

# From Solid Waste to Sustainable Energy

## *Advancing the Green Transition in the Arab Region*

*Presented by :*

**Prof. Sherien Elagroudy**

*Director, Egypt Solid Waste Management Center of Excellence,  
Faculty of Engineering, Ain Shams University.*



# Outlines

## Purpose

Introduce the problem and set the stage.

### Global Waste Crisis

Key Points

### Waste Challenge

### Rethinking Waste

Rethinking waste as a misplaced resource encourages sustainable production patterns.

### Circular Economy

### Resource Recovery Infrastructure

Waste and resource use are minimized, and resources are kept within the economy.

### Waste to Energy

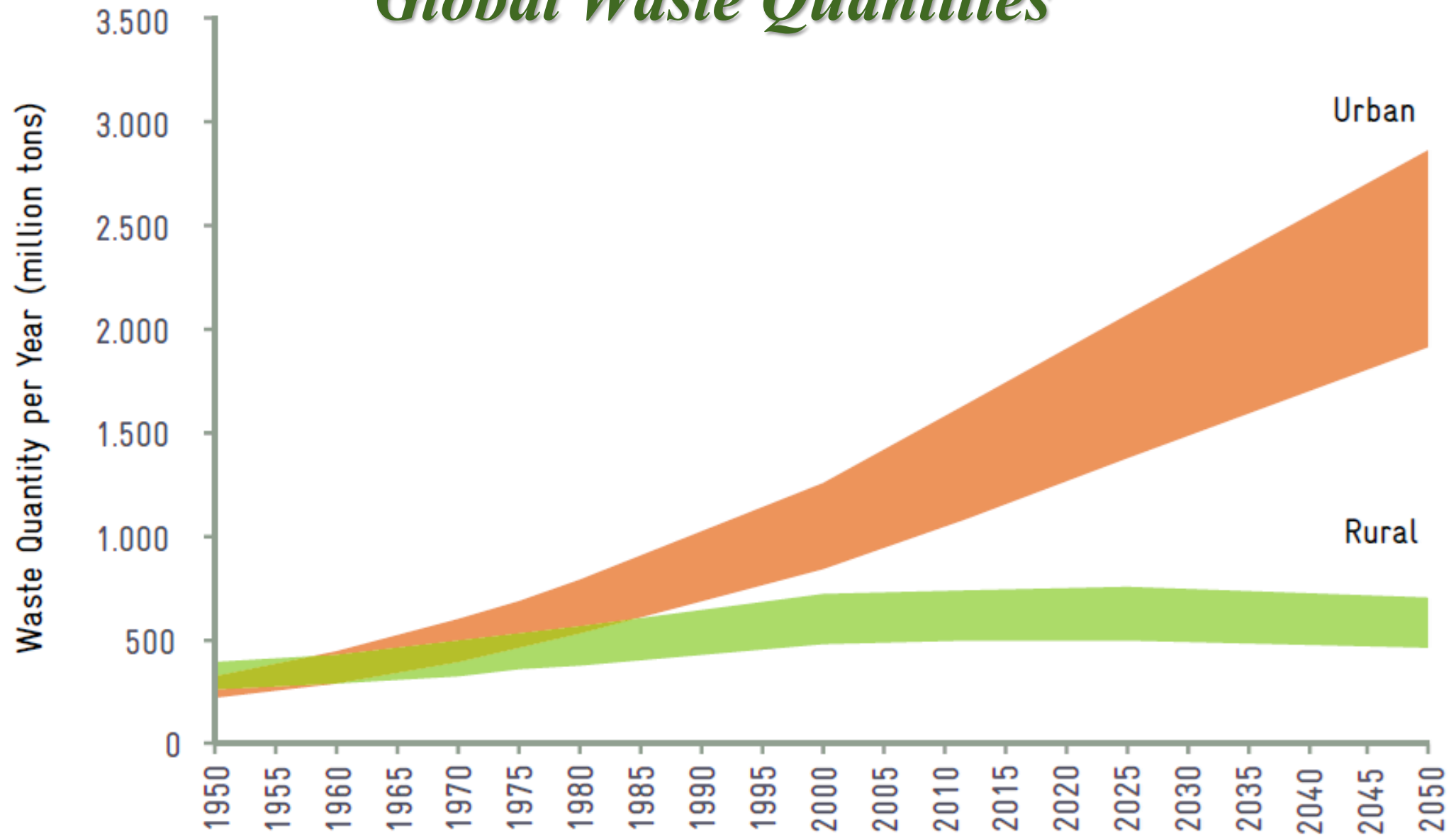
### WtE Technologies

Why we need WtE projects ?  
And how can waste be energy ?

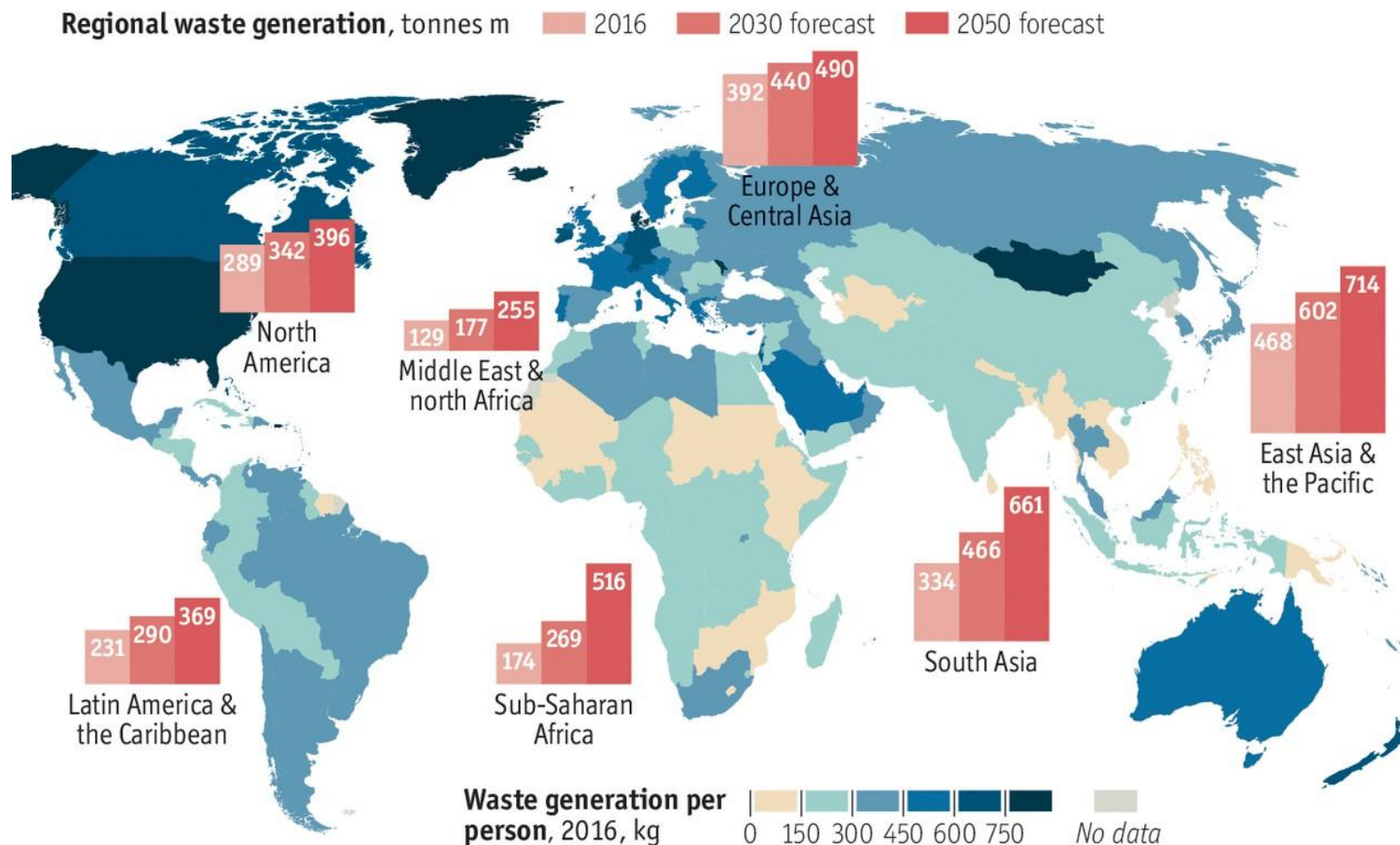
### Case studies

In Egypt  
In Arab Region  
Global waste-to-energy (WTE)  
industry

# *Global Waste Quantities*



# Regional Waste Generation



Source: World Bank

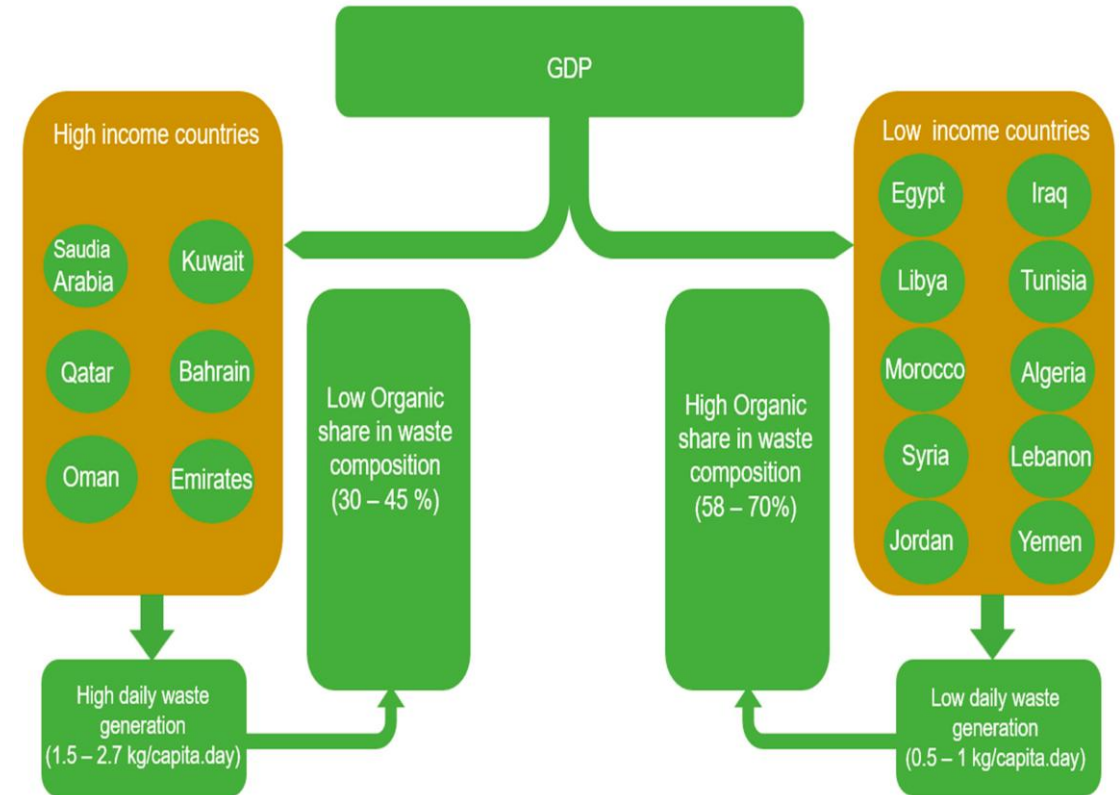
**Middle East & North Africa** shows substantial growth potential, with waste generation expected to nearly double from 129 million tonnes in 2016 to 255 million tonnes by 2050.

