



Biomass Program

Thermochemical R&D

Thermochemical Process Modeling and Optimization

Biomass gasification uses high temperatures (greater than 650°C) to thermally degrade the feedstock into a mixture of gas, liquid, and solid. The main product is a gas primarily composed of CO, H₂O, H₂, and CO₂, which can be upgraded to fuels and chemicals downstream. While biomass gasifiers have been developed and tested at the pilot-scale, there is a need to understand the range of gas compositions attainable by varying operating conditions.

This project will explore the fundamentals of syngas production and composition by conducting experiments in the National Renewable Energy Laboratory's Thermochemical Process Development Unit (TCPDU). Researchers will measure material balances (gas, liquid, and solid) as a function of various process parameters in conjunction with detailed process modeling.

The goals of research are to: (1) identify process conditions that maintain syngas quality but minimize total tar loadings; and (2) identify research opportunities that will facilitate commercialization of integrated biomass gasification technologies.



Fluidized bed reactor in the Thermochemical Process Development Unit at NREL.

R&D Pathway

Using the TCPDU, researchers will investigate the effect of varying process parameters on gasification efficiency, carbon conversion, and product gas composition. The process parameters include fluidized bed temperature, thermal cracker temperature, biomass feedstock, and the steam-to-biomass ratio.

Researchers will analyze the data gathered to determine correlations between the process variables and the syngas composition. The collected data will be used to develop an ASPEN process flow model to help evaluate the integration of various unit operations.

Benefits

- Help focus research efforts to achieve commercialization of integrated biomass gasification technologies

Applications

This research will help accelerate the commercialization of a viable biomass gasification biorefinery.

Project Partners

National Renewable Energy Laboratory

Project Period

FY 2004

For more information contact:

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Visit the Web site for the Office of the Biomass Program (OBP) at
www.eere.energy.gov/biomass.html

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