

**Which Technologies ...**

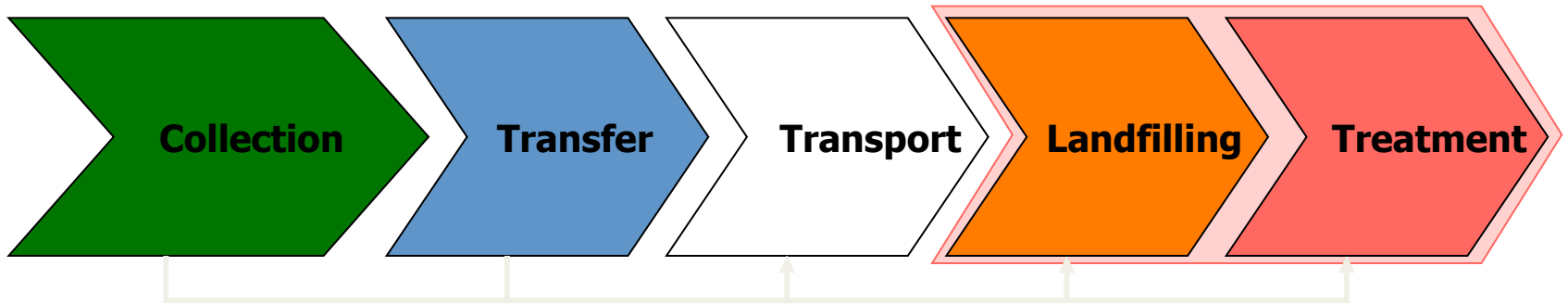
***...for SWM Treatment?***

***By Eng. Anis ISMAIL***

***Senior Environment and Solid Waste Specialist***

# MSW Treatment Technologies common to MMCs

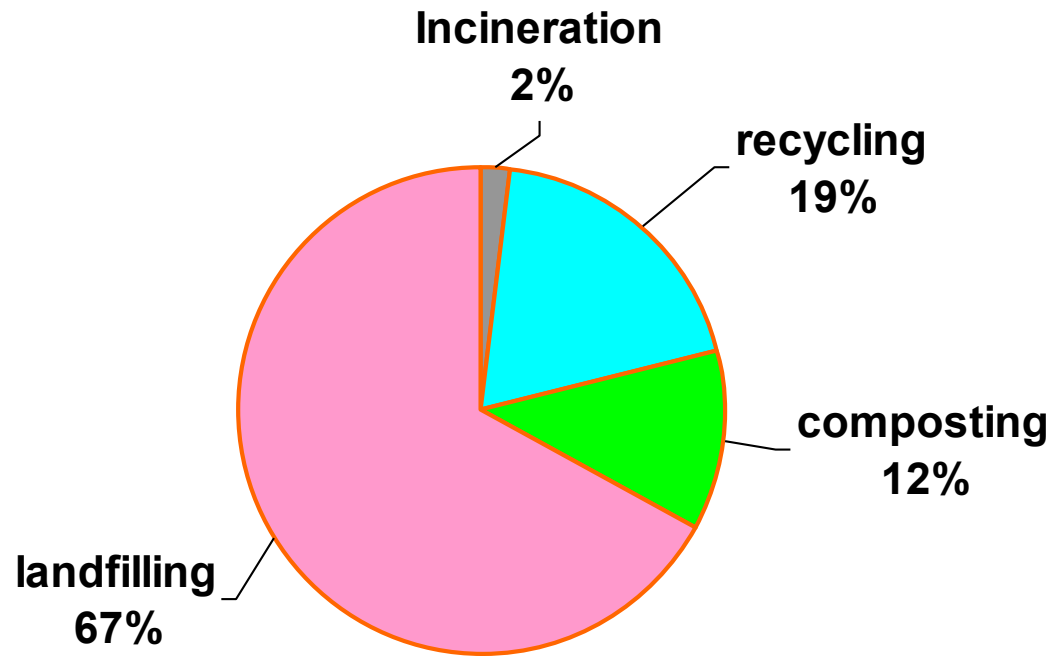
Usual solid waste management cycle



Which technologies?

