



About RAISE



Raise Global Services (RGS) provides waste to energy and water solutions for all types of solid wastes in collaboration with the leading technologies in the world to eliminate overwhelming issues of all kinds of waste including Bio-medical waste.

Type of Waste Treated

RGS treats all type of solid wastes including:

- **Organic** waste include plant material, animals and biomass waste that are all in the same classification from a molecular spectrum.
- **Domestic municipal waste** collectively includes some aspects of has all classifications of materials however the majority can be processed with a specific design model system.
- **Bio-medical waste** include waste like infectious waste include discarded blood , sharps, unwanted microbiological cultures and stocks, amputated body parts , other human or animal tissue, used bandages and dressings, discarded gloves, expired medicines other medical supplies
- **Tire Waste** include truck , car , bike and heavy vehicle tires
- **Plastic Waste** include all types of non recyclable plastic wastes



Treatment Methods

Different Processes to Treat Solid Waste:

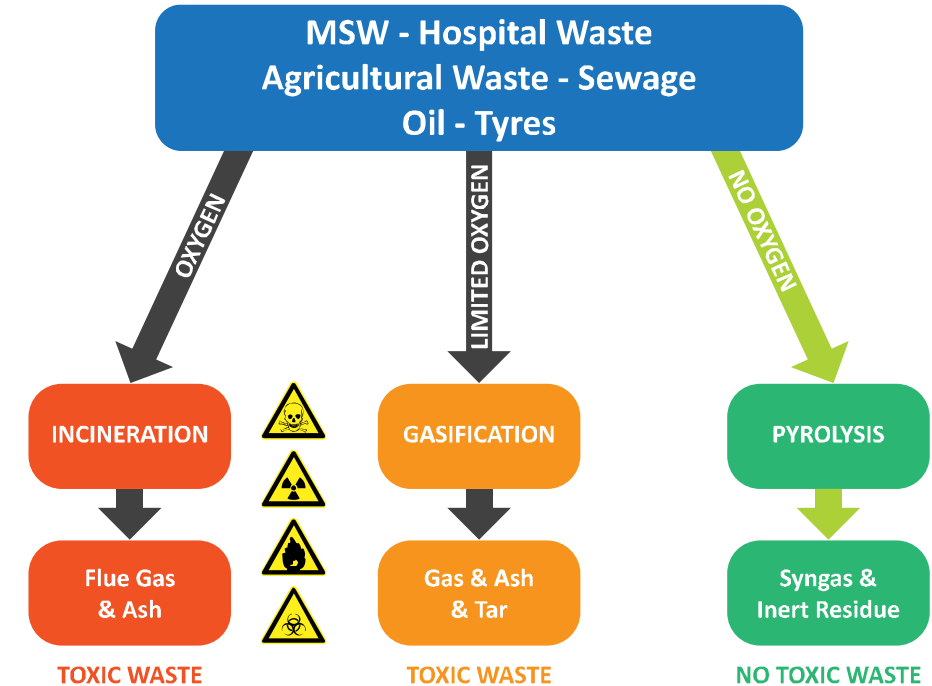
- **Incineration:** Combustion of materials in an oxygen-rich environment, producing heat, smoke, ash and other by-products. Example would be burning waste in a commercial incinerator to heat water to power a steam turbine;
- **Gasification:** Breakdown of hydrocarbons into a syngas by carefully controlling the amount of oxygen present. An example would be the conversion of coal into town gas;
- **Pyrolysis:** Thermal degradation of waste in the absence of oxygen to produce char, pyrolysis oil and syngas. Example is the conversion of cellulose fibre into a synthetic gas.

