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Biomass Program

Biomass-Derived Hydrogen from a Thermally Ballasted Gasifier

Gasification offers an efficient approach for producing fuels and products from a wide variety of biomass. The object of this Congressionally-mandated project is to develop an indirectly-heated gasification system (ballasted gasifier) for converting switch grass into a hydrogen-rich gas suitable for powering fuel cells.

To date, researchers have made significant advances to the technology and have successfully operated the ballasted gasifier with switch grass as fuel. Other achievements include establishing reliable trace gas detection for ammonia and hydrogen sulfide, demonstration of a high-temperature particulate control system, and completion of extensive testing of catalysts for the steam reforming of tar and the water-gas shift reaction.

An improved thermal model of the pyrolysis phase of the process has also been developed. Continuing work will focus on focusing on optimizing the performance of the gasification system and determining overall economics of the technology in full-scale operation.

R&D Pathway

With technical viability now established, researchers are working to: (1) improve of the overall cold-gas efficiency of the gasifier; (2) establish a methodology for reliable hydrogen chloride measurements; (3) demonstrate a combined particulate matter/trace contaminant control system; (4) evaluate the feasibility of a combined catalytic reaction/carbon dioxide sorbent system; and (5) perform an economic assessment of the integrated ballasted gasifier system.

Biomass gasifier.

Ballast in gasifier.

Congressionally Directed Thermochemical R&D

Benefits

- **Provide a reliable biomass gasifier suitable for fuel synthesis or hydrogen production**
- **Increase utilization of biomass for gasification systems**

Applications

The results of this research will provide a source of biomass-derived hydrogen for use in fuel cells or other fuel conversion systems, or as an input to chemical and petroleum refinery processes.

Project Partners

Iowa State University

Project Period

FY 2001 – FY 2007

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

September 2006