Advantages of biomass-to-liquid fuel (BTL) conversion, using fast pyrolysis process

- Easy to integrate with a wide variety of existing industrial and agricultural value chains
- Modular design, easy to expand capacity resulting in relatively low initial investment
- Capable of processing wide variety of biomass feedstock, ranging from agricultural waste to sorted household waste
- Capable of processing large feedstock particle sizes
- Excess heat available for cost-effective feedstock drying
- No interference with food supply
- Bio-oil can be used stored and transported, allowing it to be used at a different time and place from the actual biomass conversion, thus optimizing revenue potential
- Bio-oil can replace natural gas in large scale electricity plants with possibility for peak-shaving operation
- Bio-oil can replace fossil fuels in combined heat and power (CHP) systems
- Robust business model: multiple income streams counterbalance impact of pricing variations of primary energy sources
- Best in class CO_2 reduction per Euro invested

From waste to liquid energy

bio oil HOLDING NV

Company Background

Bio Oil Holding NV, based in Tessenderlo, Belgium, is a leading developer of commercial renewable energy technology. The company specializes in biomass-to-liquid fuel (BTL) conversion, using fast pyrolysis process. This bio-oil is a clean, renewable energy source, capable of replacing traditional fuels to produce power and heat, in industrial boilers and fuel gas turbines.

We are the frontrunner of the flash pyrolysis technique on the global market, and the first company to startup operations with a pyrolysis installation capable of handling 5 tons of biomass per hour. We will continue to invest in the further improvement and optimi-zation of this technology, thereby significantly contributing to the development of a strong renewable energy sector globally.

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From fossil fuels to bio-oil

It is common knowledge that the earth's fossil fuel supplies are finite and that carbon dioxide – a by-product of fossil fuel combustion – is a "greenhouse gas" which contributes to the global climate change. The international community recognizes that sustainable, clean-energy sources must be produced and used more extensively than ever before. One of those sustainable, clean-energy sources is bio-energy, which is produced when chemical energy stored in biomass is released. Currently within the field of bio-energy, there are three types of liquid bio-fuels available; bio-oil, bio-diesel, and bio-ethanol. We focus our efforts on the production and use of bio-oil.

Biomass is found in many everyday waste products, including different forms of agricultural-, forest-, and waste generated from food processing. Other major sources of biomass are residual products resulting from industrial processes, such as sawdust, bark and the husks of sugar cane and corn and the green fraction from sorted household waste.

Biomass can be converted to bio-oil via the process of fast pyrolysis, which refers to the rapid heating of small biomass particles in the absence of oxygen. This process breaks down the structure of the biomass and yields three products: condensable gases (bio-oil) (70% by weight), solid char (20% by weight), and non-condensable gases (10% by weight).

Similar to petroleum-based products, bio-oil can be stored, pumped, and transported, and it can be burned directly in boilers, gas turbines, and other heating and power generation applications. The relatively high water and oxygen content of bio-oil result in a heating value being roughly 60% of diesel on a volume basis. In the longer term, bio-oil can also be used as a source of valuable raw materials for the chemical industry.

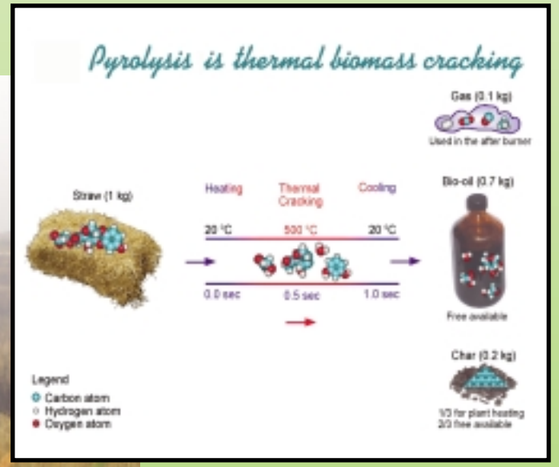
Part of the char is burned in the combustor to keep the process temperature stable and also to provide heat for drying biomass if needed . Any remaining char can be used as a fertilizer (terra preta) for the agricultural industry.

The non-condensable gases are used to generate combined heat and power (CHP). Once in operation, the installation does not require any external power or heat resources.

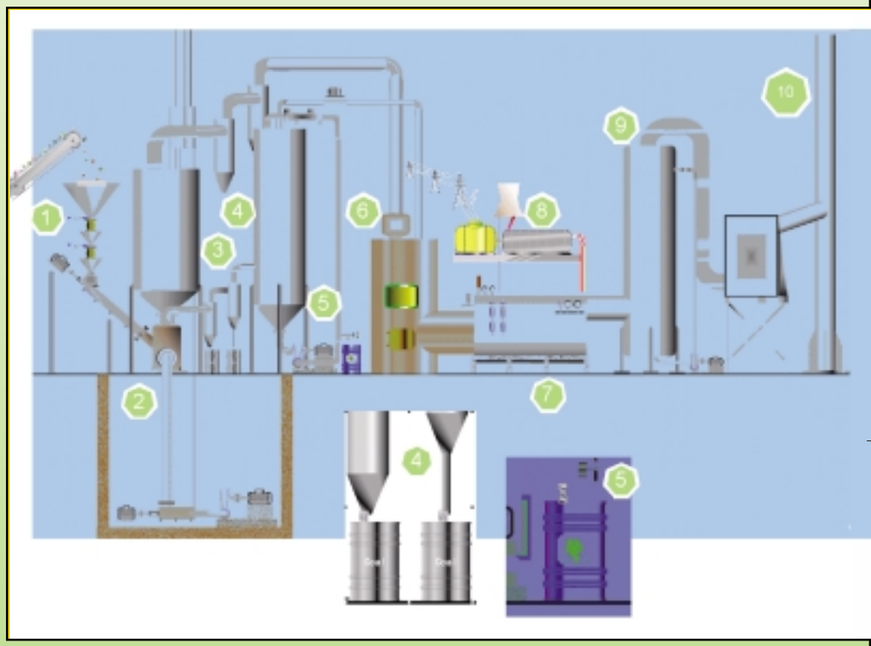
There are many possibilities to integrate the exploitation of the pyrolysis installation with industrial and agricultural value chains.

In particular for deve-loping economies, bio-oil offers great opportunities. The abundance of biomass and the need for a simple and easy process for generating liquid energy independently from fossil fuel supply are ideal conditions for flash pyrolysis process.

The process of converting biomass to bio-oil is an environmentally and economically viable alternative for waste incineration. The use of local biomass feedstock presents us with the unique opportunity to build a local and independent operation for generation of renewable CO_2-neutral fuel. Our process can be optimized for a specific type of biomass.



Fast pyrolysis process diagram and process description



The process starts with biomass feeding (1).
The bio mass is mixed in the reactor (2)
with hot sand (5500C) from the combustor (3).
Char is extracted using cyclones (4).
The vapor stream then enters the oil condenser (5) where the bio-oil is extracted.
The non-condensable gas is burned in the afterburner (6).
The resulting heat is then passed through a steam generator (7), driving a turbine (8) to produce electricity.
Flue gases are subsequently cleaned by several washers (9) before being released in the environment by the chimney (10).