

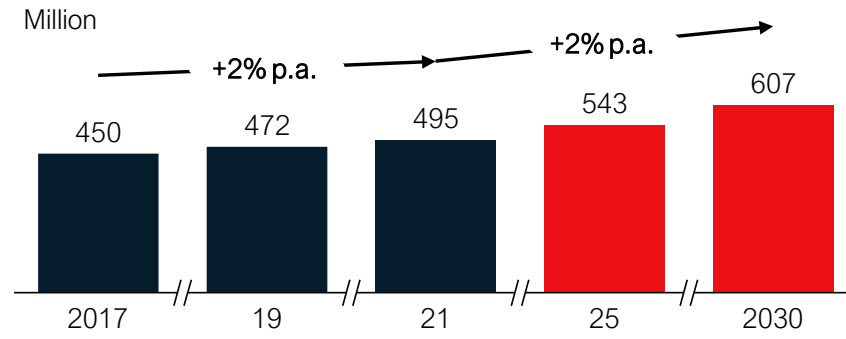
# Waste to Value Pathways in India

Solutions for Circular-Economy Driven Net Zero Transitions

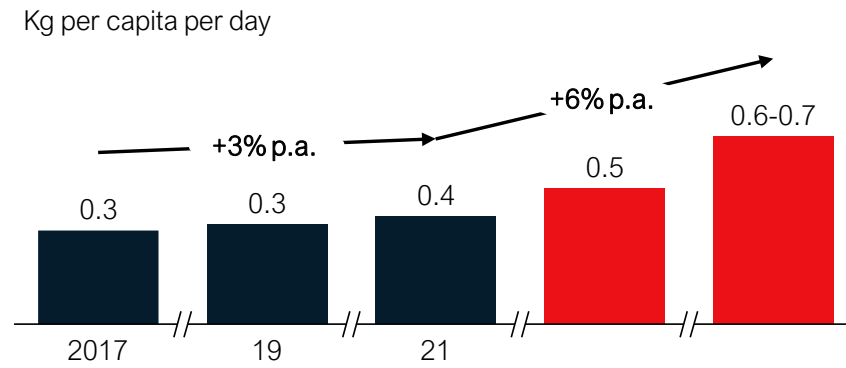
# Waste Management

# URBAN WASTE GENERATION IN INDIA

## ① Urban Population (India)



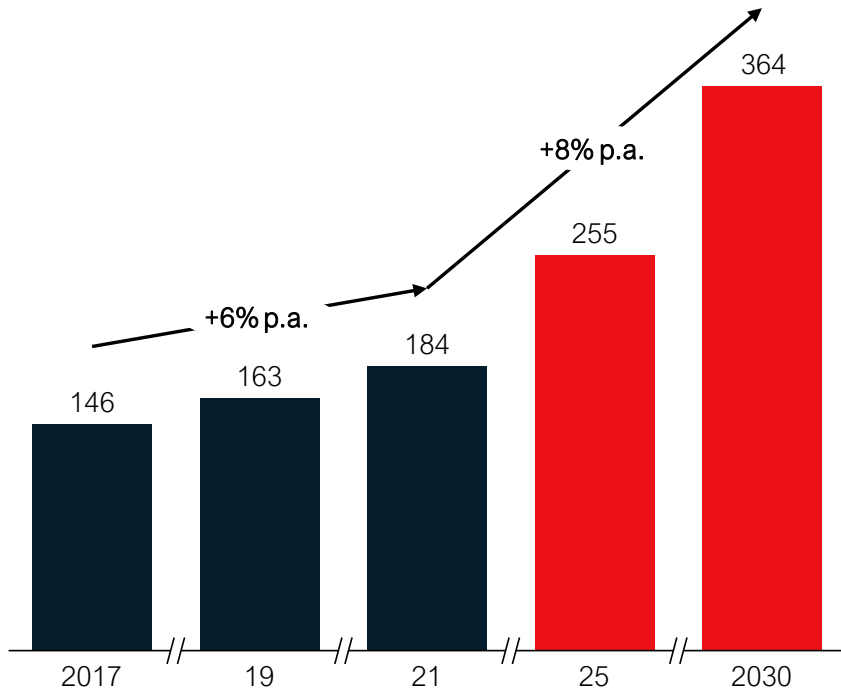
## ② Per capita MSW generation



# URBAN WASTE GENERATION IN INDIA

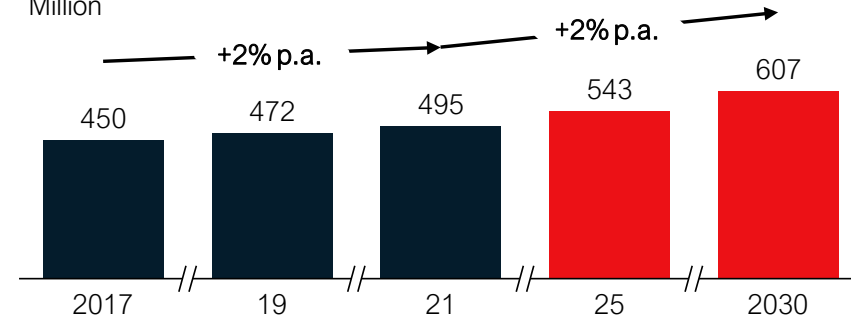
## Urban MSW generated in India

'000 MT per day; FY



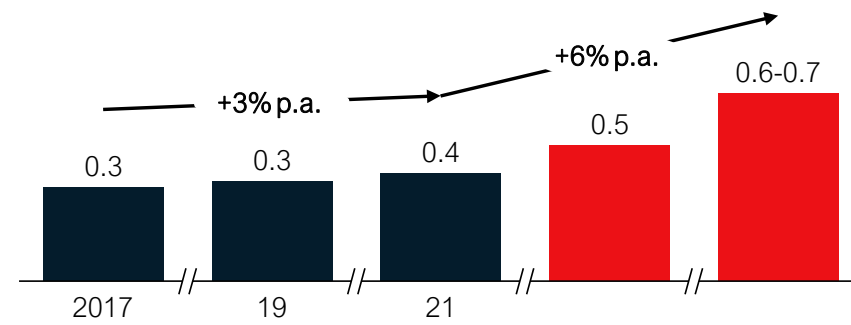
## 1 Urban Population (India)

