 Million units

x 250 mg Ag \approx 325 t Ag

x 24 mg Au \approx 31 t Au

x 9 mg Pd \approx 12 t Pd

x 9 g Cu \approx 12,000 t Cu

1300 M x 20 g/battery*

x 3.8 g Co \approx 4900 t Co

* Li-Ion type

b) PC & laptops:



300 M units

x 1000 mg Ag \approx 300 t Ag

x 220 mg Au \approx 66 t Au

x 80 mg Pd \approx 24 t Pd

x \approx 500 g Cu \approx 150,000 t Cu

\approx 140 M laptop batteries*

x 65 g Co \approx 9100 t Co

** Li-Ion type is > 90% used in modern laptops

World Mine / a+b Production / share

Ag: 21,000 t/a \blacktriangleright 3%

Au: 2,400 t/a \blacktriangleright 4%

Pd: 220 t/a \blacktriangleright 16%

Cu: 16 Mt/a \blacktriangleright 1%

Co: 60,000 t/a \blacktriangleright 23%

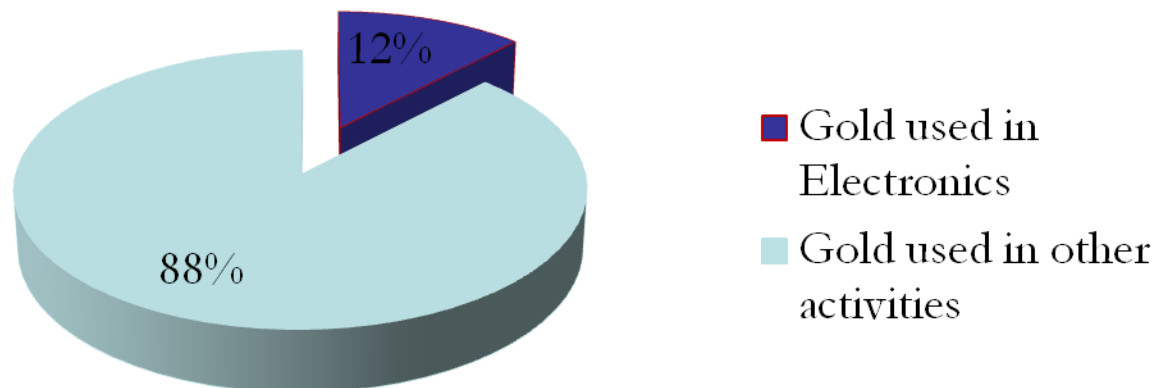
Cumulative sale of cell phones until 2008:
7.2 billion with 1800 t Ag, 170 t Au, 70 t Pd

Critical Metals

short term (< 5 years)	Tellur Indium Gallium
medium term (< 2020)	rare earth Lithium Tantal Palladium Platin Ruthenium
long term (< 2050)	Germanium Cobalt

Production VS Usage in 2012

Quantity of Gold in Tonnes



Total gold production = 2700 tonnes

Amount of Gold used in Electronics = 320 tonnes

Concerns of E- Waste Recycling



- High-risk backyard operation (over 95% of waste treated here)
- Women and children employed
- Occupational and environmental hazards
- Lack of efficient and environmentally sound technology
- Loss of resources due to inefficient processes
- Disproportionate sharing of gains – traders most benefited, workers most impacted
- Impacts mostly on vulnerable social groups- Migrant labourers bear the brunt

Legislative Overview

- The E-waste (Management) Rules, 2015 (Draft)
- The E-waste (management and handling) Rules, 2011 came into force from May 2012
- Guidelines for Implementation of –E-Waste rule by CPCB-2011

Salient Features “ E-Waste Rule - 2011”

- Responsibilities of the producer (Extended Producer Responsibility (EPR)
- Responsibilities of collection centers
- Responsibility of the dismantler
- Responsibility to the recyclers
- RoHS - Restriction on use of Haz Substances
(Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated Biphenyls, Polybrominated biphenyl ethers)
- Flexibility in implementation offered to producers
- Select categories of products included in rules (lighting excluded)

Issues in E-Waste Management



- Enforcement of EPR
- Infrastructure collection and recycling
- Informal sector
- Absence of targets
- Capabilities of PCBs and resources
- Understanding of the rule
- Mindset of inspector raj

