

# PROJECT facts

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



## EVALUATION OF A CYCLONE AND HOT GAS FILTER SYSTEM

### Description

The Wabash River Coal Gasification Plant uses an oxygen-blown E-Gas gasifier, owned by ConocoPhillips, which produces fuel gas containing significant amounts of fine particulates. Currently, particulates are cleaned from the fuel gas with metal candle filters. These filters require two plant shut-downs per year for cleaning/ replacement, and are costly to install and replace. During the U.S Department of Energy-supported project "Gasification Plant Cost and Performance Optimization Study", DE-AC26-99FT40342, performed by Nexant, it was determined that particulate removal system optimization would have a significant impact on plant economics. As a result of the study, ConocoPhillips has decided to incorporate those finding into the Wabash plant. The plan is to develop a hybrid cyclone-filter particulate cleanup system that would reduce the load on the candle filter. The cyclone is expected to remove up to 95 percent of the char, which will result in a smaller candle filter system and longer filter life. Thus both capital and maintenance costs will be reduced. This project will evaluate the potential of this hybrid system using a slipstream from the Wabash River Coal Gasification Plant. The vision is to use a hybrid cyclone-filter hot gas particulate cleanup system in the next generation E-Gas plant.

### CONTACTS

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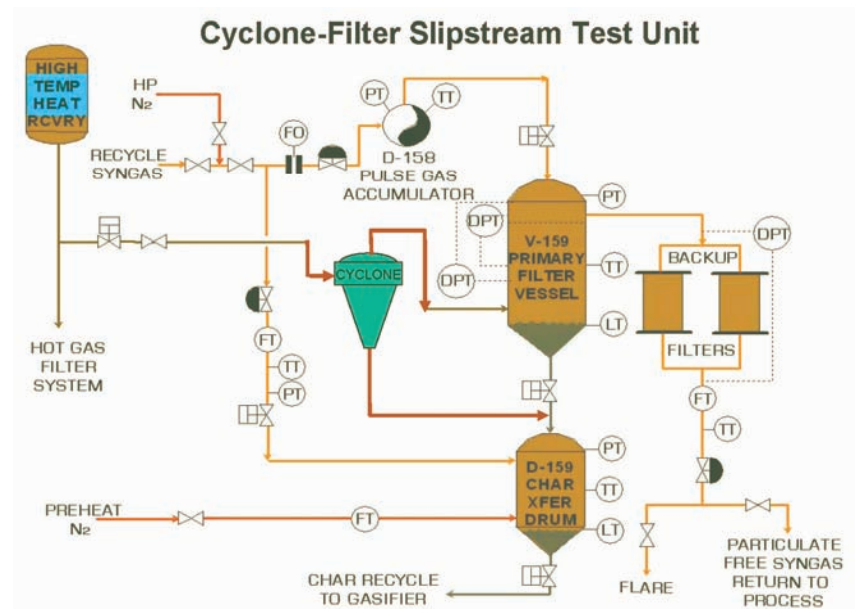
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## PARTNER

ConocoPhillips

## COST

**Total Project Value**  
\$899,994

**DOE/Non-DOE Share**  
\$719,995 / \$179,999

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## Primary Project Goal

To develop a hybrid particulate cleanup system that will reduce the load on the candle filter, resulting in reducing the: (1) maintenance frequency to once per year and (2) initial cost of the particulate clean-up system.

## Accomplishments

- Completed construction of the cyclone-filter hybrid slip stream unit
- Operated the cyclone-filter hybrid for over 1,000 hours at ever increasing face velocities, up to 1.8 times the normal face velocity. (The project goal is 1,000 hours at approximately twice the normal face velocity -- that used for filters without a cyclone)

## Benefits

Based on the study performed by Nexant, cyclone filter systems have near 100 percent availability without any increase in scheduled outages. For the preferred Spare Solids Processing Case in that study, switching to the cyclone particulate removal system will increase the plant availability by 0.5 percent, increase the power output by 8.5 MW, reduce the plant cost by \$12 million, and reduce the O&M cost. This change would increase the return on investment (ROI) by 1.5 percent for the above cases. Therefore, the success of this project will result in reduced capital and maintenance costs of coal syngas generation or power production systems.



*Filter vessel installed at Wabash plant*