
The Challenge
of Waste
Disposal
FOREMOST
APROACH

Ecological challenges & New opportunities

- Global growth of territories and landfills, occupied with municipal waste (including RDF type), electronic and industrial waste;
- Catastrophic increase in volumes of plastic, rubber and other not decomposable wastes;
- Waste incineration in numerous landfills, leading to harmful toxic emissions (toxic burning);
- Pollution of water resources with sewage;
- Destructive influence and devastating effect on environment and people.

- An effective technology for disposal of municipal waste of RDF type, electronic and industrial waste, including wastes from refineries and chemical industry, provides unique possibilities for combined efforts of the state and private business;
- Processing of dangerous and highly toxic waste with no harm for the environment;
- Real actions in health care activities, in clearing of territories and nature protection.

Brief introduction / Input - Output

- Unique flameless process for waste disposal without pollution, ash or slag by technological process;
- Suitable for virtually all types of waste, including e-waste;
- Converts waste to chemical products, hydrogen or power;
- Compact design suitable for metropolitan use;
- Meets the local requirements on emissions to the environment;
- Modular plant design for specialist use;
- Suitable for any climate.

Input:

- Organic waste (RDF type municipal waste, sewage sludge, etc.)
- Inorganic waste (plastic, rubber, wastes from refineries and chemical industry etc.)
- Special waste (household and industrial electronic equipment, furniture, etc.)

Output:

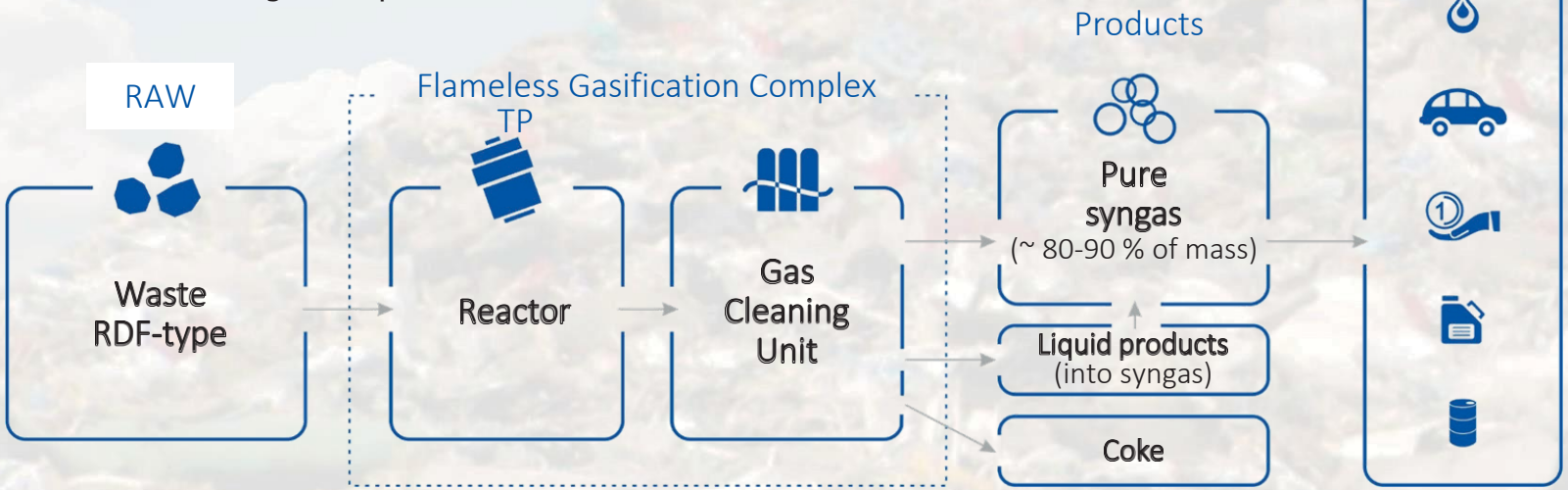
- Synthesis gas
- Oil products (if requested)
- Electricity (if requested)
- Thermal energy (if requested)
- Chemical products: methanol, DME, fertilizers, ethylene, propylene and butylene (if requested)