Million



## 2 Per capita MSW generation

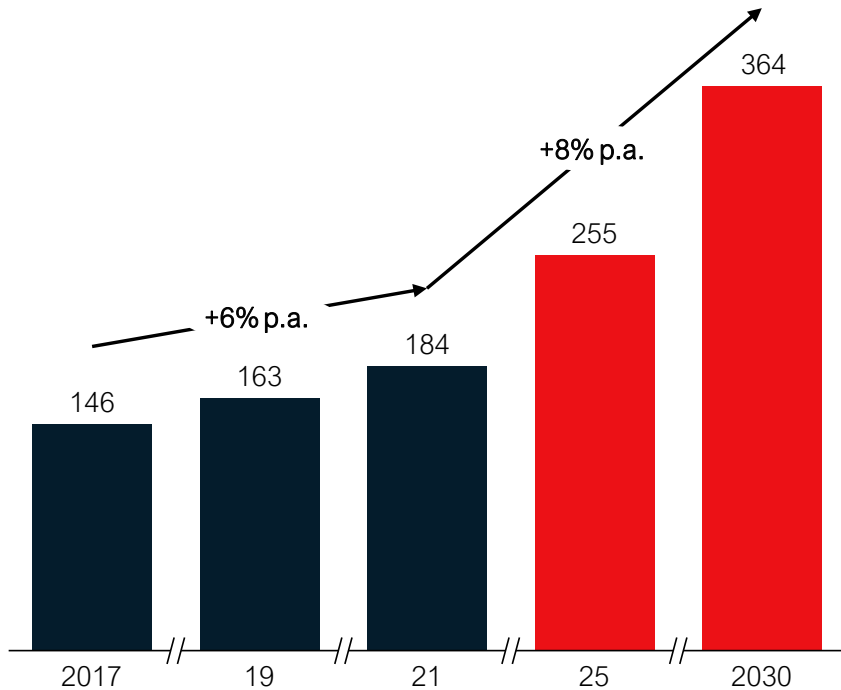
Kg per capita per day



# THE PROBLEM STATEMENT

## Urban MSW generated in India

'000 MT per day; FY



Greenhouse gas emissions from MSW are expected to grow from 19 Million tCo2e to 41 Million tCo2e annually by 2030

# 17.5%

of the Worlds' Population

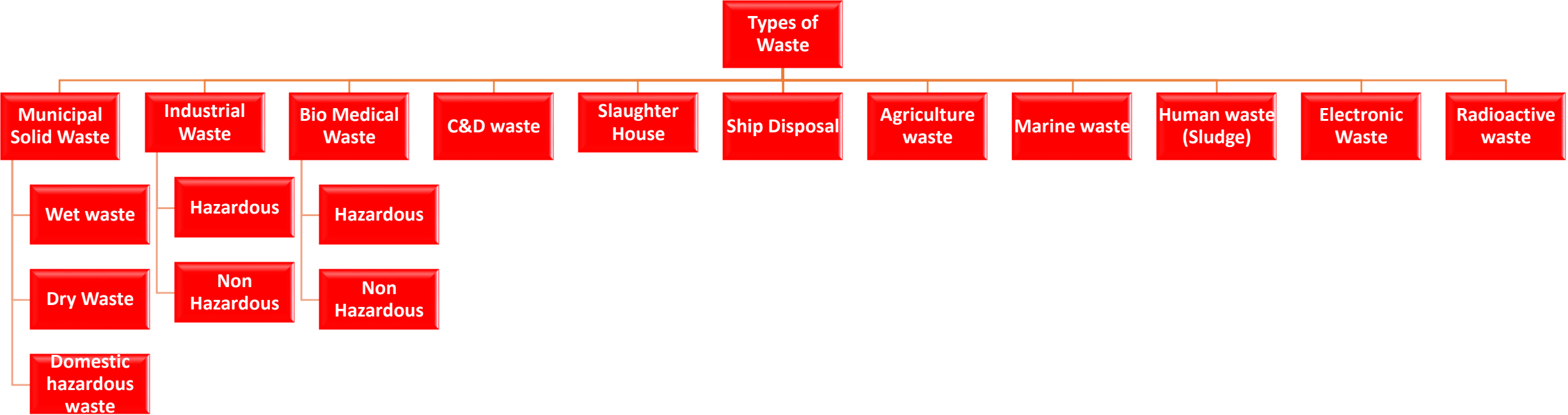
# 2.3%

of the Worlds' Land Area



The requirement of land for setting up landfills for the next 20 years could be as high as 66,000 hectares!