# Waste Generation and Waste Composition in Arab Region

The flowchart shows how Arab country's income level shapes its waste patterns.

- **High-income countries** (e.g., Saudi Arabia, Kuwait, Qatar, UAE, Oman, Bahrain):
  - **Waste composition:** Low organic share (30–45%).
  - **Waste generation:** High (1.5–2.7 kg/person/day).
- **Low-income countries** (e.g., Egypt, Iraq, Morocco, Tunisia, Algeria, Jordan, Yemen, etc.):
  - **Waste composition:** High organic share (58–70%).
  - **Waste generation:** Low (0.5–1 kg/person/day).

Overall, the chart highlights that **GDP strongly influences both the amount and type of waste produced**, with wealthier nations generating more waste but with a lower organic fraction.



# Waste Challenges

Limited infrastructure for waste collection and disposal.



Weak regulatory frameworks and poor enforcement.



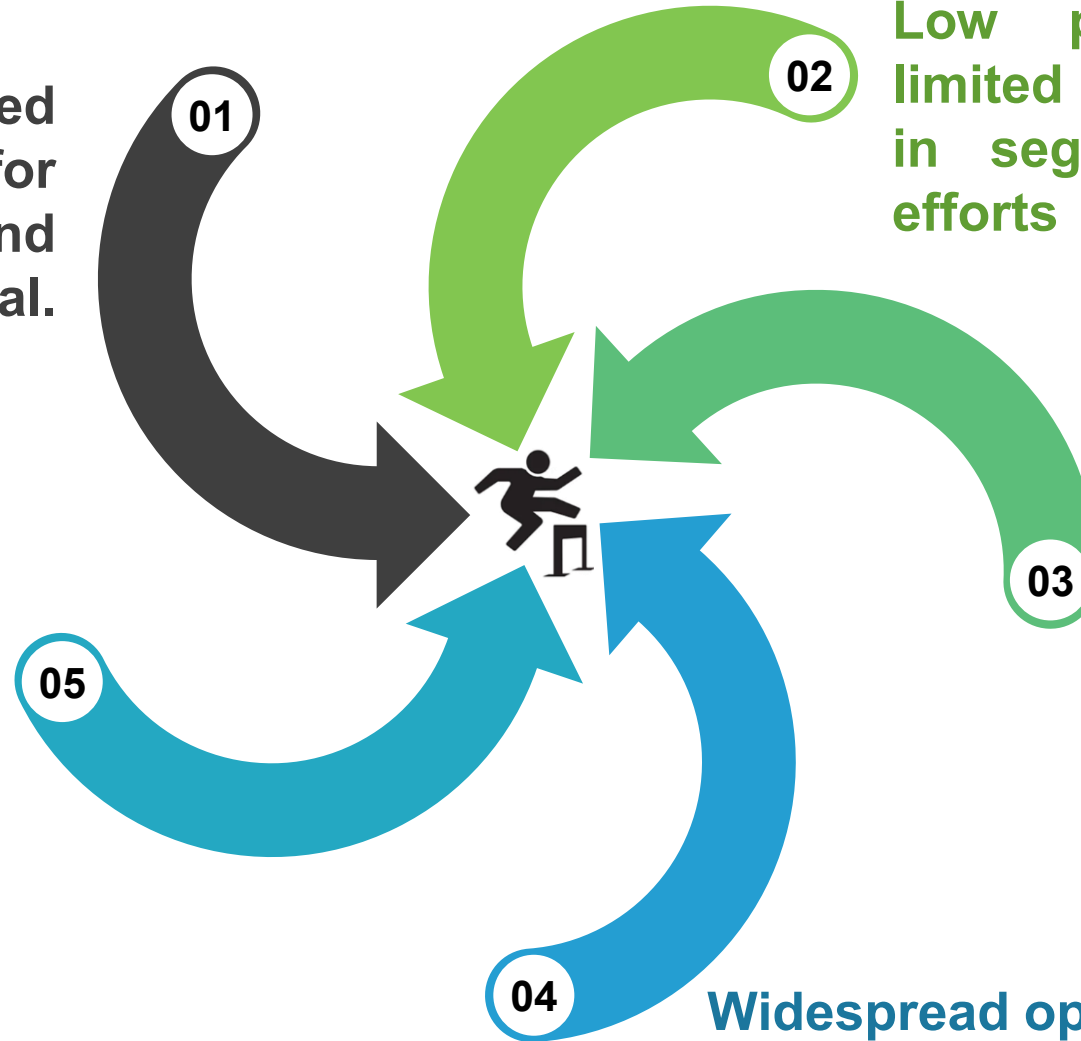
Low public awareness and limited community participation in segregation and reduction efforts



Large informal waste sector remains difficult to integrate with formal systems



Widespread open dumping causes groundwater contamination, air pollution, and health risks.





# Sustainable Solutions

**Waste** is often perceived as useless, but it contains **valuable materials** and energy potential.

- **Proper waste management** transforms waste into resources through recycling, composting, and energy recovery.
- Unlocking value from waste reduces environmental impact and supports circular economy principles.
- **Investing in resource recovery infrastructure** creates economic opportunities and conserves natural resources.
- Rethinking waste as a misplaced resource encourages sustainable consumption and production patterns.



*“Waste isn’t just garbage; it’s a resource in the wrong place”*

# Sustainable Solutions

*Not everything should be recycled,  
But landfilling should be avoided.*



Addressing **unmanaged waste** requires a combination of innovative and practical approaches.

## Policy & Regulatory Reforms



## Innovation in Materials & Technologies



Eco-Friendly Product

## Waste-to-Energy Conversion



## Enhanced Recycling Infrastructure

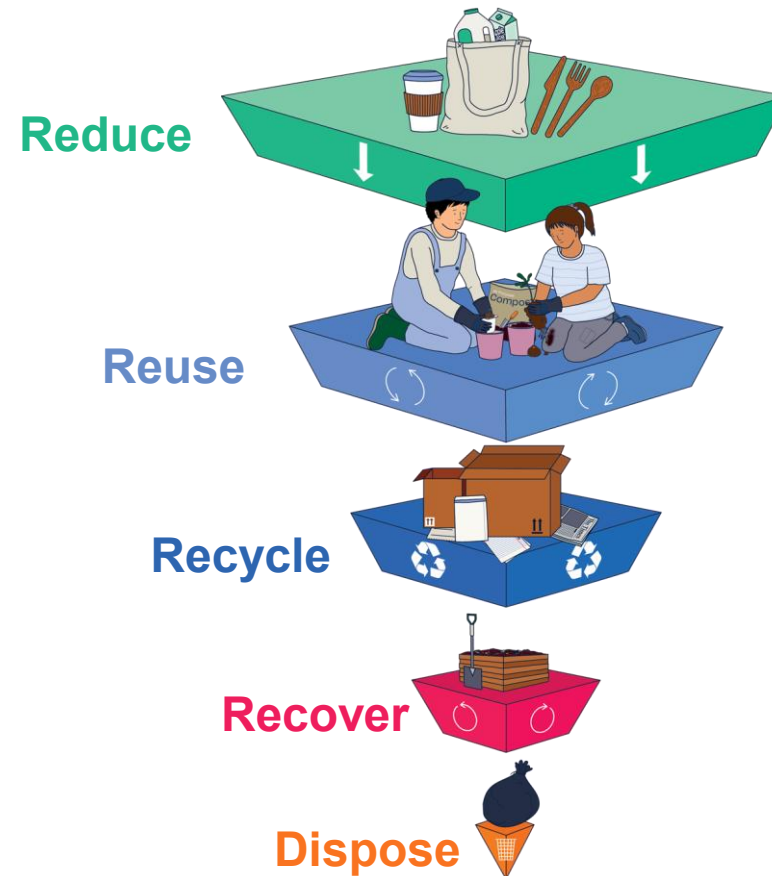




# Circular Economy

In a **circular economy**, products and materials are kept in use for as long as possible, minimizing waste and reusing resources to continually create value.

The development of MSWM systems should follow the waste hierarchy.



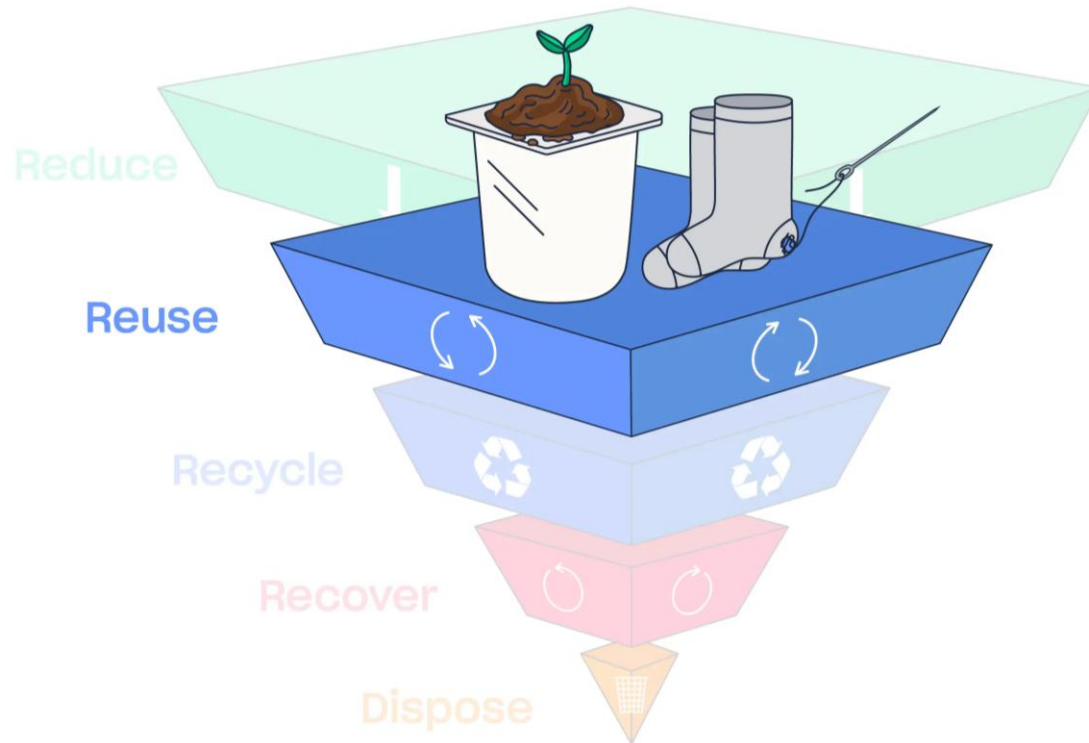
# Circular Economy

To prevent waste at the source, reduce your consumption by choosing products with minimal packaging, using reusable shopping bags instead of disposable ones, and avoiding single-use items like plastic cutlery and water bottles.