Benefits of TP Technology

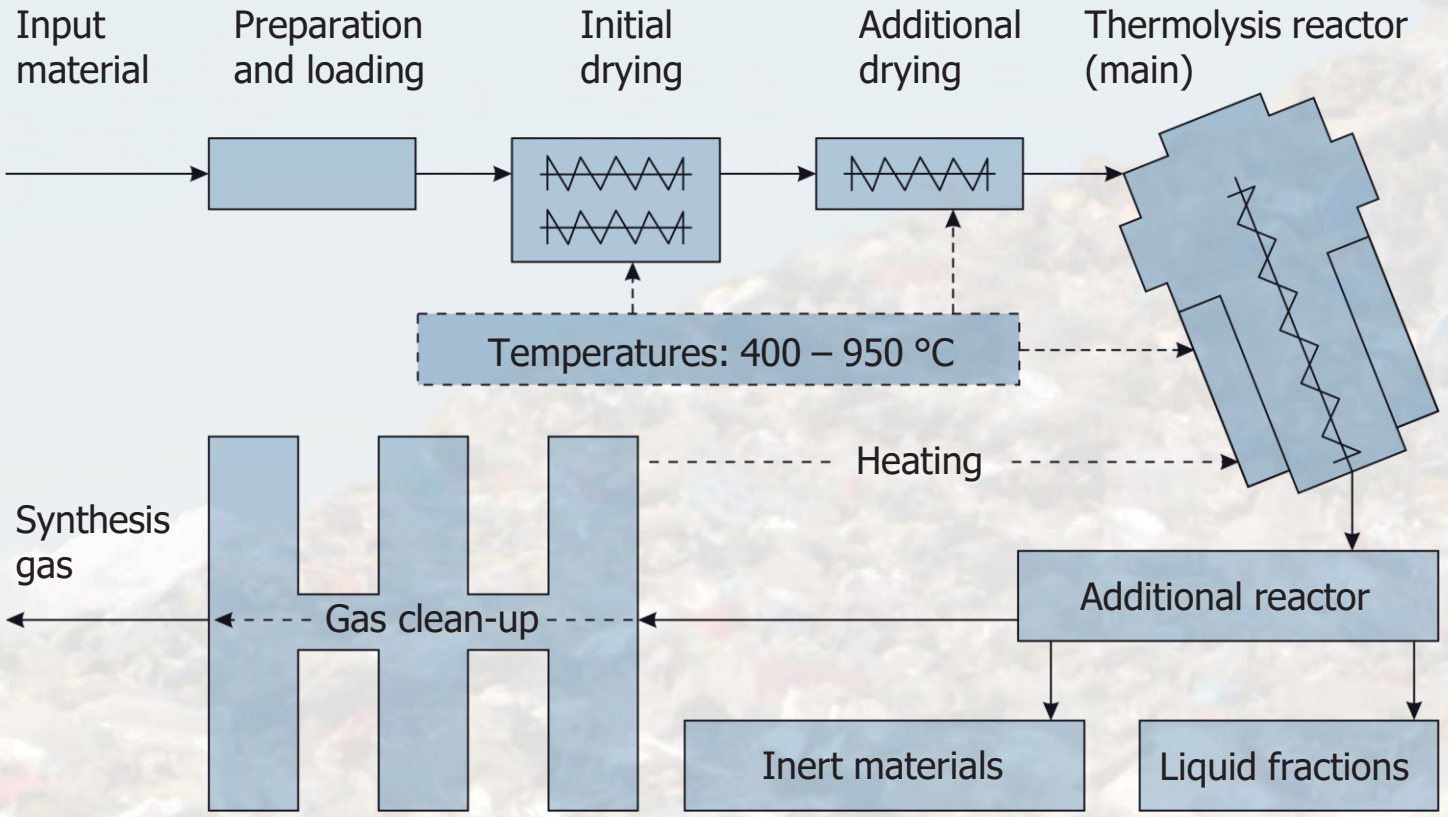
Flameless processing occurs without direct combustion of raw materials and without blowing air with oxygen, in contrast to waste incineration plants;

Transferring about 99.00 percent of the entire organic part of the raw into the gas phase;

- With flameless gasification there is no carbon dioxide emissions, while during the RDF-type waste combustion at waste incineration plants it is formed in significant amounts;
- Production of a large volume of synthesis gas, both for the generation of energy resources and for the chemical industry, what incinerators cannot do, since they can only have energy generation;
- No ash and slag for disposal.