# WASTE MANAGEMENT



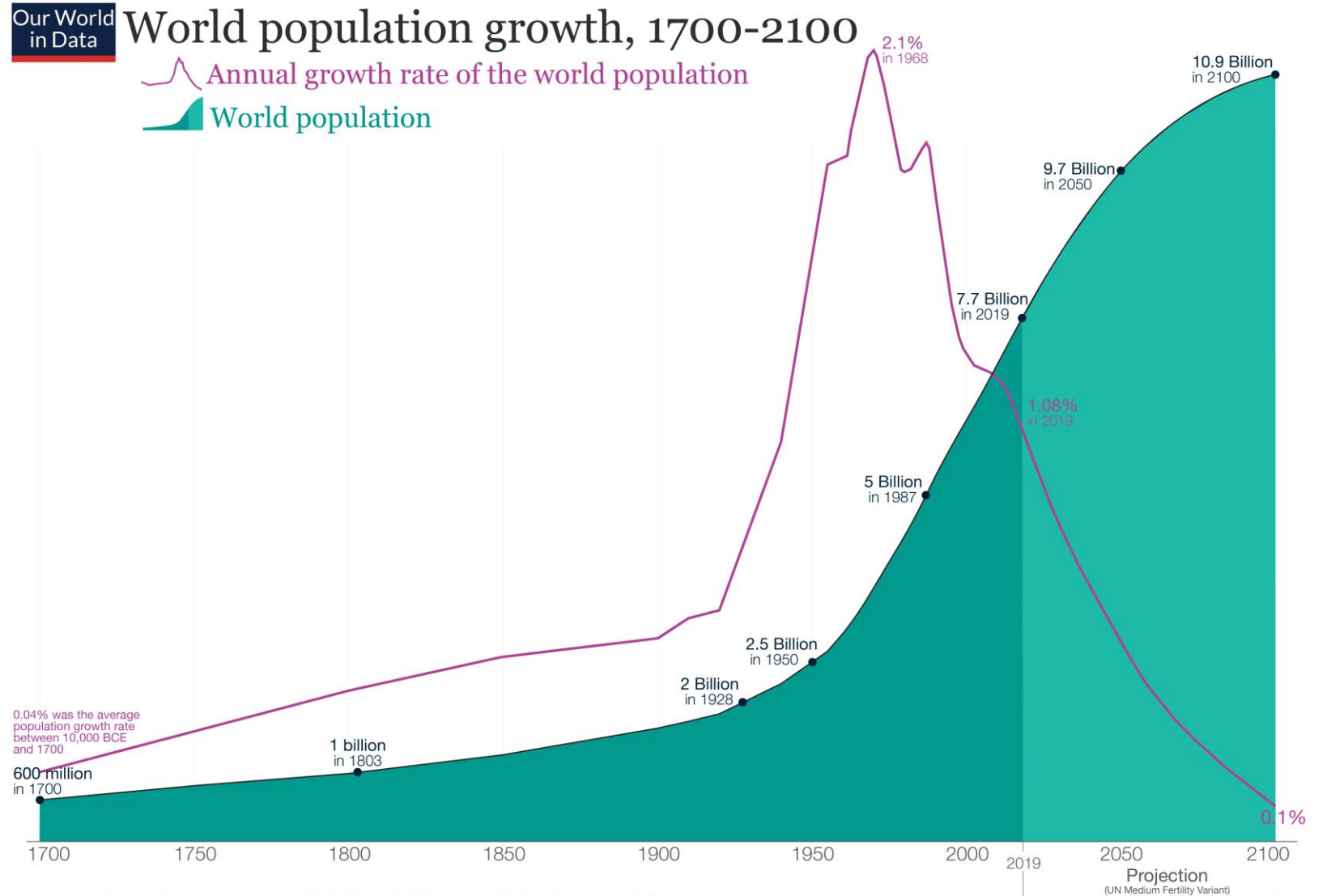
## LEGAL RULES UNDER ENVIRONMENTAL PROTECTION ACT 1968

- SWM rules 2016
- Plastic Waste Rules 2016
- C&D waste Rules 2016
- Hazardous Waste Rules 2016
- Bio Medical Waste Management Rules 2016

# THE PROBLEM STATEMENT

According to the World Bank's What a Waste 2.0 report, the world generates 2.01 billion tonnes of municipal solid waste annually, with at least 33% of that not managed in an environmentally safe manner

Cities, home to over half of humanity and generating more than 80% of the world's GDP, are at the forefront of tackling the global waste challenge.



Data sources: Our World in Data based on HYDE, UN, and UN Population Division [2019 Revision]  
This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.

Licensed under CC-BY by the author Max Roser.



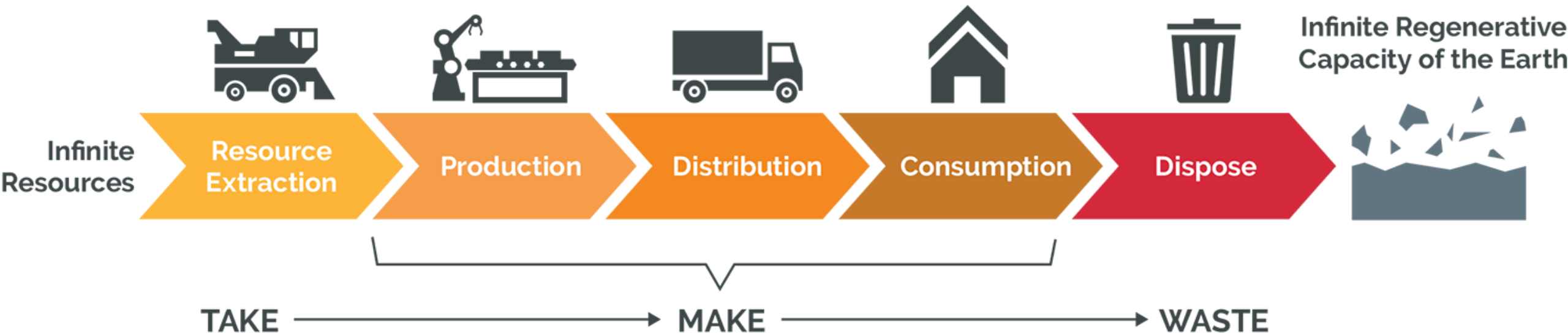
## THE PROBLEM STATEMENT

### RESOURCE SCARCITY

- Water
- Food
- Energy (Electricity and its infrastructure)
- Mobility (Cars, Roads, Rail roads, Aeroplanes etc.,)
- Construction (Houses, Offices, Hotels, Bridges etc.,
- Communication (Mobiles, Towers, Satellites)
- Leisure (Television sets)
- and so on

