



# Achieving Circularity in Production and Use of chemicals

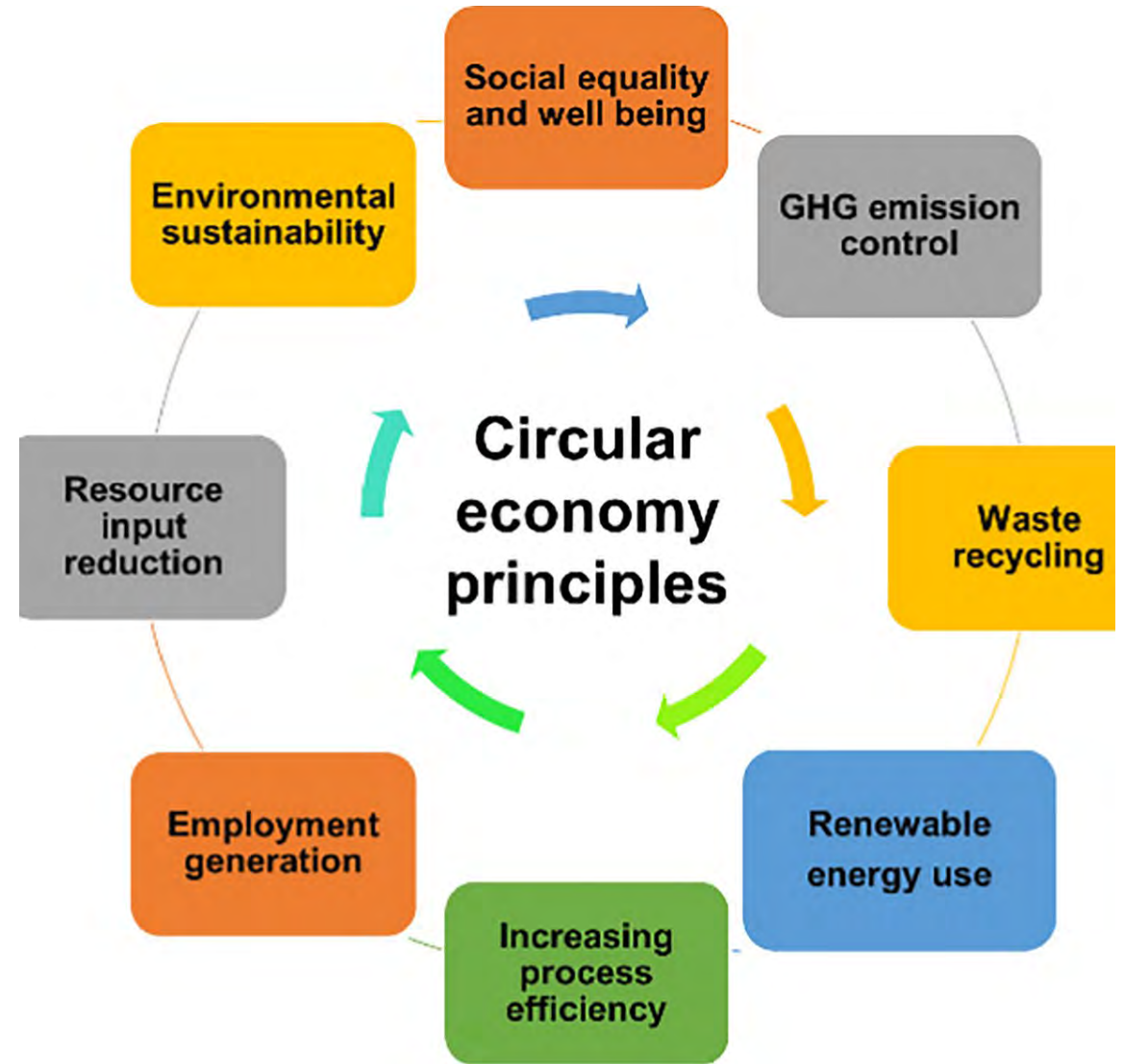
One of the key prerequisites for achieving circularity is phasing out the production and use of chemicals of concern in all economic sectors and ensuring that they are no longer used in the manufacturing of consumer products. This will ensure the re-use of materials and compliance with waste hierarchy principles



# Principles of the Circular Economy for Waste Management

**The circular economy is based on three principles, driven by design:**

- Eliminate waste and pollution.
- Circulate products and materials (at their highest value)
- Regenerate nature.