THERMOLYSIS PROCESS



Efficiency of implementation of TP technology for a project of flameless gasification of 120 000 tons per year of RDF-type waste

Technological mode I

From the volume of 120 000 tons per year of RDF-type waste, under the technological mode I (synthesis gas into chemical products), there is a possibility to receive about:

80 000 tons per year of METHANOL

(simple payback of about 3.0 years)

OR

38 500 tons per year of ETHYLENE

+ 26 500 tons per year of PROPYLENE

+ 8 000 tons per year of BUTYLENE

(simple payback of about 2.0 years)

Technological mode II

From the volume of 120 000 tons per year of RDF-type waste, under the technological mode II (synthesis gas into generation of energy resources, at power system efficiency of 0.40), there is a possibility to receive about:

50,0 MW/h of ENERGY

(simple payback of about 5.0 years)

The average indicators of air pollution during fuel combustion, g / kW-hour

Matter	Fuel				
	Syngas TP	Natural gas	Coal	Brown coal	Mazut
SO_2	None	0,002	6	7,7	7,4
NO_X	0,3	1,9	21	3,45	2,45
Fluoride compounds	None	None	0,05	0,11	0,004
Particulates	None	None	1,4	2,7	0,7

TP synthesis gas compared to other fuel gases

Gas composition, %	Low calorie			High calorie	
	Blast furnace gas	Gasification of raw materials with oxygen	**TP synthesis gas** (Technological mode I – for the production of chemical products)	Natural gas	**TP synthesis gas** (Technological mode II – for energy production)
CH4	-	-	**7.0**	97.0	**30.0**
C1-C4	0.1	-	**2.5**	1.0	**3.0**
H2	3.2	29.6	**50.0**	1.0	**30.0**
CO	23.3	58.7	**25.0**	-	**25.0**
CO2	11.5	10.4	**15.0**	-	**12.0**
N2	53.7	1.3	**0.5**	1.0	**-**
H2O	8.2	-	**-**	-	**-**
Kcal/m³	756	2 428	**3 000**	9 465	**11 000**

Comparative technical, economic and environmental indicators of various technologies for utilization of the total volume of solid waste (not RDF)

#	Indicators	Units	Technology				
			Thermal processing		Plasma	Flameless gasification (thermolysis)	Composting (biological gasification)
			Combustion	Pyrolysis			
1.	**Specific capital investments**	**Euro/1t of solid waste per annum**	**390 - 690**	**355 - 455**	**455 - 545**	160-180	**180 - 210**
2.	**Specific operational costs**	Euro/1t of waste	34 - 45	30 - 35	45 - 57	20 - 25	27 - 32
3.	**Specific environmental payments**	Euro/1t of waste	2	2	1	no	2
4.	**Specific Company revenues**	Euro/1t of waste	20	17	5	125 – 250	5
5.	**Specific energy consumption**	kW/1t of waste	50 – 70	50 – 70	500	25	90 – 120
6.	**Specific footprint**	m ^{2}/1t of waste per annum	0.1 – 0.2	0.15 – 0.30	0.1 – 0.2	0.1	0.4 – 0.6
7.	**Availability of production waste**	% By weight of solid waste	23 - 28 (ash and slag)	25 - 30 (coke residue)	The fine dust, fumes, heavy metals	sand and stones (no ash)	20 – 25 (non-compostable fraction)
8.	**Soil pollution**		presence of a slag refuse	coke residue only	practically no	no	practically no
9.	**Air pollution**		within the limits	within the limits	heavy metals	no	within the limits
	Received products after processing						
10.	**The energy produced by steam**	MW/1t of waste	160	120	no	no	no
11.	**Electric power**	MW/1t of waste	0,40	0,30	0,40	1,3 - 1,7	no
12.	**Chemical products**	Kg/1t of waste	no	no	no	500 – Methanol or 500 – DME or 225 – Ethylene 150 – Propylene 50 – Butylene	no

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