Comparison of Incineration , Gasification and Pyrolysis

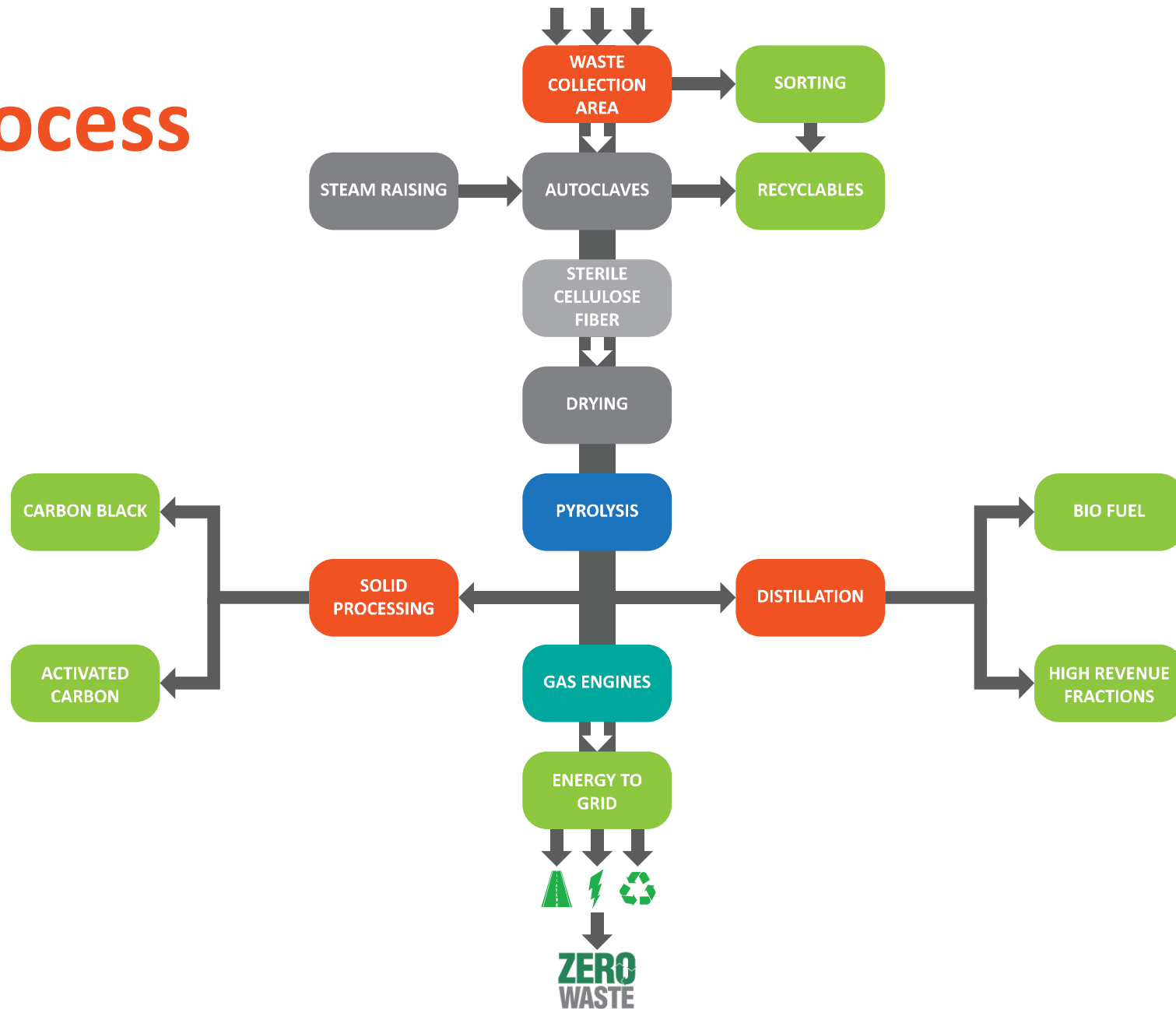
Advantages of Pyrolysis over Incineration or Gasification

There are several advantages to using pyrolysis to produce an intermediate fuel rather than directly burning raw waste:

- Can be used for many types of waste, such as tires, that are not suitable for incineration or gasification
- Produces a higher electrical output per ton because heterogeneous feedstock such as MSW or mixed waste is turned into a homogeneous gas or liquid fuel that can be used in high-pressure boilers, gas turbines or engines
- Two pollution control steps, one after pyrolysis and another after gas firing, ensure output exhaust from an advanced recycling and energy conversion plant is much cleaner than smoke from an incinerator or from gasification
- Cleaning a small homogeneous fuel gas stream before combustion rather than a large flue gas flow after burning mixed waste, as in an incinerator, reduces the size and complexity of the pollution control equipment and process
- Controlled combustion of syngas in a gas flame, as opposed to burning raw waste on a grating, reduces the extent and complexity of final exhaust cleaning.
- Produces fuel in liquid or gas form that can be safely stored or transported.