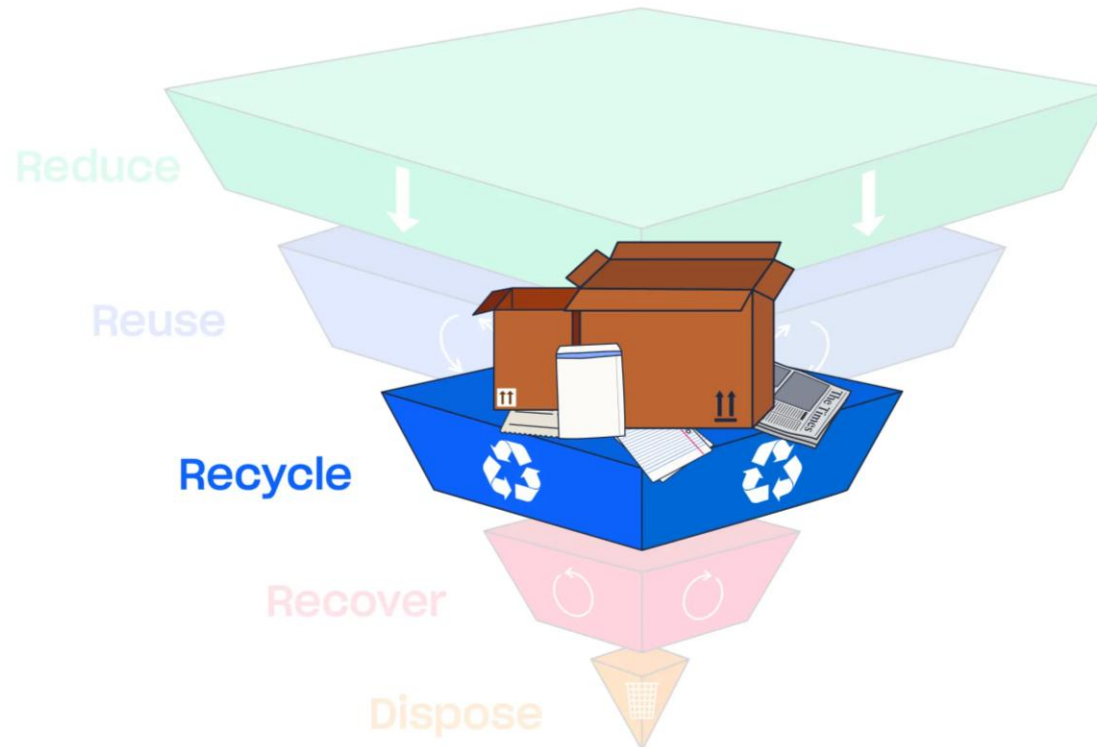
# Circular Economy

If the creation of waste cannot be prevented or reduced, then the next best option is to reuse it. This stage encourages businesses to reuse materials wherever possible and includes checking, cleaning, repairing or refurbishing whole items or spare parts that have been discarded as waste, so that they can be used again.



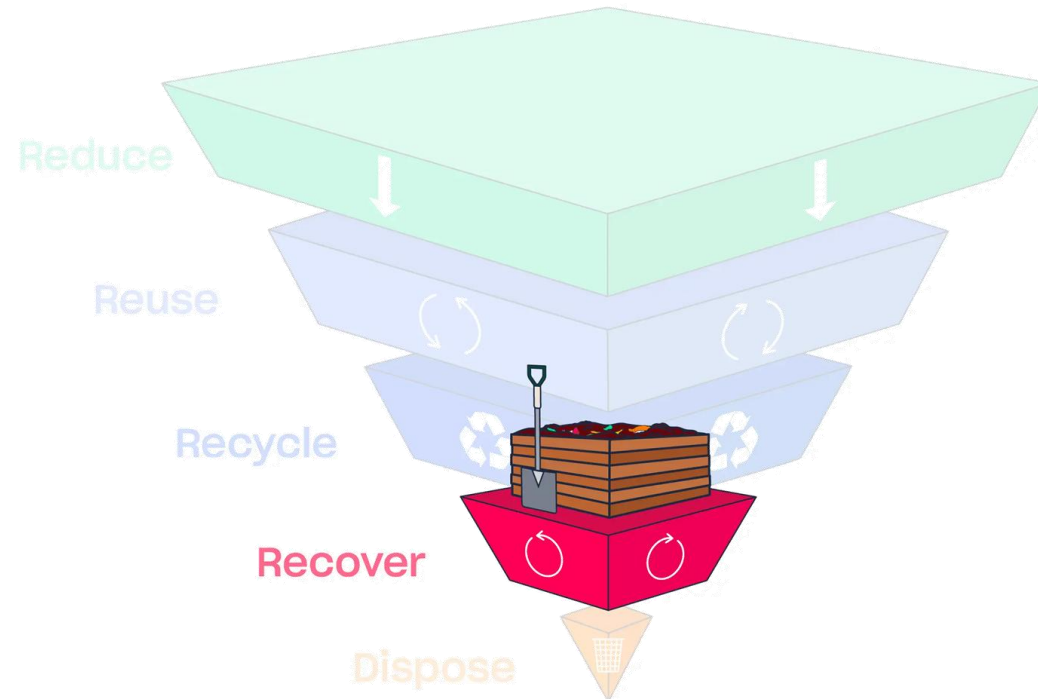
# Circular Economy

The third preferred option is to recycle. In instances where waste production cannot be reduced or prevented and the waste cannot be reused, then it should be recycled. Businesses are encouraged to promote recycling and divert waste from landfills. This can include turning waste into a new material, such as turning food waste into compost.



# Circular Economy

The penultimate stage of the hierarchy is recovery. If businesses are unable to follow the previous steps, then they should explore recovery options such as **waste-to-energy (WtE) processes**. This can include incinerations with energy recovery, gasification and pyrolysis which produces energy (fuels, heat and power) and materials from waste.



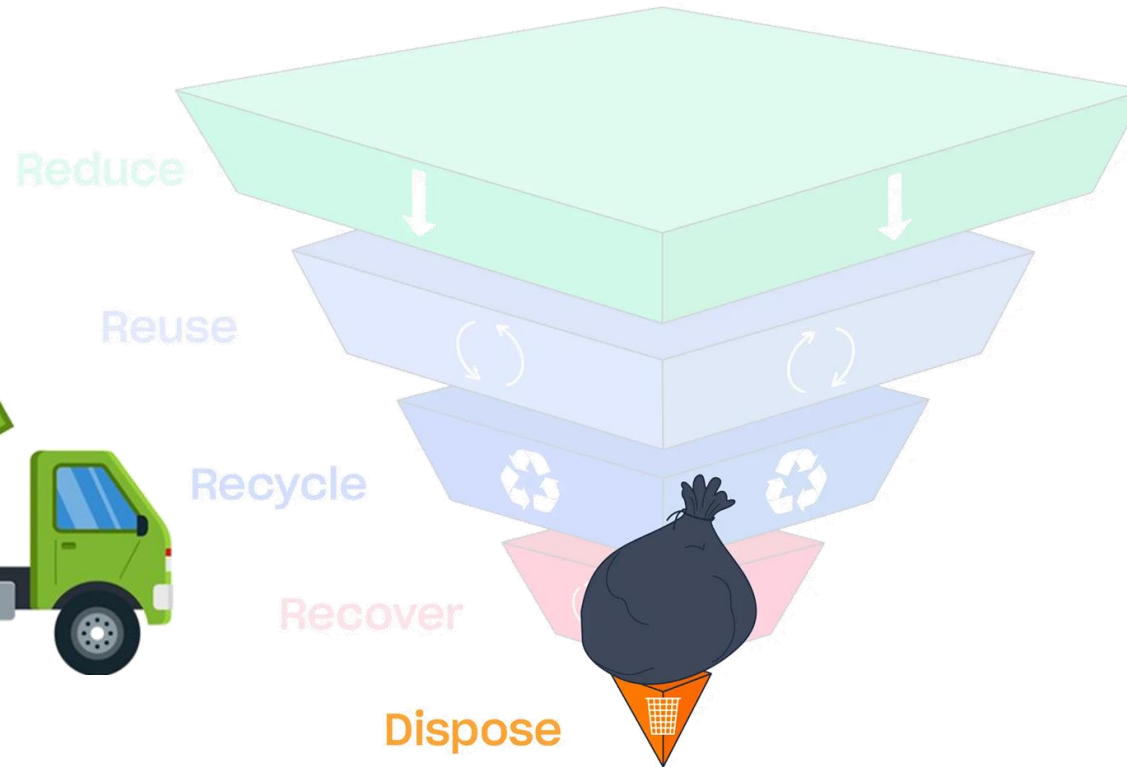


# Circular Economy

**Disposal** is the least preferred option and should only be used as a last resort. It includes landfilling or incineration without any energy recovery.



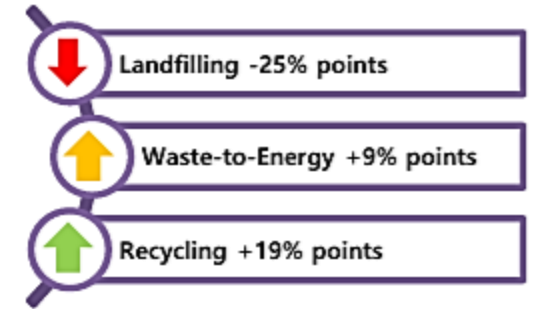
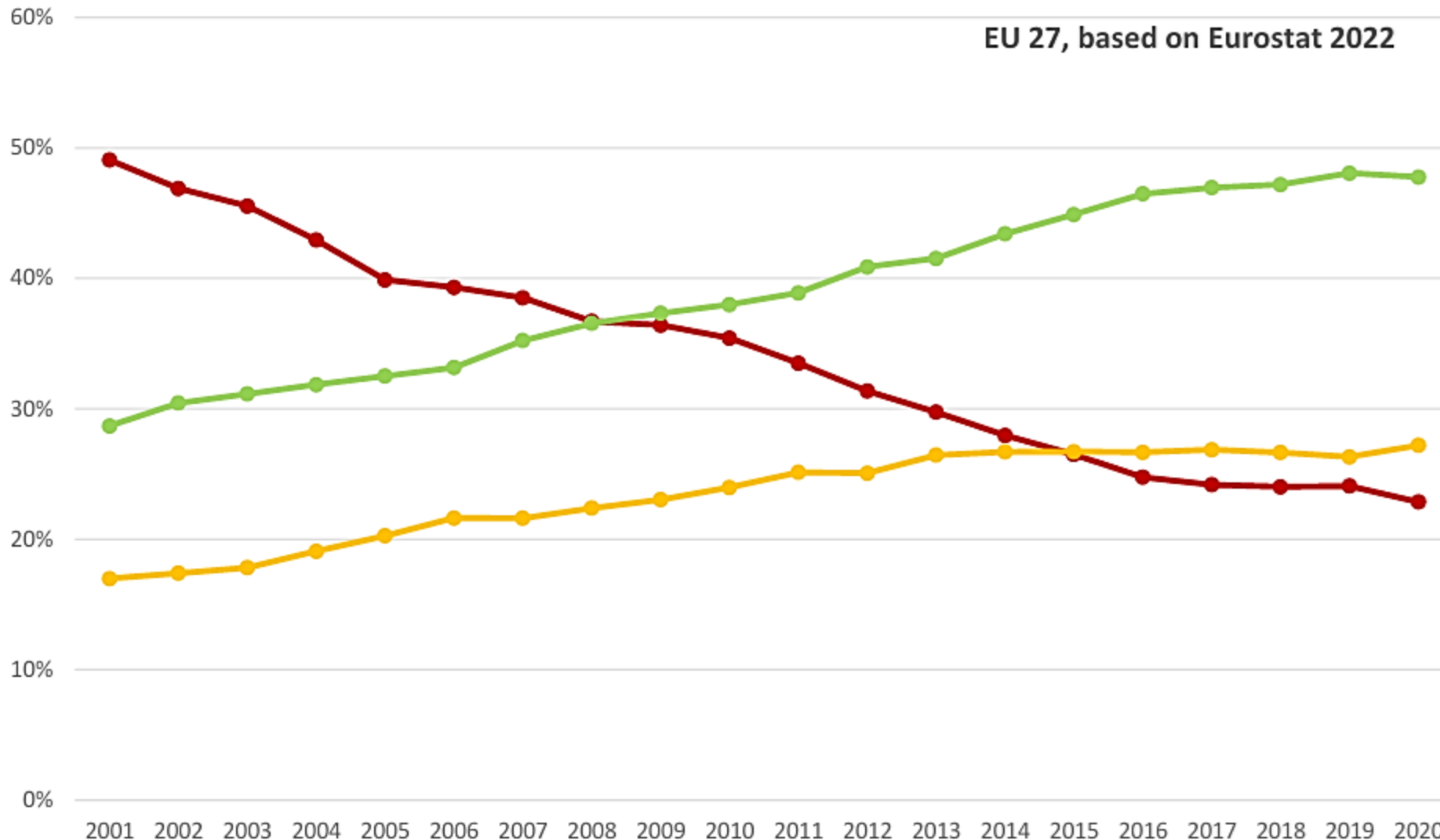
**Dumping**