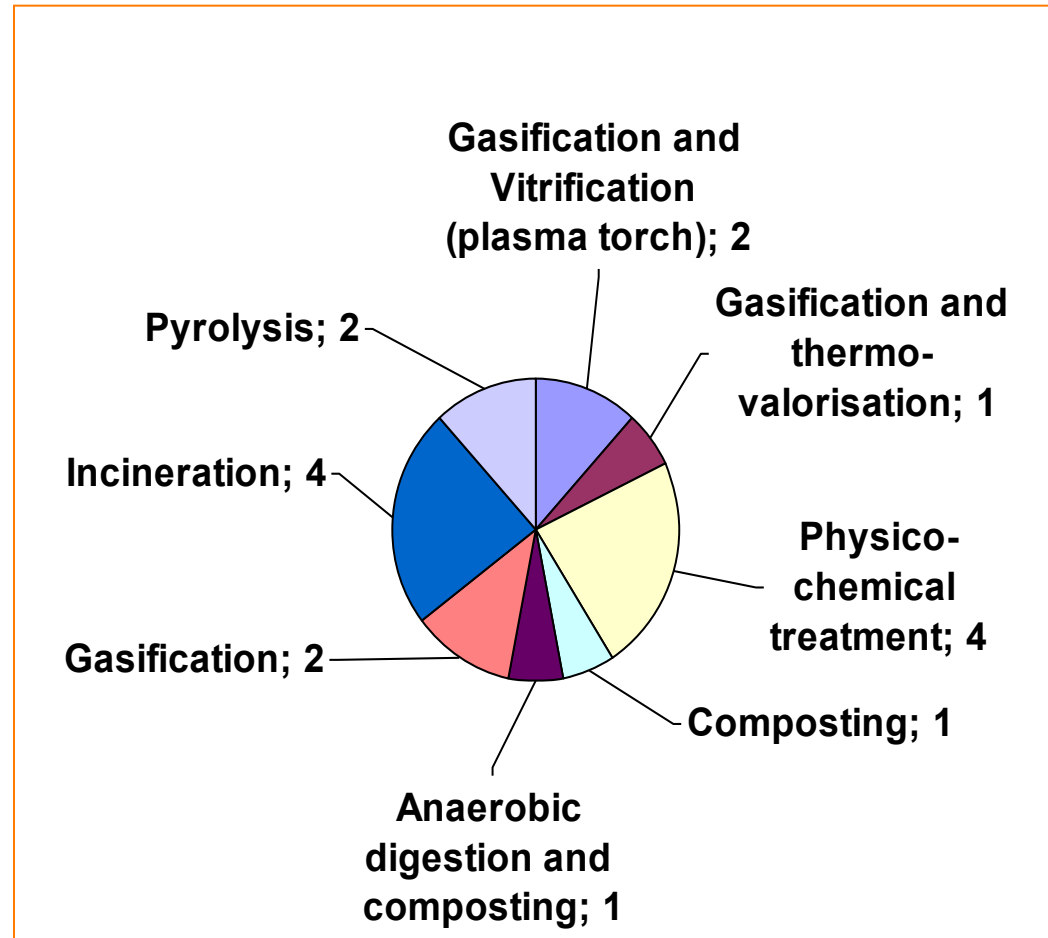
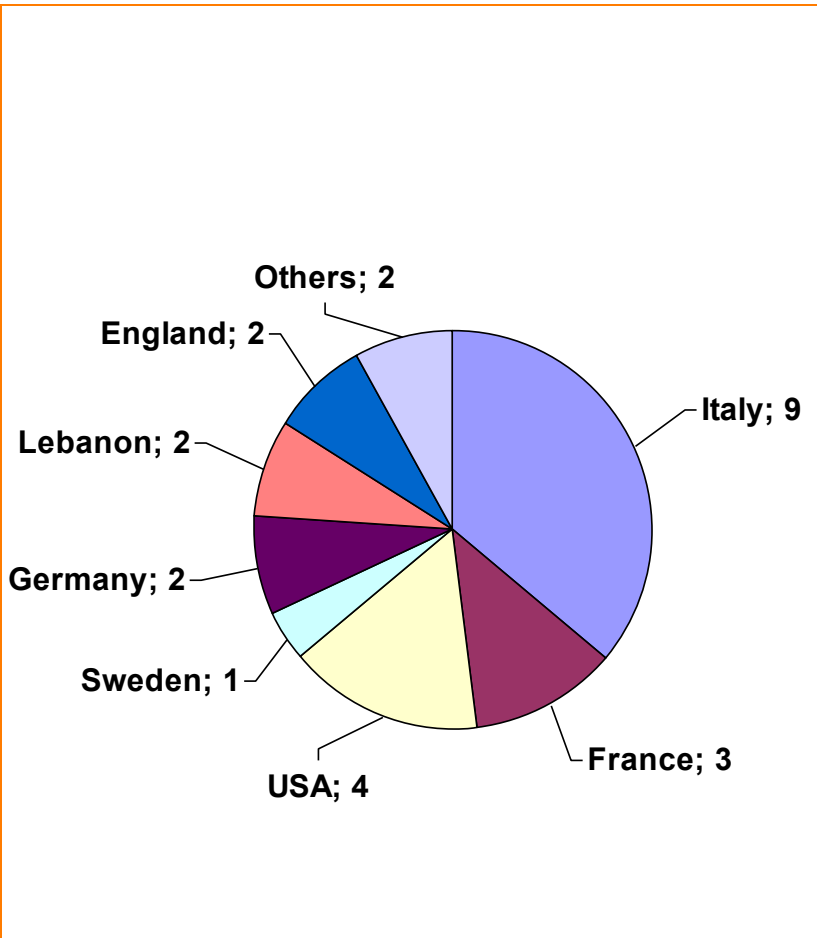


