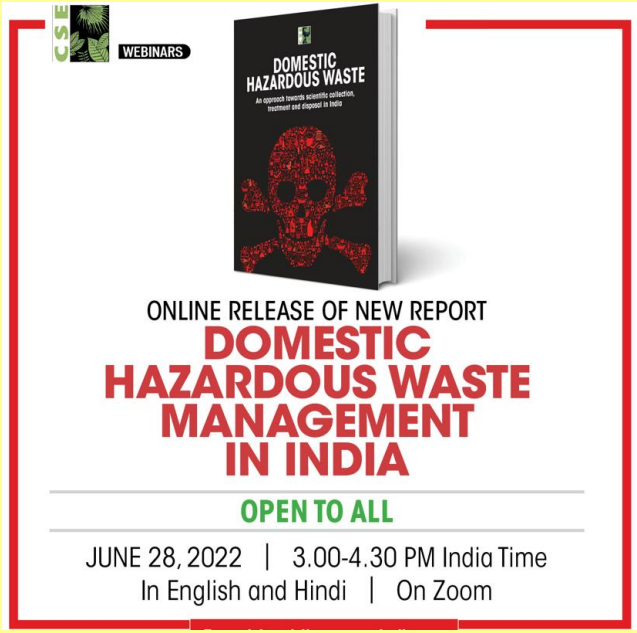

Webinar on Domestic Hazardous Waste

An approach towards scientific collection, treatment & disposal in India

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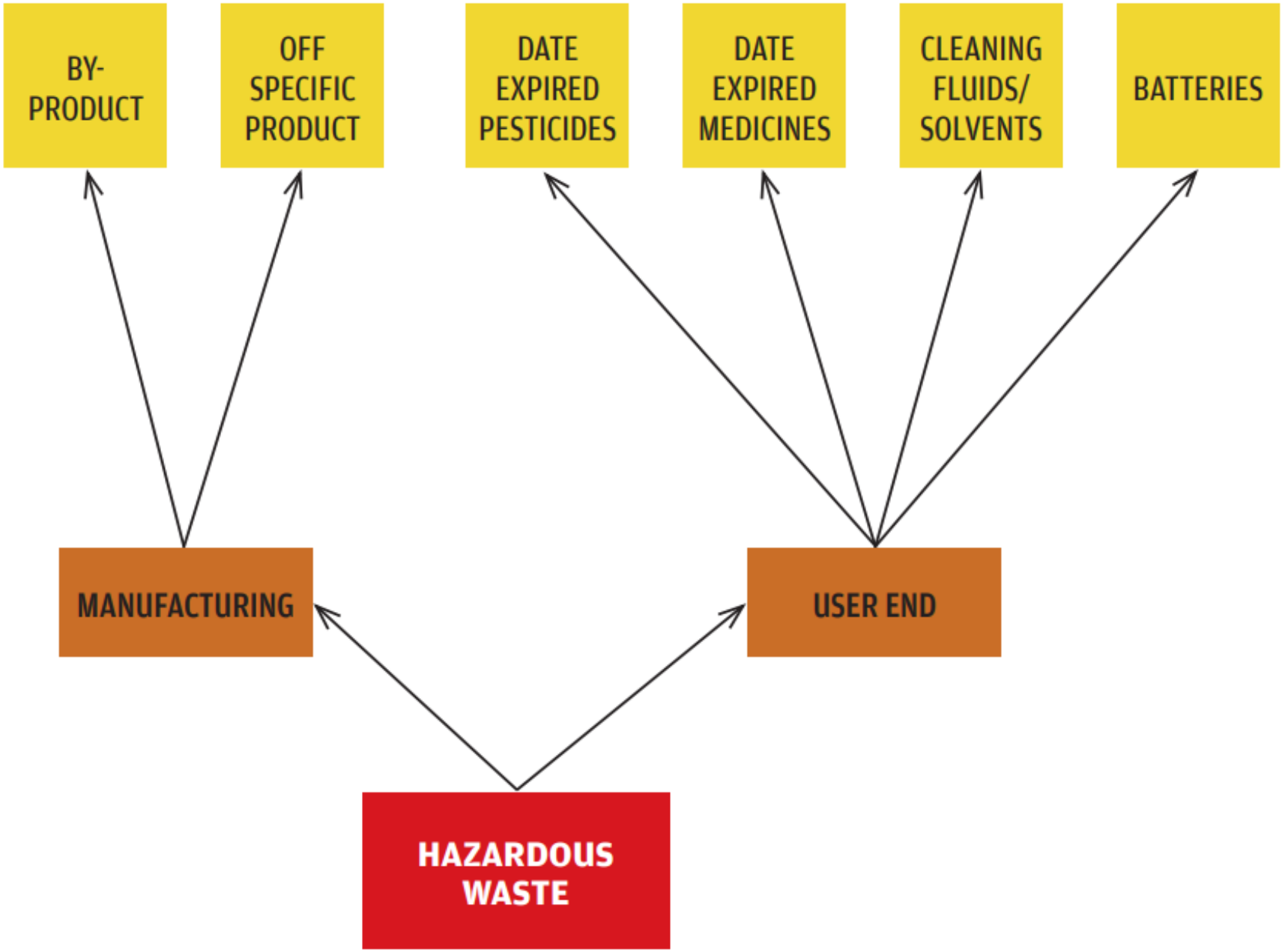
What is hazardous waste?