**Landfill**



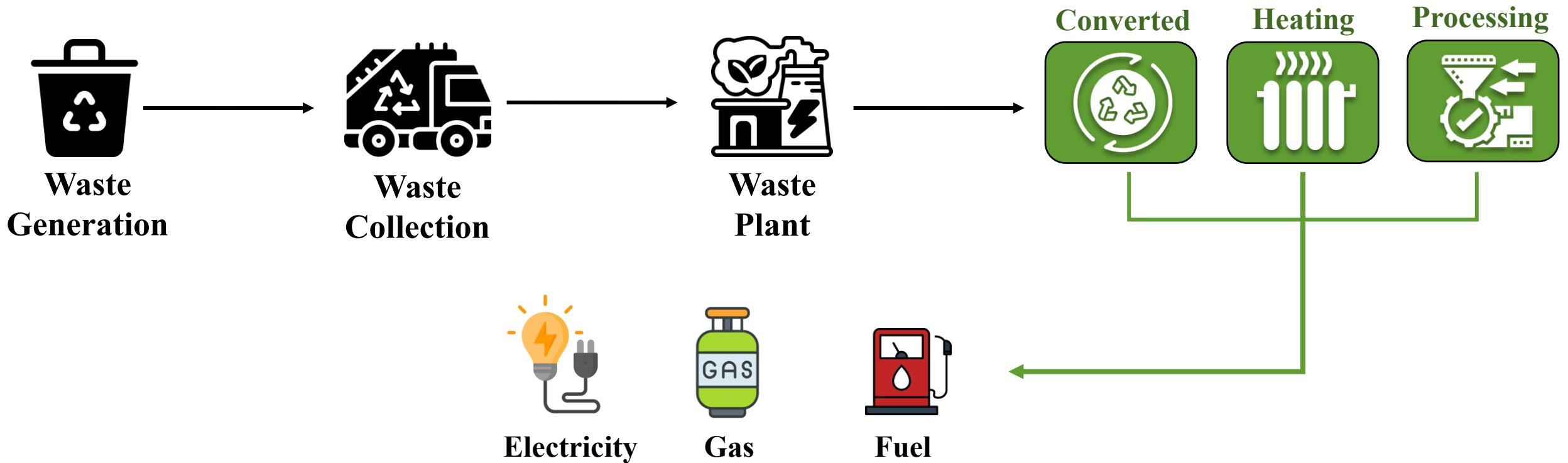
# EU Waste Management Trends: From Landfill to Recovery



Graph by CEWEP,  
Source: EUROSTAT 2021

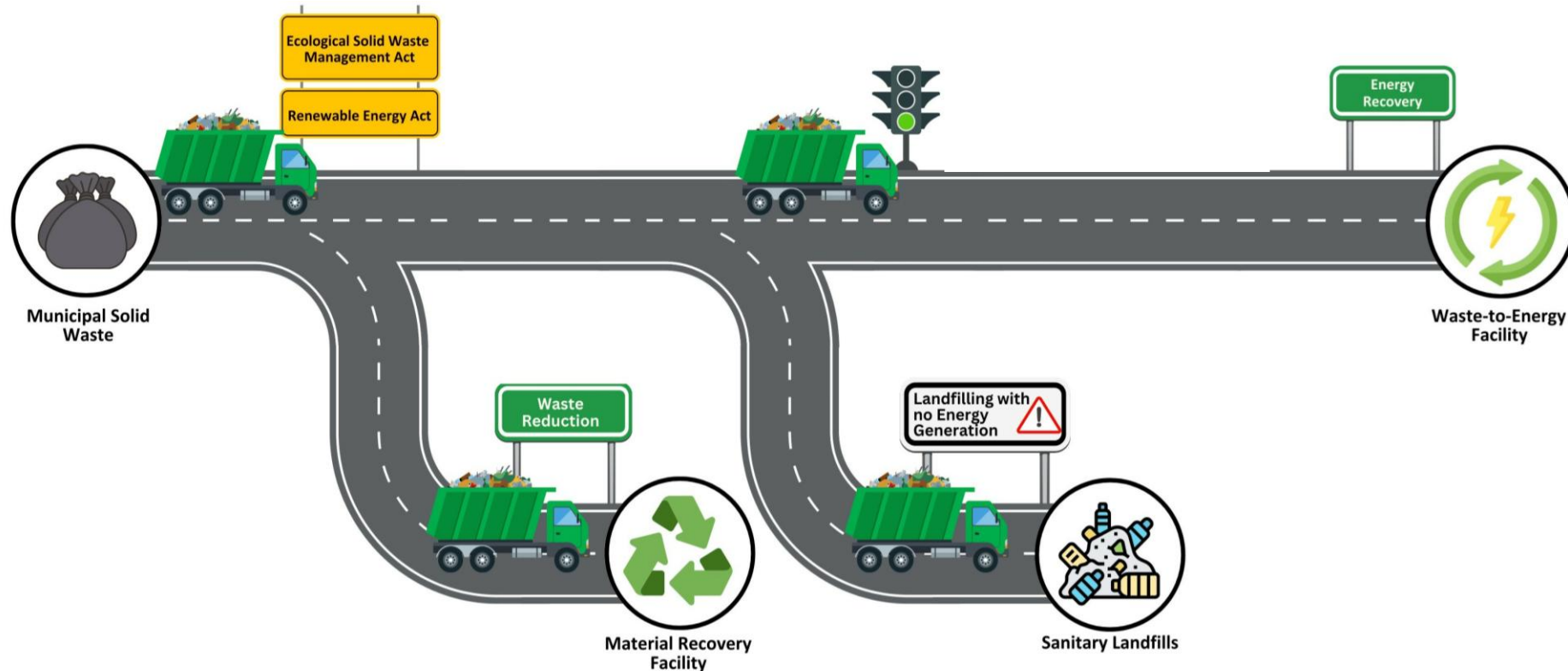
# Waste-to-Energy (WtE)

**Waste-to-Energy (WtE)** is a process that converts non-recyclable waste materials into usable forms of energy, such as electricity, heat, or fuel. This process typically involves the combustion of waste, which generates heat that can be used to produce steam for electricity generation.

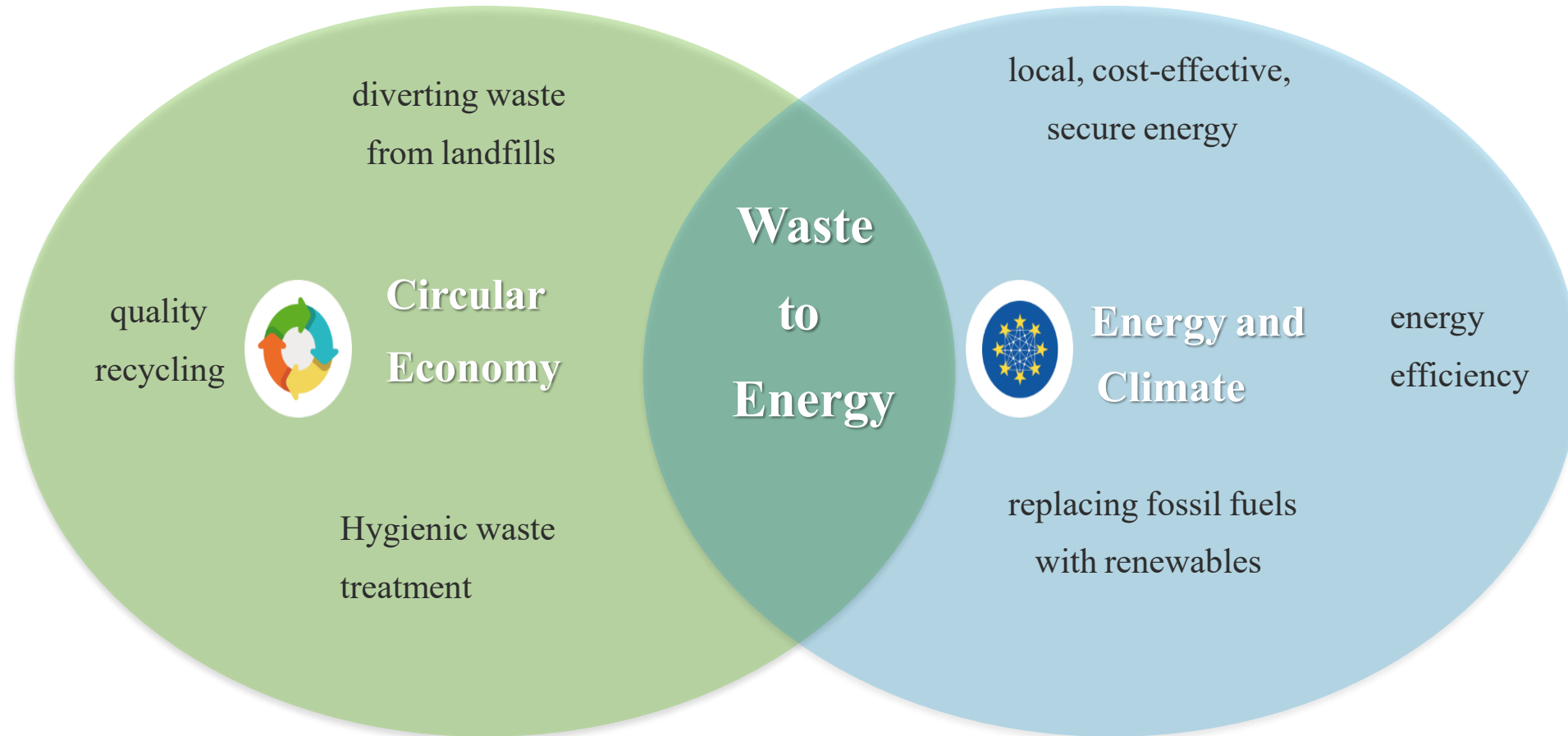


# Waste-to-Energy (WtE)

**WtE projects** can be categorized as a complementary technology for the recovery of energy from remaining non-recyclable MSW fractions, and should therefore not compete with waste reduction, reuse and material recycling measures.

