

Waste To Energy Plant (WTE)

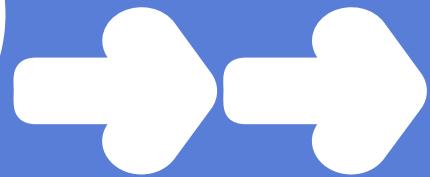
Presented by Ahowd Saeed,
ID:G23208849



Linear Economy & Circular Economy



Linear Economy



- Follows a "take-make-dispose" approach.
- Resources are used in a one-time manner and then discarded as waste.
- Emphasizes maximizing production and consumption.
- Relies heavily on resource extraction, leading to depletion and increased waste.
- Economic growth is often linked to increased consumption and production.
- Contributes to resource depletion, waste generation, and environmental degradation.

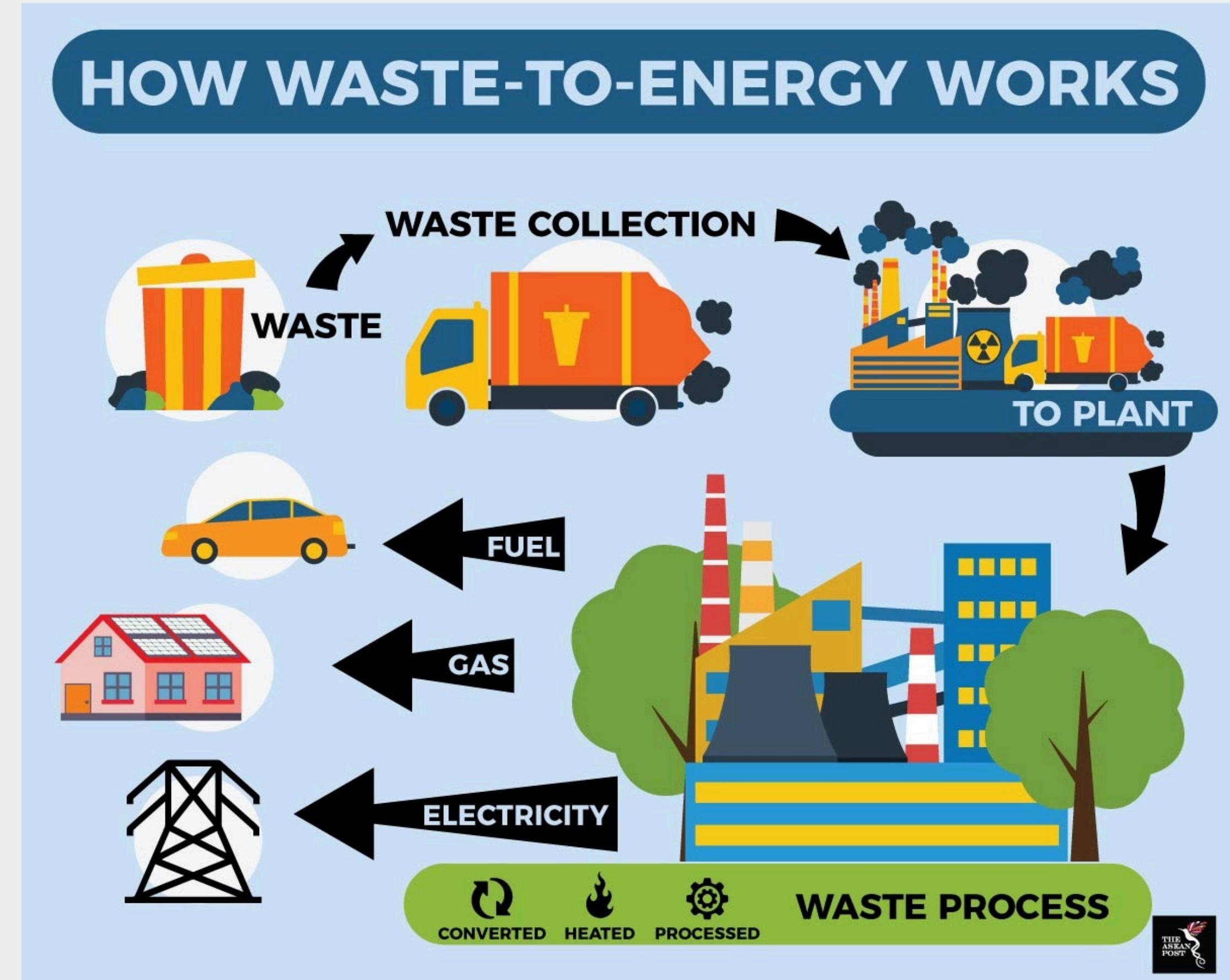


Circular Economy

- Aims to create a closed-loop system for resources.
- Focuses on recycling, reuse, and regeneration of resources.
- Promotes resource efficiency and waste reduction.
- Designs products for durability, repairability, and recyclability.
- Decouples economic growth from resource consumption and environmental impact.
- Minimizes environmental impact by reducing extraction, waste, and pollution.
- Promotes sustainable economic development and value creation through closed-loop systems.
- Contributes to resource conservation, reduced pollution, and climate change mitigation.

What is (WTE)?

A waste-to-energy (WTE) plant, also known as an energy-from-waste (EfW) plant, is a facility that converts solid waste into usable energy, typically in the form of electricity and/or heat. The main purpose of a WTE plant is to recover energy from waste that would otherwise be sent to landfills.



