

PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gasification Technologies

01/2009



ADVANCED GASIFICATION SYSTEMS DEVELOPMENT

CONTACTS

Gary J. Stiegel

Gasification Technology Manager
National Energy Technology
Laboratory
626 Cochran Mill Road
P.O. Box 10940
Pittsburgh, PA 15236
412-386-4499
gary.stiegel@netl.doe.gov

Jenny Tennant

Project Manager
National Energy Technology
Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507
304-285-4830
jenny.tennant@netl.doe.gov

Alan Darby

Principal Investigator
Pratt & Whitney Rocketdyne
6633 Canoga Ave
P.O. Box 7922
Canoga Park, CA 91309
818-586-0975
alan.darby@pwr.utc.com

Description

The Advanced Gasification Systems Development (AGSD) Program was initiated in October 2004 to demonstrate technologies that improve the availability and efficiency of gasification-based power plants and to reduce plant capital and operational costs. This project was the first step in realizing Pratt & Whitney Rocketdyne's (PWR) vision of improving gasification economics, through a paradigm shift in gasifier technology, to enable widespread commercial deployment of coal-based gasification systems. PWR has released a final interim report describing the results of this project through the summer of 2008, including:

- Pilot plant design for the novel PWR gasifier
- Mechanically cool liner tests
- Economic analysis of the PWR gasification system
- Dynamic modeling of the PWR gasifier

The second phase of this project will focus on the continued development of a high pressure solids feed pump for use in high pressure gasifiers and conclude with tests using coal, petcoke, and a biomass-coal mixture in a 600-ton per day (tpd) prototype at over 1,000 pounds per square inch (psi). The PWR feed pump will be able to transport fuel into a high pressure gasifier without first creating a slurry, so it will result in greater gasifier efficiency than a slurry feed pump. The PWR feed pump will also be able to operate across much greater pressure differentials at lower cost and higher reliability than a conventional lock hopper system. No extraordinary coal processing (drying, grinding, etc.) is expected to be required for use with the PWR feed pump. PWR has agreed to make their feed pump technology readily available to industry once it is commercially ready.

Primary Project Goal

The primary project goal is to successfully test a 600 tpd prototype of the PWR feed pump on a variety of coals and on at least one coal-biomass mixture.



PARTNERS

Pratt & Whitney Rocketdyne

Natural Resources Canada
CANMET Energy Technology
Centre

Oak Ridge National Laboratory

University of North Dakota
Energy & Environmental
Research Center

COST

Total Project Value
\$22,153,282

DOE/Non-DOE Share
\$13,816,231 / \$8,337,051

ADDRESS

National Energy Technology Laboratory

1450 Queen Avenue SW
Albany, OR 97321-2198
541-967-5892

2175 University Avenue South
Suite 201
Fairbanks, AK 99709
907-452-2559

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304-285-4764

626 Cochran's Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940
412-386-4687

One West Third Street,
Suite 1400
Tulsa, OK 74103-3519
918-699-2000

CUSTOMER SERVICE

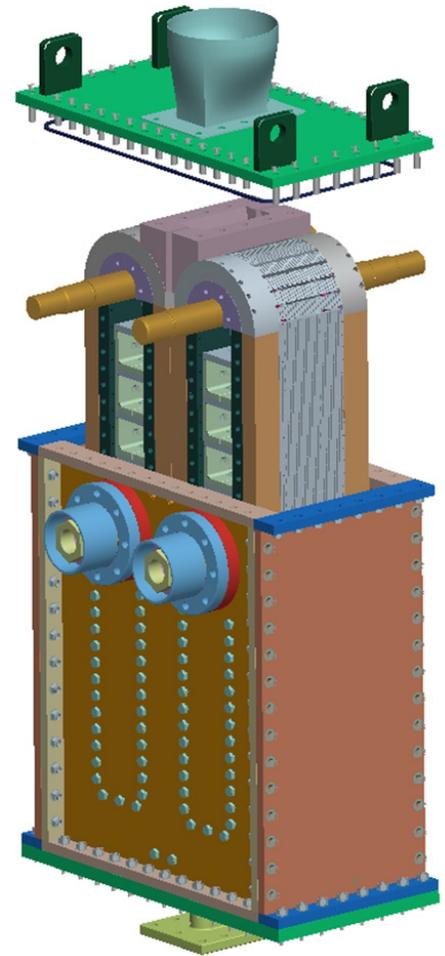
1-800-553-7681

WEBSITE

www.netl.doe.gov

Accomplishments

- Obtained a peer review of the gasifier and feed system. The peer reviewers believed that the PWR high pressure feed pump, uniform flow splitting, and mechanically cooled liner are concepts that, if successfully developed, are likely to have a beneficial impact on the gasifier industry because they could be adapted for use with other gasifiers.
- Completed several test runs of 6-way and 18-way flow splitting of the feed system, showing excellent potential for uniform and consistent flow splitting.
- Completed construction of the high pressure feed system (less the feed pump) at the University of North Dakota Energy & Environmental Research Center.
- Completed a pressure sensitivity study showing that 1,000 psi operation is the most efficient operating pressure analyzed.
- Completed preliminary design of the high pressure feed pump prototype.



PWR High Pressure Solids Pump

Benefits

The PWR feed pump has the potential to significantly improve the availability and efficiency of feeding coal, petcoke, and/or biomass into high pressure gasifiers, thereby increasing the efficiency of the gasifier and reducing plant capital, maintenance, and operating costs. These benefits have far-reaching implications for the gasification industry as PWR has agreed to make this technology available, as per typical industry licensing practices. Also, being able to feed high moisture coal into high pressure gasifiers, without added water to form a slurry or the use of lock hoppers, is expected to make these coals more commercially competitive.