NETL Life Cycle Inventory Data
Process Documentation File

Process Name: ORV CBTL Plant Operation Princeton

Reference Flow: 1 kg of FT diesel

Brief Description: Feedstocks, products, and CO_2 emissions for operation of a coal and biomass to liquids plant from report Strategies for Production of Alternative Jet Fuel in the Ohio River Valley

Section I: Meta Data

Geographical Coverage: United States **Region:** Midwest

Year Data Best Represents: 2013

Process Type: Energy Conversion (EC)

Process Scope: Gate-to-Gate Process (GG)

Allocation Applied: No

Completeness: Individual Relevant Flows Captured

Flows Aggregated in Data Set:

☑ Process ☑ Energy Use ☐ Energy P&D ☐ Material P&D

Relevant Output Flows Included in Data Set:

Releases to Air:	☑ Greenhouse Gases	☐ Criteria Air	☐ Other
Releases to Water:	☐ Inorganic	☐ Organic Emissions	☐ Other
Water Usage:	☐ Water Consumption	☐ Water Demand (throughput)	
Releases to Soil:	☐ Inorganic Releases	☐ Organic Releases	☐ Other

Adjustable Process Parameters:

None

Tracked Input Flows:

Hard Coal (Illinois No 6) [Hard coal (resource)]	*[Resource] Coal feedstock to CBTL plant*
Biomass (Corn Stover)	*[Resource] Biomass feedstock to CBTL plant*

Tracked Output Flows:

Fischer-Tropsch diesel (FTD)	*Reference flow*
Fischer-Tropsch gasoline (FTG)	*Co-product*
Power [Electric Power]	*Co-product*
Carbon dioxide [captured]	*Co-product*
Carbon dioxide [Inorganic emissions to air]	*Emission to air*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage3_O_CBTL_Plant_Princeton_2013.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

This unit process provides a summary of relevant input and output flows associated with the operaton of a coal and biomass to liquids plant operating in two different scenarios: max fuel and cogen. The max fuel scenario produces 8,640 barrles per day (bpd) of fischer-tropsch (F-T) fuels and exports 46.9 MW electricity, while the cogen scenario produces 5,064 bpd of F-T fuels and exports 116 MW electricity. The reference flow of this unit process is: 1 kg of FT diesel.

Boundary and Description

Figure 1 shows the boundaries of this unit process. Plant performance is defined by the report and consists of feedstock, Fischer-Tropsch, and carbon dioxide flow rates as well as the amount of electricity produced (NETL, 2012).

The process starts with delivered coal and biomass. Illinois No. 6 coal is finely ground and mixed with water to form a slurry, while the corn stover is chopped in a separate process. From there, the feedstocks are fed into separate gasifiers, and the syngas is sent through the rest of the F-T and power generation processes. The F-T diesel and gasoline are ready for transport to end use. The carbon dioxide stream is compressed within the plant boundaries and leaves the boundaries ready for pipeline transport.

The only emission included in this unit process is carbon dioxide to air.

Table 1 shows the inputs and outputs for each scenario, on the basis of the reference flow of 1 kg of diesel that is produced by the CBTL plant.

Figure 1: Unit Process Scope and Boundary

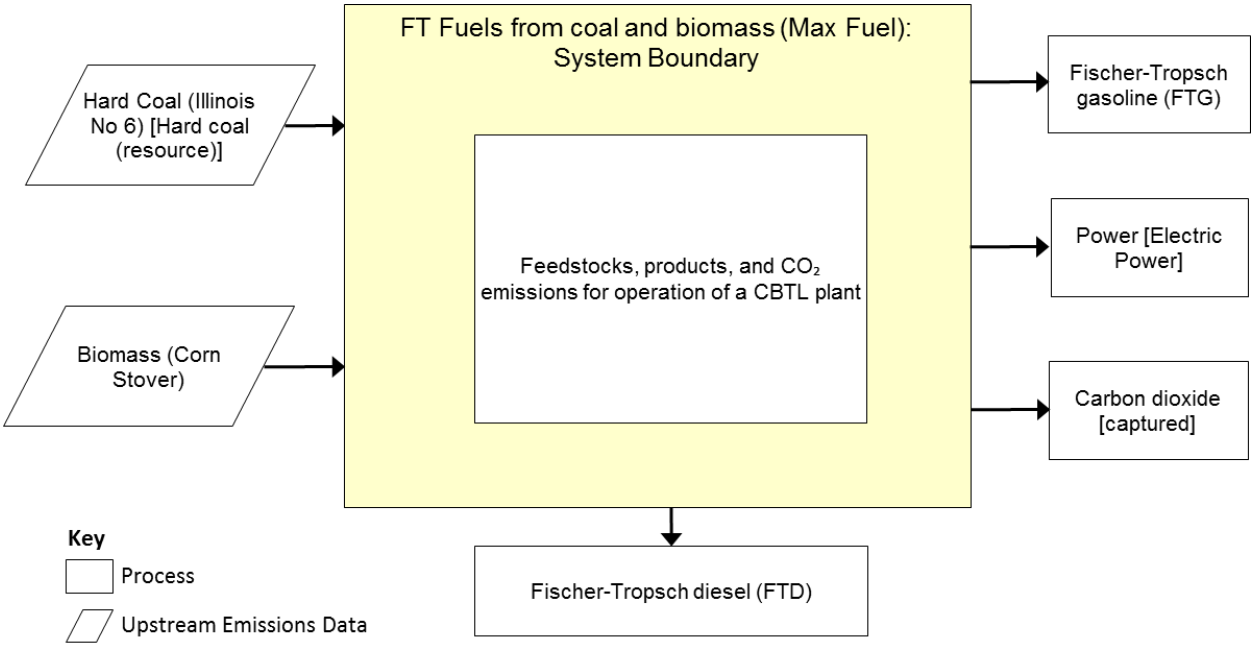

Table 1: Unit Process Input and Output Flows

Flow Name	Max Fuels	Cogen	Units (Per Reference Flow)
Inputs			
Hard Coal (Illinois No 6) [Hard coal (resource)]	4.63	7.90	kg
Biomass (Corn Stover)	1.66	0.29	kg
Outputs			
Fischer-Tropsch diesel (FTD)	1.00	1.00	kg
Fischer-Tropsch gasoline (FTG)	0.56	0.56	kg
Power [Electric Power]	1.64E-03	6.87E-03	MWh
Carbon dioxide [captured]	7.14	12.10	kg
Carbon dioxide [Inorganic emissions to air]	1.32	1.48	kg

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows.

Embedded Unit Processes

None.

References

NETL, 2012 National Energy Technology Laboratory, 2012. Strategies for Production of Alternative Jet Fuel in the Ohio River Valley. DOE/NETL-2013/1629. U.S. Department of Energy. In Review

Section III: Document Control Information

Date Created: October 11, 2013

Point of Contact: Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

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