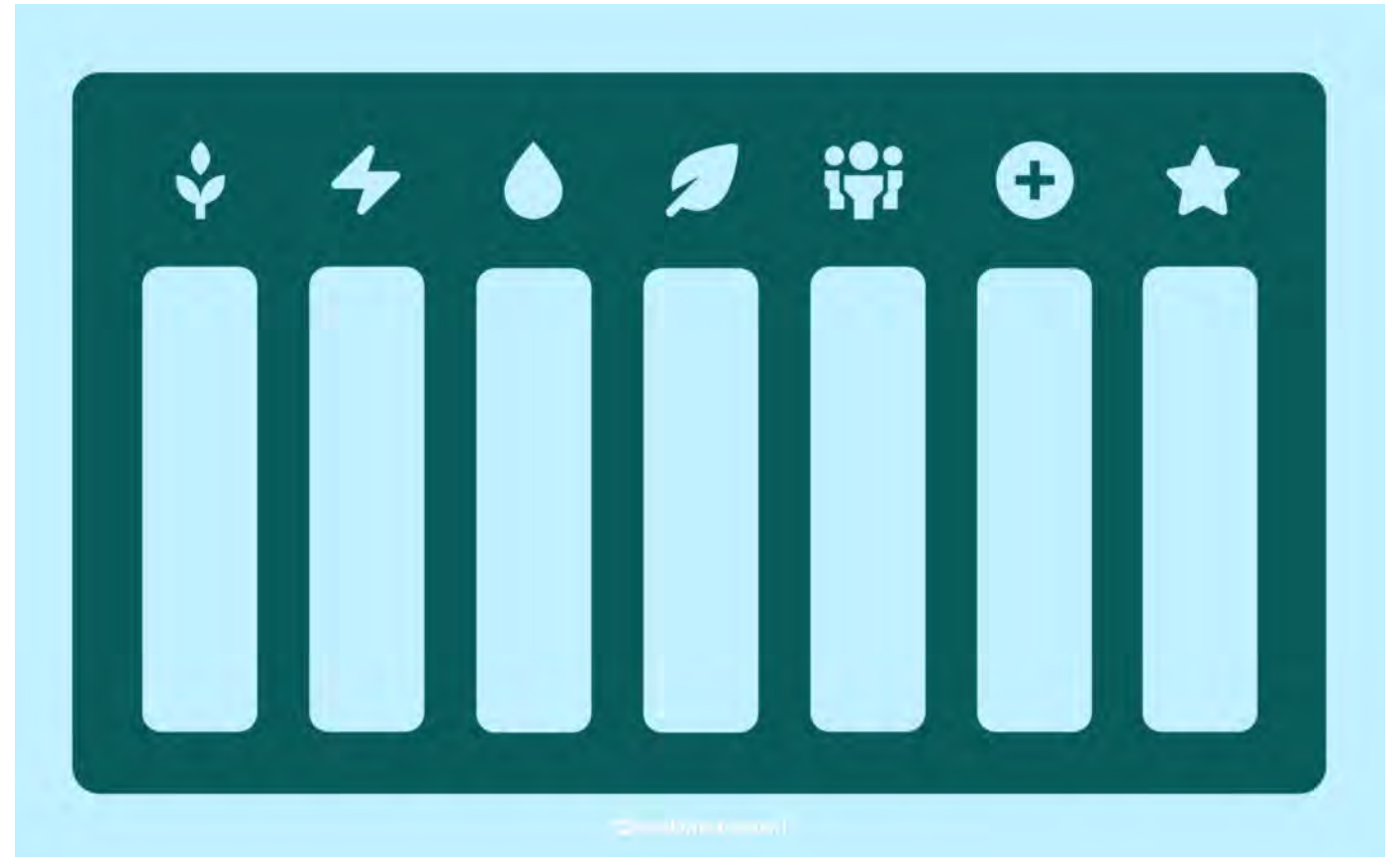


# 7 Circular Economy Principles



# Seven Pillars of the Circular Economy

1. Materials. In a circular economy, materials are cycled continuously. ...
2. Renewable Energy. ...
3. Water Stewardship. ...
4. Health & Wellbeing. ...
5. Materials. ...
6. Renewable Energy. ...
7. Water

