

# ELECTRICITY AND HEAT PRODUCTION FROM WASTE

Protecting the environment  
And Producing energy

Two needs for **Africa**, that we address through our **environmental friendly** production system based on the technology of Full Flow **Pyrolysis**



Building a cogeneration power plant combining heat, electricity and biochar from biomass, waste plastics and scrap tires

## Why Will you choose Pyrolysis instead anaerobic digestion?

The cost of the machinery in anaerobic digestion is €7500 per Kwe.

The Kwe installed in a full Flow pyrolysis is about half the price of the methanisation.

Anaerobic digestion does not recover the carbon waste fossil such as plastics and scrap tires, while the recovery of this kind of waste by the non polluting pyrolysis process proves to be a much more productive than the biomass. It is more efficient for the cleanliness of the city and better for the environment.

Finally, electricity production in large quantities is a necessity for economic development.

Pyrolysis produces Syngas (see table below) and biochar.

## Energie Eco Fertile Syngaz Vs Mgw Vs \$ Yield

	Waste to energy		PCI (MJ/m3) / 3,6 x Rdt / 0,9 x 1000	
	Wood	<i>Elephant grass</i>	Mix plastic	Scrap tires
Yield	70%	50%	85%	40%
Pci Mj /M3	11,8	9,5	23,3	22,3
Pci KwH/M3	3,27	2,63	6,47	6,19
Equival. Kwh elect	0,85	0,65	1,61	1,54
Equival. Heat convergence Kw élect	2549	1466	6112	2753

Pci : Kj (Kilojoules) / 3600

Mj : Megajoule, 1 million joules

M3 : cubic meter

KwH : Kilowatt / hour

KwH élect : Electric Kilowatt / hour

Given existing waste deposits in African countries and the shortfalls in electricity production, this technology seems adapted to the situation.

For example, the city of Libreville (Gabon, 700 000 people) produces at least 800 metric tons of waste per day, which are not valued.

### Tech :

**Pyrolysis** is a chemical cracking reaction of an organic or Carbon body under the action of heat and without other reagents.

This transformation, without any oxidant such as oxygen, creates new products due to an atomic or molecular rearrangement.

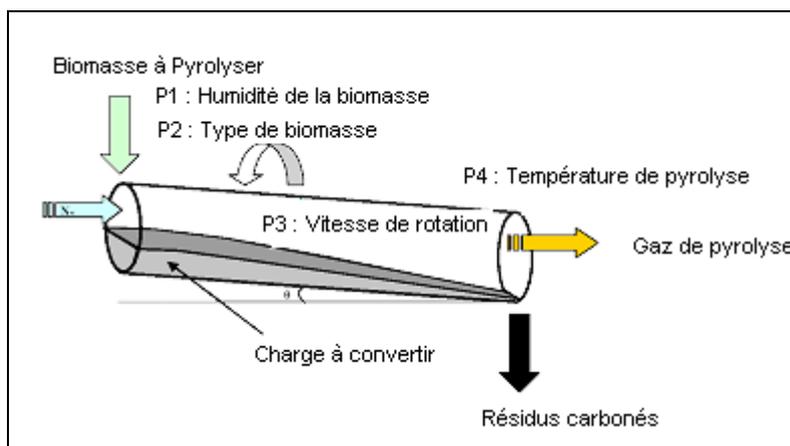
Pyrolysis provides various solid hydrocarbons (charcoal or biochar), either liquid or gaseous. This reaction is used to convert biomass into more usable sources of energy as well as soil amendments.



