

Process Development at COMPS

COMPS is a research and process engineering solutions group located at the University of the Witwatersrand in Johannesburg. The BeauTi-fueL™ design is a result of an application of the process synthesis and optimization methods developed at COMPS. These methods were used to identify opportunities and systematically reduce carbon dioxide (CO₂) emissions from FT processes. The design builds on our extensive experience in the areas of Fischer-Tropsch Catalysis and Process Synthesis.

Plasma Gasification at NECSA

NECSA's plasma technology group specializes in high temperature and plasma chemistry for the development of advanced plasma systems and applications such as the gasification and reduction of the volume of a variety of waste materials.



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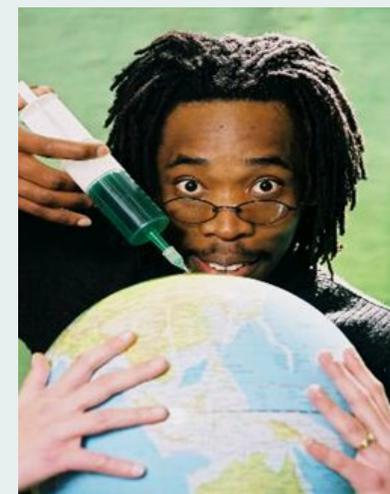
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Some images have been taken from the web.



For Earth Renewal, use Waste as Fuel!





The Vision

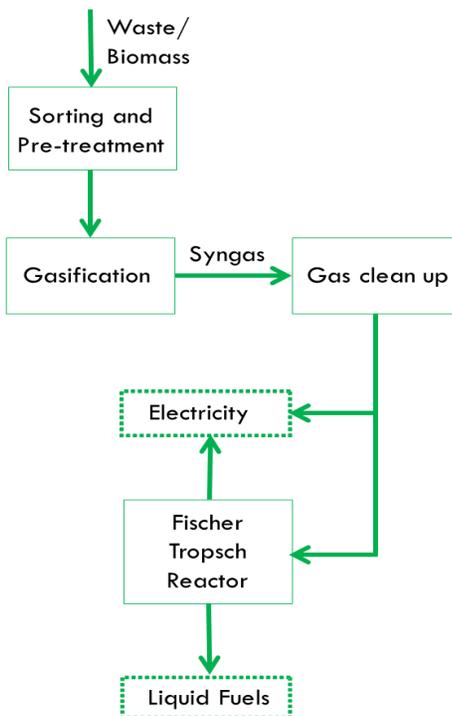
A joint venture by the Centre of Material and Process Synthesis (COMPS), based at the University of the Witwatersrand (Johannesburg, South Africa), and the South African Nuclear Energy Corporation (NECSA) has resulted in the development of a sustainable and novel, small-scale solution to waste management, by generating electricity and fuels from municipal solid waste and/or biomass.

The idea behind the “BeauTi-fueL™ Project” is to uplift small communities and make them more self-sufficient in terms of energy security, without compromising valuable food sources. Such a process is sufficiently simple, making it easy to operate, with relatively low risk. The simplicity of the process also enables it to be highly flexible and adaptable with respect to feedstock, capacity as well as production ratio of fuel-to-electricity. Along with energy production, the project also addresses the issues of job creation, waste management and utilization, as well as having the added environmental advantage of reducing greenhouse gas (GHG) emissions over conventional fossil-fuel based fuels.

The Process

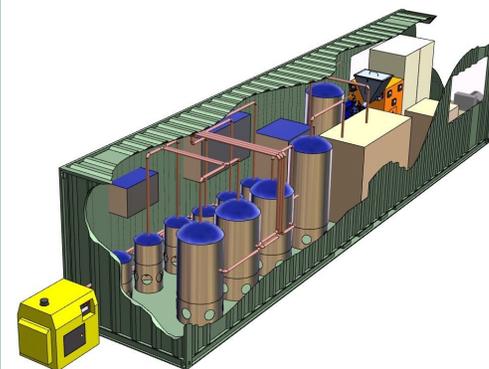
The conversion of biomass or municipal solid wastes into fuel requires the combination of novel technologies, including a plasma gasification unit, developed by NECSA and a Fischer-Tropsch unit, developed by COMPS.

The carbon feedstock (municipal waste or biomass) is converted to syngas (mainly carbon monoxide and hydrogen) in the Plasma Gasifier. The syngas is passed through a gas clean-up step to reduce the levels of harmful contaminants in the gas that could be damaging to novel reactor system. The clean syngas is then introduced to the reactor containing the Fischer-Tropsch catalysts. The product stream from the reactor is then cooled and product cuts removed at the appropriate point. The remaining tailgas is passed to an electricity generation unit. The process is flexible and the ratio of fuel-to-electricity production can be varied accordingly.



Demonstration Unit

The prototype unit is capable of processing 1 ton of biomass and converting it into 1 barrel of liquid fuels (syncrude) per day and sufficient electricity to operate the plant. The plant has been designed such that it fits into a container and onto a truck – a world first for fuel production!



The Possibilities

The proposal is to build small modular processes which have the advantages of being less capital intensive, more flexible and have a faster time-to-market. The capacity of the process would depend on feedstock availability and transportation.