Step #1

Waste Reception & Sorting

- Waste is delivered to the facility and received at designated areas.
- The waste is sorted to remove non-combustible materials, recyclables, and hazardous substances.
- Mechanical and manual sorting techniques are employed to separate different types of waste.



Types of receiving waste:

- Municipal waste.
- Industrial waste.
- Agriculture residues
- Wood waste
- Construction & Demolition
- Sewage sludge

Criteria that waste must meet:

- Calorific Value
- Moisture Content
- Composition & Combustibility.
- Hazardousness
- Size & Pre-treatment

Step #2

Combustion or Thermal Treatment

- The combustible portion of the waste, known as refuse-derived fuel (RDF), is fed into a combustion chamber or furnace.
- The waste is burned at high temperatures in the presence of oxygen.
- The combustion process releases heat energy through the exothermic reactions of burning organic matter.

Step #3

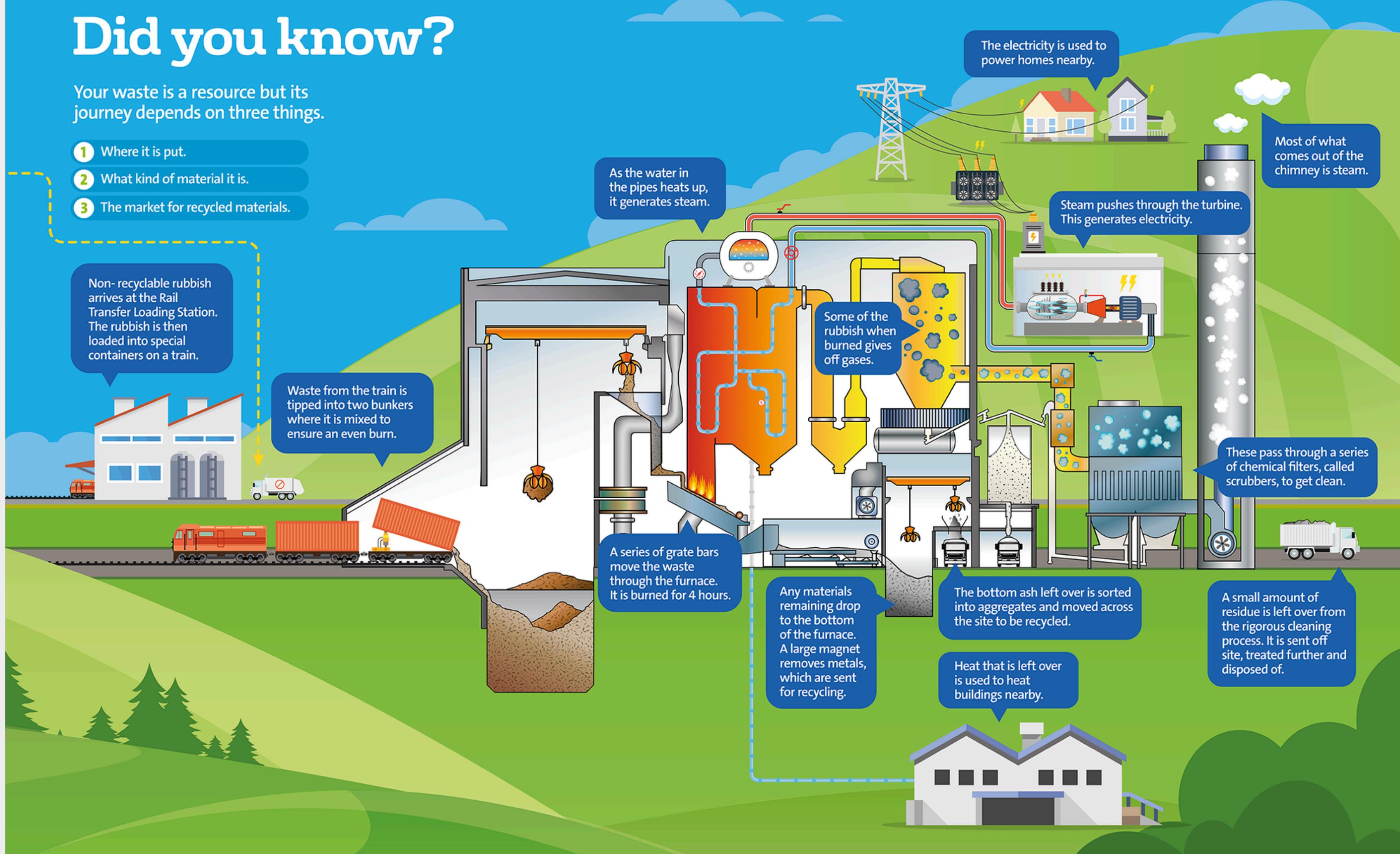
Heat Recovery and Electricity Generation

- The heat generated during combustion is used to produce high-pressure steam.
- The steam is directed to a turbine, which is connected to a generator.
- The turbine spins the generator, converting the mechanical energy into electricity.
- The generated electricity is typically sent to the local power grid for distribution and use.

Did you know?

Your waste is a resource but its journey depends on three things.

- 1 Where it is put.
- 2 What kind of material it is.
- 3 The market for recycled materials.



