

Working For You

Presented by the University of Kentucky's Center for Applied Energy Research

Coal/Biomass-to-Liquids Pilot Facility



Gasifier and related process components

This facility, nearing completion at the University of Kentucky, is an integrated coal/biomass-to-liquids (CBTL) standalone facility with a capacity of 1 barrel of fuel per day; and can be used as a test-bed for new concepts at an affordable level.

Researchers will evaluate the commercial and technical viability of advanced technologies of complete CBTL which includes feed preparation; coal and biomass gasification; gas clean-up / conditioning; gas conversion by Fischer-Tropsch synthesis; product work-up and refining; systems analysis and integration; scale-up /demonstration processes; and will also produce research quantities of FT liquids and finished fuels for subsequent fuel quality testing.

This 5,800 square foot facility will be open-access, and findings will be in the public domain to aid the wider scientific and industrial community. Environmental considerations, particularly how to manage and reduce carbon dioxide emissions from these plants, will be a primary objective of the research. The facility will leverage the CAER's existing expertise in the areas of carbon capture, FT, and ash utilization.

Research areas include:

- Feed Preparation, Characteristics and Quality | Coal and Biomass Gasification
- Gas Clean-up/Conditioning | Gas Conversion by FT Synthesis
- Product Work-up and Refining | Systems Analysis and Integration
- Fuel Quality Testing, Performance and Acceptability
- Environmental Considerations—particularly the means to manage/reduce CO₂



CBTL Pilot Equipment

Facility Capabilities:

- A coal/biomass gasifier for syngas production with a rated feed capacity of 1 ton/day
- Water-gas shift reactor for adjustment of H:CO ratio
- An amine-based stripper/scrubber and carbon bed system for gas cleaning and conditioning
- A micro-channel Fischer-Tropsch reactor with a production capacity of 1 barrel per day (BPD) of liquid fuels
- A hydrocracker to crack the heavier fractions and optimize diesel yields

The plant complex includes ancillary systems for power generation, utilities, effluent treatment, and ash disposal. In order to maximize flexibility, the system is of a modular design with skid mounted process units—and is intended to be adaptable to change-outs of equipment and capabilities.



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