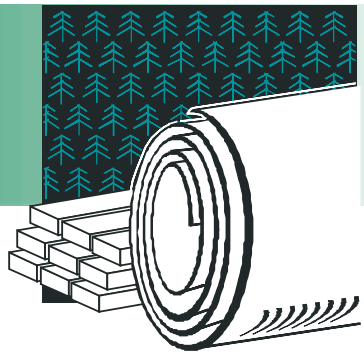
FOREST PRODUCTS

Project Fact Sheet



Engineering Study for a Full Scale Demonstration of Steam Reforming Black Liquor Gasification at Georgia-Pacific's Mill in Big Island, Virginia

Benefits

- Reduces NO_x, SO_2, CO, VOC, and particulate emissions
- Expected air emission reduction of 90%
- Replaces existing smelters, eliminating threat of smelt-water explosions
- Reduces use of non-renewable (fossil) fuels
- Increases energy efficiency
- Decreases capital and operating costs
- Provides hydrogen-rich, clean-burning fuel

Applications

The system will replace two 50-year old smelters and provides the entire chemical recovery capacity for the G-P mill. It has potential for industry-wide applications to replace Tomlinson recovery boilers and is suitable for all pulping processes (carbonate, kraft, sulfite, non-wood, etc.). Although the technology requires a high capital investment, it will provide capital returns from energy input reductions and help industry meet increasingly stringent EPA regulations.

Future applications include adaption to fuel a gas turbine in combined cycle or a fuel cell to produce more electricity.

Georgia-Pacific will Study and Demonstrate Steam Reforming Black Liquor Gasification at Big Island, VA Containerboard Mill

Black liquor is a waste product of the chemical pulping process and a source of energy for the paper making industry. Black liquor gasification, the conversion of left over black liquor into a clean-burning fuel for mill use, is a promising new alternative to existing recovery boiler technology that can reduce air emissions and increase energy efficiency in the pulping process. A PulseEnhanced™ technology, demonstrated and patented by Manufacturing & Technology Conversion International, Inc. (MTCI), uses medium temperature, atmospheric pressure exposure to steam in the absence of air or oxygen for gasification.

Georgia-Pacific (G-P), in an agreement with the Department of Energy (DOE)/ Office of Industrial Technologies (OIT), conducted an engineering study to define the scope of a full-scale demonstration of the PulseEnhanced™ steam reforming black liquor chemical recovery technology. More recently, the Big Island mill signed an agreement with the Environmental Protection Agency (EPA) and DOE/ OIT to install and demonstrate the system. This demonstration project will install a steam reformer to process all of the black liquor (400,000 pounds of black liquor solids per day) from the pulping process at G-P's Big Island, Virginia mill. It will be the first full-scale gasification system used in the commercial pulp and paper industry.

GP Steam Reformer for Black Liquor Chemical Recovery

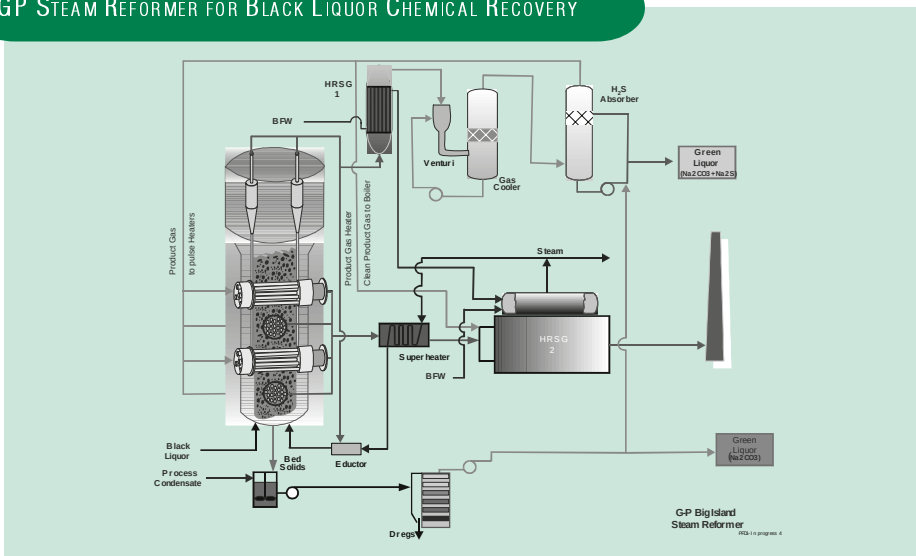


Figure 1. Proposed steam reformer for Big Island mill

Project Description

Goal: Define the scope of a full-scale demonstration of a black liquor gasification project for construction and demonstration at G-P's Big Island, VA mill.

