



Biomass Program

Trace Metal Scavenging from Biomass Syngas Using Novel Sorbents

Alkalis (sodium, potassium) and heavy metals (lead, cadmium) are present in raw syngas generated through biomass gasification. They must be removed from the syngas because they can reduce equipment lifetime and deactivate downstream processing catalysts. This project is investigating the use of high-temperature powder sorbents for scavenging alkalis and heavy metals from biomass-derived syngas.

R&D Pathway

Initially, sorbents will be tested on a syngas slipstream during switchgrass and/or wood chip gasification at Southern Company's Power Systems Development Facility (PSDF) to evaluate their potential for removing metal contaminants.

Concurrently, researchers will develop and build a reactor system that includes metal vaporization and metering apparatuses, a sorbent feeding system, and filter. This reactor system, along with the optimized sorbents, will be tested at full-scale at the PSDF.

Mechanisms, such as those governing the capture of heavy metals by sorbents and the eutectic melting during heavy metal scavenging, will be elucidated from the slipstream tests at the PSDF and other experiments. The mechanisms and kinetic data from PSDF experiments and published literature will be incorporated into the hot syngas clean-up model being developed by Southern Research Institute and the University of Alabama. Ultimately, the model will be able to predict the speciation (change of syngas composition versus temperature, time) and clean-up of hot syngas for a wide range of biomass types and gasification conditions.

Thermochemical R&D

Benefits

- Improved syngas clean-up technology
- Better understanding of alkali and heavy metal removal from syngas

Applications

Improved syngas clean-up technologies and models will facilitate the commercialization of biomass gasification technologies and their integration into biorefineries.

Project Participants

Southern Company
Southern Research Institute
University of Alabama at Birmingham

Project Period

FY 2004 – FY 2007

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