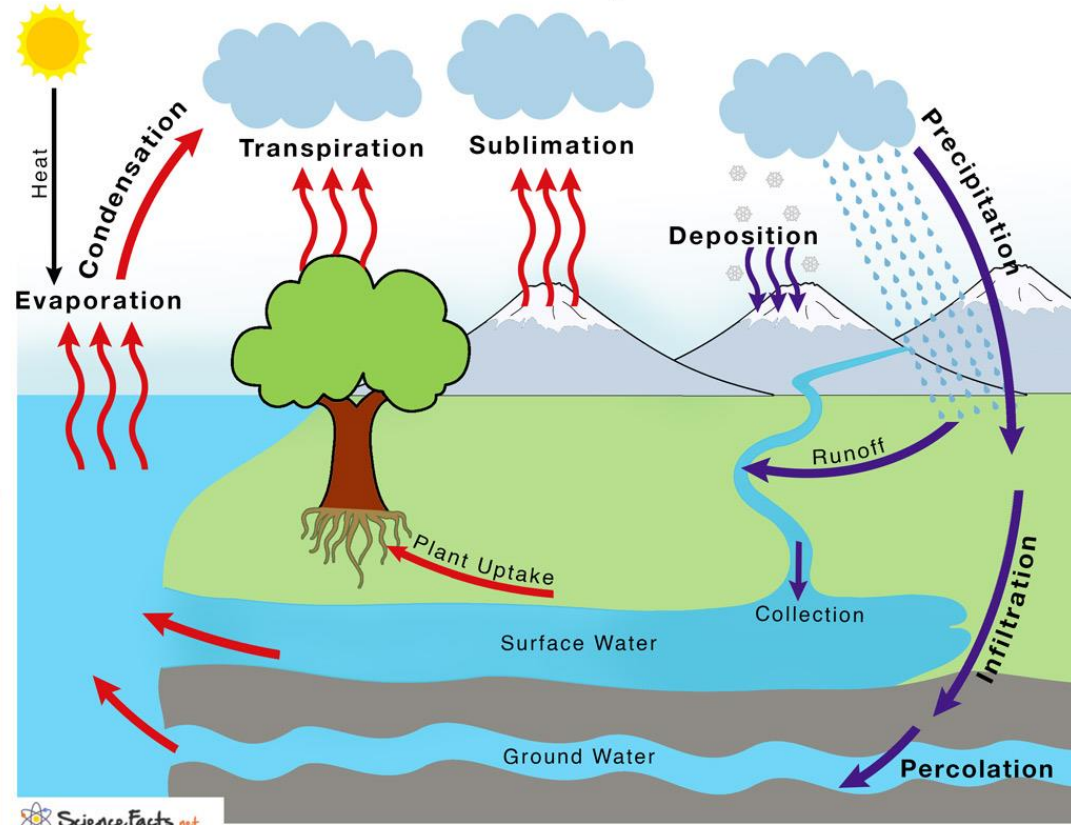
# Circular Economy

# LINEAR ECONOMY



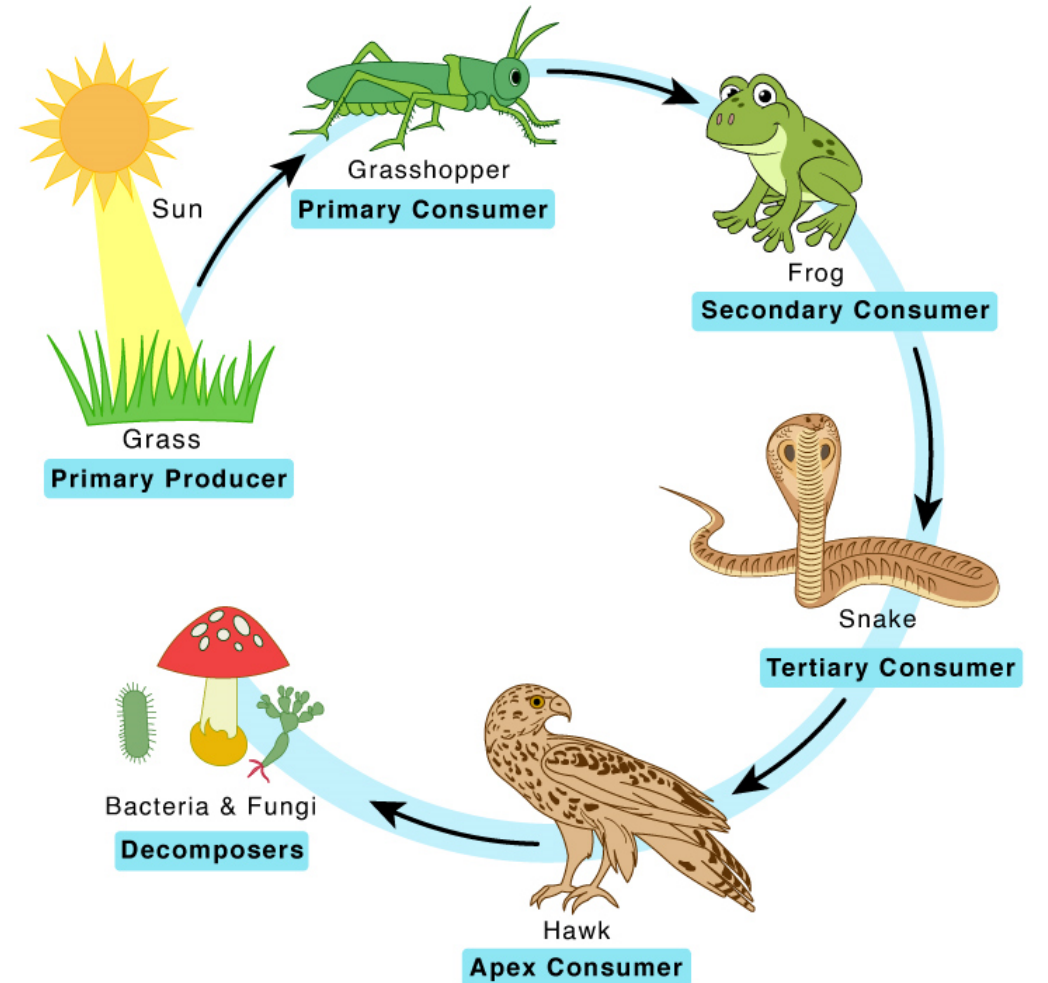
# CIRCULARITY IN NATURE

## Water Cycle



## Food Chain

ScienceFacts.net



# CIRCULAR ECONOMY

The circular economy is crucial to resource management as it emphasizes on