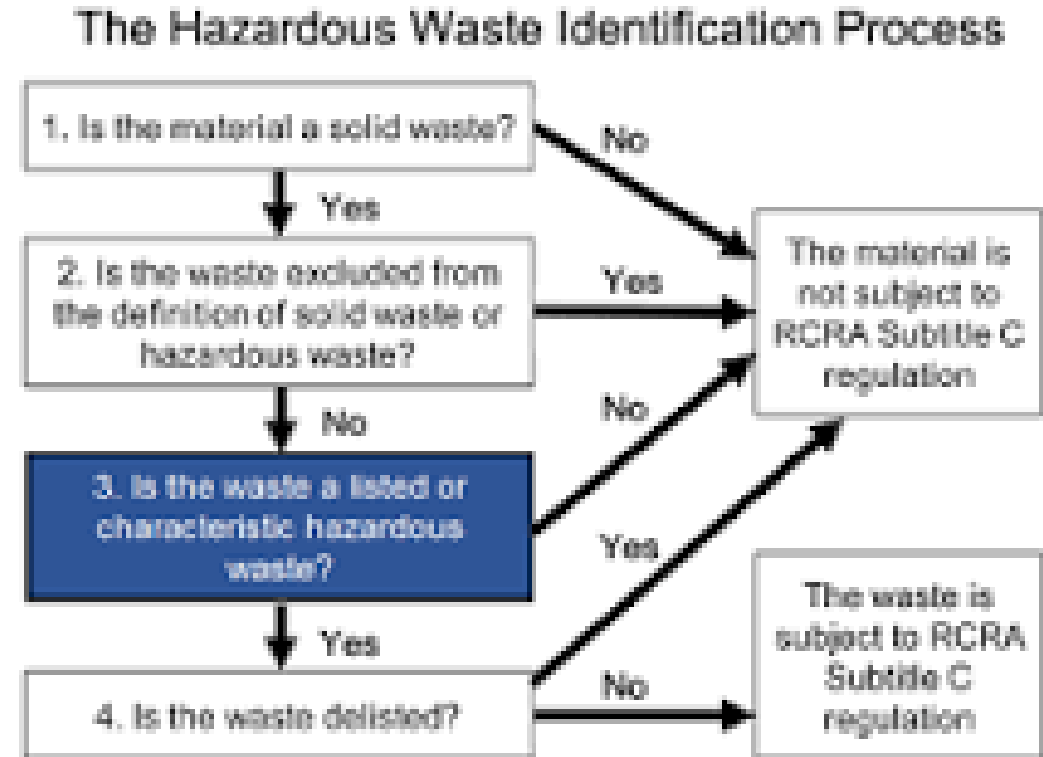


# Seven Pillars of the Circular Economy

- The circular economy is built on **seven principles**: redesign, reduce, reuse, repair, renovate, recycle and recover;
- *The circular economy is a new model for addressing human needs and fairly distributing resources without undermining the biosphere or crossing planetary boundaries.*
- **Seven Pillars of the Circular Economy provide greatest opportunity to repair the functioning of the global system**
  1. **Materials In a circular economy - Materials are cycled at continuous high value.**
  2. **All energy is based on renewable sources.**
  3. **Biodiversity is supported and enhanced through all human activities.**
  4. **Human society and culture are preserved.**
  5. **The health and wellbeing of humans and other species is supported.**
  6. **Human activities generate value in measures beyond just financial.**
  7. **The economic system is inherently adaptable and resilient.**

## 4 Types of Hazardous Waste (Characteristics + Categories)

- There are **four types of hazardous waste** in the manufacturing and chemical industries.
- These types are further **subdivided into seven more specific categories** that outline the definitions and qualities that make a waste hazardous.
- Several federal organizations in US oversee hazardous waste regulation. States often have specific directions on how to dispose of waste without contaminating the local environment.