## MSW Treatment Technologies common to MMCs

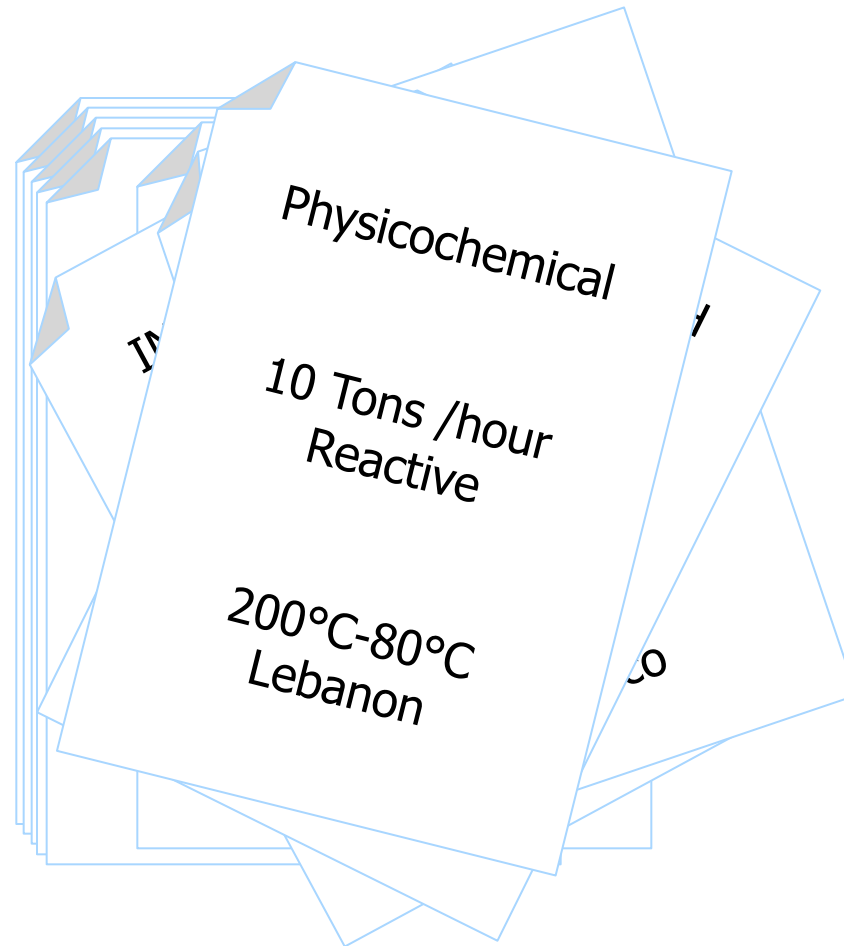


# “New” MSW Treatment Technologies being proposed throughout the MMCs

Many technologies are being sold in the MMCs.



