



# Biomass Gasification With Fischer-Tropsch Synthesis

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## Introduction:

With an increase in demand for cleaner sources of energy and also with the current incentives to produce energy using biomass, this project illustrates the manufacture of crude diesel from biomass. The available feedstock consist of 90,000 tons/yr of dry wood chips and produces 15,000 tonnes/yr of crude diesel. The process can be divided into two parts; where the biomass is converted to syngas first, and then to crude diesel using the Fischer Tropsch process.

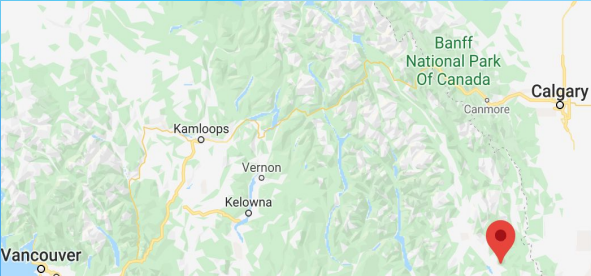


Synthetic Natural Gas



DIESEL

## Plant Layout & Location:



The Process Plant is located in Elko, British Columbia

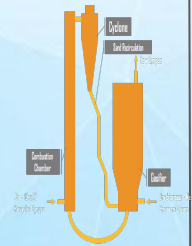


### 1. Wood Waste and Processing

Biomass is received from Elko Sawmill and stored until use

### 2. Gasification and Combustion

Biomass is converted into raw syngas using a dual fluidized bed gasifier at 10 atm and 800 Celsius. Sand is circulated to conserve heat



### 3. Gas Cleaning

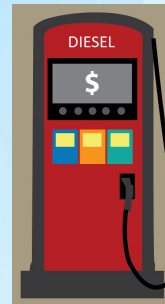
Removal of contaminants such as Sulfur and balancing of CO and H2O using Diethyl Amine

### 4. Fischer Tropsch

Using iron cobalt catalyst, the fischer tropsch process is used to convert syngas to liquid carbon chains

### 5. Diesel and Byproducts

After distillation, diesel is maximized as the product but byproducts also include gasoline, jet fuel, and heavy hydrocarbon chains which can also be sold.



## Environmental Health & Safety:

### 1. Transportation

Fuel emissions

### 2. Combustion

Carbon Dioxide emissions

### 3. Gas Cleaning

Liquid Waste Stream: H2O, Diethanolamine, H2S

Gaseous Waste Stream: CO2, H2O, H2S

### 4. Fischer-Tropsch

Cobalt Catalyst

## Economic Analysis:

Total Capital Investment: \$72,600,000

- Gasification (PFD 100) : \$21,500,000

- Gas Cleaning (PFD 200) : \$4,710,000

- Fischer-Tropsch (PFD 300): \$46,300,000

Total Product Cost: \$33,600,000/yr

- Utilities: \$13,300,000 - More than 60% from Gas Cleaning

- Distribution & Selling Costs: \$4,470,000

- Plant Overhead Costs: \$3,360,000

Cashflow: IRR = 3.9%