- minimizing waste generation,
- maximizing resource efficiency, and
- reducing environmental impact.

By adopting circular practices, we can reduce the amount of

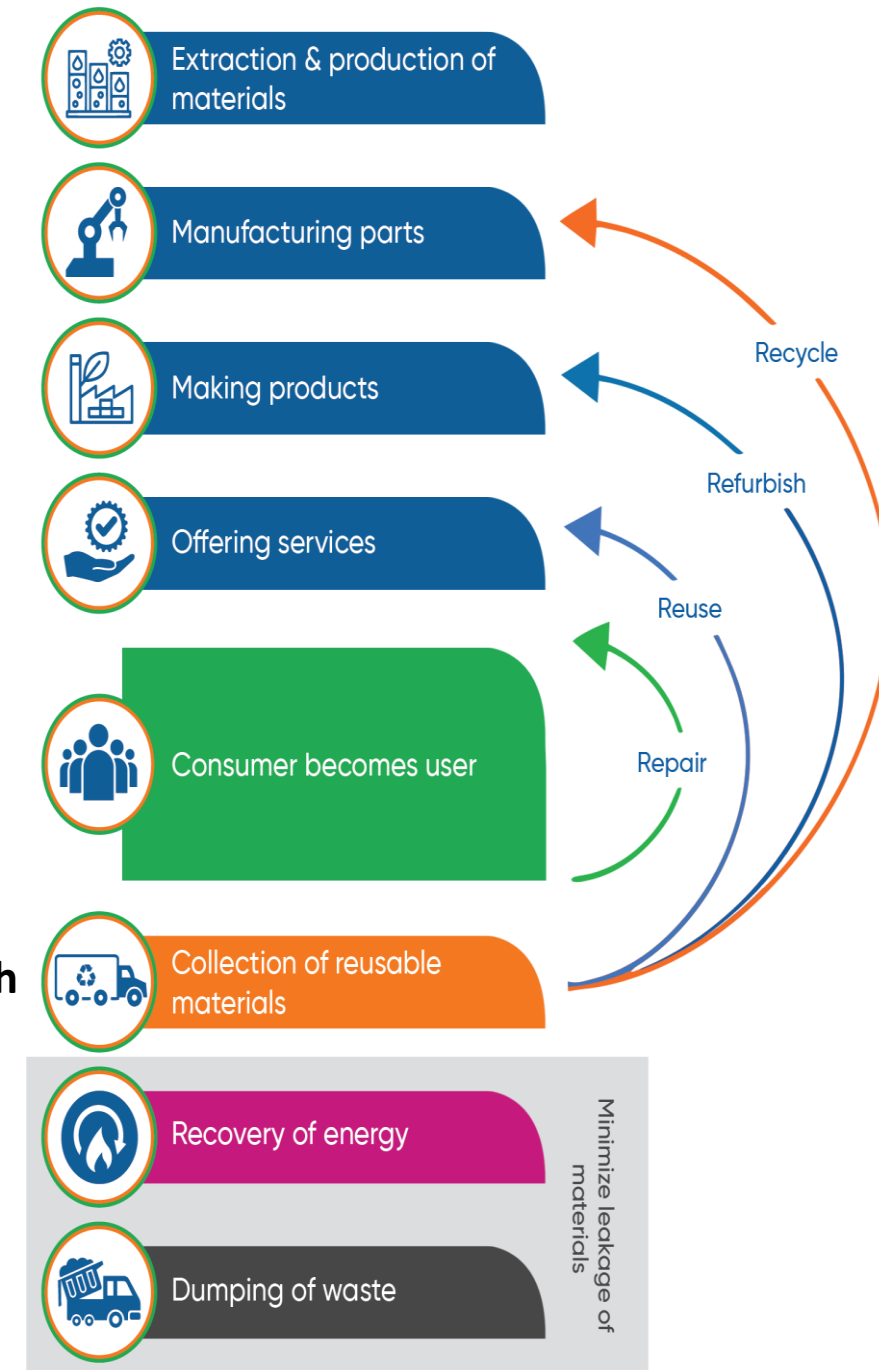
- waste sent to landfills,
- conserve natural resources, and
- mitigate climate change.