# Managing Hazardous Chemical Waste

## Caps and closures:

1. Use waste containers with leak-proof, screw-on caps so that contents can't leak if a container tips over.
2. If necessary, transfer waste material to a container that can be securely closed.
3. Keep waste containers closed except when adding waste.
4. Wipe down containers prior to your scheduled collection date.



# Storing and Disposing of Hazardous Chemical Waste

Procedures for hazardous chemical waste only.

- Radioactive waste: [Storing and Disposing of Radioactive Waste](#).
- Bio-hazardous waste : [Packaging and Disposing of Bio-hazardous and Medical Waste](#)

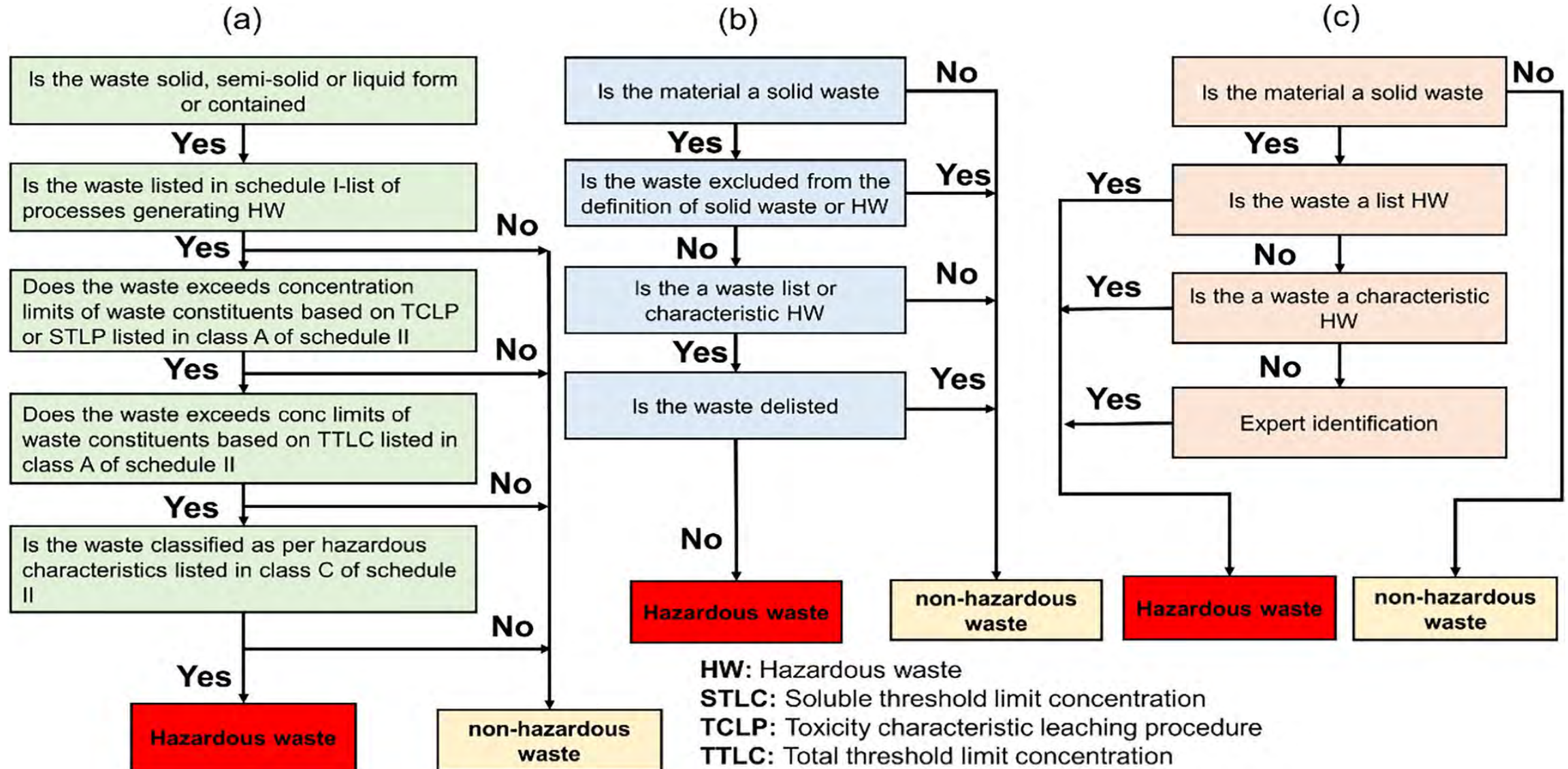
## Requirements for managing radioactive waste

