

# Mesaba Energy Project – Unit 1

## Participant

MEP-I LLC  
(Excelsior Energy, Inc.)

## Additional Team Members

ConocoPhillips — technology holder

Fluor Enterprises — EPC

## Location

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

## Technology

Next generation ConocoPhillips E-Gas™ gasifier applied in an integrated gasification combined-cycle (IGCC) mode

## Capacity

Up to 600 MWe (net); 4,731 tons of coal/day input

## Coal

PRB subbituminous (preferred)

Illinois Basin #6 bituminous

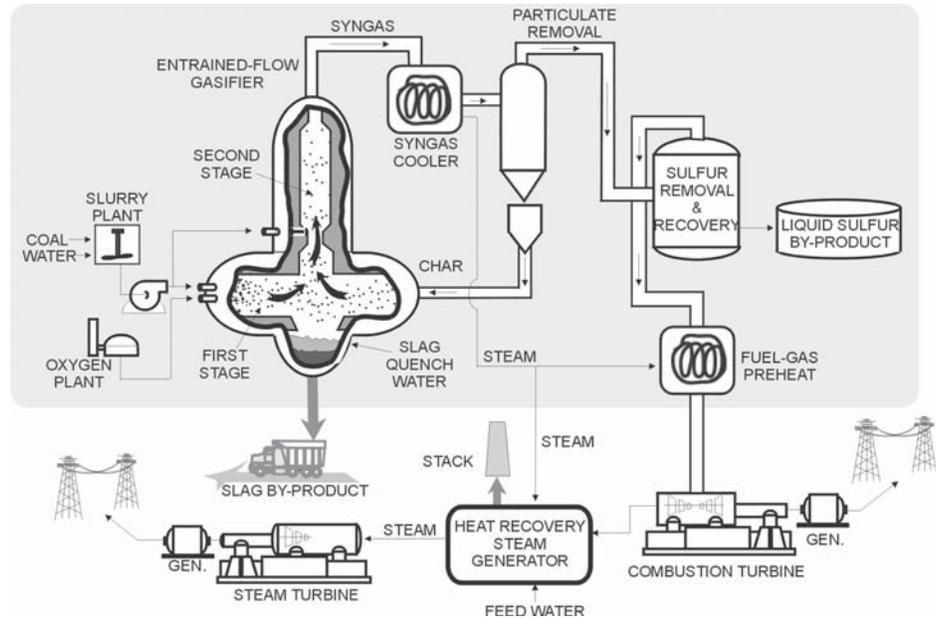
## Project Funding

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	<input type="checkbox"/>
Hybrid	<input type="checkbox"/>	Adv Comb	<input type="checkbox"/>



## Objectives

Demonstrate: double the generating capacity 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 to 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 600-MWe 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 gen-

<b>Project Duration</b> 81 Months	<b>Period of Operation</b> 12 Months	<b>Status/Schedule</b>
		*Estimated date

erate steam. Particulate matter will be removed from the cooled gas (probably in a two-stage dry process) and processed through state-of-the-art sulfur removal and recovery systems 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 Global Energy’s Wabash River Generating Station. 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 process engaged operating and maintenance personnel at the Wabash plant, E-Gas™ gasifier experts, and a top architectural and engineering firm. Nearly 300 value engineering ideas were considered. The Mesaba project will implement the commercial design configuration coming out of the VIP process and subsequent research and development.

**Status/Accomplishments**

The project was one of four projects selected under the second round of the Clean Coal Power Initiative (CCPI), which received 13 applications for financial assistance.

Two Public Scoping Meetings for preparation of an Environmental Impact Statement (EIS) were conducted on October 25–26, 2005. The Public Scoping Meetings were conducted near the two potential sites. One meeting was held at the Tacomite Community Center, Tacomite, Minnesota, and the other meeting was held at the Hoyt Lakes Arena, Hoyt Lakes, Minnesota.

The project was awarded on May 19, 2006. Final project development and initial design activities are under way.

<b>Contacts</b>	
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<b>S T A T U S</b>	<b>R e p o r t</b>	<i>Final Report Issued</i>	8/13*
		<i>Draft Report Issued</i>	5/13*
		<i>Operation Completed</i>	2/13*
	<b>O p e r a t i o n</b>		
		<i>Operation</i>	3/12*
	<b>C o n s t r u c t i o n</b>		
	<i>Construction</i>	5/08*	
	<b>D e s i g n</b>		
		<i>Award</i>	5/06
	<b>P r e A w a r d</b>		
		<i>Selection</i>	10/04