The Process



Brief About Sub-Process

Autoclaves used to sterilise waste, remove pathogens and break down the waste into a homogeneous, smaller size feedstock for pyrolysis. It sterilises the recyclables, rendering them of a saleable purity. Converts the carbonaceous matter to cellulose fibre suitable for transfer to the Pyrolizers.

Dryers are used to remove moisture in order to increase the efficiency of the Pyrolizers. Dryers use engine exhaust for increased efficiency.

Pyrolizer is the key component in the W2E plant. It converts cellulose fibre or biomass to syngas by application of heat in an oxygen starved environment.

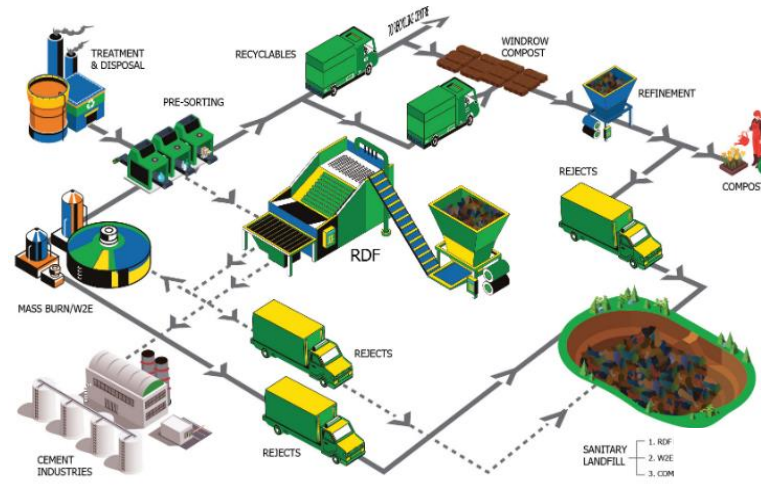
Thermal Oxidisers ensures that all world-wide emission standards are achieved with ease.

Distillation is used to convert the gas into bio fuels or other high value fractions