- Storage and disposal of radioactive waste should be strictly regulated.
- **Do not** dispose of radioactive waste in regular trash cans or pour it down the drains.

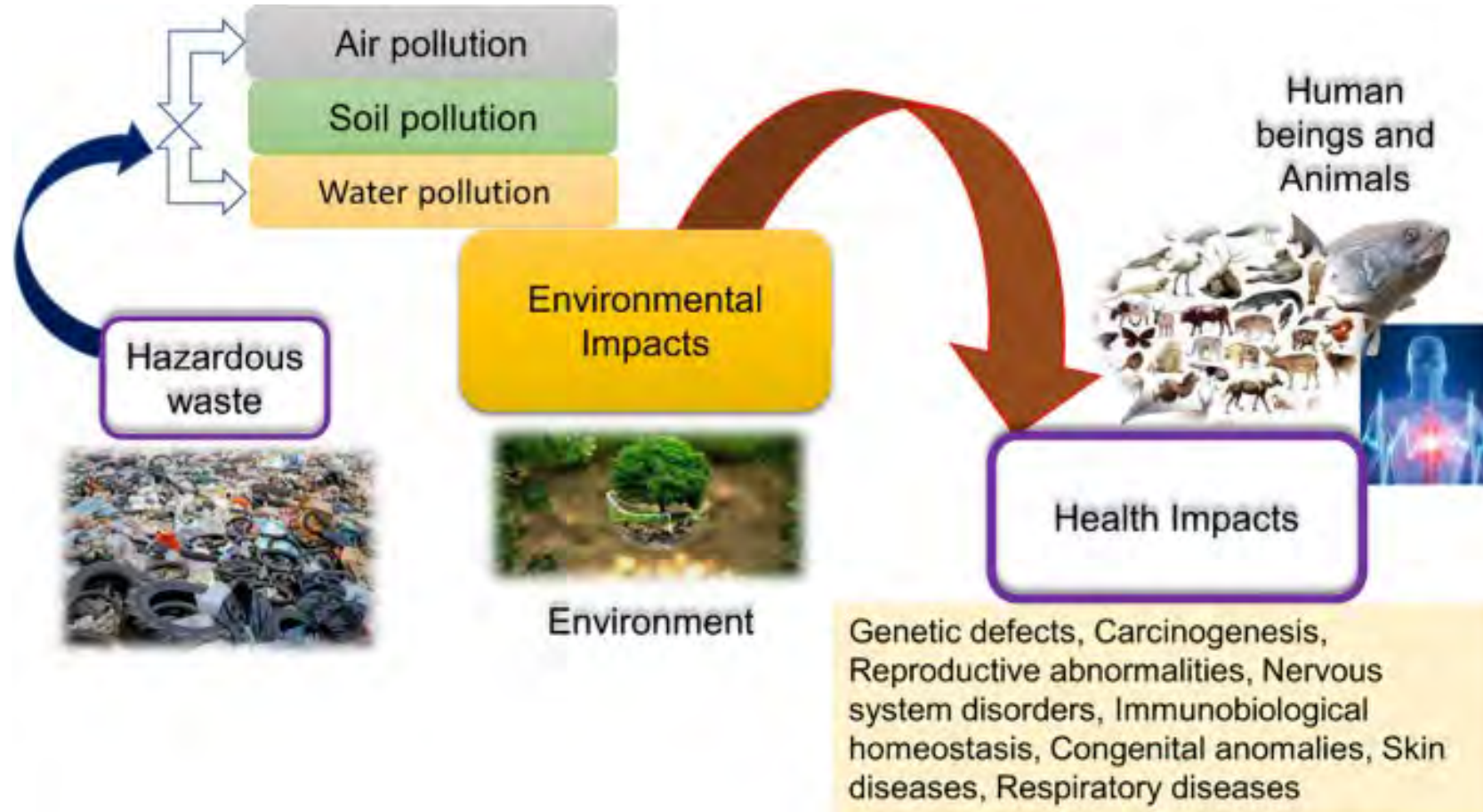
# Hazardous Waste dangerous to People or the Environment