- May include any by-product of manufacturing process, used discarded material or unused discarded material
- Or anything that causes hazard to human health and environment when present alone or in combination of other material
- The USEPA considers end-of-life materials that can catch fire, react, explode under certain circumstances, or that are corrosive or toxic as ‘hazardous waste’
- Regulated under the Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016



Sources of Hazardous Wastes

Characteristics of hazardous wastes

CORROSIVITY

- pH < 4 or >12
- Corrosion of steel at 6.35 mm/year at 55 o C

Causes deterioration, or eating away of body tissue and other surfaces that it touches.

Examples: Bleach, laundry stain removers, oven cleaners, drain cleaners and lead acid batteries.

REACTIVITY

- Unstable and readily undergoes violent change without detonation

Unstable waste which may cause explosions or release toxic fumes, gases, or vapors when heated, compressed or mixed with other materials.

Examples: Batteries, windshield washer fluid, antifreeze and laundry detergent.

IGNITABILITY

- Liquid other than an aqueous solution containing >20% organic content by volume & flash point <60 °C

Oxidizing substance when in contact with moisture, or other materials/wastes, results in spontaneous fire or combustion. Flammable waste, easily catches on fire.

Examples: Petroleum products, pesticides, insecticides and deodorants.

TOXICITY

- Poisonous and may cause injury or death if swallowed, inhaled, or absorbed through the skin.

A solid waste exhibits the characteristics of toxicity if the leachate from the representative sample by TCLP test method contains any of the contaminants in excess of the prescribed concentration limits.

Examples: Insecticides, paints, paint thinners and disinfectants.

Characteristics of hazardous wastes

CARCINOGENIC

- Carcinogenic substances and preparations that if inhaled or ingested or penetrate the skin may induce cancer or increase its incidence.

Certain chemicals, including benzene, beryllium, asbestos, vinyl chloride, and arsenic are known human carcinogens.

Examples: Cleaning agents

POISON

- Substances or wastes liable either to cause death or serious injury or harm to human health if swallowed or inhaled or by skin contact.

Certain chemicals including Benzyl benzoate, chlorine and alkyl ammonium chlorides, abarmectin, propoxur, trichlorfon, sulfluramid, chlorpyrifos and boric acid.

Examples: Pesticides, insecticides, fungicides and rodenticides.

ECO-TOXIC

- Substances or wastes which, if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

Many household products contain chemicals which are not biodegradable in nature and bioaccumulate in the food chain.

For example: Cleaning products, detergents and drain cleaners.

Concept of domestic hazardous waste

- DHW generated in lesser quantities than other waste fractions but the potential risks to the environment and human health are disproportionate to its quantum.
- Mode of disposal: DHW is co-disposed with MSW in municipal waste dumpsites or landfills.
- Environmental hazards (pollution of water, land and air)
- Health hazards

Examples of domestic hazardous waste

HOUSEHOLD CLEANERS
Oven cleaners, drain cleaners, wood and metal cleaners and polishes, toilet cleaners, tile and shower cleaners, bleach (laundry)

AUTOMOTIVE PRODUCTS
Motor oil, fuel additives, air conditioning refrigerants, starter fluids, automotive batteries, transmission and brake fluid antifreeze

PAINTING SUPPLIES
Adhesives and glues, furniture strippers, oil or enamel-based paint, latex or water-based paint, stains and finishes, paint thinners and turpentine, paint strippers and removers, fixatives and other solvents

