

Mesaba Energy Project — Unit 1

Participant

MEP-I LLC
(Excelsior Energy, Inc.)

Additional Team Members

ConocoPhillips — Gasification technology licensor

Fluor — Feasibility engineering

Granherne — Owner's engineer

SEH — Environmental/site assessment

URS — Environmental/site assessment

TBD — Engineering, procurement & construction

Location

Taconite, Itasca County, MN or Hoyt Lakes, St. Louis County, MN

Technology

Advanced ConocoPhillips gasifiers applied in a multiple train integrated gasification combined cycle configuration

Capacity

Up to 606 MWe (net); 4,731 tons of coal/day input

Coal

PRB subbituminous (preferred)

Illinois Basin #6 bituminous

Project Funding

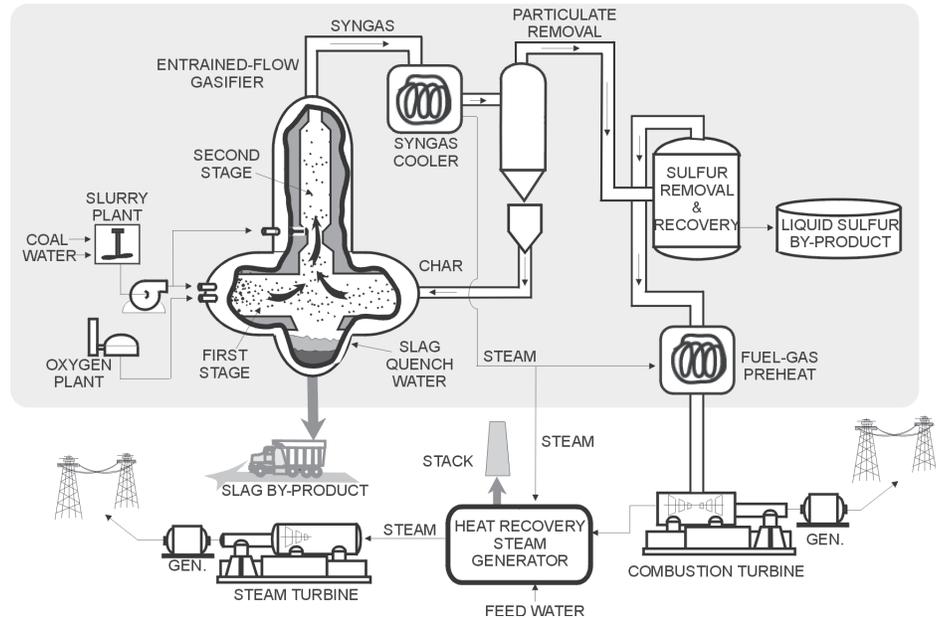
Total	\$2,155,680,783	100%
DOE	36,000,000	1.7
Participant	2,119,680,783	98.3