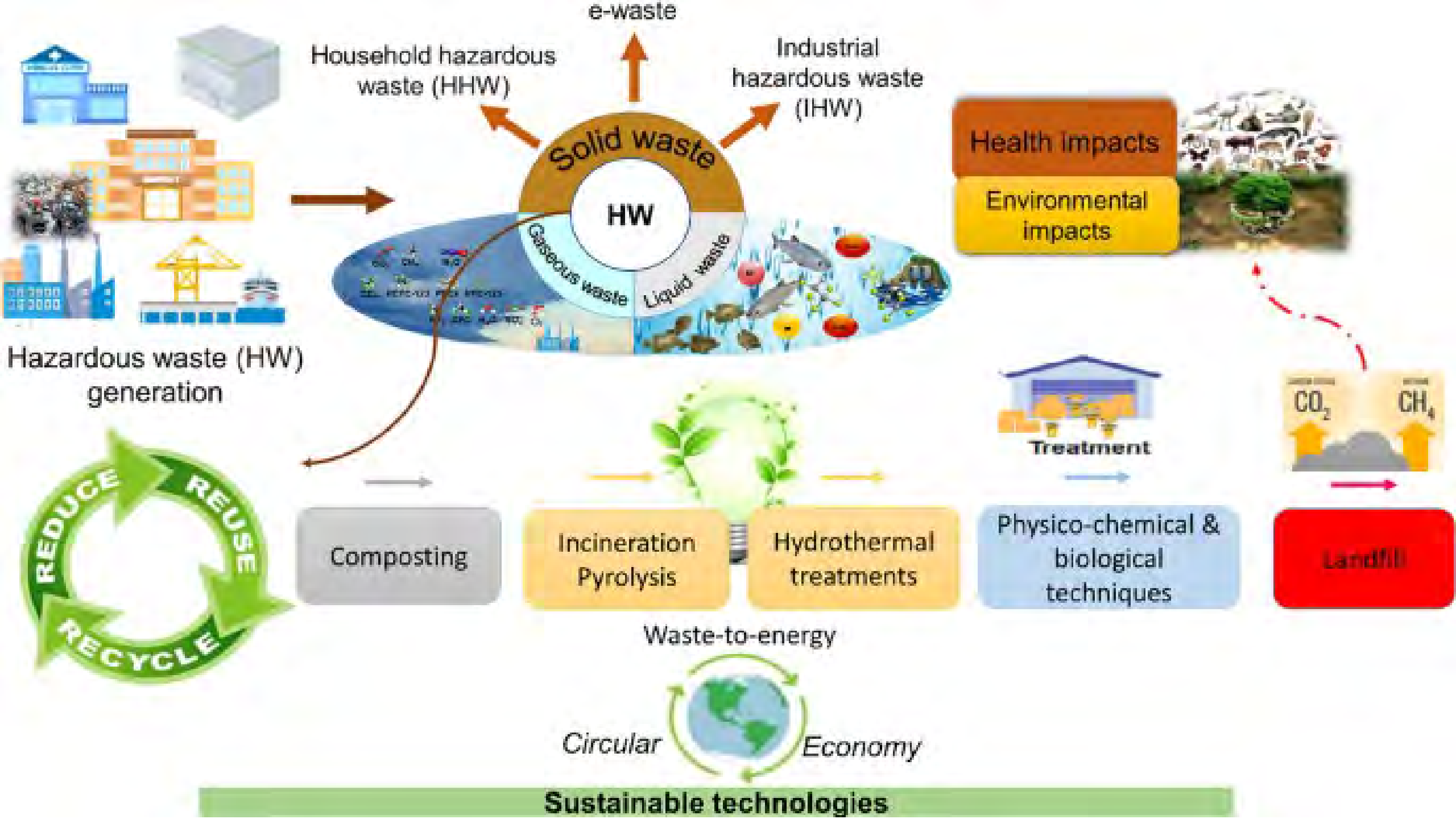
- Hazardous Waste classified as waste with one or more intrinsic chemical and physical characteristics: toxicity, ignitability, reactivity, and corrosivity (EPA [2016](#)).
- In contrast, non-hazardous waste does not directly harm people or the environment, like cardboard, glass, plastic, rocks, metals, and food scraps.
- The United Nations Environmental Programme (UNEP) has indexed waste in the category of hazardous material if they acquire one or more of the characteristics that may lead to the consequences such as:
  1. Fires during routine management
  2. Corrosive upon exposure to air, or in some particular environment
  3. Chemical reactions that lead to toxic gas emissions into the atmosphere
  4. Long-term environmental, geological, and ecological disaster effect