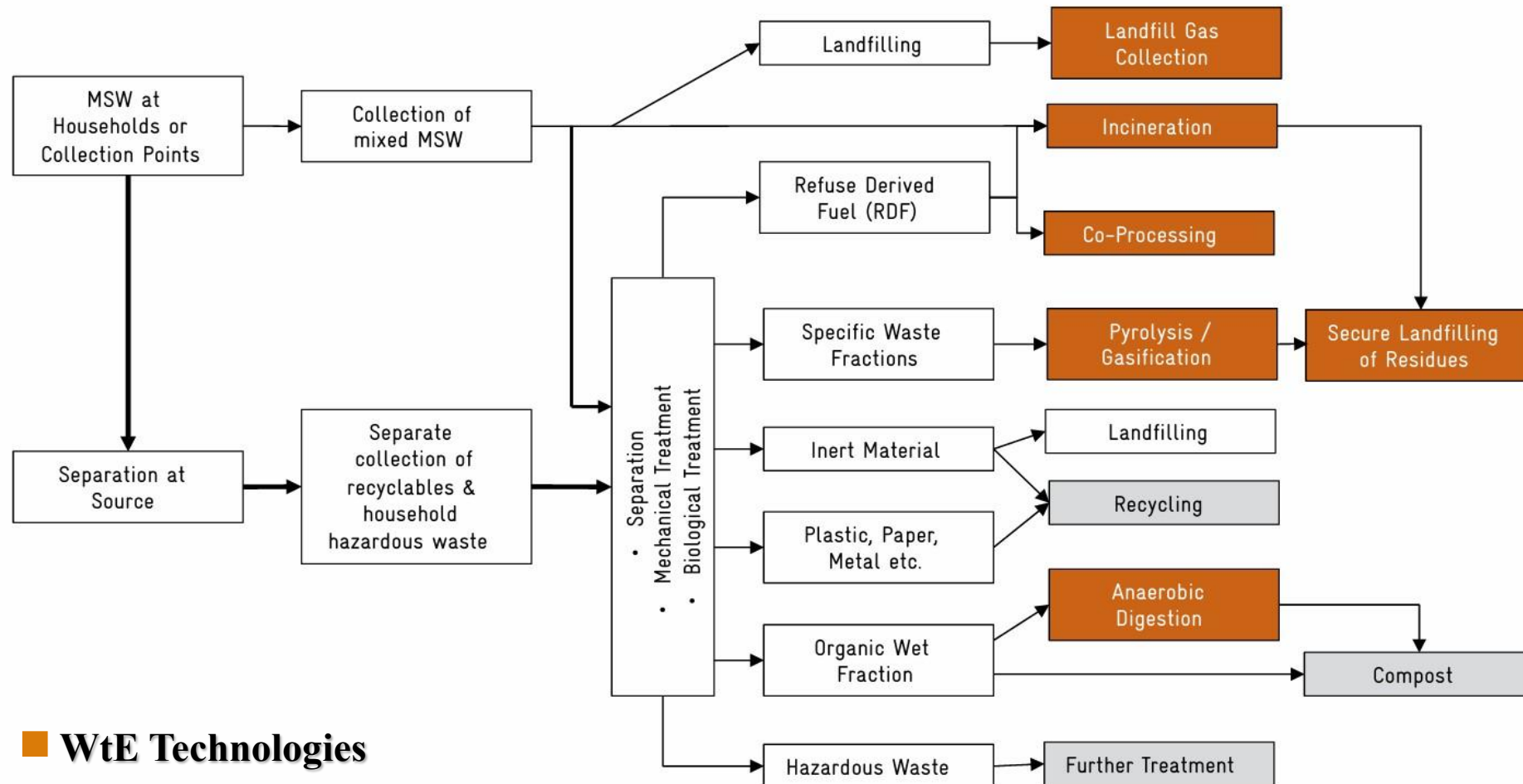


# Where Waste-to-Energy (WtE) stand ?



# Waste-to-Energy (WtE) Options

At the municipal scale, five primary Waste-to-Energy (WtE) technologies are utilized: incineration, co-processing, anaerobic digestion (AD), landfill gas (LFG) recovery, and pyrolysis/gasification (collectively referred to as alternative technologies).





# Waste-to-Energy (WtE) Options



## Refuse-Derived Fuel RDF Technology

RDF technology is the use of waste derived materials to replace natural mineral resources (material recycling) or traditional fossil fuels such as coal, fuel oil and natural gas (energy recovery) in industrial processes.

### Primary Objectives:

- To use waste-derived materials as a direct substitute for fossil fuels (e.g., coal, oil) in industrial processes.
- To safely destroy toxic organic compounds within the high-temperature environment of industrial kilns.

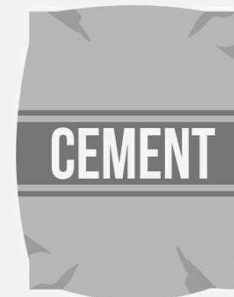
### Secondary Benefits:

- Significant reduction in the consumption of fossil fuels, leading to a lower carbon footprint.
- Support for the circular economy by recovering both energy and materials from waste.



*RDF is applied worldwide mainly in the cement industry and in thermal power plants; in a few cases it is also applied in the steel and lime industry.*

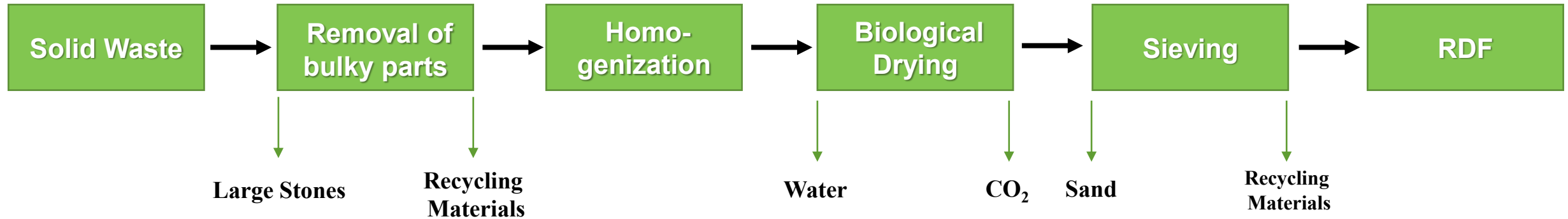
- ✓ Co-processing in cement plants has also become a wide-spread part of **waste management systems** in a number of developing and emerging countries.



# Waste-to-Energy (WtE) Options

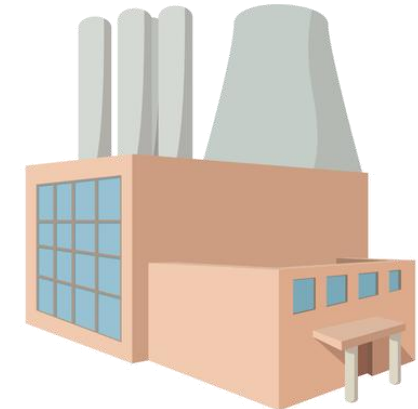
## Refuse-Derived Fuel RDF Technology

Co-processing requires relatively homogenous waste streams with a defined characteristic to ensure controlled combustion. Through different pre-treatment processes (pre-processing) waste can be transformed to so-called **refuse derived fuel (RDF)**, the acronyms **AFR (alternative fuel and raw materials)** and **SRF (solid recovery fuel)** are also used.



*RDF is typically fed to the combustion process with a separate dosing system.*

Co-processing in cement kilns has the advantage that the clinker reactions at 1450°C allow a complete incorporation of ashes and in particular the chemical binding of metals into the clinker material.



# Waste-to-Energy (WtE): Case Studies



<https://www.cemex.com.eg/>

## *Cemex Egypt Assiut Plant WtE Project*

- **Location:** Assiut Governorate, Egypt
- **Capacity:** turns 500,000 tons of municipal waste into energy
- **Serves:** 1.3M inhabitants
- **Type:** Generate alternative fuels from solid waste

### **Key Features:**

- Largest alternative fuel substitution rate in Egypt's cement industry, processing 500,000 tonnes of municipal and industrial waste annually
- Achieved significant CO<sub>2</sub> emissions reduction of 290,000 tonnes annually, equivalent to removing 69,000 gasoline-powered vehicles from roads.



**RDF Technology**

# Waste-to-Energy (WtE) Options

## Anaerobic Digestion (AD) Technology

Anaerobic digestion is a process where microorganisms break down organic matter without oxygen, naturally or in controlled systems, to produce biogas for energy use.

### Primary Objectives:

- Convert organic solid waste into renewable biogas through biological treatment in oxygen-free digesters.
- Significantly reduce landfill-bound organic waste and associated environmental impacts.
- Stabilize waste and produce safe, manageable end-products.

### Secondary Benefits:

- Generate biogas (mainly methane) for electricity, heat, or clean fuel applications.
- Yield nutrient-rich digestate for use as organic fertilizer.
- Lower greenhouse gas emissions through methane capture and diversion of organics from landfill.
- Support circular economy by recycling nutrients and energy back into the system.



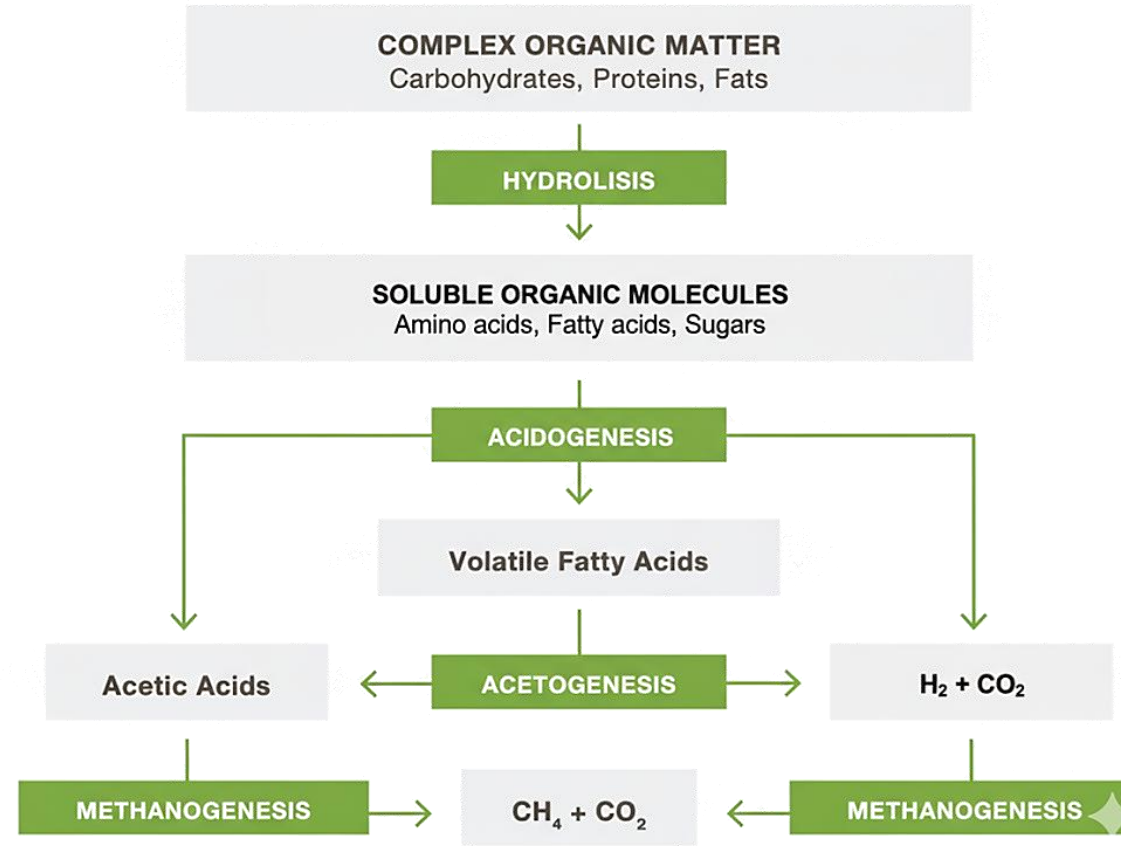
**A major challenge** to successful AD operation is being able to guarantee a consistently well separated organic waste fraction. In many countries organic waste is often mixed with inorganic matter such as plastics, metals and other contaminants which often hampers the success of AD at larger scales.