Generators are used to produce electricity that can be fed into grid

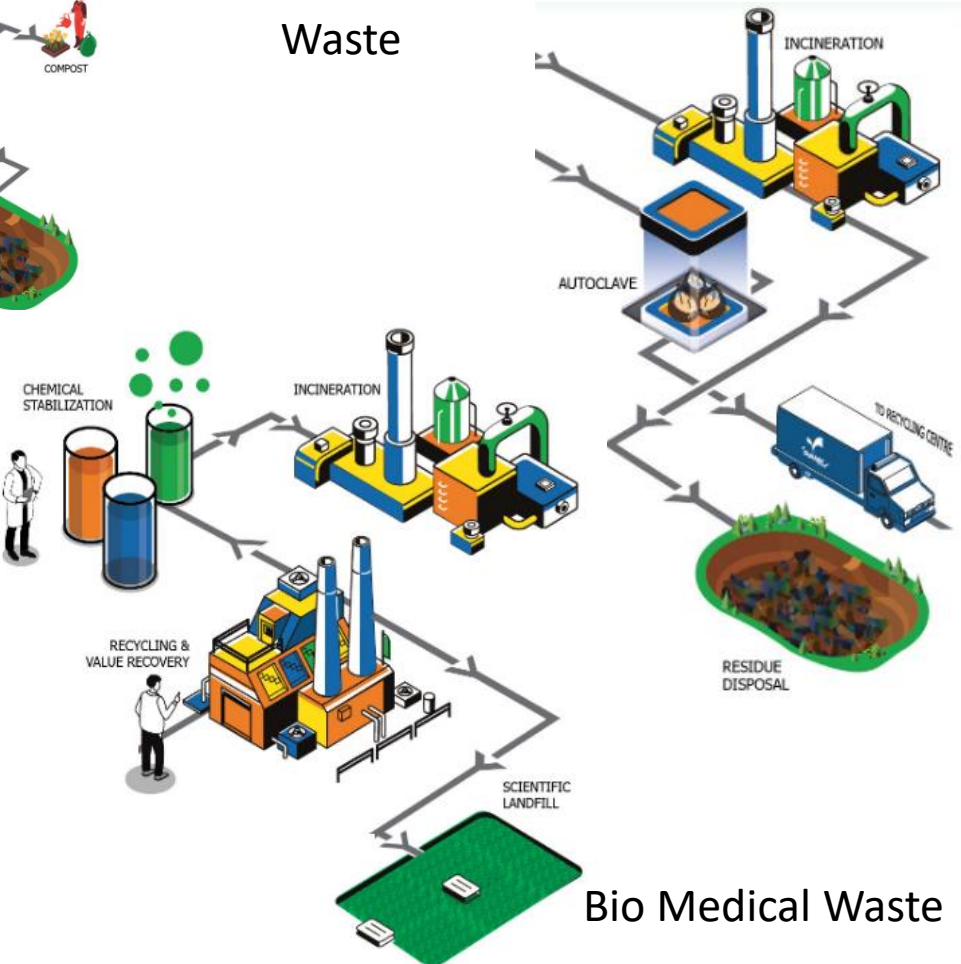
EXISTING SOLID WASTE TREATMENT

- On the right you will notice the existing waste recycling that involves **thousands of labours** and **bulky equipment** separating different wastes .
- Huge volumes of waste are left out which **cannot be recycled** that goes into **landfills**.
- The incineration technologies cause **Air Pollution** by produce heat, smoke, ash and other pollutants.



Municipal Solid Waste

Hazardous Waste



Bio Medical Waste

PROBLEMS WITH EXISTING SOLID WASTE TREATMENT

As identified in previous slides the existing solid waste processing , sewage treatment and desalination has major shortcomings as mentioned below:

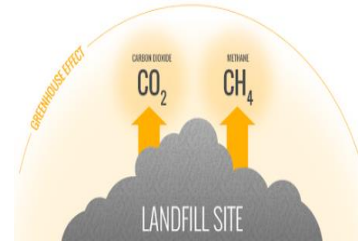
- Excessive use of landfills to dump the residual waste
- Inefficient or No power generation
- No extraction of clean fuels
- Bulky and Big Infrastructure with no Integration

PROBLEM 1: EXCESSIVE USE OF LANDFILLS



Expensive

Landfill is expensive as it required hundreds of acres of land and making of landfill is a cost intensive process.



Air Pollution

High levels of methane gas and CO2 are generated by the rotting rubbish in the ground. These are greenhouse gases, which contribute greatly to the process of global warming.



Ground Water Contamination

Toxic substances end up in landfills, which leech into the earth and groundwater over time. This creates a huge environmental hazard.



Fire Hazard

Landfills present a fire risk due to the gases they create. Methane is the main gas created, and it is also highly combustible.



Slow Breakdown of Waste

Landfills trap waste underground with little oxygen, and so even waste that would usually decompose quickly, such as fruit and vegetables, will take a long time to do so in landfill. Some materials in landfill will take over a million years to break down.

SOLUTION 1 : NO REQUIRMENT OF LANDFILL

- Our advanced process creates **zero residual waste** of any kind to deliver low Sulphur fuels and electricity for long term.
- We make sure that the waste is not returned into the local communities or dumped into sea ,river or landfills and processed to produce **energy, water, fuels and other high value products** that create many benefit to the total areas.



PROBLEM 2: INEFFICIENT OR NO POWER GENERATION

The existing solid waste treatment produce
Inefficient or No Power

SOLUTION 2: ADVANCE POWER GENERATION

Our advanced power generation is able to generate more power per Ton of waste that is continuous renewable energy, green energy and not dependent on wind, sun or other climatic conditions as explained below :

- **Municipal Solid Waste** : To consider the input of MSW, we use 100 Tons/Day of raw MSW. Considering that 10% of this is recyclables and rejects and 35% is moisture. Thus, on a dry basis we need capacity of $100 \times 0,9 \times 0,65 / 24 = 3$ Tons/Hr. = 3 MW/hr. We can process a max of **3200 Tons/Day.** to give **64MW/hr.**
- **Medical Waste** : After drying, **one ton** of medical waste will produce **900kW/hr.**
- **Biomass** :Using **100 kg/hr.** Consider that on average 30% is moisture. Thus, on a dry basis we will produce $100 \times 0,7 = 70$ kW/hr
- **Coal Dust** : After drying, **750 kg** of coal dust will produce **1MW** of electricity.