# Steps for the identification of the Hazardous Waste



# The environmental and health impact of the hazardous waste





# Hazardous Waste Management in India

- **Environment (Protection) Act, 1986 and the rules called the Hazardous Wastes (Management and Handling) Rules, 1989.**
- **Under Rule 5 of hazardous waste management, the operator of the Treatment, Storage and Disposal Facility shall maintain records of hazardous wastes handled by him in '[Form 3].**
- **Section 3 (17) of the Hazardous and Other Wastes Rules, 2016 defines hazardous wastes as that is characteristically dangerous to health or the environment.**
- **Section 3 (17) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 defines hazardous wastes. It means any waste that is characteristically dangerous to health or the environment.**
- **Disposing of Hazardous Waste in India: The first step of hazardous waste disposal is identifying the type of waste present and completing a waste profile to classify the waste and determine how to safely handle it through disposal.**
- **Further steps include quantifying, notifying, managing, transporting and disposing**
- **Examples of hazardous wastes include motor oil, automobile batteries, paints and solvents. household cleaners. drain openers, pesticides. compressed gas tanks (such as propane and oxygen)**

# **Hazardous Waste Management: Conventional and Emerging Practices**

- **Generation of waste is certain in the current era of rapid industrialization, urbanization, and economic development.**
- **A waste is considered hazardous when it can have a serious impact on human health and environment.**
- **Each year approximately 400 million tons of hazardous waste is generated worldwide.**
- **Inappropriate handling, transport, disposal, and treatment of Hazardous waste have detrimental effects on human health and the environment.**
- **Globally, various conventional approaches and methods are in place for effective management, disposal, and treatment of hazardous wastes and effluents.**
- **However, due to the complex nature, composition, and origin of hazardous wastes, researchers and scientists are consistently exploring sustainable, economical, and advanced treatment and processes for managing hazardous waste.**
- **As said above poor hazardous waste management impacts both human health and environment**
- **Conventional hazardous waste treatments include such as absorption and neutralization and disposal techniques such as landfills, commonly used in industries worldwide.**

# Hazardous Waste (HW) Generation and Sustainable Management

- Globally, industrialisation and urbanisation have led to the generation of hazardous waste (HW).
- Need to analyse the global generation and composition of hazardous industrial, household, and e-waste, along with their environmental and health impacts.
- Most hazardous waste includes Paints and solvents; Automotive wastes (used motor oil, antifreeze, etc.) Pesticides (insecticides, herbicides, fungicides, etc.) Mercury-containing wastes (thermometers, switches, fluorescent lighting, etc.)
- Sustainable hazardous waste management (HWM) need of the hour for a safe, clean, and eco-friendly environment and public health.
- Strategies of prevention, reduction, recycling, waste-to-energy, advanced treatment technology, and proper disposal require major HW policies, legislations, and international conventions related to HWM.
- Need to critically discuss recently adapted management strategies, waste-to-energy conversion techniques, treatment technologies, and their suitability, advantages, and limitations.
- The prominent waste management strategies should be aligned with circular economic models considering the economy, environment, and efficiency.
- A roadmap for future research focused on the components of the circular economy model





Thank You