Biomass Program

Thermochemical R&D

Catalytic Cleanup Conditioning Fundamentals

Gas cleanup is a technical barrier to the commercialization of biomass gasification technologies. The National Renewable Energy Lab (NREL) seeks to accelerate the development of viable cleanup technologies by: (1) developing a tool for rapid catalyst screening to identify promising tar reforming catalysts; and (2) using the screening tool to develop catalyst systems with improved tar cracking ability.

Researchers will test catalyst systems for their tar cracking ability and determine fundamentals such as tar conversion mechanisms, catalyst deactivation kinetics, and reaction rates. Detailed catalyst characterization will also be performed as part of these studies to better understand the nature of the catalyst activity and deactivation processes.

New catalysts will be developed, including robust catalysts and potential alternatives to nickel-based formulations to minimize the environmental impact of gas cleaning operations. Robust catalysts will enable repeated regeneration to maximize catalyst activity and lifetime.

R&D Pathway

NREL will utilize a micro-scale catalyst screening reactor coupled with conventional gas analysis and a molecular-beam mass spectrometer to analyze catalytically-conditioned product gas. Several catalyst systems will be tested with both tar model compounds and biomass gasification product gas to determine the optimal catalyst reduction procedures, operating conditions, bed material losses, and impact on other thermochemical process unit operations.

Catalyst formulations will be developed and tested to optimize the nickel/metal loadings and ceramic catalyst supports for optimal methane and tar reforming activity.

NREL's bench-scale catalyst microactivity test system.

Benefits

- **Improved performance of gas cleanup systems**
- **Reduced time and cost of catalyst system development**

Applications

New catalyst systems for syngas cleanup will improve the overall economics of a biomass gasification biorefinery.

Project Partners

National Renewable Energy Laboratory

Project Period

FY 2001 – FY 2005

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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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