New Draft E-waste (Management) Rules, 2015

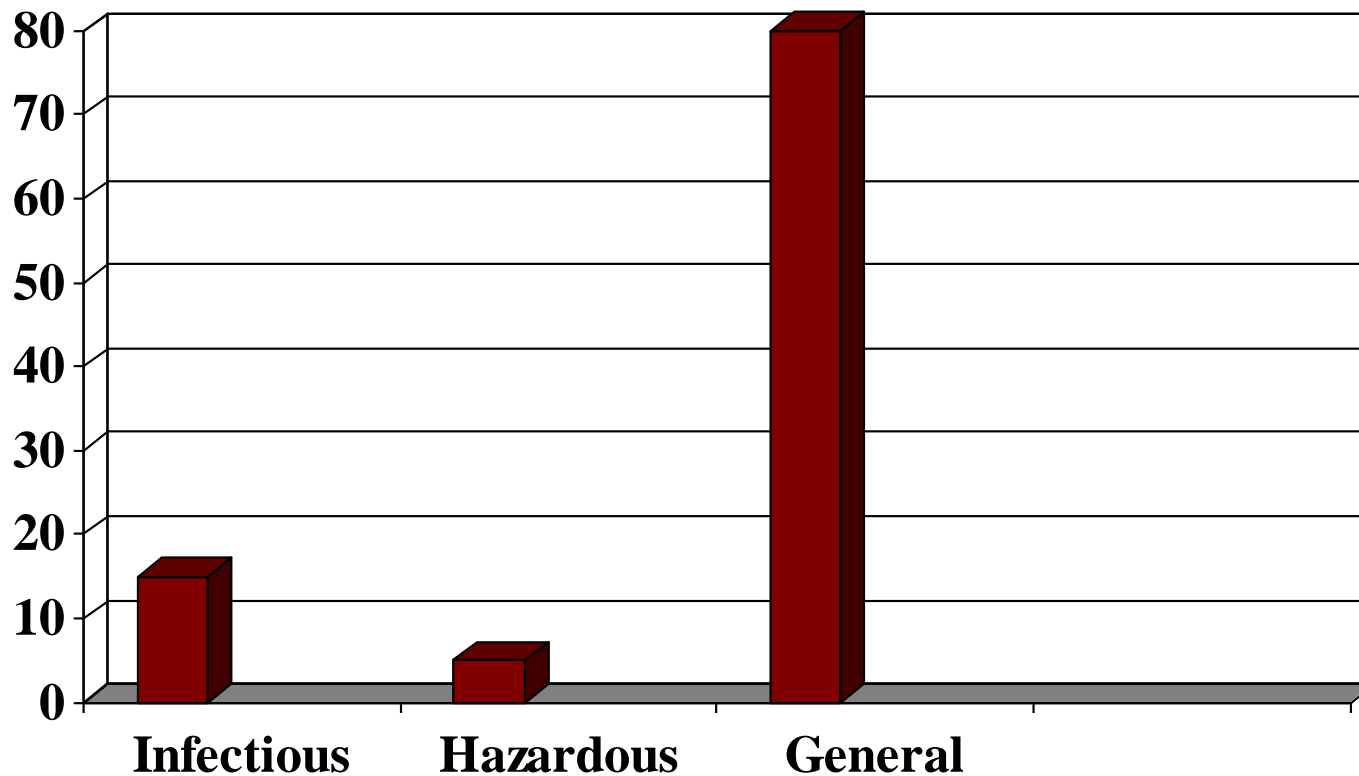
- Targets
- Deposit Refund Scheme
- State Specific EPR Plan submission
- Central authorization
- Introduction of dealers and refurbishers
- Single line e-waste collection channel
- Concept of Producer Responsibility Organization
- Compulsory annual return filling by each stakeholder especially by bulk consumers
- Self declaration for RoHS

Scope for Improvement

- Detail plan for DRS
- Other government department to be included such as customs and finance
- Responsibility of PRO to be defined
- Compliance by the State Pollution Control boards.
- High recycling standards to create market for recycled products
- Lack of data on generation, infrastructure and recycling quantities

Biomedical Waste

Bio-medical waste means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals; or in research activities pertaining thereto or in the production or testing of biological etc.