The PulseEnhanced™ process differs from other technologies because it does not require partial oxidation of the liquor inside the gasifier. This lower temperature allows the gasifier to convert black liquor organics to gas at temperatures well below those required for smelt formation, eliminating the danger of smelt-water explosions in the recovery boiler. This equipment will maximize the recovery of energy and chemicals while producing a medium Btu fuel gas (450-500 Btu/scf).

Researchers have extended the scope of the original nine-month engineering study and will continue work with government and industry partners to install and demonstrate the system.

Progress and Milestones

- The PulseEnhanced™ Steam Reformer was demonstrated and patented by MTCI. It is licensed to StoneChem Inc. for sale in the U.S.
- Previous pilot trials of the technology include:
  - —A 25-ton-per-day demonstration reformer, operated at Inland Container Corporation's Ontario, Canada mill in March 1992;
  - —A 50-ton-per-day demonstration, which successfully ran for 500 hours at Weyerhaeuser's New Bern, NC plant.
- In the early nine-month engineering study at Big Island, researchers performed environmental modeling to obtain a permit and made necessary process development unit adjustments to reduce the formation of condensable hydrocarbons (tars) found in early liquor tests.
- G-P recently received funding from DOE's Combustion program and EPA's Project XL (eXcellence and Leadership) for construction and demonstration of the technology.
- Installation of the gasification system at the Big Island mill will be completed in 2002.

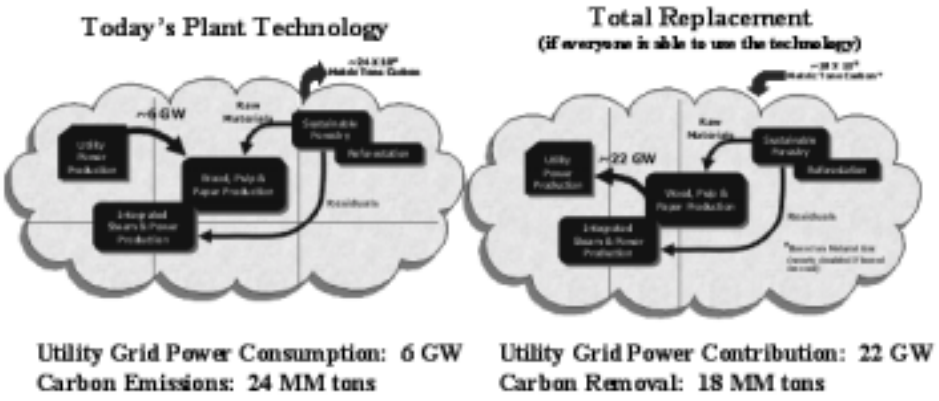
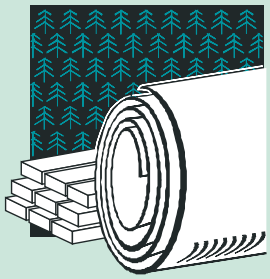


Figure 2. Predicted impact of gasification combined cycle technology on the pulp and paper industry.



PROJECT PARTNERS

Georgia-Pacific
Atlanta, GA

Industra
Portland, OR

StoneChem, Inc.
Baltimore, MD

Fluor Daniels
Greenville, SC

Simons Engineering, Inc.
Atlanta, GA

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Valri Robinson
Office of Industrial Technologies
Phone: (202) 586-0937
Fax: (202) 586-3237
E-mail: valri.robinson@ee.doe.gov

Dr. Robert DeCarrera
Georga-Pacific Corporation
133 Peachtree St., NE
Atlanta, GA 30303
Phone: (404) 652-4686
E-mail: rdecarre@gapac.com

Please send any comments, questions, or suggestions to webmaster.oit@ee.doe.gov

Office of Industrial Technologies
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

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