BIOMASS-BASED DME PRODUCTION PLANT IN INDONESIA

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PROJECT OVERVIEW

Design of a dimethyl ether (DME) production plant from empty fruit bunch (EFB) in Kampar, Riau, Indonesia to be used as an additive to LPG for household fuel.

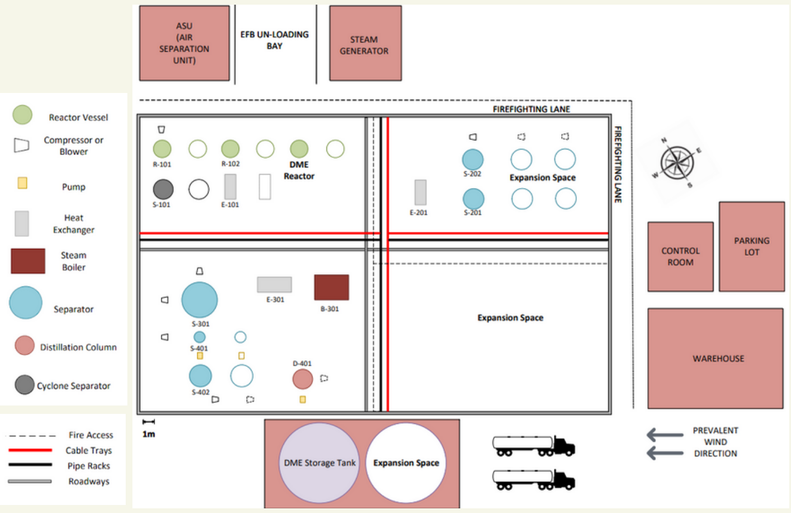
Location
Kampar, Riau, Indonesia

Production Capacity:
356 000 tonnes per year

SOCIETAL NEEDS

- Meets Indoesia's National Energy Master Plan targets
- Reduce LPG imports by 6%
- Locally produced energy source
- Able to integrate a 20 vol% DME-LPG mixture
- 85% CO2 reduction
- 15% NOx reduction

PLANT LAYOUT



PROCESS DESCRIPTION

1 Empty Fruit Bunch (EFB) Treatment

Biomass by-product treated off-site and fed to plant as slurry

2 Biomass Gasification

The pre-treated EFB is gasified in a fixed bed reactor to produce impure syngas

3 Syngas Drying & Purification

Biochar is separated from syngas with a cyclone. H2/CO ratio is modulated with a WGS reactor. Syngas undergoes drying and impurity removal with a scrubber

4 DME Synthesis

Syngas reacts exothermically at 260°C, 50 bar in a fluidized bed reactor on a bi-functional catalyst to produce gaseous impure DME

5 Steam Generation

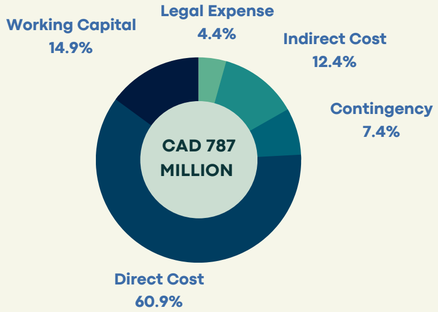
260°C DME is cooled to 15°C with the help of an interchanger that produces high-quality steam from cooling water

6 DME Purification

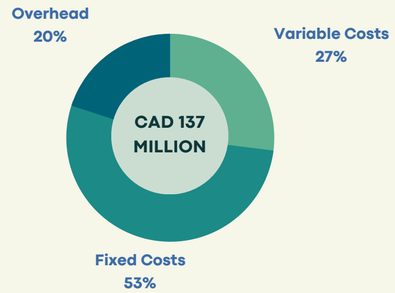
A liquid-gas separator recovers unconverted syngas to recycle to the reactor, and a series of flash and a distillation column are used to remove CO2, CO, H2, N2 and H2O from the final product: **Liquid DME at 20 bar**

ECONOMIC ANALYSIS

Total Capital Cost (TCI)



Annual Operating Cost



Plant Details

- Plant life: 20 years
- Construction: 3 years
- 8100 operating hours per year

Economic Potential

- IRR: 18%
- NPV: CAD 934 million

Revenue Sources

- DME Sales: 79%
- Steam Sales: 21%
- Average Annual Profits: CAD 149 million

ENVIRONMENTAL ANALYSIS

Emissions

- Off-site purification and compression
- CO sold to steel plants
- CO2: storage and utilization
- H2S: sold to sulfuric acid plants

Waste

- Biochar: sold to farmers for fertilizer use
- Wastewater: in-house steam generation

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