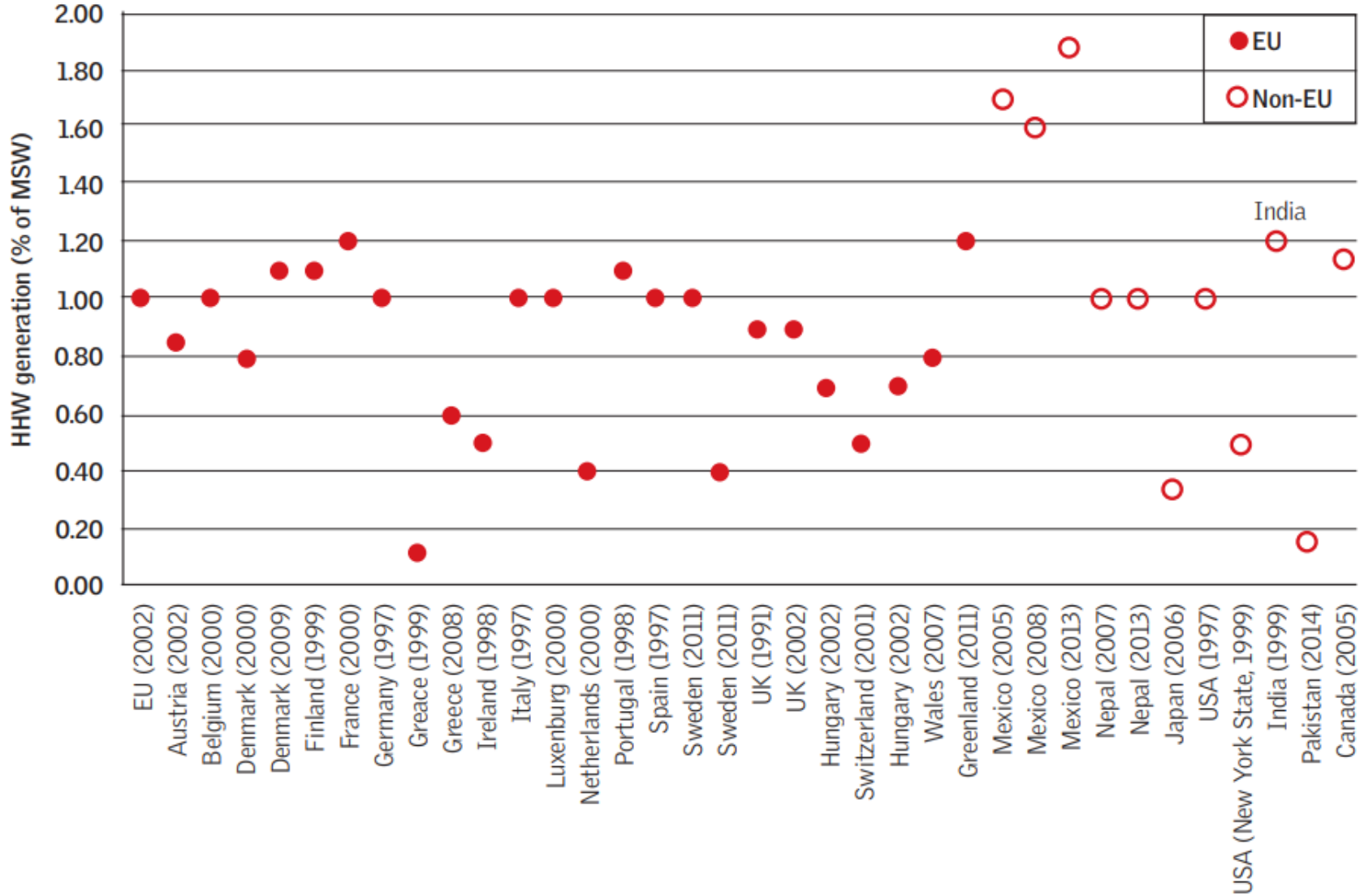
HOUSEHOLD INSECTICIDES
Herbicides, insecticides, fungicides/wood preservatives

MISCELLANEOUS
Mercury thermostats or thermometers, fluorescent light bulbs, discarded PVC toys, batteries, computer components and end-of-life electronics items

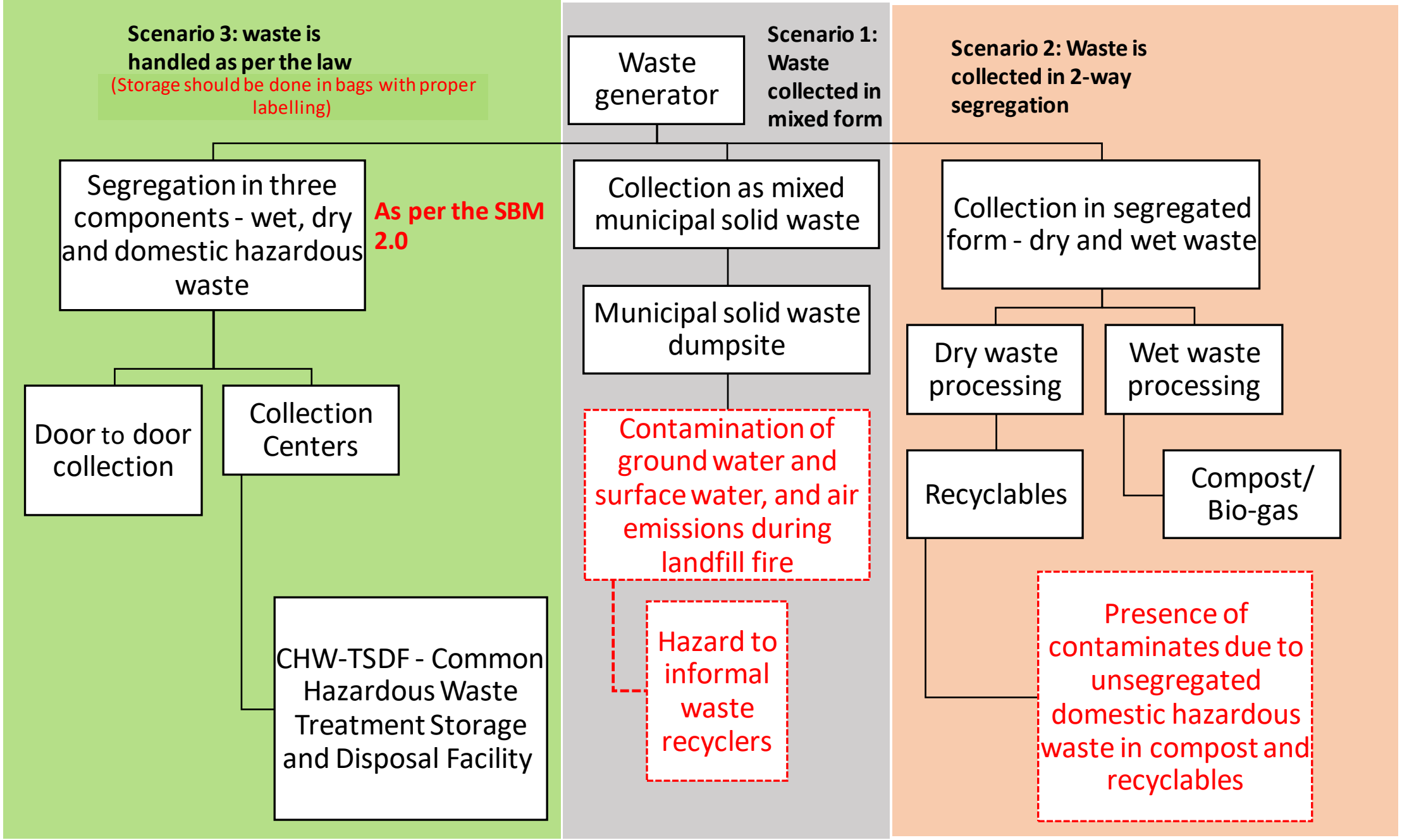
OTHER FLAMMABLE PRODUCTS
Compressed gas cylinders, kerosene diesel fuel gas/oil mix, lighter fluids, shoe polish, cigarette butts

