Petroleum Coke Gasification

Sweeny E-Gas™ Project

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October 7, 2008
Key Points

- ConocoPhillips believes gasification technology and CCS will expand low carbon energy supplies

- Sweeny E-Gas™ and Kentucky SNG Projects will be industry leading gasification and CCS projects

- E-Gas™ technology offers feedstock and product flexibility and brings an owner’s mentality
ConocoPhillips Purpose and Objectives

- Increase and diversify energy/fuel supplies
- Develop and apply technology and innovative solutions
- Minimize environmental footprint
- Increase shareholder value
Expanding Energy Supply via Technology

- Converting abundant coal and petcoke to SNG, power, fuels and chemicals expands and enhances the energy mix.

- Gasification is competitive with unconventional and alternative resources:
  - Competitive with conventional resources in a carbon constrained world.
  - Cost increases have slowed projects.
  - Incentives can facilitate projects.

- Solving environmental concerns a key to success:
  - Cost effective technology solutions.
  - Clear rules and regulations for carbon capture and storage (CCS).
Public Policy Positions and Engagement

• Engaged in development of Climate Change Policy
  – Support a coherent, mandatory national framework
    • Signal for cost of carbon
    • Paced to match technology
    • Equitable across sectors
  – Leverage our skills to drive emerging technology
    • Carbon capture and storage

• Supportive of a comprehensive energy policy
  • Access to resources
  • Development of new supplies / fuels
  • Public education

• Water Management
  – Qatar Global Water Sustainability Center

Offering technical insight and economic realism
Where is ConocoPhillips Focused

Largest AK Producer
Denali and McKenzie
Delta Gas Pipelines

Largest Position in Canadian Oil Sands
EnCana JV

2nd Largest N.A. Gas Producer & Refiner

Legacy N. Sea Position
Strong Refining Assets

Immingham

KY SNG (w/ Peabody Energy)

Sweeny

Qatargas 3 LNG
Shah Sour Gas (UAE)
Saudi Refinery JV

Growing Positions in Asia, ME and Russia/Caspian

Origin Energy JV
CBM to LNG*

ConocoPhillips Asset Area

Potential Gasification and CCS Site/Area

*CBM = coal bed methane
LNG = liquefied natural gas
Approach to Developing Gasification Projects

**Company Attribute**

- **Global Energy Company**
  - Natural gas and heavy oil focus
  - Strong in OECD countries

- **Technology Developer and Licensor**
  - Coking, desulfurization & biofuels
  - E-Gas™ gasification technology

- **Experienced Major Project Manager and Operator**
  - HSE a major priority
  - Reliability & efficiency

**Gasification Approach**

- **Resource Development Focused**
  - Expanding energy supplies
  - Complement existing assets

- **Leverage and Improve Technology**
  - Gain access to new resources
  - Continuously improve and speed technology to market

- **Predictable and Reliable Projects**
  - Owner’s risk mentality
  - Disciplined approach

*Momentum is building to build and license E-Gas™ projects*
Sweeny E-Gas™ Project - Overview

• Located adjacent to the Sweeny Refinery in Brazoria County, TX
• Conceptual engineering completed in June 2008
• Two concepts will be developed during the feasibility phase (FEL1)
  – SNG + H₂ and IGCC + H₂*
  – Final concept selection in 2009
• CCS options, including enhanced oil recovery (EOR), are under development
• Bechtel Corporation (Houston) selected as primary FEL1 contractor
• Anticipated start-up 2014 - 2015

*SNG = substitute natural gas (methane)
IGCC = integrated gasification combined cycle
+ H₂ = hydrogen co-production
Sweeny Complex Overview

- **Refinery processes 247 MBD crude oil**
  - Produces about 5 MTD petroleum coke
  - Natural gas and hydrogen pipelines
  - Large site for expansion near petcoke storage

- **Chevron Phillips Chemical Company LP**
  - Processes 115 MBD NGL
  - Produces 5.4 billion lb/yr ethylene and propylene
  - Clemens underground storage facility that includes 2 BCF natural gas and 1 BCF hydrogen
  - Shares utilities and common facilities

- **440 MW gas-fired cogen power plant**
  - COP and GE 50% partners (SCLP)
  - Provides steam and power to complex
  - Excess power to ERCOT grid

**Excellent location due to:**
- petcoke supply
- infrastructure synergy
- energy/H₂ demand
- market access
- CO₂ storage options
- experienced workforce
Sweeny E-Gas™ Project – Options Considered

Petcoke → CO₂ Capture – EOR/Storage → Syngas → H₂ + CO → H₂/CO Sales → SNG - Pipeline

→ Methanol/MTO → Fischer Tropsch

→ Low Carbon Power/Steam

→ New F Class IGCC (ERCOT)

→ Sweeny Complex Pipeline Sale

→ Sweeny Complex Pipeline Sale

→ Methanol MTP/MTO

→ CTL/FT with Product Upgrade: 10 Mbpd

→ IGCC with Pilot FT 1 Reactor: 2 Mbpd

IGCC + H₂ and SNG + H₂ chosen for more detailed feasibility study
Sweeny E-Gas™ Project FEL1 Scope

**Gasification Island**
- Air Separation Unit
- E-Gas™ Technology
- CO Shift
- Acid Gas Removal
- Sulfur Recovery Unit
- Refinery Integration

**Carbon Capture & Storage**
- Incremental capture cost and utilities
- CO2 Compression
- CO2 Transportation

**SNG/ Methanation**
- Methanation
- Steam Power
- SNG Compression

**IGCC/ Power**
- CO2 Capture
- High H2 Power Block
- Heat Recovery Steam Generator/Turbine

**Hydrogen**
- PSA
- Tail gas clean-up
- H2 Compression

**Concept selection based on FEL1 engineering results, regulatory developments and market outlook in 2009**
Sweeny E-Gas™ Project – CCS/EOR Options

Numerous EOR & storage options being worked

Denbury’s Resources Inc. “Green Pipeline” Permits in progress & buying ROW – multiple fields planned for EOR

100 mi radius from the Sweeny Complex

(Net Sand Grid from Gulf Coast Carbon Center, based on Galloway et al., 1982)

Numerous EOR & storage options being worked
Key Challenges

• Hyper-inflation
  – Linkage between capital cost and product prices

• Climate change regulation
  – Impact on scope, prices, and schedule

• Stakeholder engagement
  – Gaining support or non-objection (especially for CCS)

*Evolving effort to address all challenges and advance project*
Kentucky SNG Project Update

Status

• Completed Feasibility Study (FEL1)
• Engaged key technology suppliers
• Funding KGS CO2 test well to be drilled Q1 2009

ConocoPhillips and Peabody Energy are jointly progressing a mine-mouth coal and petcoke gasification project that would produce substitute natural gas (SNG) in western Kentucky

Continuing to advance project targeting operation by 2015
E-Gas™ Technology Update

Technology

- Design & operational enhancement from Wabash experience
- Increased throughput, efficiency and reliability
- Optimized cost
- Process integration improvements

Licensing

- Continued focus on key N.A. projects
- Increased emphasis in Asia – China office
- Select opportunities elsewhere

KEY FEATURES

- Two Stage Design
- Slurry Fed, Oxygen Blown
- Entrained Flow
- Refractory Lined

ADVANTAGES

- Continuous Slag Removal – No Lockhoppers
- Dry Char Recycle
- No Wastewater Generation
- No Carbon Lost
- Separate Fire-tube Syngas Cooler
- Installed NG Start-Up Burners

Contact our E-Gas™ technology team for more information!
Summary

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Thanks for your attention!