WTE Landfills

Case Study

Turning LFG to a source of renewable energy and to reduce GHG emissions of MSWLF

Landfills are classified into subtitles based on the characteristics of their waste. After the RCRA Act, landfills were regulated to:



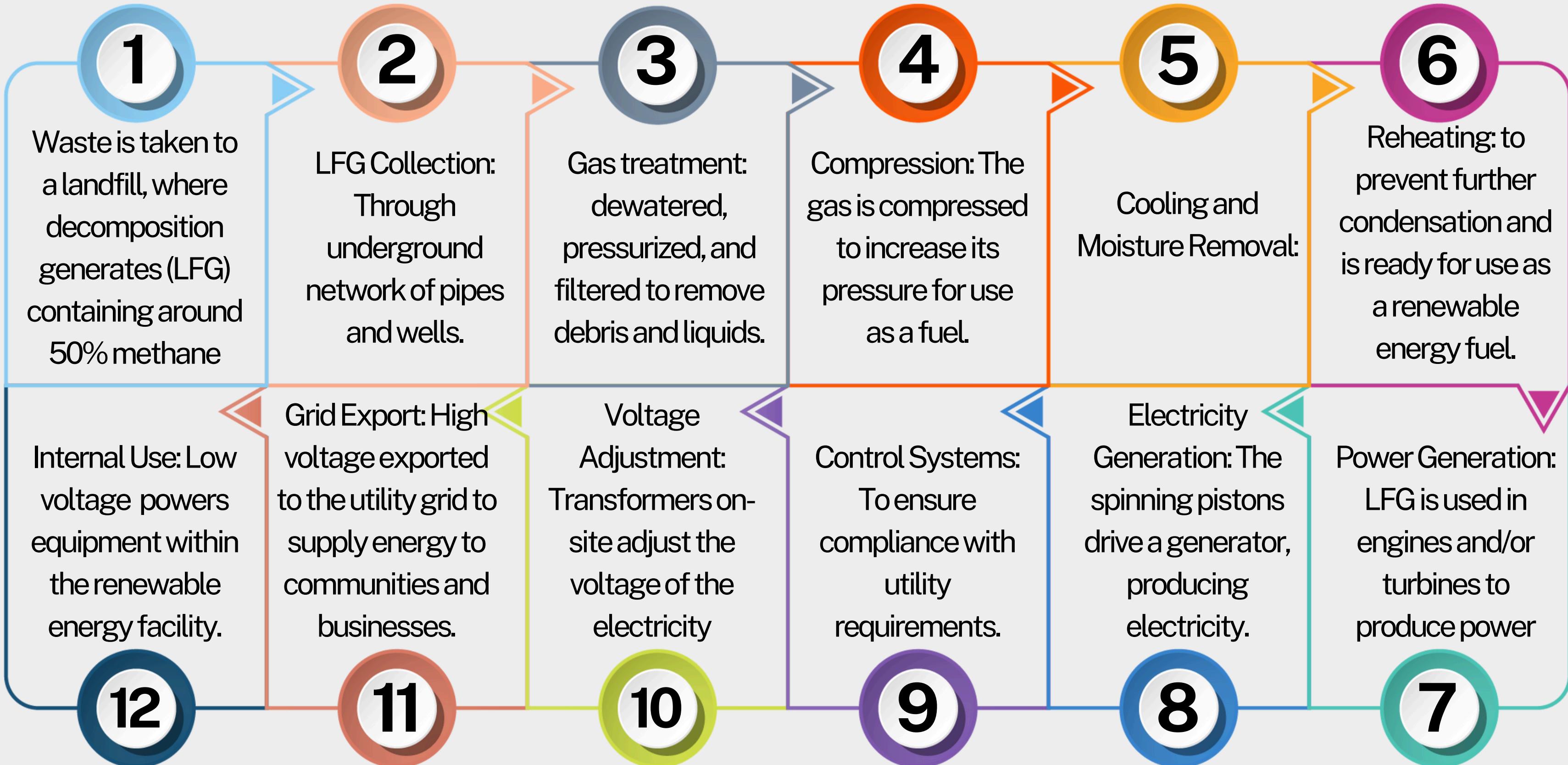
Subtitle C (hazardous waste)

Subtitle D (solid waste).