Indian Scenario

Total No of Health Care Facilities (HCF)	: 1,68,869
Total number of Beds (Approx.)	: 17,13,742
The quantum of waste generated	: 4,84,271 Kg/day
Total quantity of waste treated	: 4,47,456 kg/day
Number of HCF utilizing CBWTF	: 131,837
Number of HCF applied for authorization	: 106805
Authorizations Granted	: 105270
Total violations	: 7894
Total CBWTF operation	: 190
CBWTF (Under Construction)	: 29

Source: CPCB (2013)

Biomedical Waste (Management and Handling Rules) 1998

- Responsibility of the Occupier (Generator) “Polluters Pay Principle”
- Role of the Operator of the Biomedical Waste Facility
- Segregation, Disinfection & Mutilation
- Transportation and Storage
- Treatment and disposal
- State Pollution Control Board is the supervisory authority
- Interdepartmental advisory committee
- Annual report to the central pollution control board
- Concept of Business Model
- Concept of Centralised Facility , Multiple technologies
- Discouraging on-site incineration.

Issues in BMW

- Waste segregation in hospitals
- Inadequate Monitoring by SPCBs, capacity issues
- Lack of reliable national data
- CTFs operations non transparent.
- Inadequate control of regulator over generator
- Inadequacy of appropriate infrastructure for rural and difficult terrains
- No research and new data(Innovation non existent)
- Cost to regulate

Scope for Improvement

- Flow of fund for biomedical waste management
- Tendering & Allocation process of CTFs
 - The lowest bid argument in CTF allocation process when only one CTF is available as the applicant
- Subsidy /Land grant to the CTFs
- Audit reports of CTFs
- Performance and technology of the CTFs
- Efficacy of Infrastructure in CTFs
- Performance of Pollution Control Boards in terms of initiating action against defaulting HCFs
- Lack of reliable national data on BMW – waste generated, treated, infrastructure for BMW management

Funding Opportunity & Accessibility



- **Availability**

- National Health Mission (NHM) by Ministry of Health (MoH) under the line item IMEP (Infection Management & Environment Plan)
 - For purchase of consumables
 - Payment to CBWTFs
 - Training of healthcare worker on bio medical waste
- NACO funding for Blood Safety