INDOOR PESTICIDES
Ant sprays and baits, cockroach sprays and baits, flea repellents and shampoos, bug sprays, houseplant insecticides, mosquito coils, moth repellents, pet care products, pet food items

Quantities of DHW



Source: Inglezakis and Moustakas, 2015



Flow of DHW the waste value chain

How ULBs can manage DHWs ?

- Create/amend the bye-laws on source segregation to mandate segregation of DHW at source
- Capacity building programmes for city officials and waste workers
- Engage with the waste generators with appropriate IEC materials on DHW
- Design/re-design the waste management infrastructure (collection vehicles & storage) to deal with DHW
- Bring DHW under the scope of monitoring mechanism
- Identifying the nearest disposal facilities, membership with CHW-TSDFs/recycling facilities

Two way source segregation

Green colour bin/container/bag for wet waste (organics)

Blue colour bin/container/bag for dry waste

Two way source segregation

Green bin/container/bag for wet waste (organics)

Blue bin/container/bag for dry waste

Black colour bin/container/bag for domestic hazardous waste

Four way source segregation

Green colour bin/container/bag for wet waste (organics)

Blue colour bin/container/ bag for dry waste

Black colour bin/container/bag for domestic hazardous waste

Red colour bin/container/ bag for Sanitary waste

IEC for source segregation

आइए हम घरेलू कचरे के बारे में जानें

गीला कचरा

बचा हुआ खाना, सब्जियों एवं फलों के छिलके, अंडे के छिलके, चिकन अवशेष जैसे हड्डियां, चाय कॉफी के बैग, पूजा सामग्री, फूल आदि सभी गीले कूड़े में आते हैं।

सूखा कचरा

पेपर (अखबार, ऑफिस पेपर, कॉपी, टेट्रा पैक इत्यादि), प्लास्टिक (कोल्ड ड्रिंक्स बोतल, पानी की बोतल, जूस की बोतल, खिलौने, इत्यादि), गिलास, धातु गिलास, धातु आदि सभी सूखे कचरे में आते हैं।

जैव अपशिष्ट कचरा

सेनेटरी कचरा जैसे : डायपर, बेबी वाइप्स एवं सेनेटरी पैड्स आदि, COVID-19 कचरा जैसे मास्क, पीपीई किट, ग्लव्स, कैप, टिश्यू पेपर, खून में सनी पट्टियां एवं कपड़े आदि सभी जैव अपशिष्ट कचरे में आते हैं।

घरेलू हानिकारक कचरा

पेंट के ड्रम, कीटनाशी के डिब्बे, सीएफएल बल्ब, ट्यूबलाइट, अवधि समाप्त औषधियां, टूटे हुए पारे वाले थर्मामीटर, प्रयुक्त बैटरी, प्रयुक्त सुइयां, सिरिंज आदि सभी घरेलू हानिकारक कचरे में आते हैं।