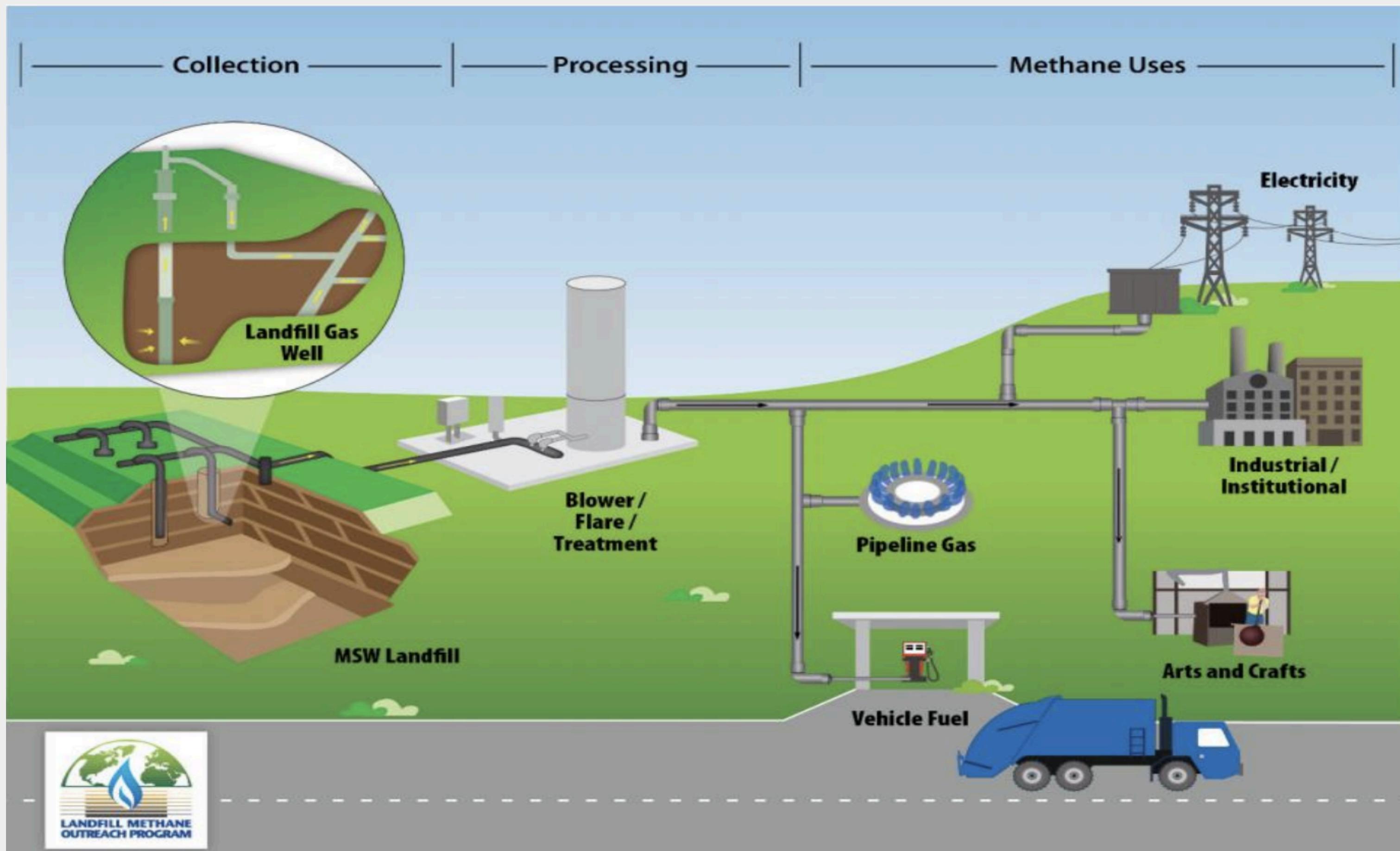
Subtitle D landfills consist of the following

