US NATIONAL: CCS LEGAL & POLICY UPDATE

IEAGHG CCS SUMMER SCHOOL
JULY 19, 2011
Federal Legislative

- Obvious legal drivers for CCS are stalled
  - No cap & trade
  - No clean energy standard
- Billions of federal dollars in support for CCS have been enacted under numerous programs
  - Plus tax incentive programs
- Significant budget pressures on the horizon
Federal Regulatory

- Clean Air Act GHG permitting program in place
  - Will CCS be a Best Available Control Technology?

- Federal injection regulations in effect
  - Class VI
  - Class II

- Federal GHG inventory reporting regulations in effect
  - Class UU
  - Class RR

- Some uncertainties remain
  - Is CO$_2$ subject to RCRA and CERCLA?
Hints of Favorable Policy Winds for EOR

- Lugar bill
- Current GOP leadership views CO$_2$-EOR as energy independence, not carbon management
- Economic “upside” of EOR in an adverse budget environment
EOR Deals

- IPPs & Utilities: Tenaska, Leucadia National, DKRW, Mississippi Power, Southern, others
- Role for EOR in most, if not all, projects
  - Class VI as backstop
- Typical project hurdles —
  - Economics
  - State legislative and/or PUC approval
  - Federal funding/loan guarantees
With Rare Exception, All Projects Involve EOR in or to the Gulf Coast …

Gulf Coast Region: Potential Tertiary Oil Reserves (1)

<table>
<thead>
<tr>
<th>Location</th>
<th>Reserves (MMBbls)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>38 MMBbls</td>
</tr>
<tr>
<td>3 Tinsley</td>
<td>46 MMBbls</td>
</tr>
<tr>
<td>1 86 MMBbls</td>
<td></td>
</tr>
<tr>
<td>2 77 MMBbls</td>
<td></td>
</tr>
<tr>
<td>6 Citronelle</td>
<td>26 MMBbls</td>
</tr>
<tr>
<td>7 Hastings Area</td>
<td>70 - 100 MMBbls</td>
</tr>
<tr>
<td>8 Oyster Bayou</td>
<td>20 - 30 MMBbls</td>
</tr>
<tr>
<td>9 Conroe</td>
<td>130 MMBbls</td>
</tr>
</tbody>
</table>

Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proved</td>
<td>164</td>
</tr>
<tr>
<td>Probable</td>
<td>334</td>
</tr>
<tr>
<td>Produced-to-Date</td>
<td>46</td>
</tr>
<tr>
<td>Total (2)</td>
<td>544</td>
</tr>
</tbody>
</table>

1) Proved plus probable tertiary oil reserves as of 12/31/10
2) Using mid-points of range.

Source: Denbury Investor Presentation, April 2011
Including Anticipated CO$_2$ Deliveries From Upper Midwest Coal Gasification Projects...
As Well As Storage In the Rocky Mountain Region

Rockies Region: Potential Tertiary Oil Reserves

CO₂ Sources:
- Existing Anthropogenic (Man-made)
- Proposed Coal to Gas or Liquids
- CO₂ Source Owned or Contracted

South Pine
61 MMBbls

Bell Creek
30 MMBbls

Other CCA Fields
136 MMBbls

1) Probable and possible reserve estimates.

Source: Denbury Investor Presentation, April 2011
CO₂ Storage Potential From EOR Is Huge

Table 5. Comparison of Forecasts of CCS Deployment and Associated Benefits due to ACES

<table>
<thead>
<tr>
<th>Source/Method</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
<th>2035</th>
<th>2040</th>
<th>2045</th>
<th>2050</th>
<th>Estimated Cum by 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(GW)</td>
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<tr>
<td>Coal with CCS Deployment - Capacity (GW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(GW)</td>
</tr>
<tr>
<td>NRDC - MARKAL</td>
<td>16.9</td>
<td>36.9</td>
<td>39.8</td>
<td>87</td>
<td>138</td>
<td>154</td>
<td>201</td>
<td>201</td>
</tr>
<tr>
<td>NRDC - NEMS</td>
<td>13.6</td>
<td>45.6</td>
<td>108.8</td>
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<td></td>
<td></td>
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<tr>
<td>EIA - NEMS</td>
<td>13.1</td>
<td>31.4</td>
<td>68.9</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Coal with CCS Deployment - CO₂ Stored (million tonnes)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Gt)</td>
</tr>
<tr>
<td>NRDC - MARKAL</td>
<td>124</td>
<td>226</td>
<td>243</td>
<td>2.4</td>
<td>521</td>
<td>809</td>
<td>902</td>
<td>1,170 96</td>
</tr>
<tr>
<td>NRDC - NEMS</td>
<td>78</td>
<td>224</td>
<td>530</td>
<td>1.6</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIA - NEMS</td>
<td>85</td>
<td>190</td>
<td>409</td>
<td>1.5</td>
<td></td>
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</tr>
<tr>
<td>Incremental Oil Prod. from CO₂ Stored with CCS from Power Plants (MMBpd)*</td>
<td></td>
<td></td>
<td></td>
<td>(Billion Barrels)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRDC - MARKAL***</td>
<td>1.3</td>
<td>2.4</td>
<td>2.6</td>
<td>9</td>
<td>2.6</td>
<td>2.6</td>
<td>3.9</td>
<td>4.8 37</td>
</tr>
<tr>
<td>NRDC - NEMS</td>
<td>0.3</td>
<td>1.4</td>
<td>3.6</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIA - NEMS</td>
<td>0.4</td>
<td>1.3</td>
<td>3.0</td>
<td>6</td>
<td></td>
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</tbody>
</table>

* Assumes all CO₂ from CCS is stored in oilfields with EOR potential at a rate of 0.26 tonnes of stored CO₂ per barrel of oil.

** Assumes a price for captured CO₂ of $15/ton, which increases economic potential to between 38 billion barrels using “best practices” and 59 billion barrels using “next generation” technologies at oil prices ranging from $70 and $100 per barrel.”

EOR Projects Are Helping To Form A CCS Legal Framework, Too

Source: CCSReg Project
EOR Projects Are An Integral Part of CCS R&D

Role of Private Sector and EOR/EGR in Phase II Projects

Private sector parties participated in all of the Phase II projects, demonstrating the important role that the private sector plays in sequestration research. Private sector expertise and resources will continue to be essential in supporting Phase III sequestration projects and in developing capture technologies, many of which are being tested at private sector plants.

The role of the EOR and EGR industries in supporting Phase II projects is particularly significant. For the 19 projects surveyed there were 20 injections (1 project involving 2 injections at different strata), 12 of which are EOR/EGR injections, and an additional 2 are on sites in which EOR or EGR activities are conducted. The predominance of EOR and EGR among Phase II projects reflects the advantage they enjoy compared to saline-formation sequestration due to the low cost of adapting existing commercial infrastructure for EOR and

What Does The Future Hold for CCS As A Matter of National Policy?

- EPA regulatory program will creep towards CCS as BACT – but likely to take many years to play out
- Continued role for government in R&D and demonstration, subject to budget pressures
- CO$_2$-EOR will continue to receive favorable attention
  - Why the ROZ is a hot topic
CAVEAT

EVERYTHING IN THIS PRESENTATION ONLY APPLIES UNTIL THE NEXT PRESIDENTIAL ELECTION
THANK YOU

FOR MORE INFORMATION:

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