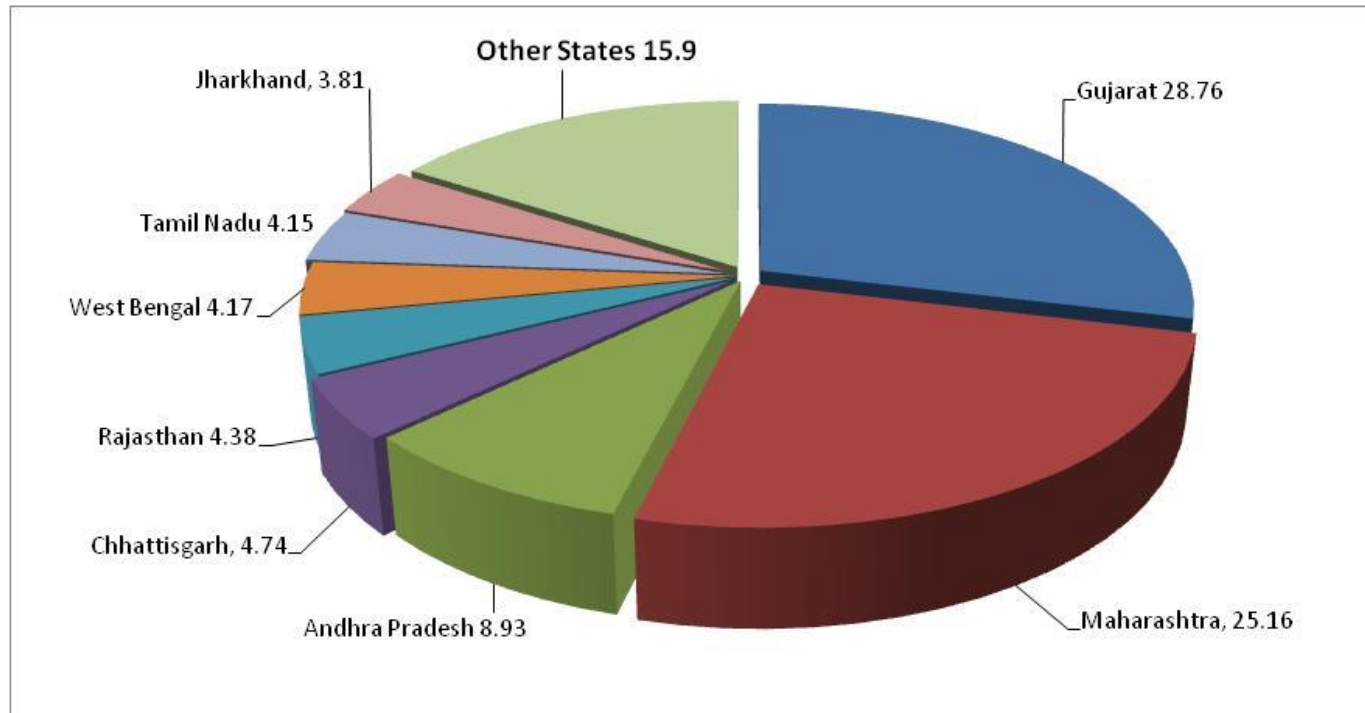
- **Accessibility**

- Approach for funds under IMEP as part of annual PIP submission by State health dept, though it varies state wise
- Central procurement, payments & training may be possible through State Health Society, though it may varies state wise (as in few state individual health set up makes the payment)
- Alternatively Rogi Kalyan Samiti (RKS) funds are used for making these arrangements in few states

Hazardous Waste

- Categories in three groups
 - ✓ Recyclable
 - ✓ Incinerable
 - ✓ Disposable
- Generate - 62, 32, 507 metric tone of hazardous waste annually
- 36, 165 no. of hazardous generating industries in India
- Maharashtra, Gujarat and AP account 63% of the total HW
- 30 TSDFs in India. (Gujarat has maxim . No)
- Disposal through incineration and land fill TSDF(PPP)

Generation of Hazardous Wastes by States



Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008

- Replaced the HW Rule of 2003
- Broader the definition of hazardous waste
- Occupier(Generator) responsible for safe and environmentally sound handling of hazardous wastes
- Hazardous wastes shall be collected, treated, re-cycled, re- processed, stored or disposed in facilities authorized by the SPCBs
- Maintain the records of the hazardous waste facilities
- Conditions for the recycling of hazardous wastes
- Export and Import subject to the conditions
- Responsibilities of the authorities (MoEF, CPCB, SPCBs, State Govt, DGFT, Port Authority)
- Liability of the occupier, transporter and operator of the facility
- Setting up of the TSDFs

Issues in Management

- Monitoring Infrastructure
- Getting data from the private operators
- Interstate transfer of waste
- Capacity of the PCBs

Scope of Improvement

- Land for the TSDF facilities
- Tendering process of the TSDFs
- Technologies use in the TSDF
- Subsidies provided to the technologies
- Environmental compliances in TSDF
- Hazardous Waste Management of PSUs
- Effective monitoring by the state pollution control boards

Plastic Waste

- Annual Generation of Plastic Waste in India: 5.6 million tons
- Per day plastic waste generation is 15342 tons
- Delhi producing 689.5 tones a day
- Chennai (429.4 tones)
- Kolkata (425.7 tones)
- Mumbai (408.3 tones).
- 60 % of the total plastic waste recycled (9,205 tones per day)
- 40% of the total plastic uncollected and littered (6,137 tones remain uncollected and littered)

Plastic Waste: Environmental Hazards

- During polymerization process fugitive emissions are released.
- During product manufacturing various types of gases are released.
- Indiscriminate dumping of plastic waste on land makes the land infertile due to its barrier properties.
- Burning of plastics generates toxic emissions such as Carbon Monoxide, Chlorine, Hydrochloric Acid, Dioxin, Furans, Amines, Nitrides, Styrene, Benzene, 1, 3- butadiene, CCl₄, and Acetaldehyde.
- Littered plastics give unaesthetic look in the city, choke the drain and may cause flood during monsoon .
- Garbage mixed with plastics interferes in waste processing facilities and also cause problems in landfill operations.
- Recycling industries operating in non-conforming areas are posing threat to environment to unsound recycling practices.

Plastic Waste(Management and Handling Rule): 2011

- Huge responsibilities lie with the Municipality Authority (collection, storage, segregation, transportation, disposal)
Setting Up of collection centers in association with producer
- Standardization of BIS in the process of manufacture and recycling
- Labeling mandatory
- EPR has been outlined
- Authorization from the State pollution Control Boards