# **“New” MSW Treatment Technologies being proposed throughout the MMCs**



# **“New” MSW Treatment Technologies being proposed throughout the MMCs**

## **Many ways to be introduced in order to present the Projects**

- Via diplomatic circuit and embassies
- Via official submission of the offer of Project
- Via direct contacts
- Via local private operators
- Via local consultants and firms

## **Many Forms to submit Projects by suppliers of Technology**

- Detailed feasibility study
- Summary Paper on the subject
- Presentations

## **Many types of contracts are submitted by suppliers of technology!!**

- Design-Built-Operate
- Built-Operate-Transfer
- BO(X)
- Affermage
- Concession
- Other: *simple contracts (by ton)*

# **“New” MSW Treatment Technologies being proposed throughout the MMCs**

## **Some guarantees are usually requested by suppliers of technology**

- Guarantee of payment
- Guarantee of providing sufficient quantities of waste
- Official letter of agreement
- Approval on the technology
- Other: financial *and fiscal advantages*

## **Performance of the technologies proposed by the suppliers of technology**

*(Not enough information on the performance of the proposed technologies).*

*Most of the technologies seem!!!! to be tested in the occidental countries and not adapted to the M.income DCs specifications.*

## **No clear and well defined guarantee for the project success!!**

Guarantee to provide investment (with the relevant potential risk)

Guarantee to take all material outside the country (Lebanon)

# **“New” MSW Treatment Technologies being proposed throughout the MMCs**

## **Authorities follows and responds to investors presenting an offer of Project**

- They ask for a feasibility study
- They launch requests for competition
- Ask for EIA
- Ask about the application of the technology in other countries

## **Failed and disappointing experiences with the offers of Project already received.**

- *Composting plants (Morocco and Tunisia) mainly because of the inadequacy of technology to the waste composition and the difficulties to commercialize compost*
- *Second hand incinerators for WB & Gaza, not such a good experience.*



# **Worldwide Technologies in MSW Treatment fields**

## **Three main kinds of technologies**

- Mechanical-biological treatment
- Thermal treatment
- Material Specific Treatment

## **Example of MSW technologies**

- Composting – Open Windrow
- Composting – In-vessel
- Anaerobic Digestion
- Aerobic Digestion
- Fermentation
- Vermicomposting
- Incineration
- Pyrolysis
- Gasification
- Waste Melting
- Bioreacting Landfill
- Mechanical Separation

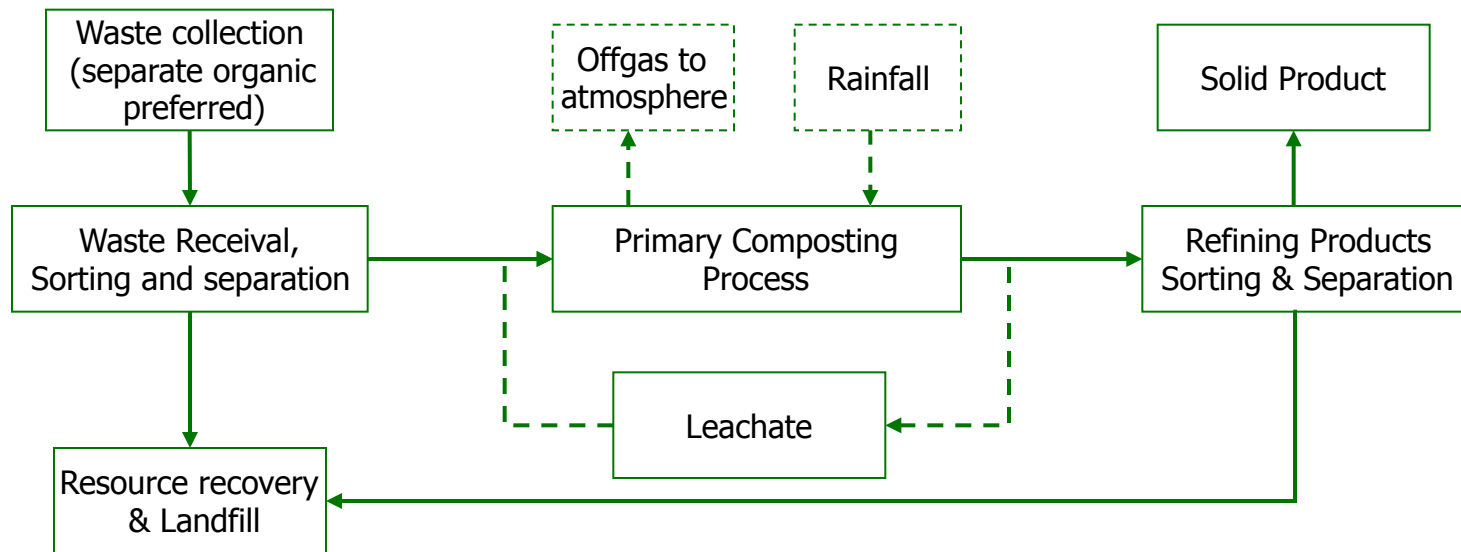
# Worldwide Technologies in MSW Treatment fields