PROBLEM 3: NO EXTRACTION OF FUELS

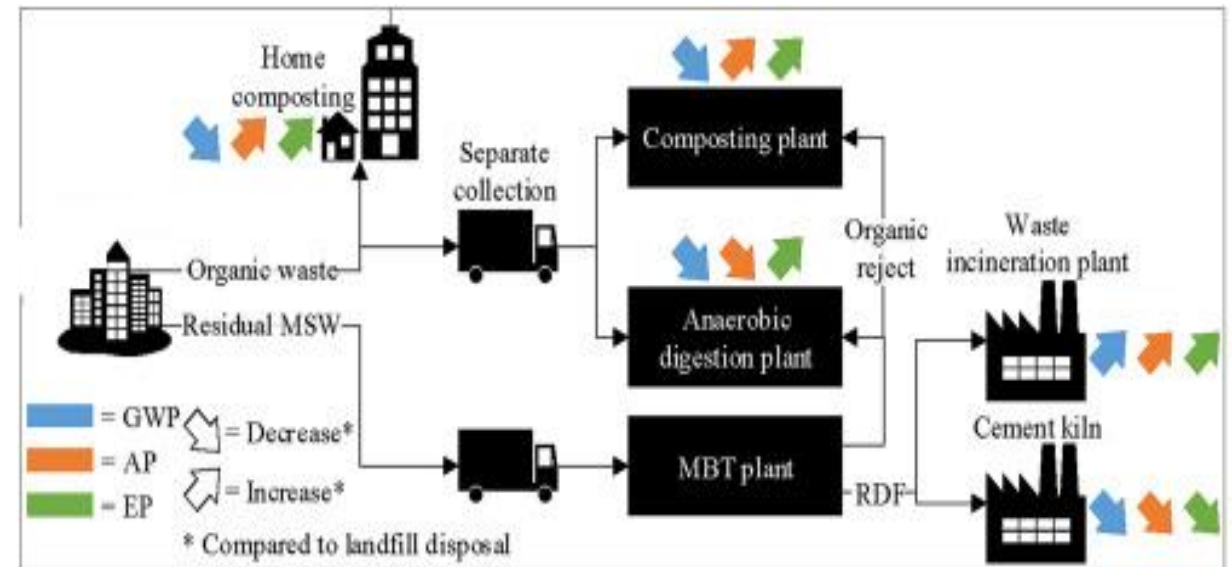
The existing solid waste treatment do not produce clean (low Sulphur) fuels

SOLUTION 3: LOW SULPHUR FUELS EXTRACTED

- The tire pyro oil can be further refined using our proprietary distillation system to provide liquid cuts of Diesel (65%), Naphtha (15%) and heavy fuel oil (20%) that has 10ppm ULS. If a twin distillation system is installed that will give the same yields but the better quality 10ppm diesel.
- With respect to coal dust we have 4 options as explained below :
 - Option 1: Convert all gas to H2 and use tail gas to run the plant.
 - Option 2: Convert all gas to liquid fuel. For example, 1,28m litres per annum with 65% diesel, 35% naphtha and 10% HFO.
 - Option 3: Install the FT system to produce the liquid fuels creating the 1,28m litres and then hive off the Naphtha and create the H2 from this as POC for the hydrogen. We can build a 200kg/day H2 plant.
 - Option 4: Install 50% Liquid fuel and 50% H2 capability.

PROBLEM 4: BULKY INFRASTRUCTURE WITH NO INTEGRATION

- The sorting of waste requires a lot of equipment and labour that uses a lot of land and manpower.
- Each waste is then **treated separately** which again involves **huge infrastructure and manpower** as shown in the image on the right.