# Waste-to-Energy (WtE) Options

## Anaerobic Digestion (AD) Technology

Anaerobic digestion involves four main steps—hydrolysis, acidogenesis, acetogenesis, and methanogenesis—where organic waste is converted by specific microbes into biogas (mainly methane and carbon dioxide) under oxygen-free conditions.



*The process efficiently breaks down carbohydrates, proteins, and fats through sequential microbial actions, resulting in 40-70% methane content in the produced biogas.*

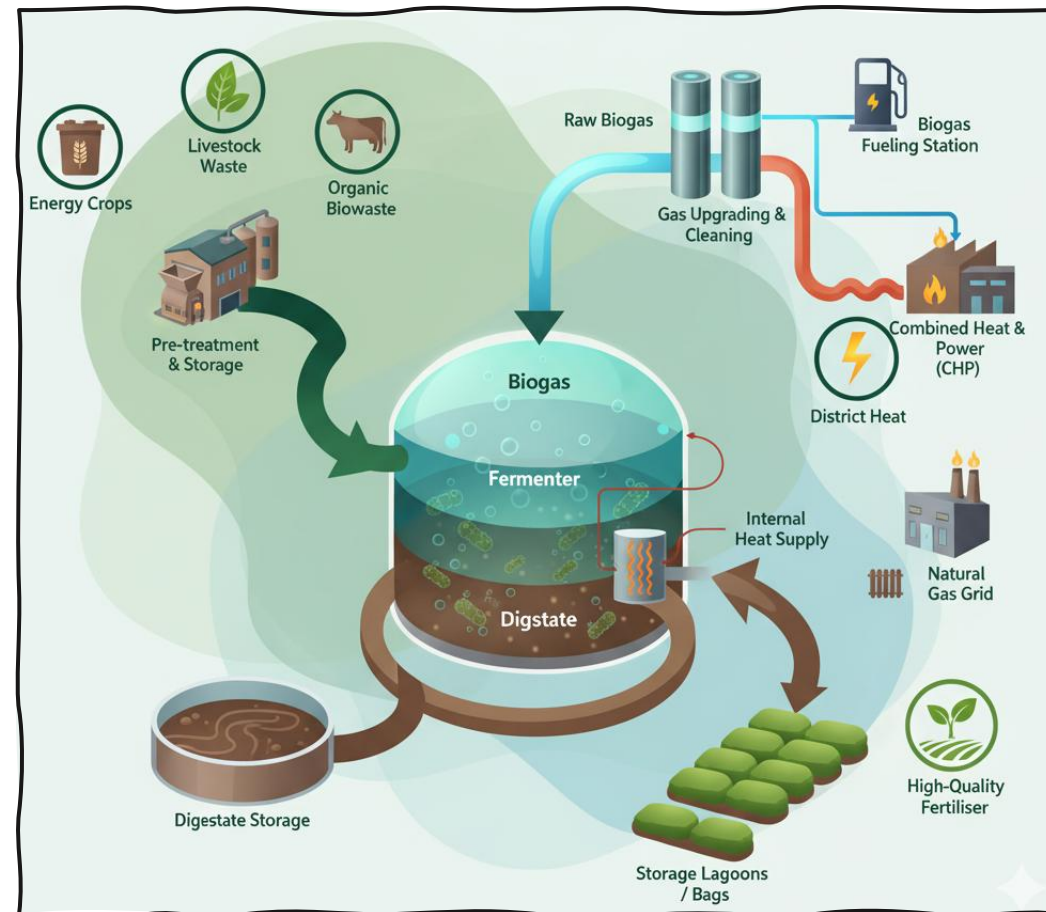


# Waste-to-Energy (WtE) Options

## Anaerobic Digestion (AD) Technology

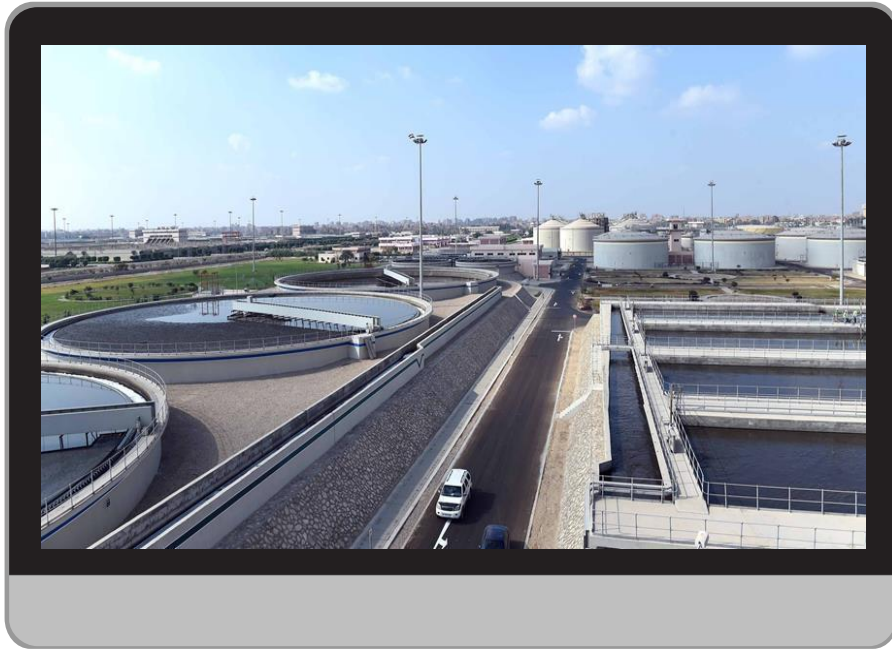
The integrated biogas system converts organic wastes into renewable energy and useful by-products through natural biological processes in a controlled environment:

- Collect organic materials such as energy crops, livestock residues, and organic biowaste.
- Pre-treat and store feedstock to prepare for digestion.
- Feed the organic material into an airtight anaerobic digester where microbes break down the waste without oxygen.
- Capture raw biogas (mainly methane and carbon dioxide) produced during digestion.
- Upgrade and clean biogas for use in electricity generation, heating, or injection into the natural gas grid.
- Collect digestate, the leftover material, and process it into high-quality fertilizer.





# Waste-to-Energy (WtE): Case Studies



<https://www.presidency.eg/en/>

## *Gabal El Asfar Biogas Plant - Cairo*

- **Location:** Outskirts of Cairo, Egypt
- **Capacity:** Treats 2.5 million cubic meters of wastewater per day
- **Serves:** 8 million people
- **Type:** Biogas production from wastewater treatment

### **Key Features:**

- **Largest wastewater treatment facility** in Africa and Middle East
- Integrated biogas production facility **converts organic waste into biogas**
- Biogas used for electricity and heat generation
- Covers significant portion of plant's energy needs
- Proof of concept for other WtE projects in Egypt



## **Anaerobic Digestion (AD) Technology**

# Waste-to-Energy (WtE) Options



## Municipal Solid Waste Incineration (MSWI) Technology

MSWI is a controlled thermal treatment process that utilizes specialized facilities to burn municipal waste.

### Primary Objectives:

- To significantly reduce waste volume and mass.
- To render waste chemically and biologically inert.

### Secondary Benefits:

- Recovery of energy in the form of heat, which can be converted into electricity or used for district heating and cooling.
- Elimination of groundwater contamination risks associated with landfills.



*MSWI is designed to treat typically mixed and largely untreated domestic waste and certain industrial and commercial wastes.*

A key parameter is the energy content, the so-called lower calorific value (LCV) in MJ/kg.

- To ensure autothermic combustion of the waste LCV should not be below 7 MJ/kg on average over a year (for comparison: The LCV of 1 kg fuel oil is about 40 MJ/kg).
- In developing countries, the LCV of unsorted MSW is often below this threshold due to a dominant organic content with high moisture and a significant level of inert waste fractions such as ash or sand.

# Waste Type & Energy Content

| Waste Type      | Calorific value (MJ/kg) |
|-----------------|-------------------------|
| Newspaper       | 46.80                   |
| Normal paper    | 24.24                   |
| Textile         | 15.70                   |
| Leather         | 15.70                   |
| Garden waste    | 12.9                    |
| Vegetable waste | 30.7                    |
| Polytechnic     | 40                      |
| Plastic         | 40                      |
| Other wastes    | 22                      |



# Waste-to-Energy (WtE) Options

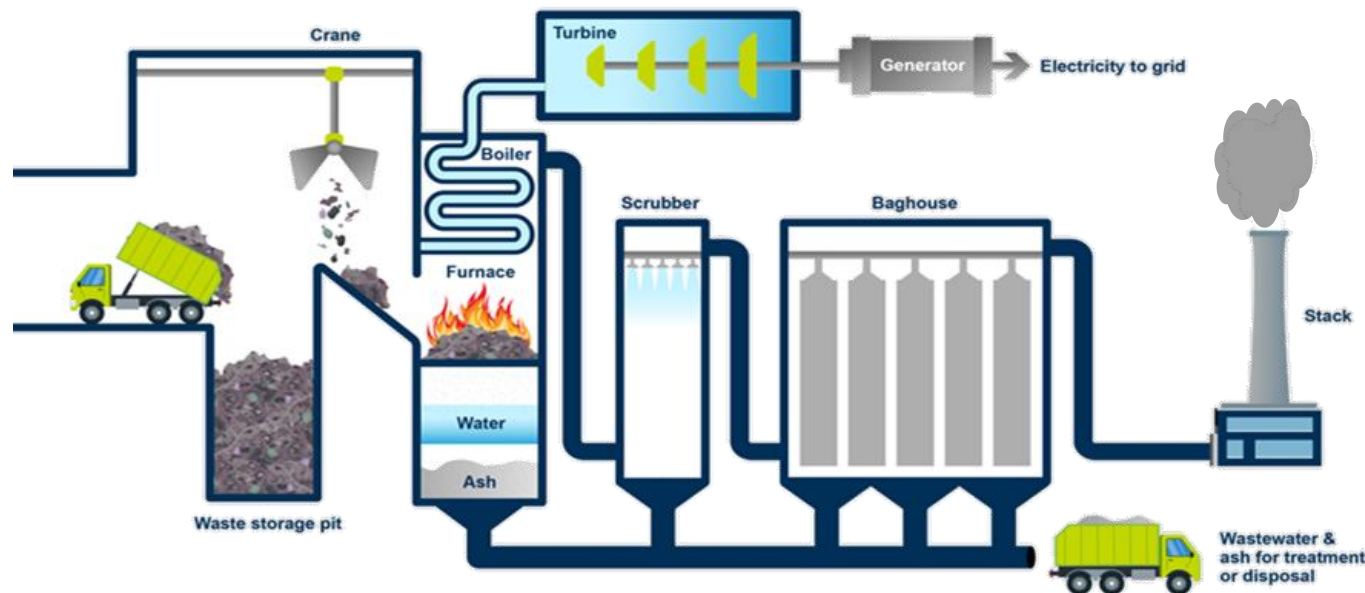


## Municipal Solid Waste Incineration (MSWI) Technology

MSWI operates through an **autothermic combustion** process, meaning the high-calorific value of the waste itself sustains the burning without the need for supplementary fuel.

### Key Components & Infrastructure Requirements

- **Combustion Chamber:** The primary zone where waste is burned at high temperatures.
- **Steam Generation System:** A heat recovery boiler that uses the generated heat to produce high-pressure steam.
- **Emission Control Equipment:** Advanced systems, such as scrubbers and baghouse filters, to manage and reduce pollutants.



# Waste-to-Energy (WtE) Options



## Municipal Solid Waste Incineration (MSWI) Technology

Municipal Solid Waste Incineration offers significant advantages in modern waste management systems.