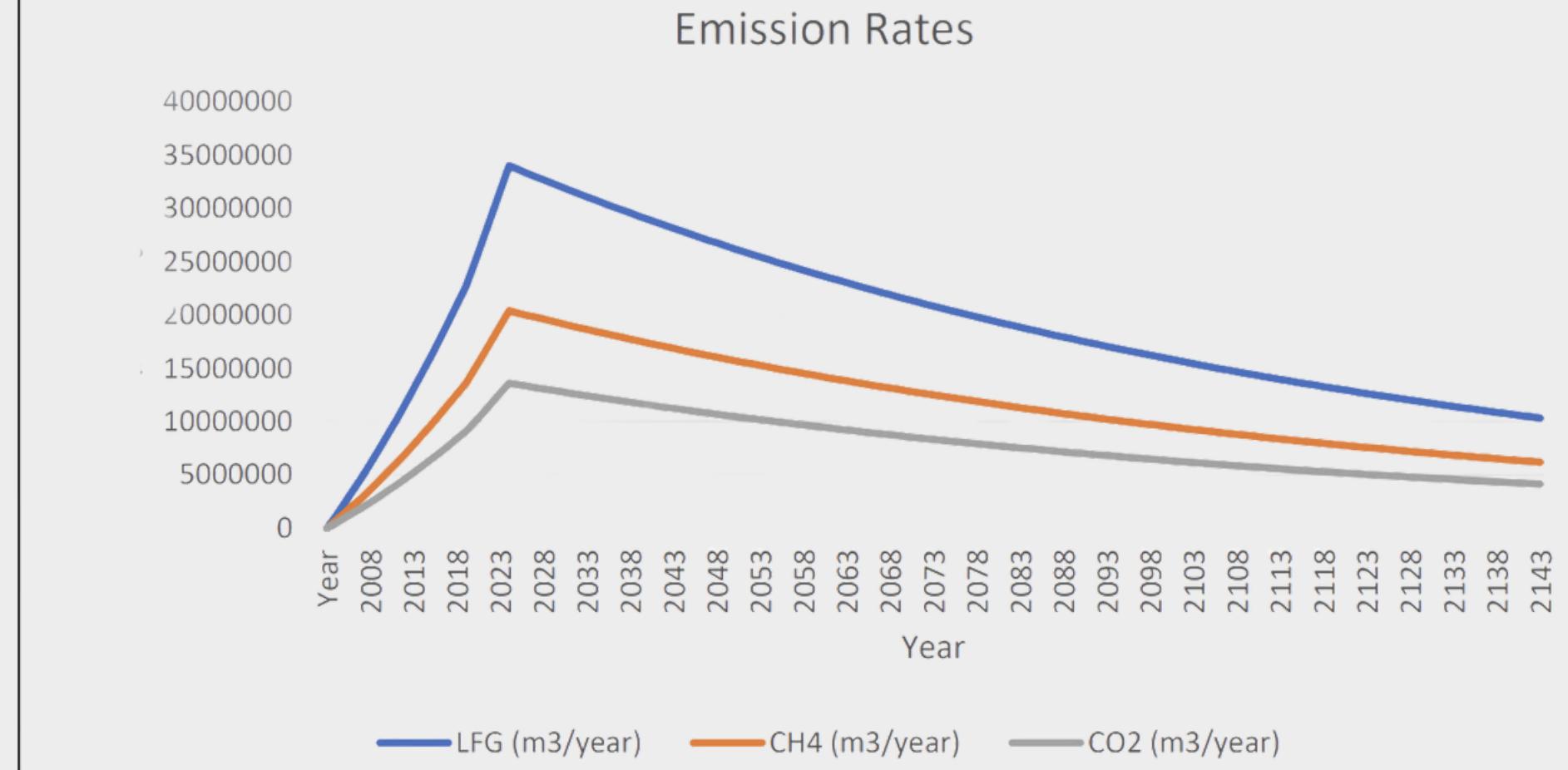
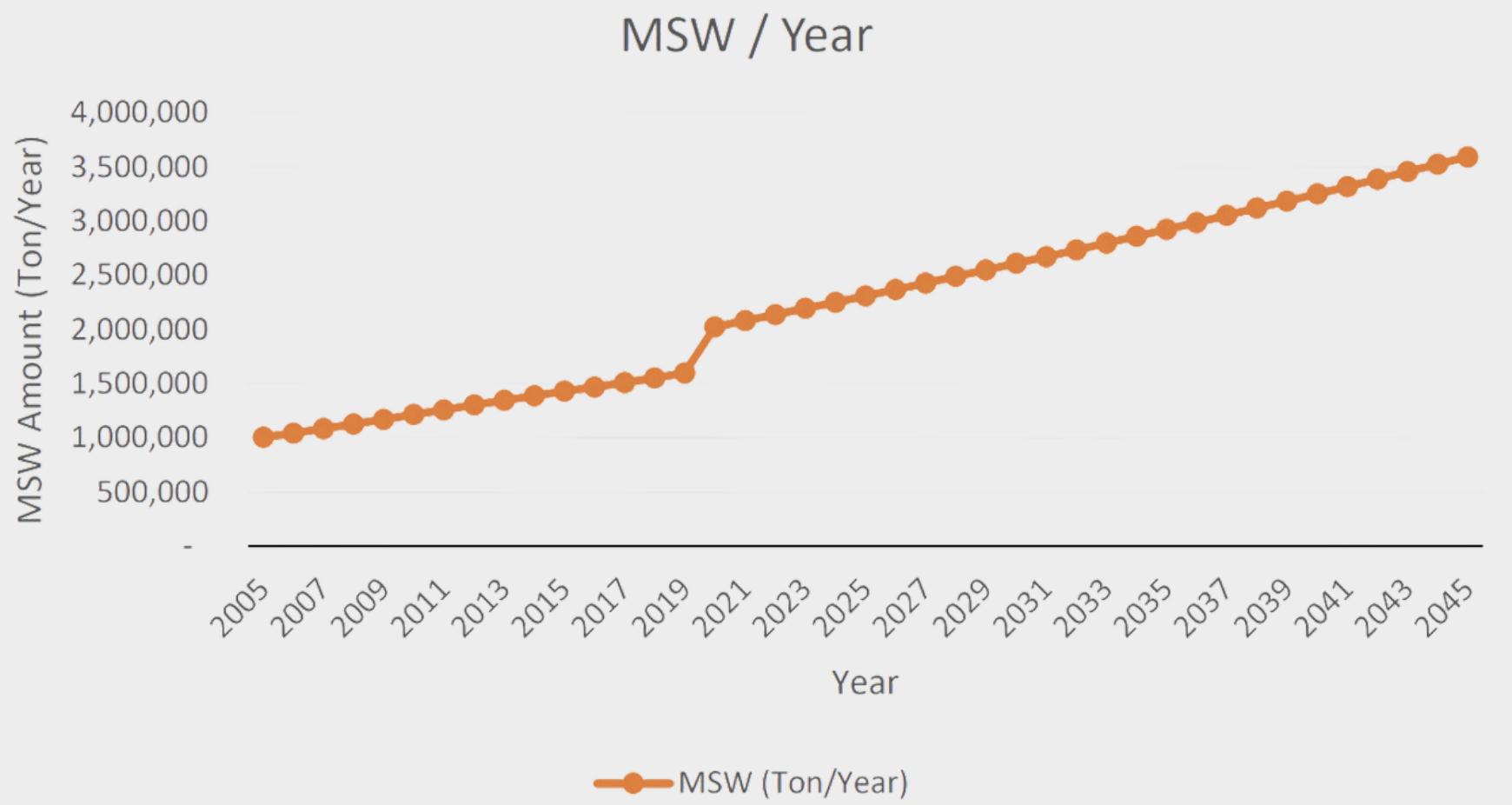
- a) Municipal Solid Waste Landfill (MSWLFs).
- b) Bioreactor Landfill.
- c) Industrial Waste Landfill.
- d) Construction and Demolition Landfill.
- e) Coal Combustion Residuals Landfill.

