



biomass technology group

Biomass consultants, researchers and engineers

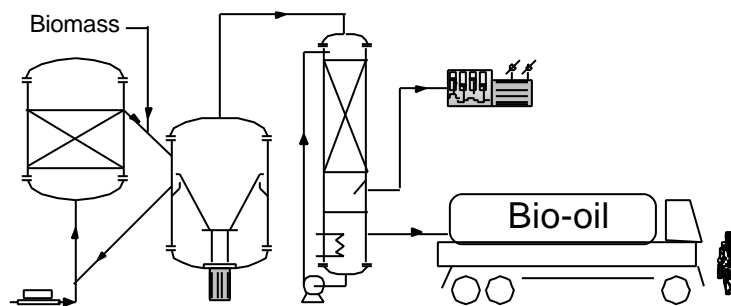
BTG Biomass Technology Group BV is a private firm of consultants, researchers, and engineers, operating worldwide in fields of sustainable energy production from biomass and waste

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Pyrolysis produces a clean liquid biomass energy carrier

Fast pyrolysis is a technology by which biomass is decomposed into bio-oil, char and gas. When wood is applied, bio-oil is the major product 75 wt.% Bio-oil can substitute for fuel oil or diesel in many static applications including boilers, furnaces, engines and turbines for electricity generation. The gases 10 wt.% can be fired in a boiler or in a gas engine. Finally, the char 15 wt.% may be combusted in the pyrolysis unit to drive the process auto-thermally. Only the ash is left as a waste stream.

Char combustor	Biomass pyrolyser	Bio-oil condenser	Gas engine
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Notwithstanding the above and other advantages, fast pyrolysis systems will only be implemented if they can be operated cost-efficient. This will be achieved by a simple and robust process, which can be scaled-up easily. The principle of the process applied by BTG is illustrated in the above figure.

Advantages of the technology are

- Bio-oil is cheaper to transport than biomass.
- Bio-oil has a volumetric energy density of 20 GJ/m³.
- Wood chips only have an energy density of 4 GJ/m³.
- Bio-oil is cleaner than biomass.
 - The ash content in bio-oil is a factor 100 lower than biomass.
 - Minerals like K, Cr, and Cu remain in the char.
 - The cost of bio-oil production is relatively low due to the mild conditions.



Market introduction

There are good opportunities for pyrolysis to gain a substantial share in the international bio-energy market. During the nineties, BTG has continuously improved its rotating cone technology for producing bio-oil. The facility can now be operated on a fully automated and stand-alone basis.

BTG aims to become a major provider of biomass pyrolysis systems, pyrolysis products (bio-oil) and process licenses. In view of the good prospects for its patented rotating cone technology, BTG is actively seeking to establish long-term partnerships and strategic alliances to gain a significant market share in the growing biomass pyrolysis market. To support the market introduction of pyrolysis systems, BTG has initiated application tests, including the co-combustion of pyrolysis oils in coal fired power generation plants and the application in a stationary diesel engine. At present BTG is selling pyrolysis oil mainly for research purposes to interested parties around the world.

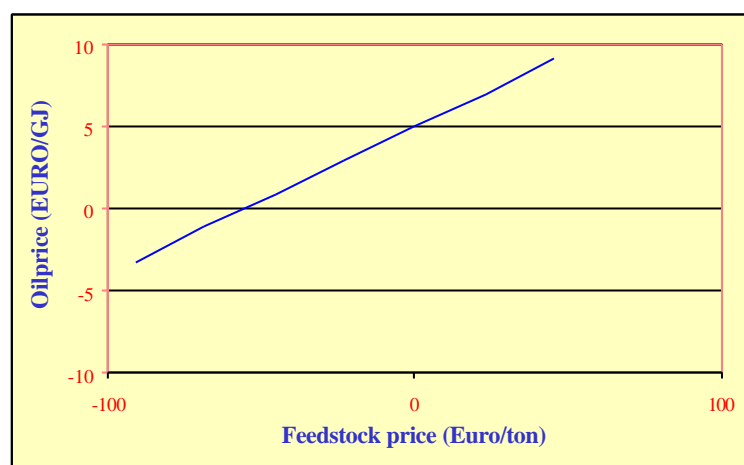
Economics

Economic scenarios indicate that pyrolysis oil produced with BTG's technology at a scale of 10 t/hr will cost less than 10 Euro/GJ, at feedstock costs of 50 Euro/tonne, see figure below

The current interest in producing chemicals as a by-product from the primary liquids may contribute to the economic potential of future energy applications.



The 5 ton/day pilot plant



Oil production costs in a 10 t/hr wood processing plant, 7500 annual operating hours. Investment costs:15.2 Million Euro, IRR = 10 %

Information

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