It promotes

recycling, reuse, and remanufacturing, creating a closed-loop system where materials are continually circulated within the economy.

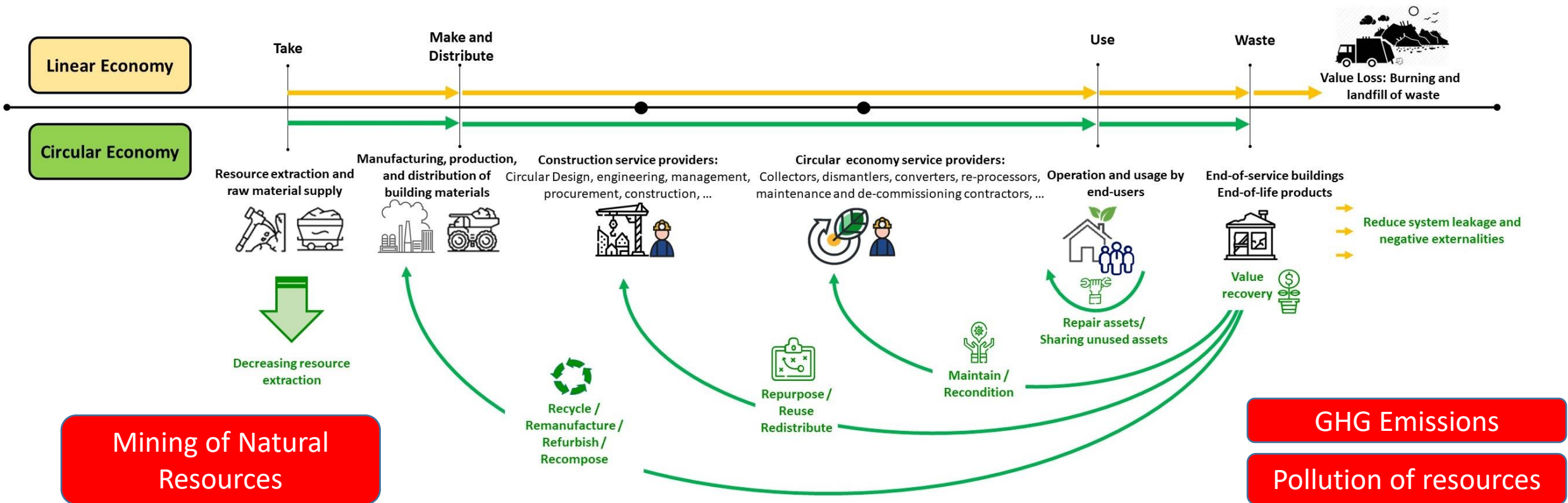
The circular economy also drives **innovation, job creation, and economic growth** while fostering **sustainable consumption and production patterns**.

**Ultimately, it offers a sustainable and resilient approach to Resource management that benefits the environment, society, and the economy.**



# CIRCULAR ECONOMY

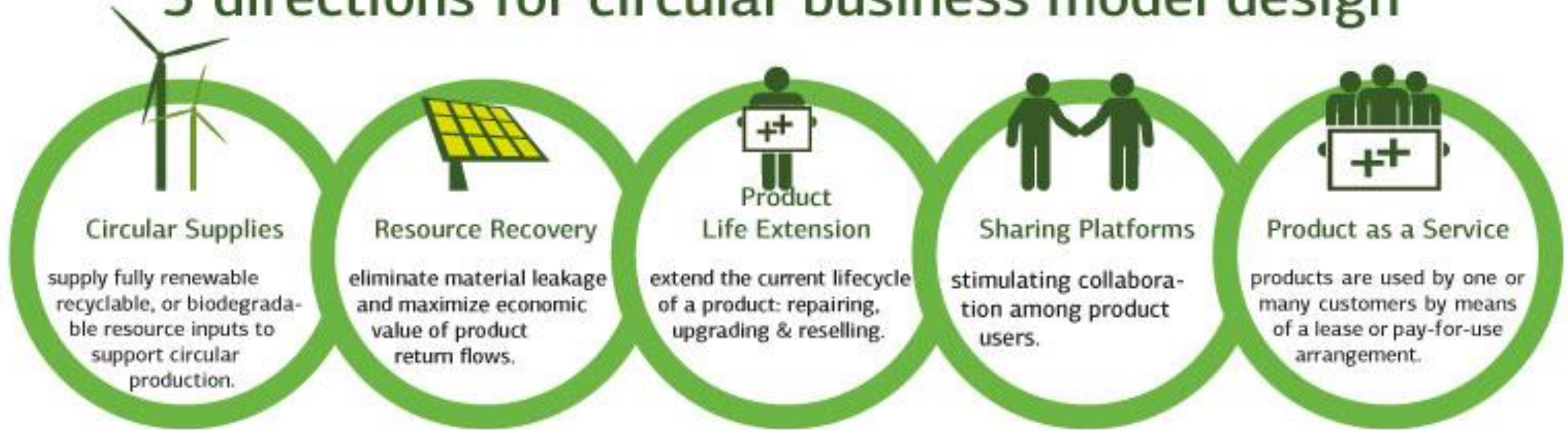
## Linear economy vs. circular economy approaches in the construction supply chain



India's transition to a circular economy holds immense potential for creating circular jobs and driving sustainable economic growth.

According to a report by the World Economic Forum, up to 50 million jobs can be generated with a projected economic impact of \$15 trillion.