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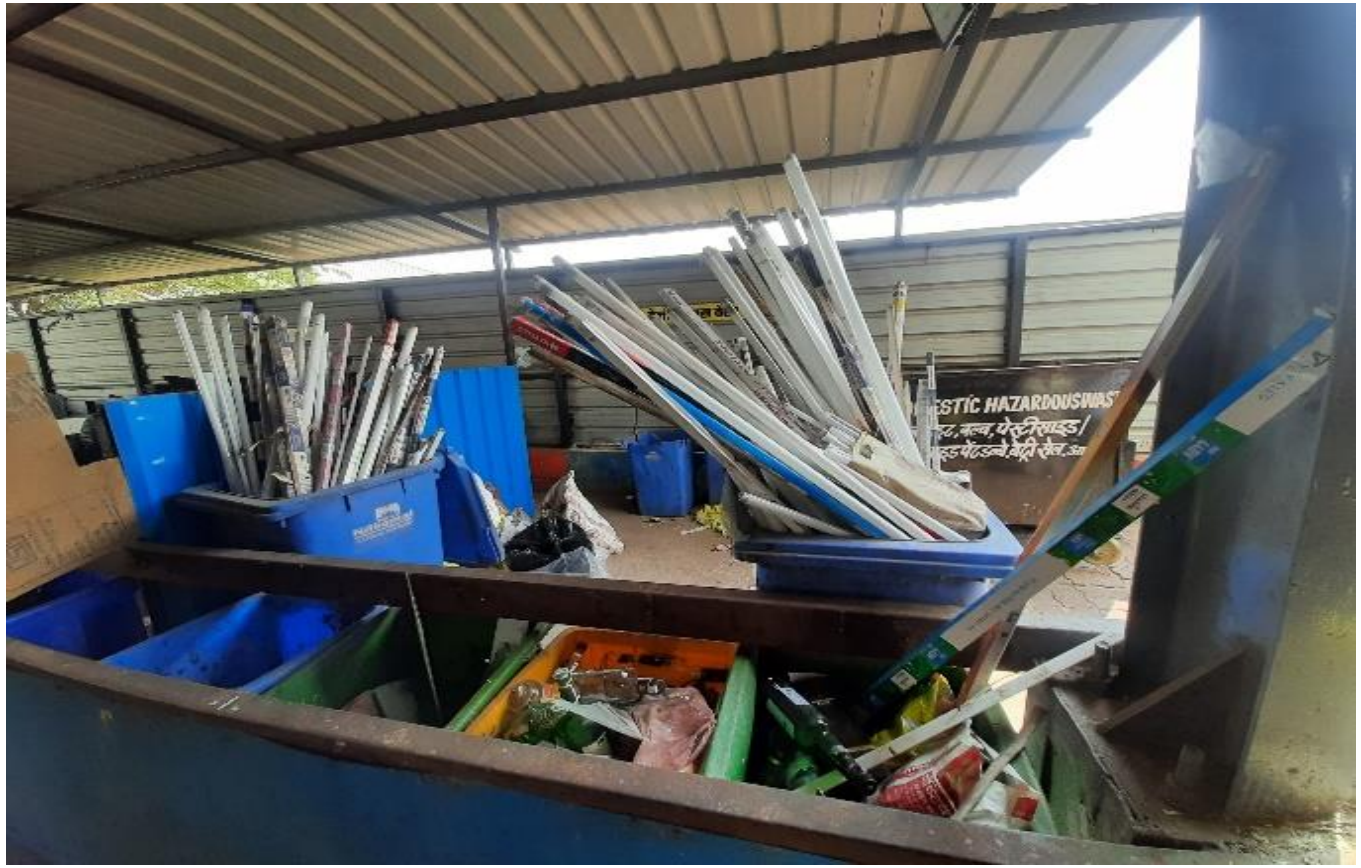
Monitoring

- Karad started with three-way segregation (wet, dry and hazardous) in 2015 with the help of a team of 7 people from a SHG called the Greeny team (IEC team), 16 foremen and 200 volunteers across the city.
- The volunteers followed a five-round protocol, which is a five-round survey

