DOE - Fossil Energy Techline - Issued on: August 18, 2010

DOE Selects Projects to Advance Technologies for the Co-Production of Power and Hydrogen, Fuels or Chemicals from Coal-Biomass Feedstocks

Washington, D.C. Â– Eight projects that will focus on gasification of coal/biomass to produce synthetic gas (syngas) have been selected for further development by the U.S. Department of Energy (DOE). The total value of the projects is approximately $8.2 million, with $6.4 million of DOE funding and $1.8 million of non-Federal cost sharing.

Syngas is a mixture of predominantly carbon monoxide and hydrogen which can subsequently be converted either to power, fuels, or chemicals. The research is aimed at making use of the nationÂ's abundant coal and biomass resources to produce affordable power, fuels and chemicals in a safe and environmentally clean manner. In addition, the production of fuels and chemicals from coal-biomass feedstocks has the added benefit of reducing overall greenhouse gas emissions.

Projects awarded under areas 1 and 2 will provide valuable data for improving our understanding of how to make coal/biomass gasifiers operate more efficiently. Work in area 3 will result in the development of conceptual designs for co-production facilities incorporating advanced, novel concepts.

The projects, to be managed by the Office of Fossil EnergyÂ's (FE) National Energy Technology Laboratory (NETL), are described below:

Area 1: Pre-Processing and Conditioning of Coal/Biomass Mixtures for Simultaneous Co-Feeding Systems

Projects in this area will focus on the development and characterization of multiple coal-biomass mixtures and types that are transportable, storable, and accommodate direct co-feeding into gasification systems.

- **CoalTek, Inc.** (Tucker, Ga.)Â—CoalTek, teaming with the University of Kentucky Center for Applied Energy Research in Lexington, Ky., Duke University in Durham, N.C., and the University of North Dakota Energy and Environment Research Center in Grand Forks, N.D., will blend coal and biomass to develop a robust and versatile feedstock for co-gasification. Microwave energy will be used to dry and soften high-moisture coals and form the dried coal into a durable briquetted fuel.
(DOE share: $999,472; Recipient share: $249,868; Duration: 36 months)
- **Gas Technology Institute** (Des Plaines, Ill.)Â—GTI, in partnership with Desert Research Institute and the University of Nevada, both in Reno, Nev.; Clean Coal Briquette Inc. in Lakewood, Colo.; and Parker Towing Company in Mulga, Ala., will produce quantities of Loblolly pine blended with ground coal and coal fines and formed into robust, weather-resistant pellets and briquettes. GTI will demonstrate how the pellets/briquettes are rugged enough to withstand transportation and piling and show how the pellets/briquettes can be processed into

a crushed or pulverized product suitable for use in a commercial coal gasifier.
(DOE share: $1,000,465; Recipient share: $250,174; Duration: 36 months)

- **Virginia Polytechnic Institute and State University** (Blacksburg, Va.)Â—Partnering with the University of Kentucky in Lexington, Ky.; GreenFields Coal Company in Beckley, W.Va.; Alpha Natural Resources in Abingdon, Va.; and Dominion Energy in Richmond, Va., VPI will develop optimally engineered systems for manufacturing coal-biomass briquettes/pellets that are ideally suited for transportation, storage, and co-feeding fixed- and fluidized-bed gasifiers.
(DOE share: $999,061; Recipient share: $251,756; Duration: 24 months)

Area 2: Reactive Properties of Coal/Biomass Mixed Fuels

Research in this topic area will focus on definition and measurements of key reactive properties of several mixed coal-biomass fuels through the use of small-scale laboratory experiments and/or science-based computational models.

- **Georgia Institute of Technology** (Atlanta, Ga.)Â—Georgia Tech will team with the National Renewable Energy Laboratory in Golden, Colo., to obtain experimental reactor data and develop kinetic rate expressions for pyrolysis and char gasification for coal-biomass blends using lignite coal and switch grass; develop an understanding of the effect of pyrolysis conditions on the porous char structure; and build mathematical models for predicting gasification behavior for a broad range of pressures and temperatures.
(DOE share: $1,101,814; Recipient share: $463,585; Duration: 36 months)
- **Leland Stanford Junior University** (Stanford, Calif.)Â—Leland Stanford Junior University will combine char mass loss measurements in selected environments containing CO2, CO, H2O, and H2 with specific surface area and temperature programmed desorption measurements to determine char reactivity as a function of temperature, pressure, and gas composition. The data will be used to develop a reaction mechanism and associated kinetic parameters that accurately describe the rate-limiting reaction pathways during conversion of the char to syngas. This will be done for each coal/biomass mixture examined.
(DOE share: $457,583; Recipient share: $114,396; Duration: 36 months)
- **Virginia Polytechnic Institute and State University** (Blacksburg, Va.)Â—VPI, teaming with the University of Delaware Energy Institute in Newark, Del., and Northeastern University in Boston, Mass., will perform experiments to determine the gas composition of sub-bituminous coal and biomass feedstocks (poplar wood, switch grass, and corn stover); model detailed reaction kinetics and product formation to provide an understanding of the major pathways involved; and simulate and predict the coal-biomass gasification mixtures.
(DOE share: $999,888; Recipient share: $252,504; Duration: 36 months)

Area 3: Design Concepts for Co-Production of Power, Fuels and Chemicals

Projects in this area will focus on the development of preliminary conceptual designs and techno-economic analyses that predict plant efficiency, cost of produced products, and environmental impacts.

- **Princeton University** (Princeton, N.J.)Â—Princeton will design, simulate, and analyze 20 process configurations to enable meaningful cross-configuration comparisons and insights into the potential impacts of advanced technologies. Each plant Princeton designs will produce a separate co-product: synthetic gasoline, light olefins, hydrogen, or ammonia.
(DOE Share: $442,121; Recipient share: $110,570; Duration: 12 months)
- **University of California Irvine** (Irvine, Calif.)Â—The University of California, Irvine, will develop design concepts incorporating advanced technologies in areas such as oxygen production, feed systems, gas cleanup, component separations, and gas turbines for gasification facilities equipped with carbon capture and storage for coproduction of power along with hydrogen, fuels, a petrochemical, and with an agricultural chemical. Three different plant types for three different coals consisting of a bituminous (Illinois No.6) coal, sub-bituminous (Powder River Basin) coal, and lignite co-fed with corn stover will be developed.
(DOE Share: $446,895; Recipient share: $111,725; Duration: 12 months)

- End of Techline

For more information, contact:

- FE Office of Communications, 202-586-5616