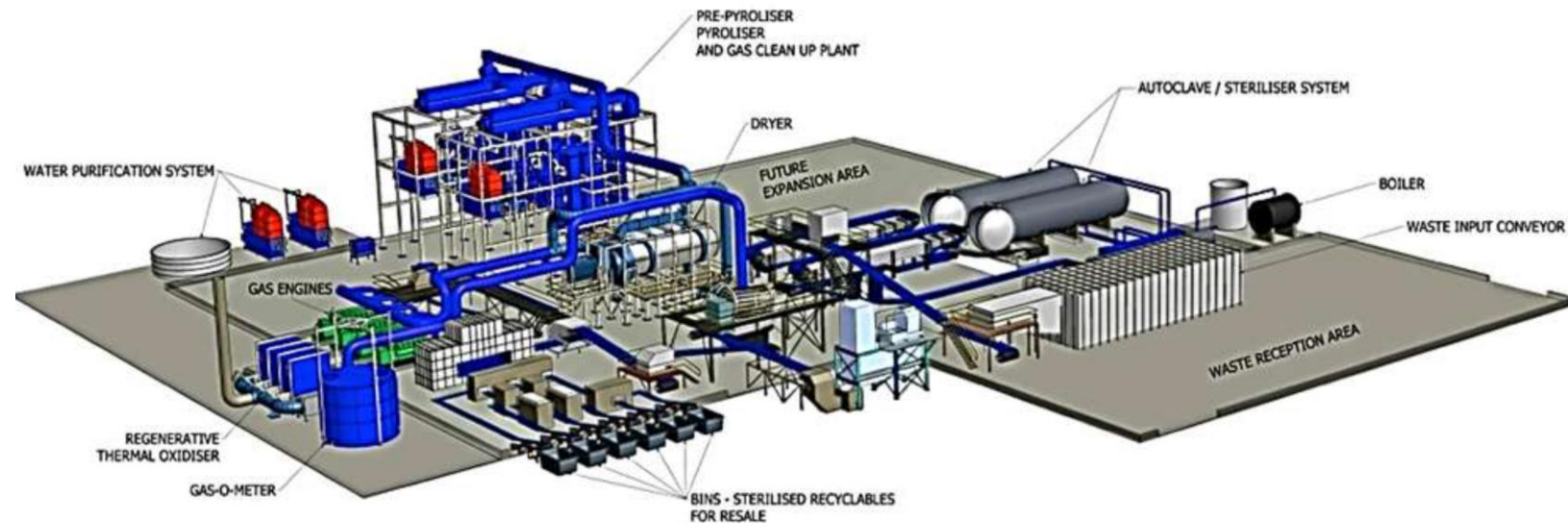


Solid Waste Processing

SOLUTION 4: SMALL FOOTPRINT REQUIRED

A 400 Tons/Day MSW plant will require only 3 acres in total.

- One acre for the buildings, one acre for the weighbridge and trucks arriving, turning and departing
- 2500 sq.m for temporary overflow storage
- 1528 sq.m for double-fenced all-round security