## Composting – Open Windrow

### Description

Composting is the microbial decomposition of organic materials under aerobic conditions. Open windrow composting is undertaken in an uncontrolled environment where the windrow size and periods between windrow turning are managed to minimize composting periods. The open environment means that odors will escape to the atmosphere and that rainfall will generate leachate. Windrow composting will only be successful if the right mixture of materials are used and if inorganic materials such as metals, glass and plastic are removed. In general the quality of compost from an open windrow is relatively low.

### Simplified Process Flow Sheet



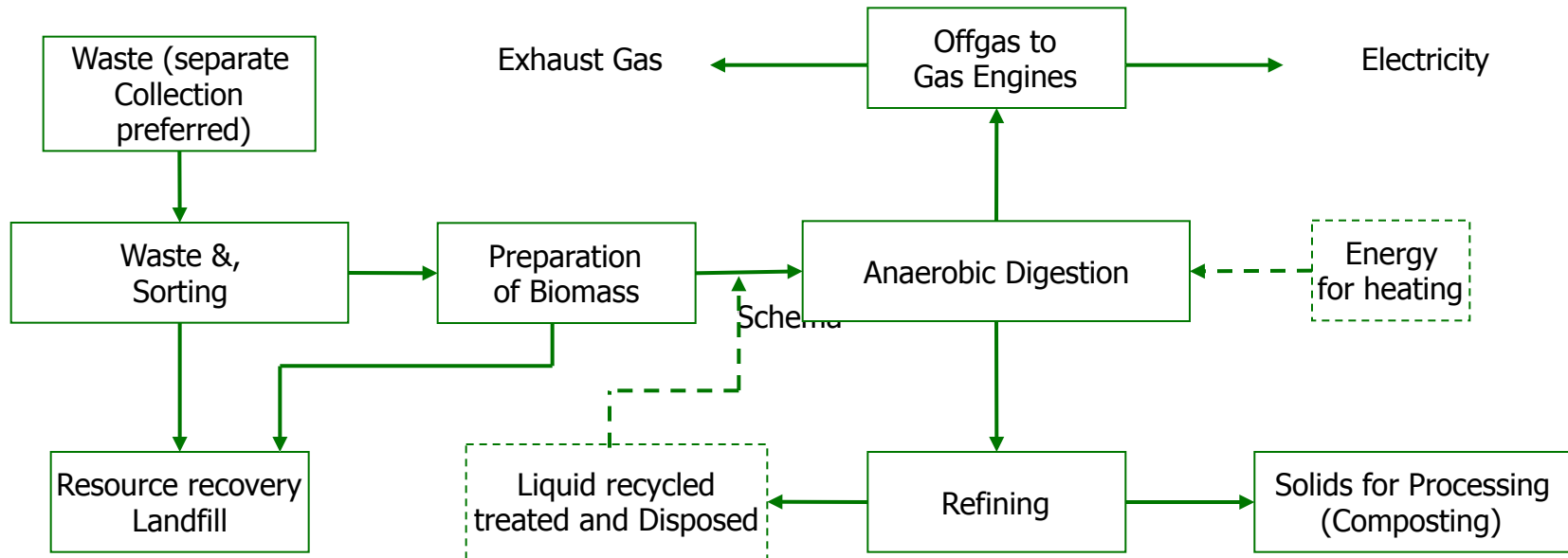
# Worldwide Technologies in MSW Treatment fields

## Anaerobic Digestion

### Description

Anaerobic digestion involves the breakdown of waste via microorganisms in the absence of oxygen. Anaerobic digestion occurs under controlled conditions within enclosed vessels, and thus the process is optimized. The input waste is often mixed with recirculated liquid waste and organic sludge and the temperature and moisture content are controlled. The digestion process is thus much faster (say 15 days), and the methane produced can be completely captured and reused for heating or electricity production. The liquid and solid residues may then be used as a compost or fertilizer, or may need to be disposed to landfill.