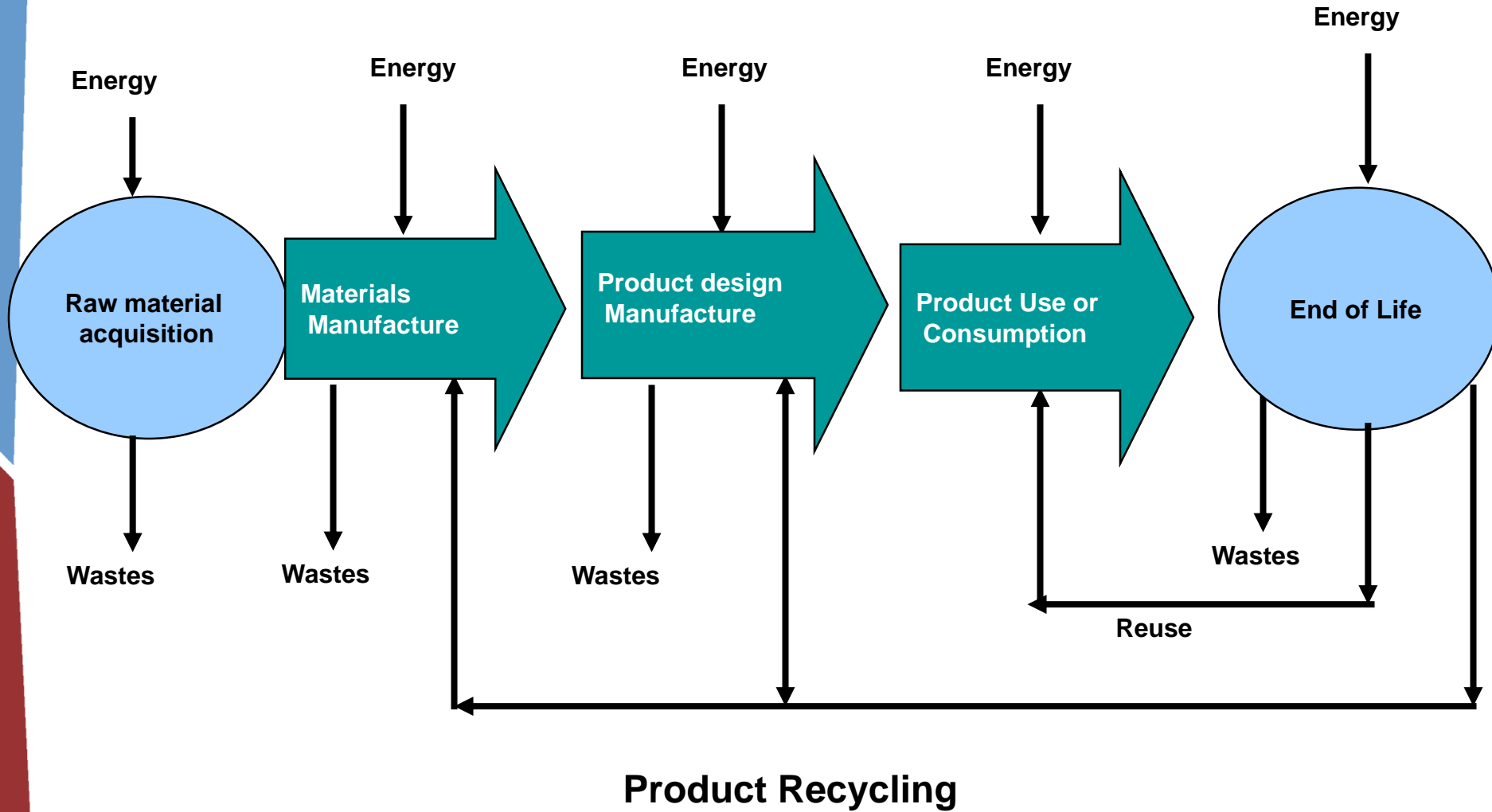
Issues in Management

- Capacity of the Municipalities
- Proactive participation of producer
- Labeling of plastics and enforcement
- Monitoring

Scope of Improvement

- Mechanism of Collections, Transportation, Storage, Segregation and Processing of the Plastic Wastes by the Municipalities
- Land allocation process for the disposal facilities
- Monitoring Role of the State Pollution Control Boards

EPR Principle



Issues in the Present Governance

- Implementation lie with State Environment Department, SPCBs and Urban bodies
- Multiple agencies
- Coordination and conflict with departments (Ex: Biomedical Waste Managements)
- Interstate conflict
- Cost to regulate
- Lack of research and infrastructure
- Accountability of agencies
- Informal sector

Scope for Improvements

- Improve capacities of SPCBs
- Improve coordination among the ministries
- Streamline the management practices
- Role of civil society
- Fixing the responsibilities and accountabilities
- Accountability of the private players
- Societal Risk Analysis Vs Business Model
- Budget for the cost of regulation
- Separate financial mechanism for waste management

New Age Resource Management

- Decouple economic growth and environmental degradation
- Lifecycle thinking
- Resource efficiency
- Design for environment
- New thinking on waste policy
- New Business opportunity