Design of the collection vehicle

Customized waste collection vehicle to collect DHW in Indore and Bhopal

Appropriate storage area



Storage bins in Transfer station in Bhopal and Indore

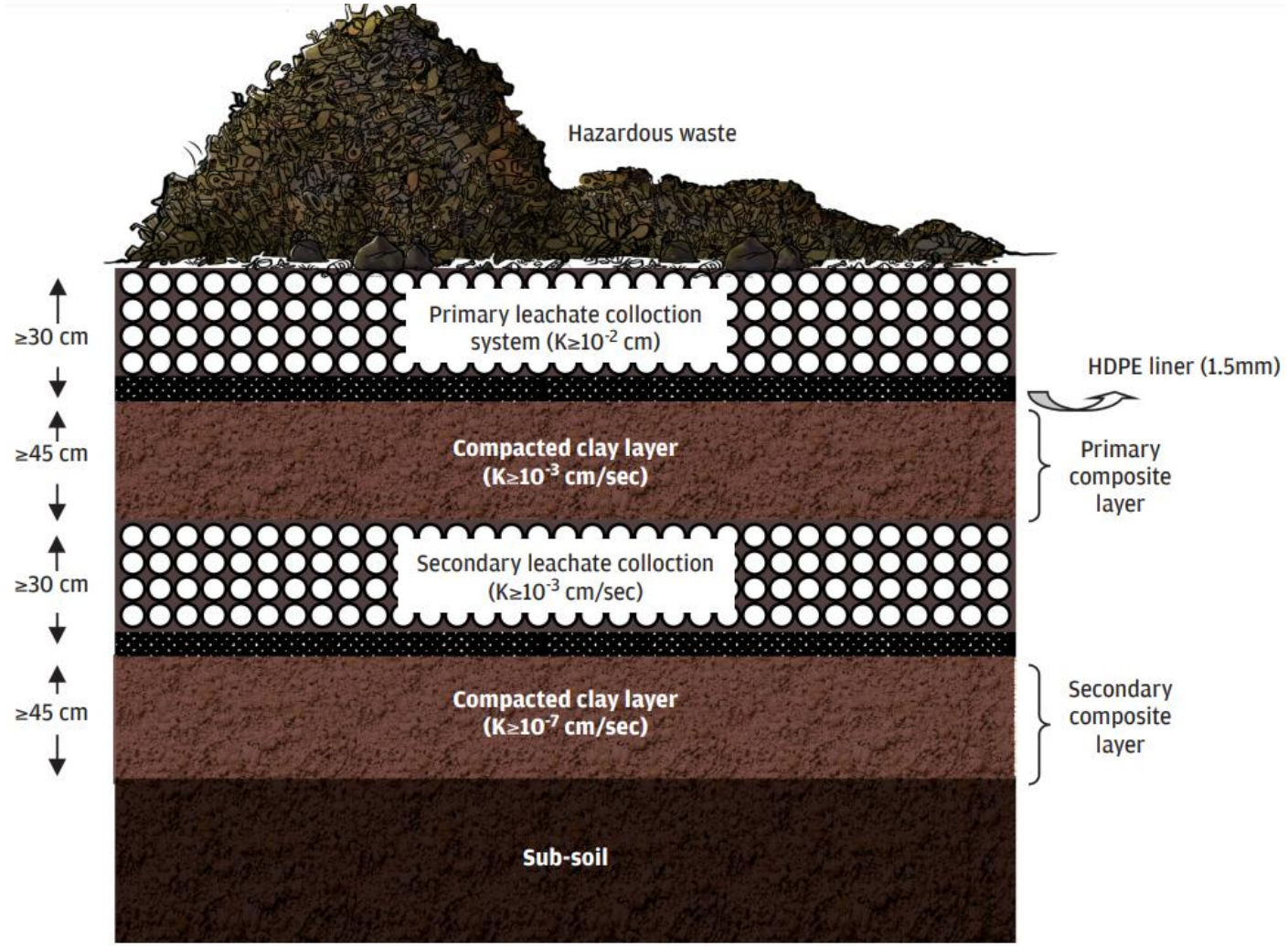
PPEs for waste handlers

Segregation of DHW in transfer station

Disposal of DHW in CHW-TSDF?

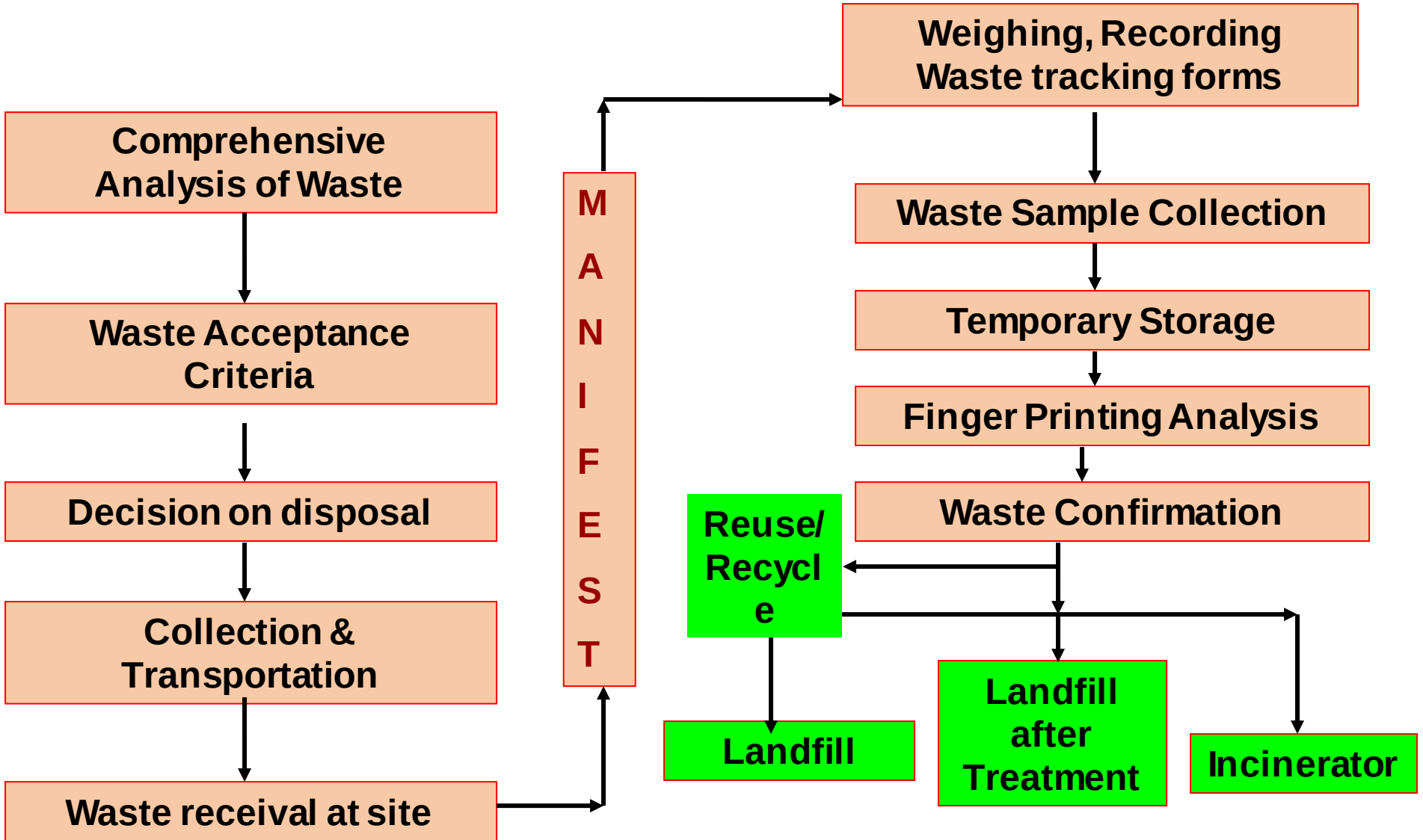
- *CHW-TSDF* – A 'Common Hazardous Waste Treatment, Storage and Disposal Facility' typically is referred to the arrangement or setup created for several generators of hazardous wastes
- There may be an individual industrial facility having a TSDF of their own for their use, then it will not be called as the "common" facility
- The facility may be designed to receive wastes from one sector or the facility may cater to several industry sectors