### Simplified Process Flow Sheet

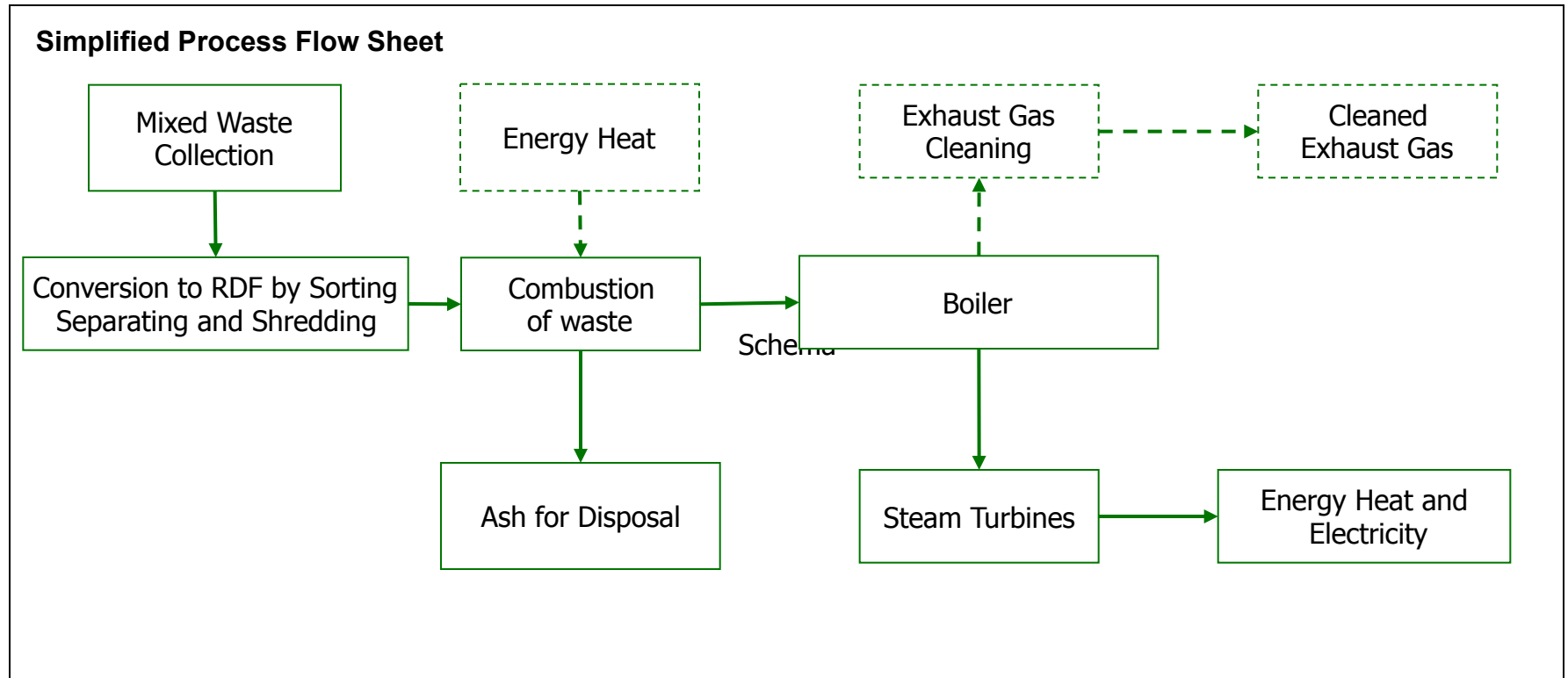


# Worldwide Technologies in MSW Treatment fields

## Incineration

### Description

Incineration involves the feeding of waste into an incinerator either after its conversion to resource derived fuel (RDF) or without a significant amount of processing apart from the removal of bulky items. Most modern incineration technologies precondition incoming waste by removing contaminants and processing the remaining waste into RDF by some sort of size reduction (shredding) process. Energy exchange occurs as hot gas passes through a multi pass boiler system where super heated steam is produced for use in a turbine generator. High volume scrubbers must be used to neutralize acid gases and to remove other contaminants such as dioxins. Residues of the process are acid-free flue gases and small amounts of ash. Although there may be the potential for re-using the ash residues, they may require landfilling.



