SSEB Committee on Clean Coal Energy Policies & Technologies

Panel on Technological Solutions to a Robust Coal Future

May 20, 2015
Kingsport, Tennessee

Mike Nasi, Partner, Jackson Walker L.L.P.
& General Counsel,
Presentation Outline

Overview of CCUS Technologies

Incentives, Certainty, & Cooperation

Risk of Lost Opportunities
Presentation Outline

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Incentives, Certainty, & Cooperation

Risk of Lost Opportunities
Petra Nova CCUS Project - Overview

Power Generation:
250 MW of flue gas slip stream
Commitment to maintain full capacity to the grid

Carbon Capture:
Post-combustion amine solvent-based system
90% carbon capture of slip stream
1.5 million tonnes (1.65 short tons) annually

Product Delivery and Utilization:
CO2 will be safely moved from plant in 80-mile, 12-16” pipeline
EOR operations will be conducted by Hilcorp Energy Company

Location will be 4,000 of 11,400 acres of West Ranch Oil
90% of CO₂ is recovered from the flue gas by contacting with KS-1™ solvent.
Engineering (80% complete)
Design is mature with few changes.
(<1% of contract value)
Keeping pace with accelerated construction progress.

Procurement (56% complete)
All major POs issued.
Delivery of Critical Path items pulled forward 1 month (Compressor & Regenerator); COD held firm
Focus is shifted to fabrication, delivery, & quality

Construction (13% Complete)
3% ahead of Baseline Plan (on early curve).
Excavation work complete with few obstructions.
Most of the major foundations are poured.
(HRSG, Cooling Tower, Quencher/Absorber).
Ductbanks, U/G piping, and backfilling ongoing with goal of being “out of the ground” by July.
First anchor bolts up work begins this month (Cooling Tower, Absorber erection, process piperack).
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Roadmap for Regional CCUS Incentives

- Local Tax Exemptions/Abatements
- State Tax Exemptions and Credits
- Environmental Regulatory Certainty
- Oil & Gas Regulatory Certainty
State Incentives Play Key Role at in CCUS Project Development

- Liability/Ownership Clarification
- Clear Regulatory Framework
- Grants
- Loans
- Franchise Tax Credits
- Eminent Domain for pipelines
- Sales Tax Exemptions
- Property Tax Abatement
- Gross Receipts Tax Exemptions

**Phases**
- FEED
- Permitting
- Financing
- Construction
- Operation

**Bills**
- HB 3732 (2007)
- HB 1796 (2009)
- HB 4586 (2009)
- SB 1387 (2009)
- HB 469 & 1796 (2009)
- HB 2446 (2013)
- HB 3676, HB 3896 & 3390 (2009 & 2013)
- HB 3732 & 469 (2007 & 2009)
- HB 469 (2009)
- HB 2446 (2013)
- HB 3732 (2007)
Business Case for Gulf Coast CCUS

Coal Fleet (especially Texas) is Large, Clean, Young (useful life longer than national avg)

Gulf economy is healthy & demand for power, oil, and chemicals continues to grow

Gulf Coast EOR Opportunities are Significant

300-year Reserve of Gulf Coast Lignite

Good Rail Access to Powder River Basin Coal

Portfolio of state-based incentives is a road
~50 Million Tons Produced Per Year (300 years of recoverable reserves)
Gulf Coast Carbon Sinks
Growth Potential for Sale of Captured CO$_2$ for EOR

billion barrels recoverable Gulf Coast with captured
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Risk of Lost Opportunities
EPA’s Modeled CPP-Forced Retirements
Top 10 Generators of Coal Electricity – Final 2030 Target – BLOCK 2

Additional reductions required when compared to 2013 data (55.36%).

Texas’ modeled coal reduction is:
• Greater than the next 9 coal generators combined.
• Greater than the requirements for 29 states combined.
# Texas Projected Retirements By 2020*

<table>
<thead>
<tr>
<th>Plant</th>
<th># of Units</th>
<th>Proj. Year of Retire.</th>
<th>Coal (MW)</th>
<th>Plant</th>
<th># of Units</th>
<th>Proj. Year of Retire.</th>
<th>CT (MW)</th>
<th>O/G (MW)</th>
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<td>Sabine</td>
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<td><strong>TOTAL</strong></td>
<td><strong>24</strong></td>
<td><strong>12,790</strong></td>
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<td><strong>15</strong></td>
<td></td>
<td><strong>4</strong></td>
<td><strong>3,489</strong></td>
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**COMBINED RETIREMENTS TOTAL: 16,283 MW; 39 Generation Units**
Lost: 1/2 of the Youngest Coal Fleet
Lost: 1/2 of the Cleanest Coal Fleet

Average NOx Emissions
Top 10 States by Total Coal-Fueled Capacity

Texas NOx emissions are nearly half the national average.
Lost: 1/2 of the Most Retrofitted Coal Fleet

Investments in Clean Coal Technology
1970 - 2010

Controlled Emissions
- Hg (Mercury)
- NOx (Nitrogen Oxide)
- SO2 (Sulfur Dioxide)
- PM (Particulate Matter)

Total Number of Plants: 41
Nameplate Capacity: 25,302 MW
Avg. Install Cost/Plant: $394 million

<table>
<thead>
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<th>Time Period</th>
<th>Investment (in billions $)</th>
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<td>2000s</td>
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Investment in Environmental Controls

Source: U.S. Energy Information Administration (EIA), Existing Electric Generating Units database, and U.S. Environmental Protection Agency.
QUESTIONS?

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