CHW-TSDFs



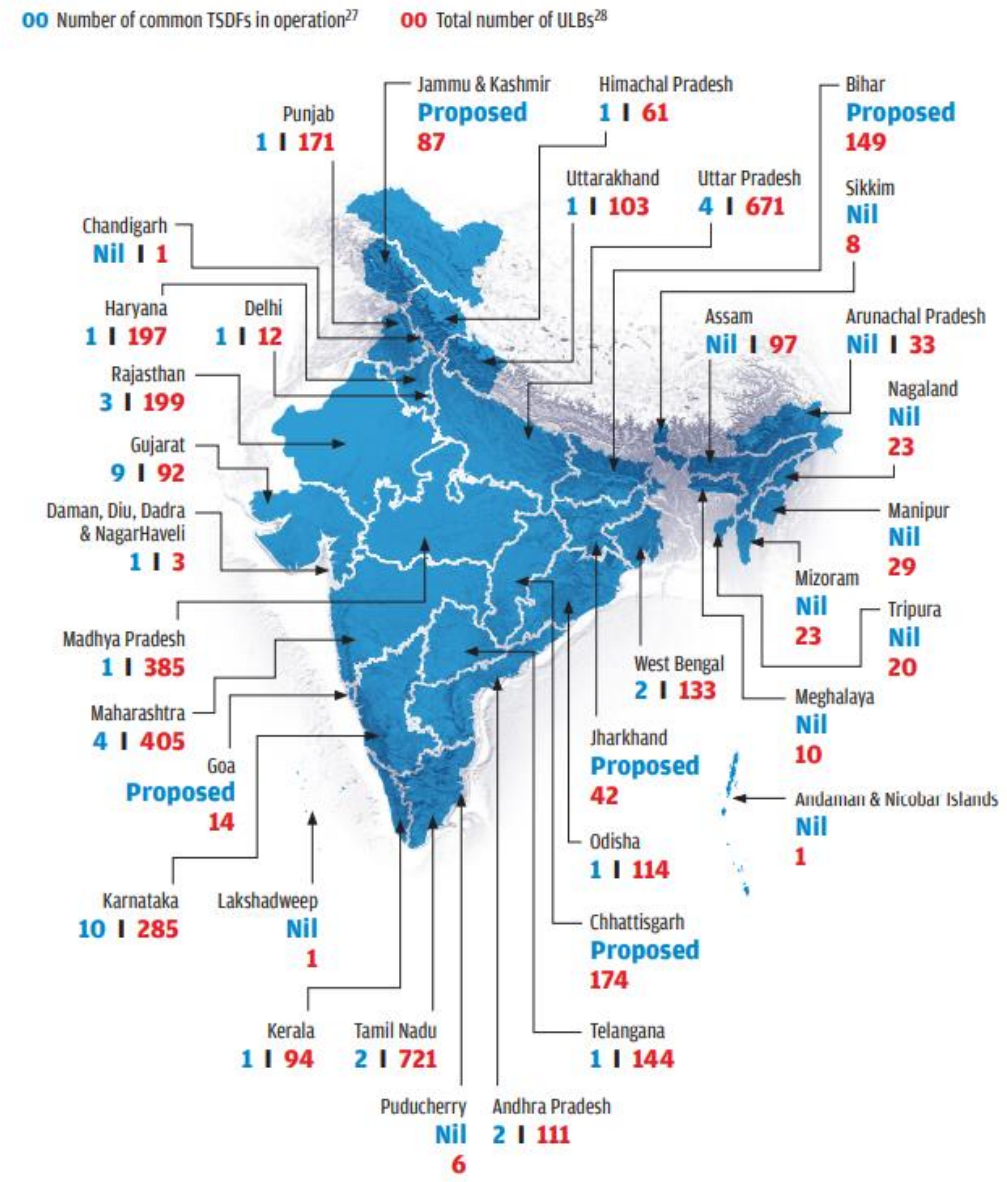
Source: CPCB-HAZWAMS/17/2000-01

Flow of operations in CHW-TSDF



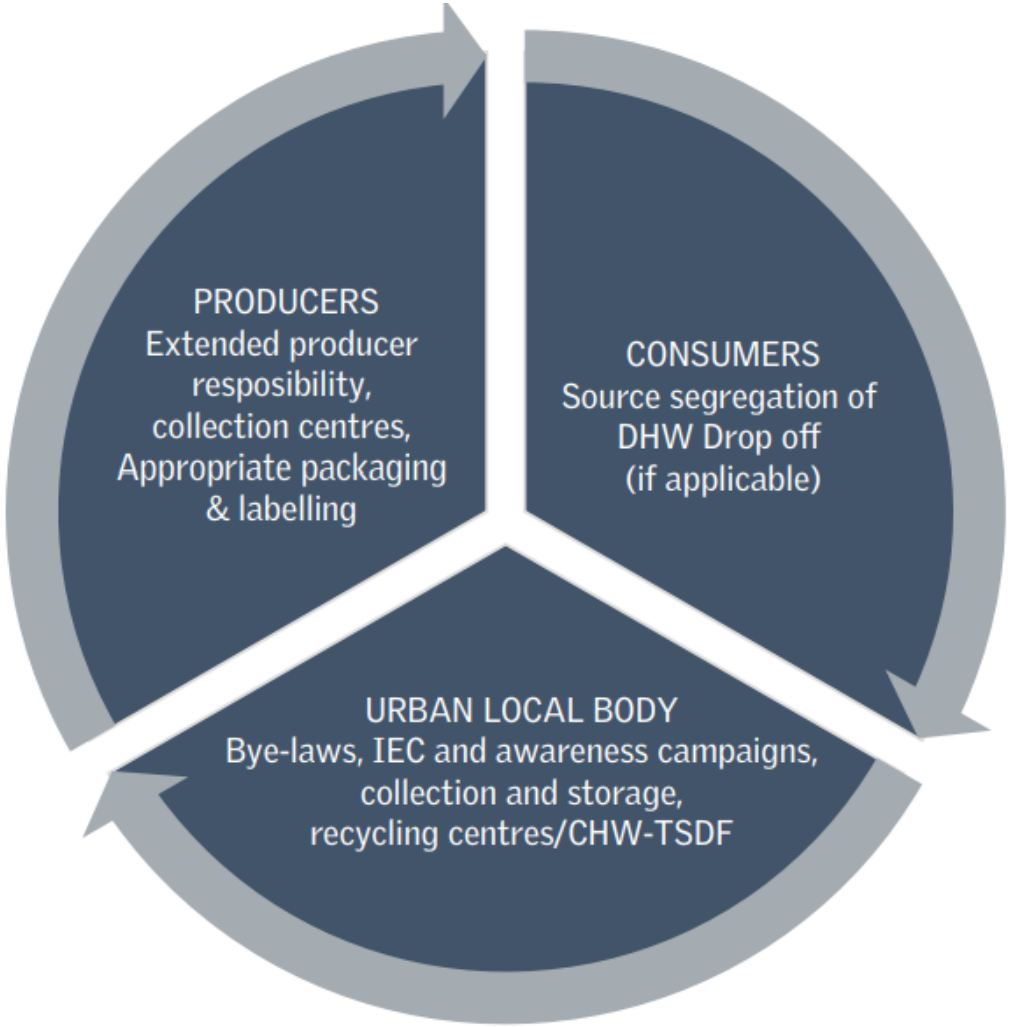
Challenges

- Lack of data
- Gaps in the existing regulation
- Inefficient source segregation
- Inadequate collection
- No disposal mechanism
- Cost of disposal and transportation



Recommendations

- Hazard and risk identification at consumer level
- Legal intervention
- Introduction to municipal bye-laws with penal provisions
- Identification and inventory of domestic hazardous waste by urban local bodies
- Capacity building programmes for ULB officials and waste workers
- Extensive IEC activities to train households to segregate domestic hazardous waste
- Ensuring proper collection and disposal mechanism
- EPR policy for domestic hazardous waste



Thank you!

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