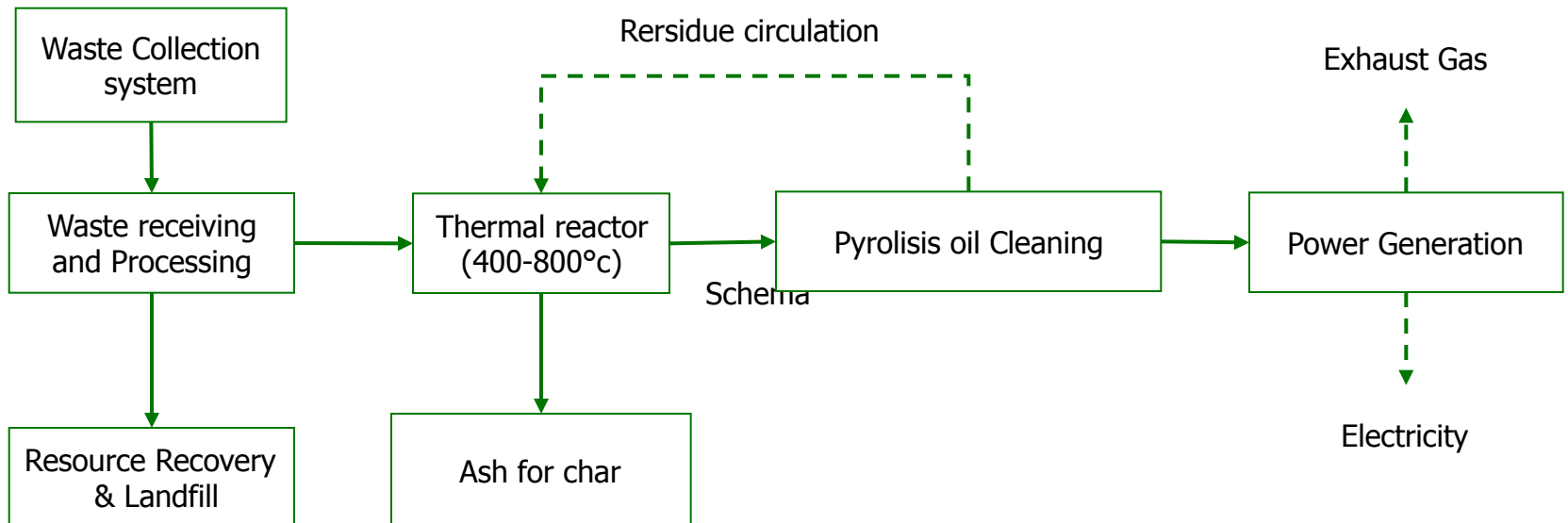
# Worldwide Technologies in MSW Treatment fields

## Pyrolysis

### Description

Waste is generally pre-processed to remove recyclable materials, contaminants and then reduced in size before being fed into the thermal reactor. Pyrolysis is the thermal decomposition of organic rich waste in the absence of oxygen and under pressure. The typical temperature is 500 degrees Centigrade. The liquid fraction from the reactor contains acetic acid, acetone, methanol and complex hydrocarbons and can be used as a synthetic fuel after processing. Heavy metals will be captured in the char as well as in the flue gas.