SOLUTION 4: FULL INTEGRATION OF DIFFERENT SYSTEMS

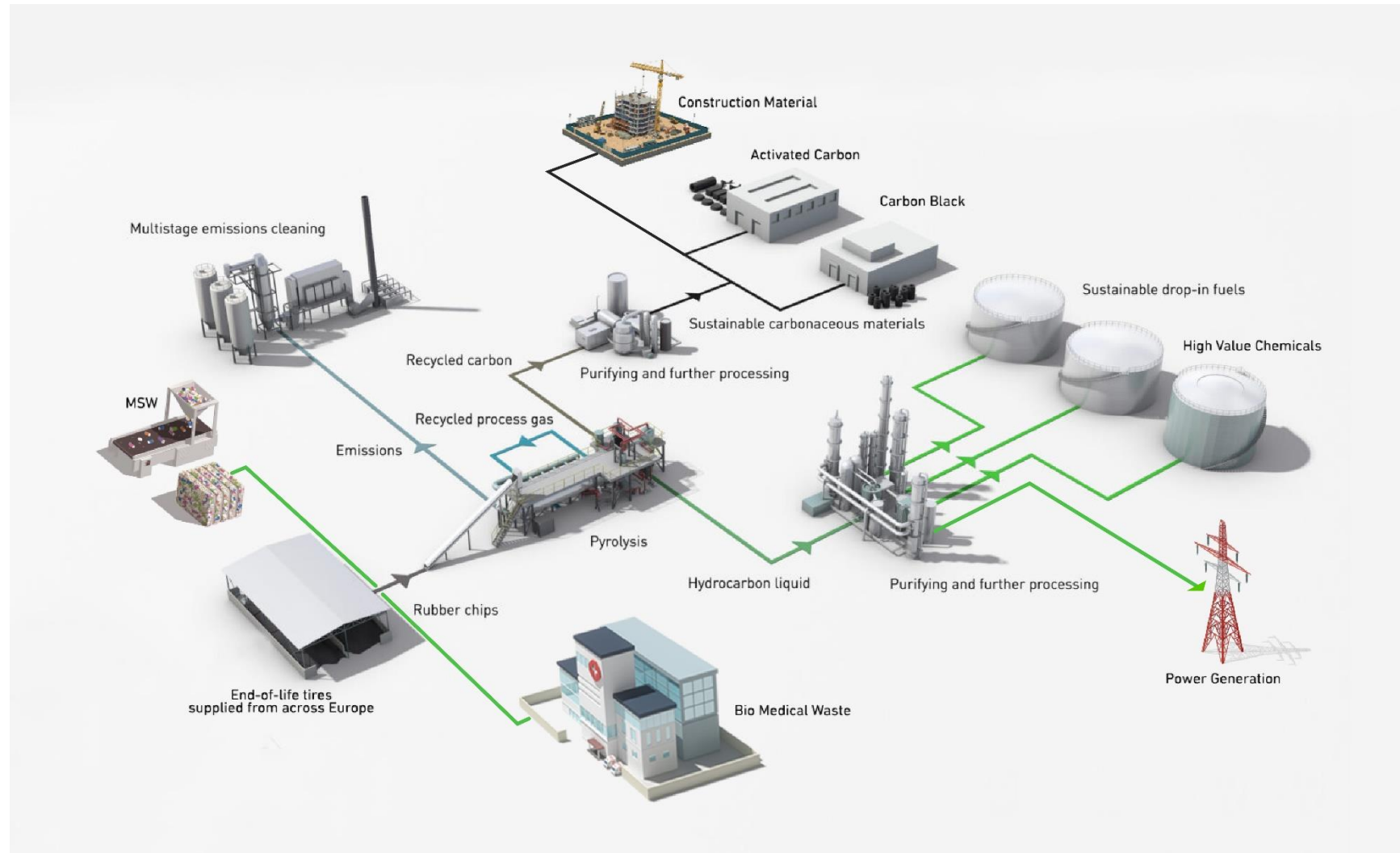
Our systems are best integrated to convert all of the waste into high value outputs.

ADDITIONAL BENEFITS:

- The potassium rich fertiliser additive from medical waste processing can be mixed in to give a higher-grade organic fertiliser.
- The plant produces its own pure water from the 15% to 35% moisture contained in the waste. The amount of water produced is subjected to many factors at point of origin .
- Produces energy products and/or other supplementary products from medical and veterinary waste, municipal solid waste, rubber tyres, agri and biomass waste, coal dust and sewerage sludge – thereby reducing waste
- Creates new jobs in the construction, operation and maintenance of waste-to-energy facilities.

General System Flow

- This system is designed for **approx. 3,200 MT/Day** with **360 Days** a year operation (**1.15 Million Ton/Year**)
- 3200 Mt/Day processing gives **64 mWh** of electricity
- General processing **100 Ton/Hr**
- **100 % processing** with **no holding , landfill or storage requirements**



EXISTING PLANT REFERENCES

We have good number of installation across globe that are custom made according to local requirement. A few of the installation are in:

- A small plant in Pendale, Randvaal, South Africa
- An abattoir in Kroonstad, South Africa
- A medical waste plant in Rhode Island USA
- A plastics to low sulphur diesel plant in the USA
- A MSW plant in Emalahleni, Mpumalanga, South Africa
- A medical waste plant in Ireland

CONCLUSION

The bottom line is that our waste treatment completely converts the waste either into electricity, water, fuels or other high value products with **Zero Residual Waste and EPA approved Emissions.**

Thank You!



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GLOBAL SERVICES

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