### Volume Reduction

Achieves up to a 90% reduction in waste volume, leading to significant conservation of valuable landfill space.

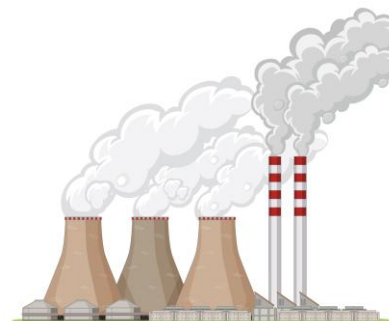


### Energy Recovery

The process effectively converts the biomass fraction of waste into a source of carbon-neutral energy, diversifying a region's power portfolio.



### Advantages





# Waste-to-Energy (WtE): Case Studies



<https://araburban.org/en/infohub/projects>

## *Sharjah Waste-to-Energy Plant - UAE*

- **Capacity:** 30 MW electricity generation
- **Waste Processing:** 300,000 tonnes annually (37.5 tonnes/hour)
- **Serves:** 28,000 homes equivalent
- **Status:** Operational since 2022

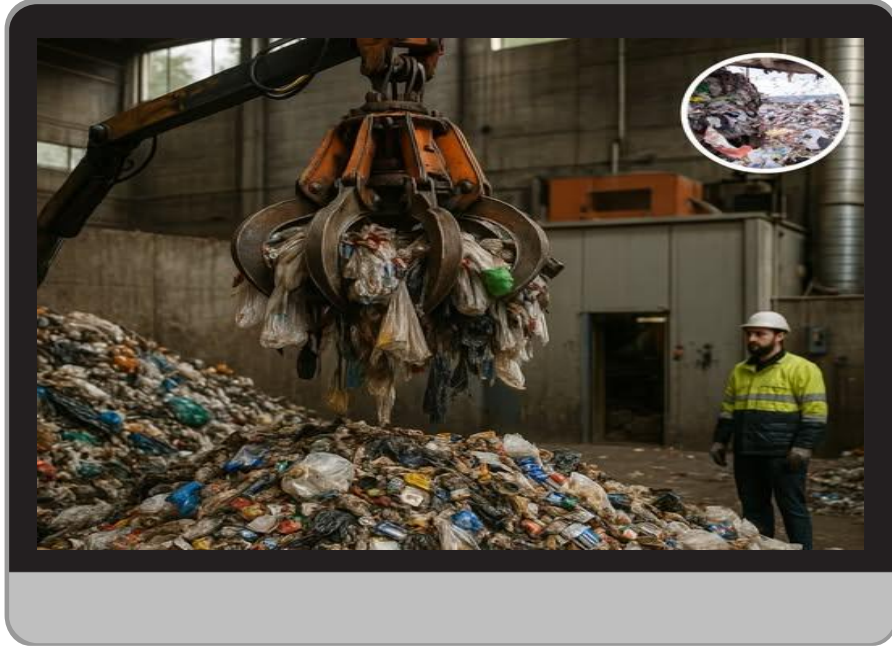
### **Key Features:**

- High-temperature and high-pressure steam incineration of non-recyclable municipal solid waste.
- Waste combustion generates heat recovered in steam boilers.
- Steam drives turbines to produce around 30 MW of low-carbon electricity.
- The plant incorporates state-of-the-art flue gas treatment meeting strict EU environmental standards to minimize emissions.



**Municipal Solid Waste  
Incineration (MSWI)  
Technology**

# Waste-to-Energy (WtE): Case Studies



<https://www.blueoceanstrategy.com/>

## *Sweden's National Waste-to-Energy (WtE) system*

- **Location:** Nationwide system across Sweden with 34 waste-to-energy plants
- **Purpose:** Minimize landfill use, generate renewable energy, and foster a circular economy to reduce carbon emissions
- **Capacity:** Converts about 2.2 million tonnes of municipal solid waste annually; processes nearly 50% of household waste into energy

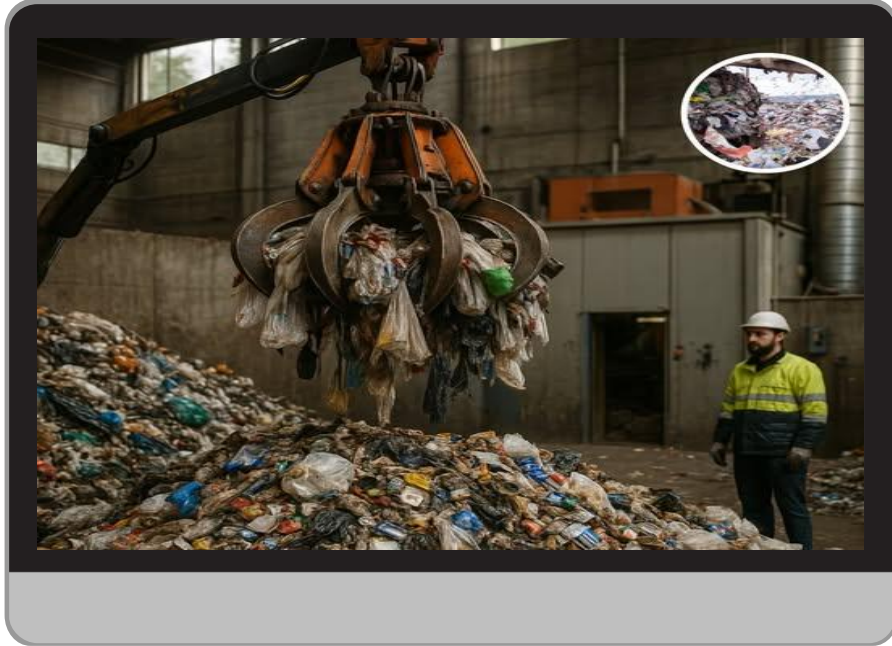
### **Key Features:**

- Only non-recyclable waste is sent to WtE; Sweden recycles or composts most organic and recyclable fractions first.
- Only 1% of waste goes to landfill; 52% converted to energy, 47% recycled
- Generates heating for over 1 million households and electricity for approximately 250,000 homes
- Imports waste from several countries, generating about 100 million USD annually





# Waste-to-Energy (WtE): Case Studies



<https://www.longbeach.gov/energyresources/about-us/serrf/>



## *Southeast Resource Recovery Facility (SERRF), Long Beach, California, USA*

- **Location:** Long Beach, California, serving the Los Angeles region with one of the largest WtE plants in the United States
- **Purpose:** Reduce landfill dependency, generate renewable electricity, and recover metals for recycling through advanced WtE incineration and energy recovery processes
- **Capacity:** Processes approximately 1,300 tons of municipal solid waste per day, producing up to 38 MW of electricity for the local grid

### **Key Features:**

- Modernizes facility operations with energy-efficient upgrades like variable frequency drives, achieving an annual energy saving of over 34%
- Generates enough renewable electricity to power thousands of homes and recovers significant quantities of metals for recycling
- Reduces greenhouse gas emissions by diverting waste from landfill and offsetting fossil fuel electricity generation



**Municipal Solid Waste  
Incineration (MSWI) Technology**

# Waste-to-Energy (WtE): Case Studies



## *EEW Energy from Waste Plants, Germany*

- **Location:** Nationwide network across Germany with 19 waste-to-energy plants operated by EEW Energy from Waste GmbH
- **Purpose:** Minimize landfill use, convert municipal and commercial waste to process steam, district heating, and electricity, and contribute to climate goals by treating biogenic waste
- **Capacity:** Incinerates about 5 million tonnes of waste annually, supplying electricity to roughly 570,000 households and providing district heating

### Key Features:

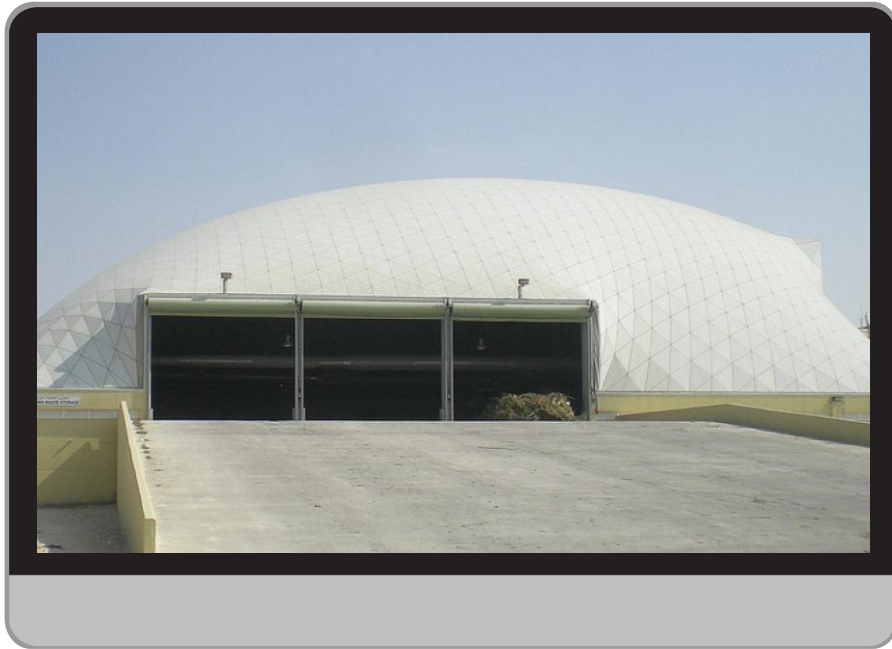
- Produces both electricity and heat, thereby maximizing resource recovery and energy efficiency for local industries and communities
- Reduces approximately 1 million tonnes of CO<sub>2</sub> emissions per year and imports additional waste for treatment, strengthening circular economy efforts

<https://www.eew-energyfromwaste.com/en/>



**Municipal Solid Waste  
Incineration (MSWI) Technology**

# Waste-to-Energy (WtE): Case Studies



<https://archello.com/project/>

## *Qatar Domestic Solid Waste Management Centre*

- **Location:** Mesaieed, Qatar
- **Capacity:** 34 MW electricity generation
- **Waste Processing:** 2,300 tonnes daily
- **Status:** Operational since 2011

### **Key Features:**

- Mechanical sorting for recyclables
- Organic waste treatment for fertilizer and biogas production
- Incineration for non-recyclable waste
- Landfill of inert waste
- Electricity transferred to national grid
- First functional integrated WTE plant in Gulf Cooperation Council.





# Waste-to-Energy (WtE) Options



## Pyrolysis and Gasification

Pyrolysis and gasification are thermal processes that treat waste by heating it in low-oxygen environments. Pyrolysis breaks down waste into gas, oil, and solid char at moderate temperatures, while gasification further processes the solid residue at higher temperatures with limited oxygen to produce combustible syngas.

### Primary Objectives:

- Convert waste into useful energy forms such as syngas, bio-oil, and char through controlled thermal decomposition.
- Maximize energy recovery from waste while minimizing environmental impact.
- Provide an alternative to incineration with lower emissions and more versatile byproducts.

### Secondary Benefits:

- Decrease reliance on fossil fuels by generating renewable energy.
- Lower greenhouse gas emissions, especially methane.
- Create economic opportunities through energy production and waste management innovation.



*Pyrolysis & Gasification*

Gasification and pyrolysis, were considered a technically and financially viable **alternative to waste incineration** and were labelled with the quality of being a non-pollution technology, compared to incineration.