### Simplified Process Flow Sheet

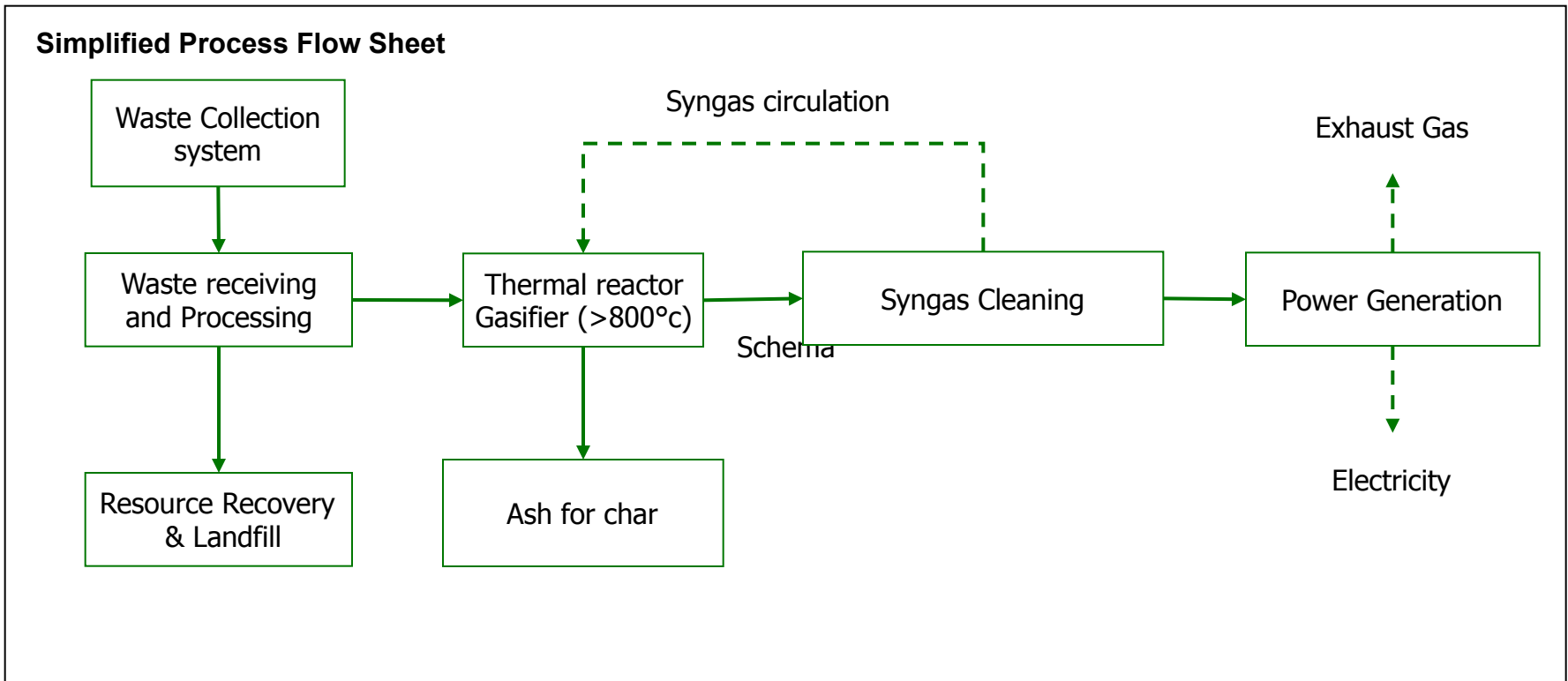


# Worldwide Technologies in MSW Treatment fields

## Gasification

### Description

Waste is generally pre-processed to remove recyclable materials, contaminants and then reduced in size before being fed into the thermal reactor. Gasification is the thermal decomposition of organic rich waste in an atmosphere of slightly reduced oxygen at elevated temperatures of above 800 degrees Centigrade. A combustible 'syngas' rich in carbon monoxide, hydrogen and hydrocarbons is produced. This syngas is used to generate electricity in reciprocating gas engines.



# Screening Criteria for Feasibility Assessment

The Screening/evaluation of any technology should consider three major aspects:

1. The **technical aspect** is included in order to evaluate the technical efficiency of the treatment technologies because very different techniques are available for treating MSW.
2. The **monetary aspect** is included to identify the relation between technical or environmental standards of the treatment technology compared to the costs they cause
3. The **environmental and social aspect** is included due to the aims which are stated in environmental laws and guidelines as well as other aims concerning sustainable development in the region.

# Screening Criteria for Feasibility Assessment

## Strategic Considerations

What benefits will the technology bring beyond those relating strictly to waste management

## Technical aspects

Proven application elsewhere

Requirements in term of quality of input

Minimum and max quantity of waste

The design life of the technology

Consistency/compatibility with existing and planned MSWM Systems including those of the informal sector;

## Financial, affordability & Cost Recovery

Financial capability and banking references

Guaranties for the commercial offer

Capital and Recurrent Cost



# Screening Criteria for Feasibility Assessment

## Legal & Institutional aspects

Existence of legal framework for private sector investment

Existence of environmental standards and enforceable legal framework to which technologies conform.

Existence of a well defined institutional framework for permitting, monitoring and enforcement of legal instruments

Technical and managerial capacity and control required in support of implementing the proposed technology

Opportunities for private sector involvement in the application of the technology offered

## Environmental and Social Issues

Environmental Assessment Scoping

Public Consultation

Potential negative impacts on environment and natural resources vs local capacities to mitigate and monitor

Users willingness and capability to pay

Thanks  
for your attention