Landfill Gas



WTE Landfills Gas





MSW amount increase every year

Graphical results for MSWLF gas emissions

Annually Comparison

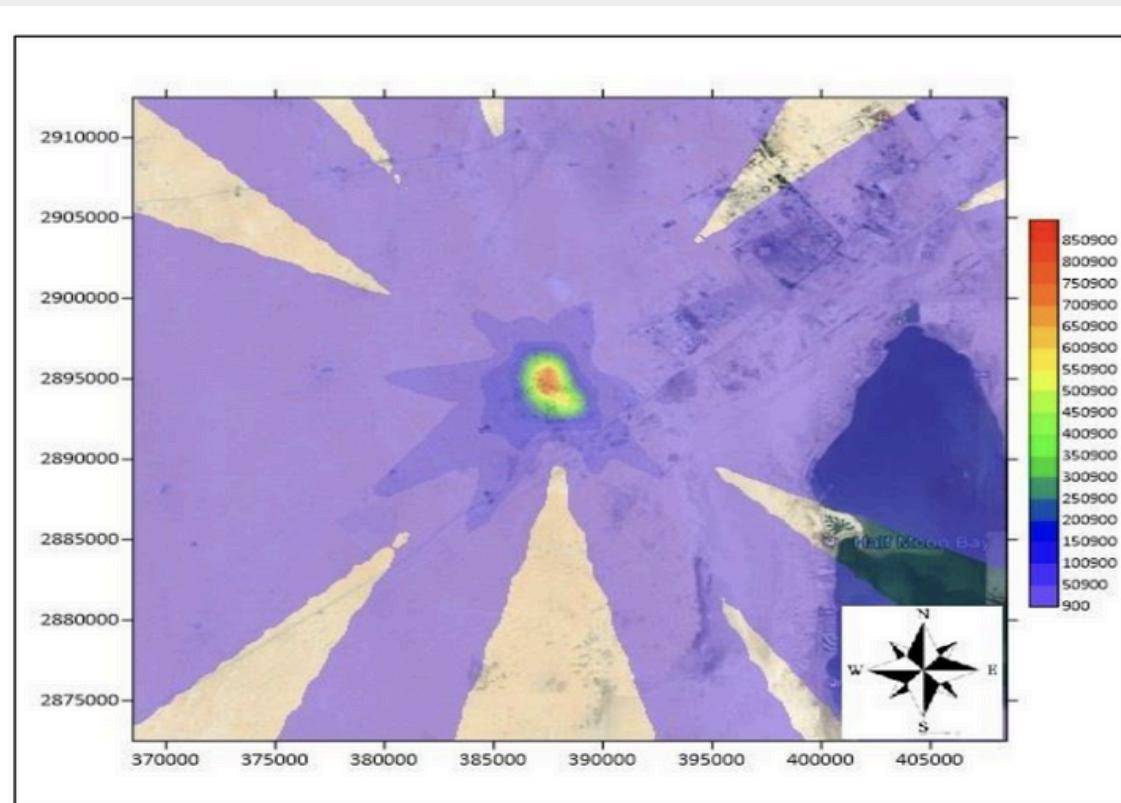


Figure 4.5:Daily GHG Emission for Dammam Landfill if conventional

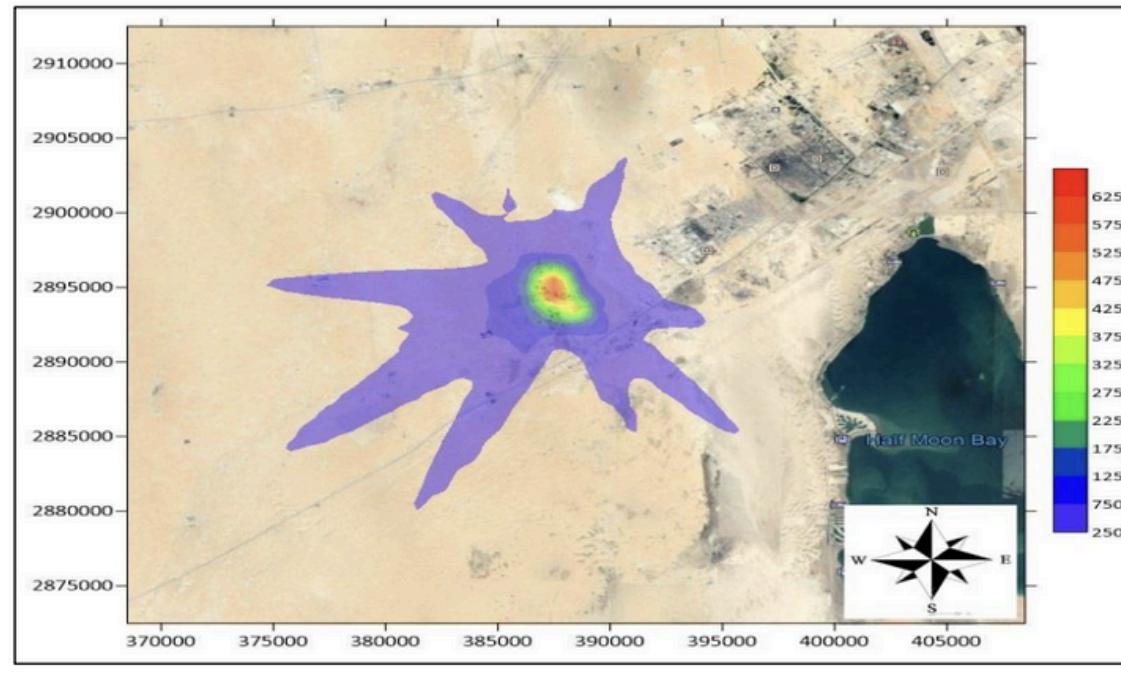


Figure 4.6:Daily GHG Emission for Dammam Landfill if LFG to energy