# 5 directions for circular business model design



Integrate renewable materials

Redesign value chains to maximize value chains

Right to repair

Sharing Cabs  
Sharing factories

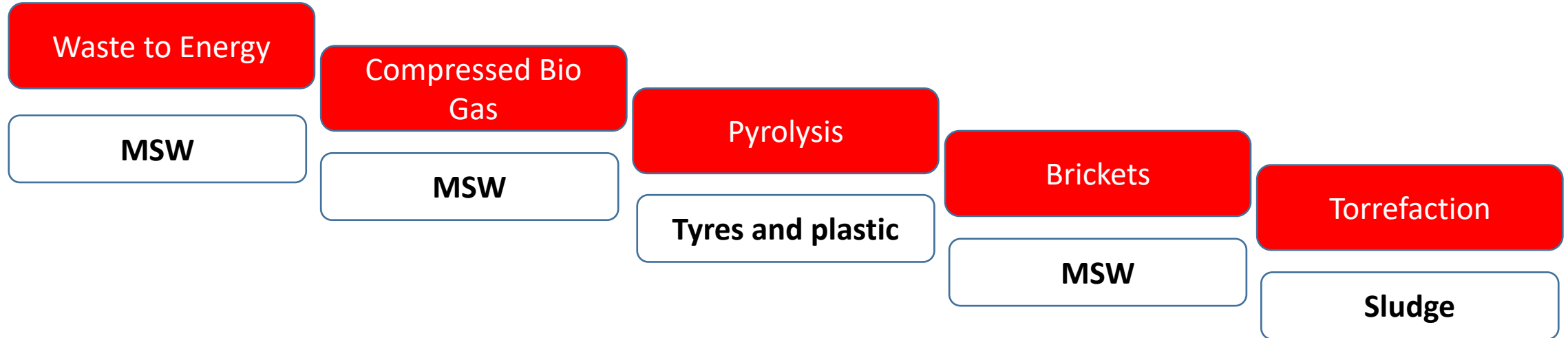
Renting Furniture

Waste to Energy



## WASTE TO ENERGY

- Waste especially Municipal Solid Waste carries a calorific value ranging from 1200 Kcal to 1900 Kcal
- Other wastes like used tyres, Drain Sludge, Garden waste etc., are also used in different types of waste to Energy

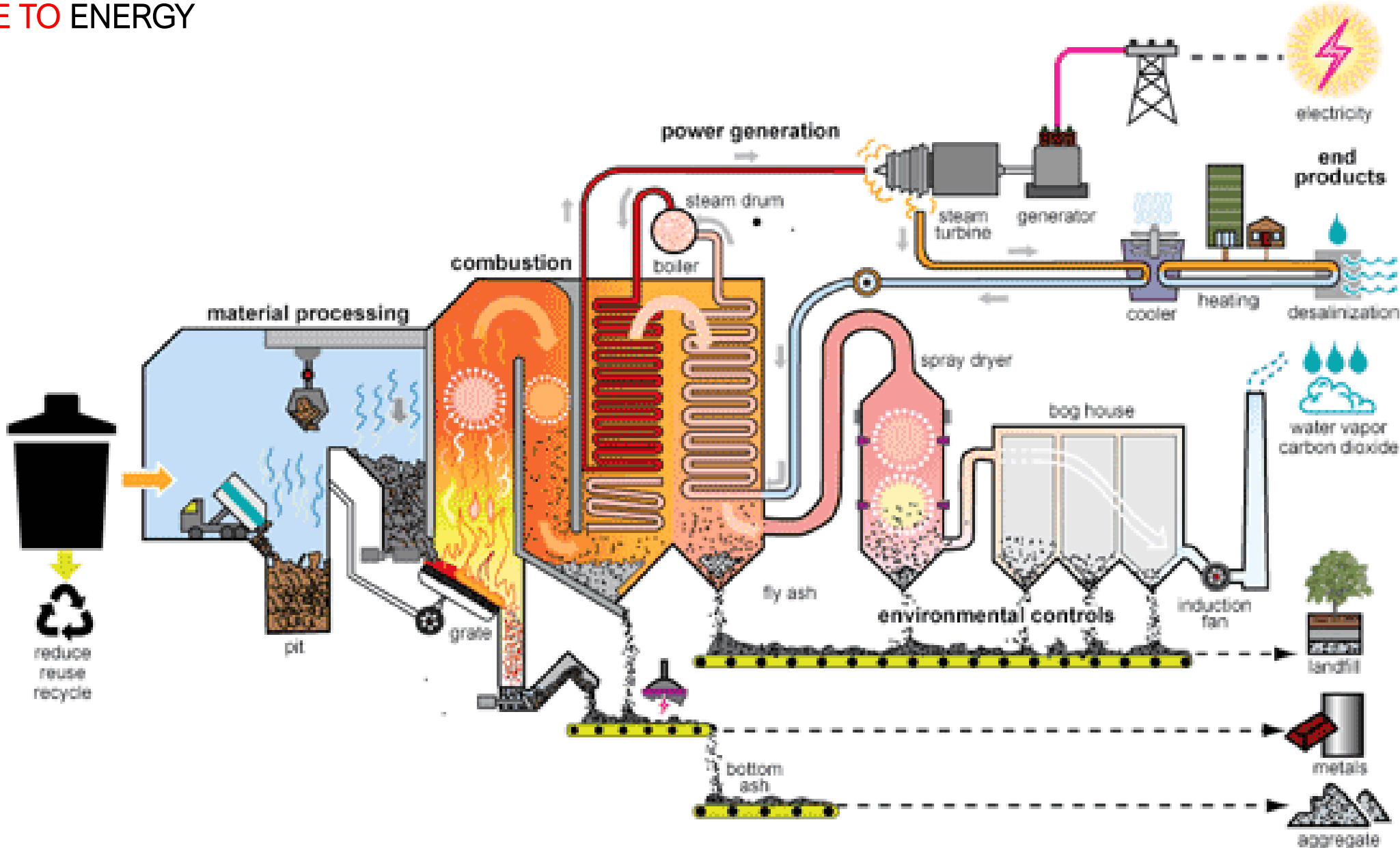


## WASTE TO ENERGY

The process of generating electricity in a mass-burn waste-to-energy plant has seven stages:

1. Waste is dumped from garbage trucks into a large pit.
2. A giant claw on a crane grabs waste and dumps it in a combustion chamber.
3. The waste (fuel) is burned, releasing heat.
4. The heat turns water into steam in a boiler.
5. The high-pressure steam turns the blades of a turbine generator to produce electricity.
6. An air-pollution control system removes pollutants from the combustion gas before it is released through a smoke stack.
7. Ash is collected from the boiler and the air pollution control system.

# WASTE TO ENERGY



## EXPERIENCES IN WASTE TO ENERGY – 24 MW PLANT IN DELHI



## 24 MW WTE PLANT - HYDERABAD



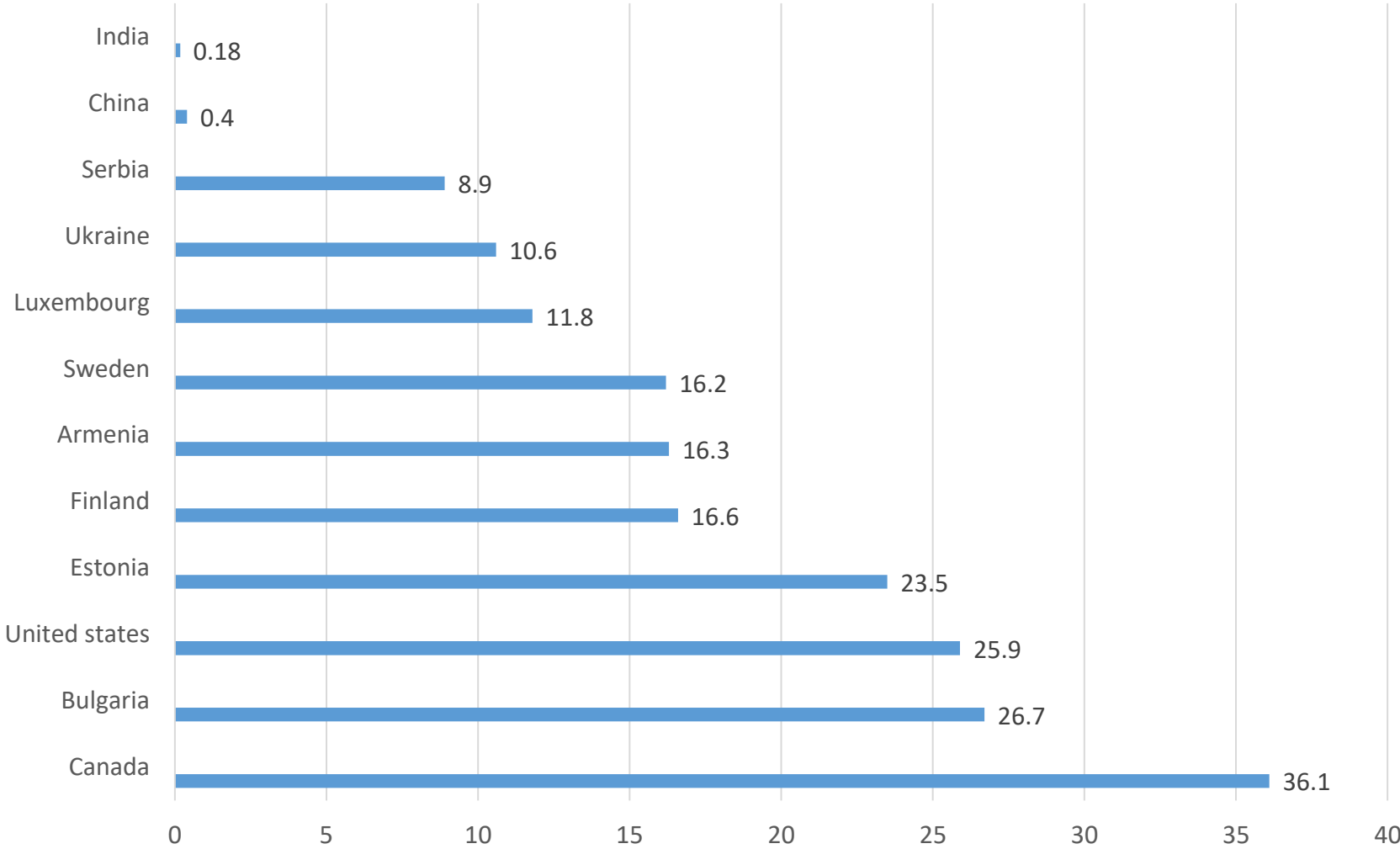
## CHALLENGES IN WTE

### CHALLENGES:

- Very high capital expenditure 25 Cr per MW
- High cost of production of electricity approx: INR 12 per Unit ( Solar at INR 2 per unit)
- Feed quality (Low calorific value, consistency of Fuel and availability of fuel)
- Financing of projects
- Skilled manpower for running of these projects

# WASTE TO ENERGY FUTURE

Per Capita waste generated per annum in Tons



## WASTE TO ENERGY FUTURE

The Future of waste to Energy:

2600: Active plants across the world

300+: Active plants in China

250+: Active plants in Europe ( Total Installed capacity is around 4000 MW)

10+ : Active plants in India ( Total Installed capacity of 240 MW)



THANKS