CCPI-2

Advanced Power Systems

IGCC CFB

Hybrid Adv Comb

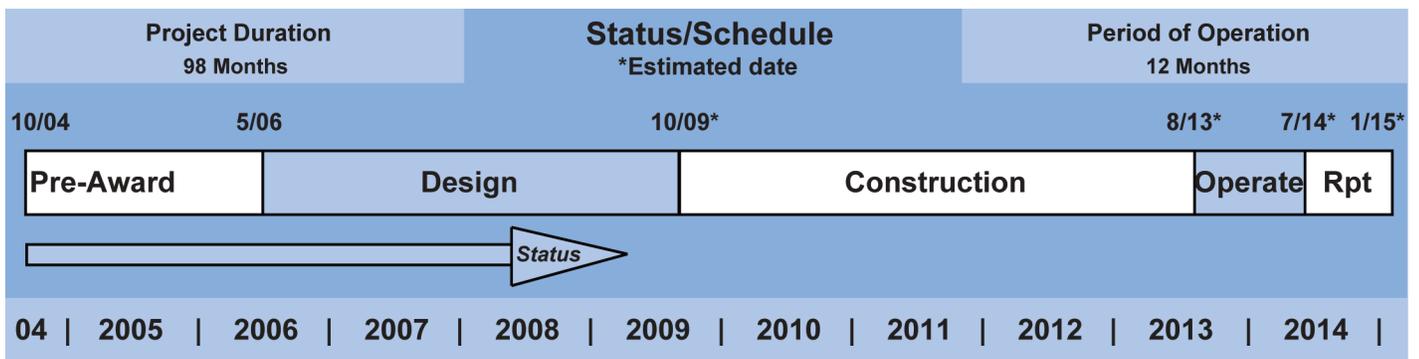


Objectives

To demonstrate: a generating capacity that is double that of the Wabash River Coal Gasification Repowering Project; advanced full-slurry quench (FSQ) multiple-train gasifier system having 90 percent or better operational availability; first-of-a-kind (U.S.) integrated air separations unit; greater feedstock flexibility; emission levels for criteria pollutants and mercury equal to or below those of the lowest emission rates for utility-scale, coal-based generation fueled by similar feedstocks; carbon dioxide emissions 15–20 percent lower than the current average for U.S. coal-based power plants fueled by similar feedstocks; design heat rate of about 8,600 Btu/kilowatt-hour when using bituminous coal; and a standard replicable design configuration with a sound basis for providing firm installed cost information for future commercialization.

Technology/Project Description

The project will demonstrate the next-generation ConocoPhillips E-Gas™ technology in up to a 606-MWe (net) integrated gasification combined-cycle (IGCC) application. The IGCC design will incorporate findings from a comprehensive Value Improving Practices (VIP) process applied by an industry forum to improve cost and performance based on the predecessor Wabash River Coal Gasification Repowering Project. The ConocoPhillips E-Gas™ gasifier features an oxygen-blown, continuous-slugging, two-stage entrained-flow process. Coal is slurried, combined with 95 percent pure oxygen from an air separation unit, and injected into a first stage gasifier, which operates at 2,600 °F and 400 pounds per square inch gage (psig) pressure. In the first stage, the coal slurry undergoes a partial oxidation reaction at temperatures high enough to bring the coal's ash above its melting point. The fluid ash falls through a tap hole at the bottom of the first stage into a water quench, forming an inert vitreous slag. The synthesis gas formed in the first stage flows to a second stage where additional coal slurry is injected. The coal undergoes pyrolysis in an endothermic reaction with the



hot gas, enhancing the synthesis gas heating value and improving efficiency. The synthesis gas leaving the gasifier will be cooled and the heat will be used to generate steam. The syngas will be processed to remove particulates (probably using a two-stage dry process), mercury using activated carbon beds, and sulfur (as a marketable by-product) prior to combustion in advanced gas turbines. Heat from the gas turbines and steam from the syngas loop will be used to raise steam for the steam turbine.

Benefits

ConocoPhillips E-Gas™ technology established its potential for providing clean energy at competitive costs in the successful demonstration at Wabash River Station Unit #1. The Mesaba project is designed to validate that potential and move the technology into commercialization by demonstrating a commercial E-Gas™ IGCC design configuration emerging from a comprehensive analysis of the Wabash plant. Following the Wabash Demonstration, a VIP process (a formal industry process applying nine separate practices) was applied to examine lessons learned from the Wabash demonstration, identify options to improve cost and performance, and optimize design for a commercial plant configuration. The Mesaba project will implement the commercial design configuration coming out of the VIP process and subsequent research and development.

Status/Accomplishments

The environmental site permitting process is ongoing, with the Minnesota Public Utilities Commission (PUC) assessing Excelsior Energy's submittals for a Large Electric Generating Plant Site Permit, High Voltage Transmission Line Route Permit, Natural Gas Pipeline Routing Permit, and other environmental-related permits. The draft Environmental Impact Statement (EIS) was released in November 2007.

The Draft EIS is available at http://www.netl.doe.gov/technologies/coalpower/cctc/EIS/eis_mesaba.html. The Final EIS is planned to be released in 2009. Excelsior announced the project had been selected for the Federal loan guarantee program in October 2007 and had been selected to receive Federal investment tax credits in May 2008. See <http://www.excelsiorenergy.com/>.

The project will demonstrate the commercial viability of a large, multiple-gasifier system with carbon dioxide emissions 15 to 20 percent lower than the 2006 average for U.S. generation with similar feedstocks.

The ConocoPhillips E-Gas™ gasifier features an oxygen blown, continuous-slugging, two-stage entrained-flow process that can produce a concentrated carbon dioxide stream that would be amenable to capture for geologic storage or beneficial reuse such as enhanced oil recovery.

Excelsior intends to adopt zero-liquid discharge and thereby eliminate any discharge to the environment of process water and cooling tower blow-down water from the proposed plant.

Contacts

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