Annually Comparison

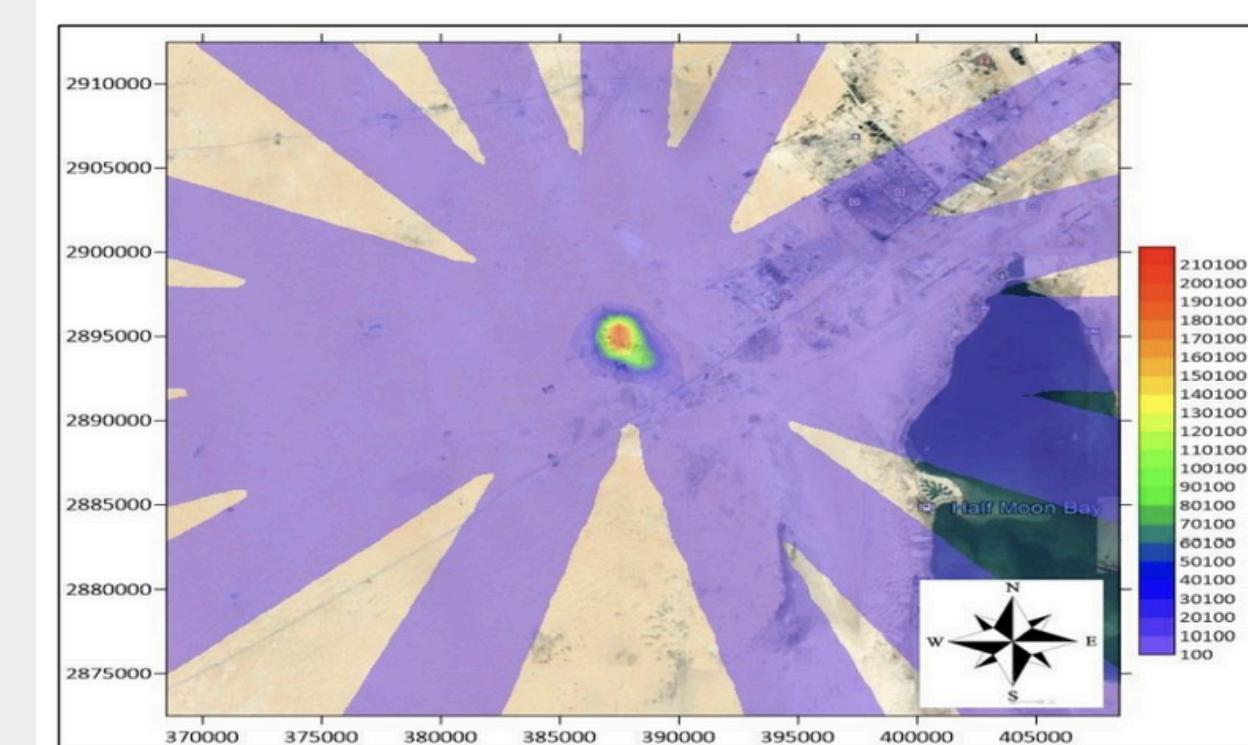


Figure 4.7:Annual GHG Emission for Dammam Landfill if conventional

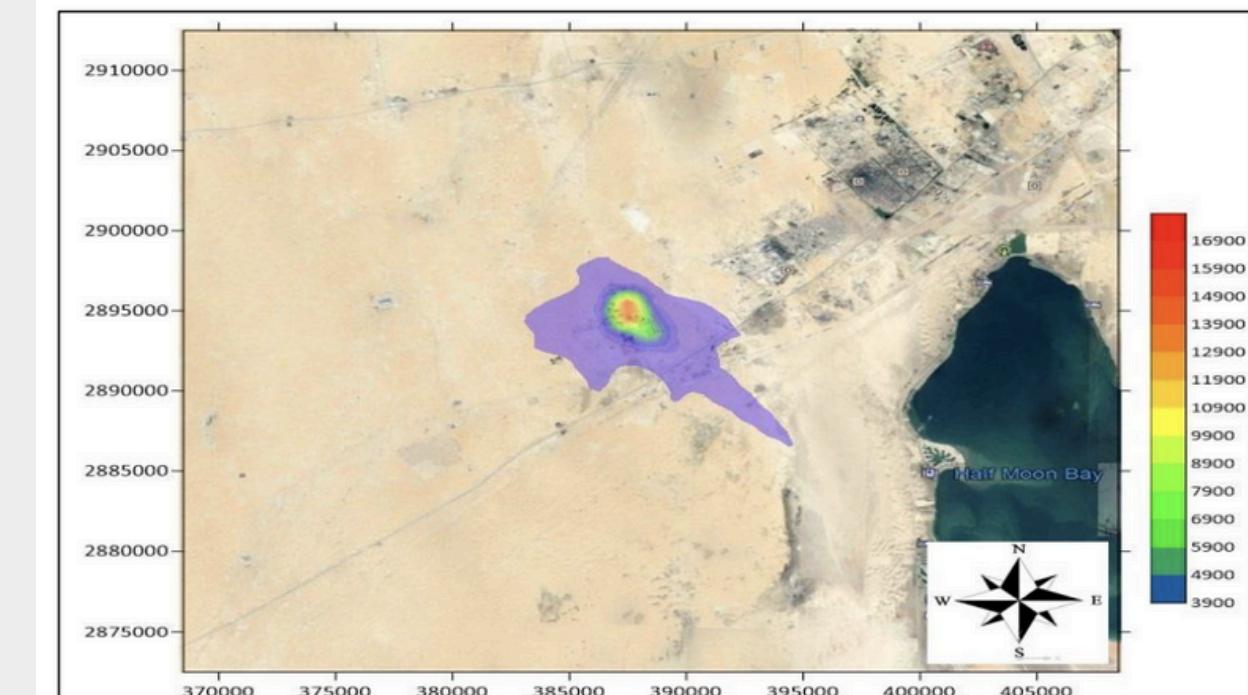
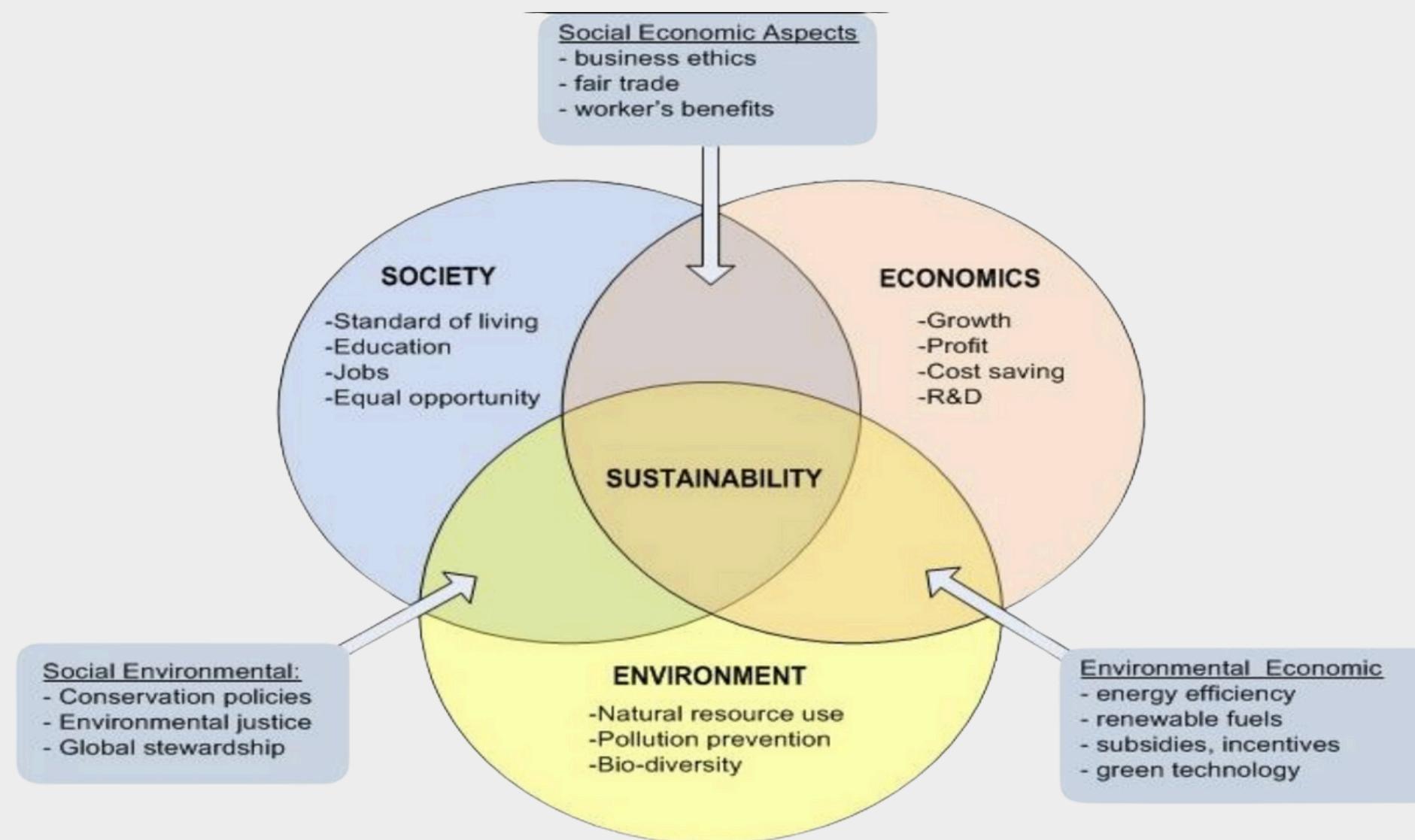


Figure 4.8:Annual GHG Emission for Dammam Landfill if LFG to energy

WTE Landfills



- Decrease emissions GHGs that participate in global climate change.
- Revolutionize the use of non-renewable sources.
- Assist to improve air quality.
- Grow up the landfill business and offer revenue for landfills owners and operators.
- Reduce the consumption of oil and natural resources.
- Jobs creation and enhance investment in landfills business.



Thank
you very
much!