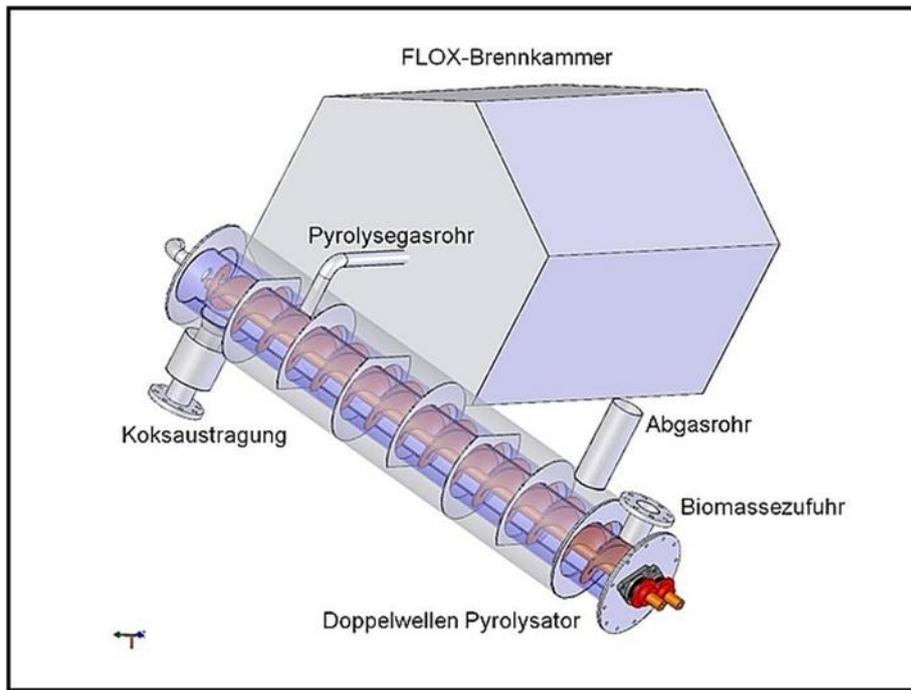
biochar

**Gasification** is a process at the border between the pyrolysis and combustion.

This allows converting carbonaceous materials or organic fuel in a synthesis gas (often referred to as "syngas"), mainly composed of carbon monoxide (CO) and hydrogen (H<sub>2</sub>), contrary to the combustion of which the majority products are CO<sub>2</sub> and H<sub>2</sub>O.



The mechanical principle of full flow anaerobic combustion is simple. It works without reloading batches.



After getting CH<sub>4</sub> Syngas, the gas is burned in a steam boiler to power an electric generator, to supply a local electricity grid. Residual heat will be recovered to provide process heat in an industrial laundry (hospitals or commercial), a glass bottling plant, agro industries. Schematically, 1 metric ton of dry biomass at 10% produces 1 MW Electric + 3.5 MW residual hot water.

*Both wholesale prices on the local market of Electrical MW and process heat MW need to be assessed, to calibrate the project.*

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Autonomous oven can also transform all plastic waste (plastic bags, plastic film Pe. PP. Pa) except PVC. Pyrolysis also deals effectively with used tires. In this case, yields will be 2 to 3 times higher than those obtained by the pyrolysis of biomass.

**Biochar** from wood or miscanthus cracking will be valued in barbecue briquettes or organic amendment for the organic culture. Biochar production is in inverse proportion to the volume of the produced Syngas. Industrial equipment produces biomass roasting to Syngas depending on the oven temperature, in the following proportions:

Biochar and Coke: 5-25%, Syngas: 75-95%. Biochar plastics and tires can possibly be sold in chemistry as Black Carbon.

In the production phase, the optimal volume of waste to be treated is 30 Tons Ms / day. On the basis of an operating time of **8000 h / year**, industrial equipment can process in a year about **10,000 tons of dry biomass materials** or 8000 Metric tires / plastics, or a mix of both inputs.

## Your contacts to go further :

**Artaxerkes** (Pre Sales) is available to assess the needs of industrial makers able to invest several million euros in a facility of this type.

\* Industrial equipment is manufactured in the European Union, the industrial process is validated by a European engineering company. They are delivered in containers, in the form of industrial blocks.

**EEF** (Assistance for Project Managers), a specialist in energy crops, supports you in achieving your project as soon as the conditions to sell the electricity generated are clearly identified.

In addition to industrial equipment \* EEF brings expertise on production, supply of biomass, valuation of co-products, and maintenance of the production site.

Contacts :

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**ARTAXERKES**

[www.artaxerkes.com](http://www.artaxerkes.com)  
Olivier KERFANT  
Office in Paris. Correspondents in Africa

[info@artaxerkes.com](mailto:info@artaxerkes.com)  
Tel : 0033 603 49 69 99.

**energie  
ECOFERTILE**

[www.energieecofertile.fr](http://www.energieecofertile.fr)  
Didier H. FERTIL  
Energie Eco Fertile

[contact@energieecofertile.fr](mailto:contact@energieecofertile.fr)  
Tel : 0033 610 96 15 52.