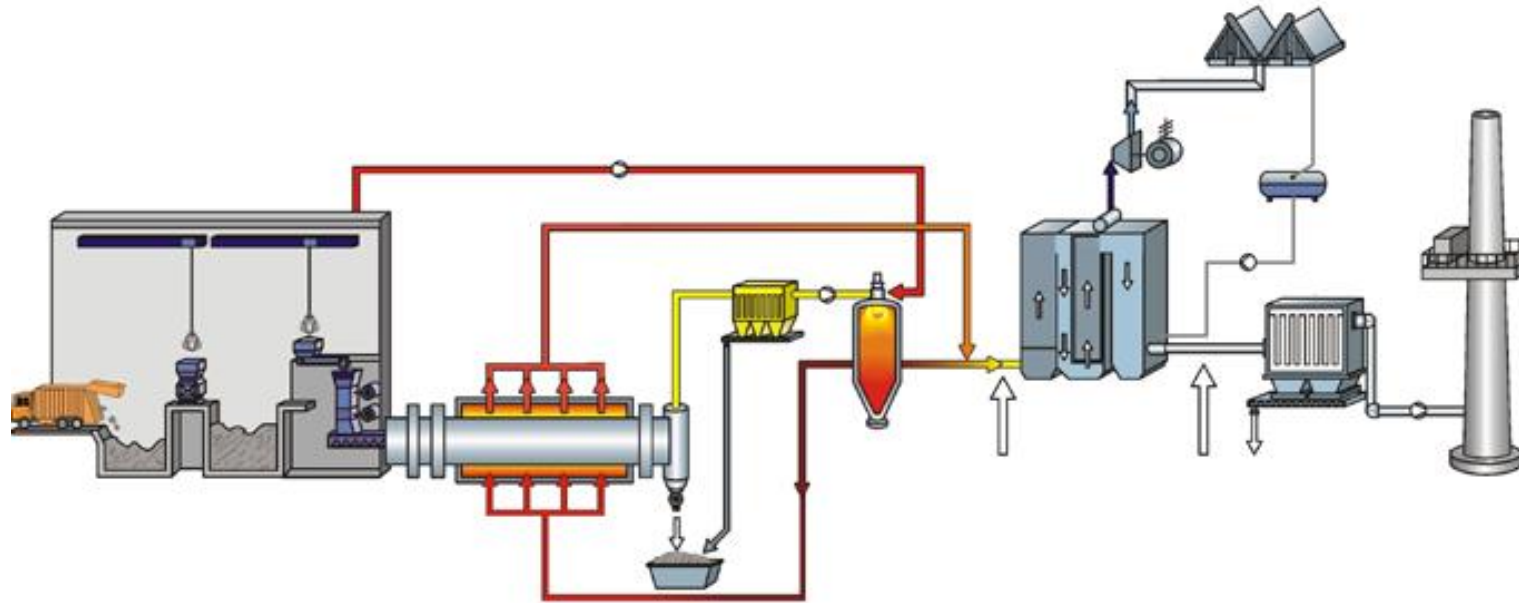
# Waste-to-Energy (WtE) Options



## Pyrolysis and Gasification

This technology involves installing a network of collection wells and pipes that extract the gas, which is then treated and either combusted (flared) to convert methane into less harmful carbon dioxide or used to generate electricity, heat, or renewable natural gas with the following technological steps:

- **Smoldering process:** Formation of gas from volatile waste particles at temperatures between 400 and 600°C.
- **Pyrolysis:** Thermal decomposition of the organic molecules of the waste between 500 and 800°C resulting in formation of gas and a solid fraction.
- **Gasification:** Conversion of the carbon share remaining in the pyrolysis coke at 800 to 1000°C with the help of a gasification substance (e.g. air or steam).
- **Incineration:** Depending on the technology combination, the gas and coke are combusted in an incineration chamber.



# Leading Countries in bioenergy

The table highlights leading countries in per capita renewable energy supply by various technologies in 2024:

- Countries such as **Germany, Sweden, and Estonia** currently demonstrate global leadership in renewable energy production from solid waste, particularly within biopower, biofuels, and pellets generation.
- Their achievements reflect advanced resource recovery policies and sustainable waste-to-energy conversion technologies, setting benchmarks for other nations striving for efficient and environmentally sound energy systems.

|                                                                                                      | 1                  | 2              | 3              | 4           | 5             |
|------------------------------------------------------------------------------------------------------|--------------------|----------------|----------------|-------------|---------------|
| Total renewable power capacity <b>per capita</b>                                                     | <b>Iceland</b>     | Norway         | Sweden         | Austria     | Finland       |
|  Solar PV           | <b>Netherlands</b> | Australia      | Germany        | Estonia     | Spain         |
|  Wind power         | <b>Sweden</b>      | Finland        | Denmark        | Ireland     | Norway        |
|  Hydropower         | <b>Norway</b>      | Iceland        | Canada         | Sweden      | Paraguay      |
|  Biopower           | <b>Germany</b>     | Czech Republic | United Kingdom | Latvia      | Italy         |
|  Geothermal power | <b>Iceland</b>     | New Zealand    | Costa Rica     | El Salvador | Nicaragua     |
| Total biofuels production <b>per capita</b>                                                          | <b>Sweden</b>      | United States  | Finland        | Brazil      | Denmark       |
| Total pellets production <b>per capita</b>                                                           | <b>Estonia</b>     | Latvia         | Austria        | Germany     | United States |
| Solar water heating collector capacity <b>per capita</b>                                             | <b>Barbados</b>    | Cyprus         | Greece         | Israel      | Austria       |

Source : REN21. 2025. Renewables 2025 Global Status Report Collection, Global Overview.

# Decision Making Support Matrix

Any WtE project is a complex undertaking and should be accompanied by a professional and thorough feasibility assessment. The decision matrix presented in this chapter seeks to assist in getting a first idea of the suitability of potential technologies.

**Parameter:** Overall level of waste management

| Advanced waste management system which is based on waste streams (e.g. biomass, hazardous waste, recyclables) exists. | Systematic waste collection is organized. Some waste fractions (e.g. tyres, recyclables, biomass) are directed towards recycling and composting. | Systematic waste collection and disposal on landfill exist. Recycling is not organized systematically. | Absence of systematic waste collection, recycling and disposal. |                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incineration                                                                                                          | Incineration                                                                                                                                     | Incineration                                                                                           | Incineration                                                    | <b>GREEN</b><br>the WtE technology is most probably suitable.                                                                                               |
| Co-processing                                                                                                         | Co-processing                                                                                                                                    | Co-processing                                                                                          | Co-processing                                                   |                                                                                                                                                             |
| Anaerobic digestion                                                                                                   | Anaerobic digestion                                                                                                                              | Anaerobic digestion                                                                                    | Anaerobic digestion                                             | <b>YELLOW</b><br>more information and/or some improvements to local conditions may be required for successful planning and implementation of a WtE project. |
| Landfill gas collection                                                                                               | Landfill gas collection                                                                                                                          | Landfill gas collection                                                                                | Landfill gas collection                                         |                                                                                                                                                             |
| Pyrolysis & Gasification                                                                                              | Pyrolysis & Gasification                                                                                                                         | Pyrolysis & Gasification                                                                               | Pyrolysis & Gasification                                        | <b>RED</b><br>the WtE technology is not suitable. It is strongly recommended to improve or change the specific local conditions.                            |

Source :GIZ, 2017. "Waste-to-Energy Options in Municipal Solid Waste Management: A Guide for Decision Makers in Developing and Emerging Countries."

# Decision Making Support Matrix

Any WtE project is a complex undertaking and should be accompanied by a professional and thorough feasibility assessment. The decision matrix presented in this chapter seeks to assist in getting a first idea of the suitability of potential technologies.

**Parameter:** Access to energy end-users of WtE

**GREEN**

the WtE technology is most probably suitable.

**YELLOW**

more information and/or some improvements to local conditions may be required for successful planning and implementation of a WtE project.

**RED**

the WtE technology is not suitable. It is strongly recommended to improve or change the specific local conditions.

| WtE or RDF facilities are located close to an industrial area with power and heat / gas demand. Good transport and energy infrastructure exists. | WtE or RDF facilities are located in an area with moderate heat demand. Good transport and energy infrastructure exists. | WtE or RDF facilities are located close to a large power transmission network. No heat demand in the area. | WtE or RDF facilities are located in an area which is poorly connected to energy consumers. |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Incineration                                                                                                                                     | Incineration                                                                                                             | Incineration                                                                                               | Incineration                                                                                |
| Co-processing                                                                                                                                    | Co-processing                                                                                                            | Co-processing                                                                                              | Co-processing                                                                               |
| Anaerobic digestion                                                                                                                              | Anaerobic digestion                                                                                                      | Anaerobic digestion                                                                                        | Anaerobic digestion                                                                         |
| Landfill gas collection                                                                                                                          | Landfill gas collection                                                                                                  | Landfill gas collection                                                                                    | Landfill gas collection                                                                     |
| Pyrolysis & Gasification                                                                                                                         | Pyrolysis & Gasification                                                                                                 | Pyrolysis & Gasification                                                                                   | Pyrolysis & Gasification                                                                    |

Source :GIZ, 2017. "Waste-to-Energy Options in Municipal Solid Waste Management: A Guide for Decision Makers in Developing and Emerging Countries."



# EGYPT SOLID WASTE MANAGEMENT CENTER OF EXCELLENCE



April 2025



# Waste Treatment Plant Technical and Economic Feasibility Study and Design for Big Cities, Egypt

- Understanding of the requirements taking into account the waste volume, regulatory framework, and waste management practices
- Conducting an extensive evaluation of available waste treatment technologies focusing on Composting with RDF Production, and Bio-drying with RDF production
- Determining the economic viability of this project
- Outlining major components, process flow, and integration of different treatment stages



# 5 MBT Facilities

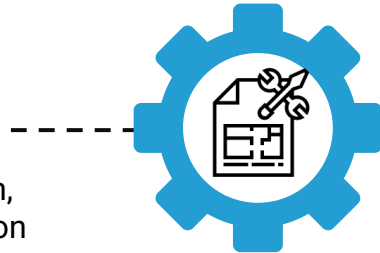
ESWMCE proudly presents the successful completion of the Sohag Plant in El Salam City and the Minya Plant in Tuna El-Gebel City in addition to ones in Dakahlyia, Menofia and South Sinai. For our client Waste Management Regulatory Authority, Ministry of Environment Egypt. These state-of-the-art facilities, each with a capacity of 320 tons per day, focus on the recycling of solid municipal waste, generating organic fertilizer, and producing alternative fuel



## WE PROVIDED:-

### DETAILED MSW DESIGN

Key areas included, dropping zone, sorting areas, chopping machine room, composting area & compost maturation zone



### DETAILED SUPPORTING FACILITIES DESIGN

Storage rooms & offices



### CONSTRUCTION SUPERVISION

Ensure that executed work aligns perfectly with the design



### DESIGN FOR SUSTAINABILITY

Contribution to sustainability practices



# Our Laboratories

ESWMCE Laboratories are **ISO 17025** certified.



## Sample Preparation Lab

- Sieves
- Hammer Mill
- Ball Mill
- Digital Shaker
- Drying Oven



## Our Lab Facilities



## Inorganic Lab

- HSS/GC-MS
- Solid phase extraction
- Digital Reactor (COD)

## Organic Lab

- Microwave Digester-Speed wave
- Milli-Q @ IQ
- Water Purification System
- Total Kjeldahl Nitrogen
- ICP-MS
- LAMBDA 365 UV-Vis Spectrophotometer



## Biochemical Treatment Lab

- Ultrasonicator
- Two Stage Anaerobic Digester
- Gas Analyzer
- Bomb Calorimeter



**Thank You**