Kansas Carbon Capture Utilization and Storage Task Force

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Tiraz Birdie, Franek Hasiuk

15th October 2019
Third Carbon Capture, Utilization, and Storage in Kansas Conference
Beren Petroleum Conference Center, Lawrence, KS
Outline

• Carbon Capture Utilization and Storage (CCUS) in Kansas
• Kansas – strategic region for future CCUS infrastructure
• Developing CCUS marketplace
  – Challenges and opportunities
  – Creating competitive advantages for the state
# Carbon SAFE Phase I – Project Team

## Project Management & Coordination, Geological Characterization

**Kansas Geological Survey**  
University of Kansas  
Lawrence, KS  
- Tandis Bidgoli, PI, Assistant Scientist  
- Lynn Watney, Senior Scientific Fellow  
- Eugene Holubnyak, Research Scientist  
- K. David Newell, Associate Scientist  
- John Doveton, Senior Scientific Fellow  
- Susan Stover, Outreach Manager  
- Mina FazelAlavi, Engineering Research Asst.  
- Jennifer Hollenbah - CO2 Programs Manager  

**Improved Hydrocarbon Recovery, LLC**  
Lawrence, KS  
- Martin Dubois, Joint-PI, Project Manager

## Policy Analysis, Public Outreach & Acceptance

**Great Plains Institute**  
Minneapolis, MN  
- Brendan Jordan, Vice President  
- Brad Crabtree, V.P. Fossil Energy  
- Jennifer Christensen, Senior Associate  
- Dane McFarlane, Senior Research Analysts  

**Blake Production Company, Inc.**  
(Davis Ranch and John Creek fields)  
- Austin Vornon, Vice President  

**Knighton Oil Company, Inc.**  
(John Creek Field)  
- Earl M. Knighton, Jr., President  

**Casillas Petroleum Corp.**  
(Pleasant Prairie Field)  
- Chris K. Carson, V.P. Geology and Exploration  

**Berexco, LLC**  
(Wellington, Cutter, and other O&G fields)  
- Dana Wreath, Vice President

**Stroke of Luck Energy & Exploration, LLC**  
(Leach & Newberry fields)  
- Ken Walker, Operator

## CO2 Source Assessments, Capture & Transportation, Economic Feasibility

**Linde Group (Americas Division)**  
Houston, TX  
- Krish Krishnamurthy, Head of Group R&D  
- Kevin Watts, Dir. O&G Business Development

## CO2 Sources

**Westar Energy**  
Brad Loveless, Exec. Director Environ. Services  
- Dan Wilkus, Director - Air Programs  
- Mark Gettys, Business Manager

**Kansas City Board of Public Utilities**  
Ingrid Seltzer, Director of Environmental Services

**Sunflower Electric Power Corporation**  
- Clare Gustin, V.P. Member Services & Ext. Affairs  
- Richard K. Leicht, Vice President of Refining  
- Rick Johnson, Vice President of Refining

## Regulatory

**Kansas Department of Health & Environment**  
Division of Environment  
- John W. Mitchell, Director  
- Bureau of Air  
- John W. Mitchell, Director

## Energy, Environmental, Regulatory, & Business Law & Contracts

**Depew Gillen Rathbun & McInteer, LC**  
Wichita, KS  
- Christopher Steincamp, Attorney at Law  
- Joseph Schremmer - Attorney at Law
Why CCUS in Kansas

prior DOE site characterization study

coal-fired power plant
petroleum refinery or manufacturing plant (cement & fertilizer)
ethanol plant

proposed geologic storage complex
geologic storage complex study area and closure

oil and gas fields

prior DOE site characterization study
proposed phase 2 site: Patterson

index map
Why CO₂ EOR in Kansas

Tertiary oil recovery potential of CO₂-ready sites in Kansas

<table>
<thead>
<tr>
<th>Basin</th>
<th>EOR potential (Mil bbl)</th>
<th>Net CO₂ Demand (MMT)</th>
<th>Direct Jobs Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois/Indiana</td>
<td>500</td>
<td>160 – 250</td>
<td>1,550 – 3,100</td>
</tr>
<tr>
<td>Ohio</td>
<td>500</td>
<td>190 – 300</td>
<td>1,550 – 3,100</td>
</tr>
<tr>
<td>Michigan</td>
<td>250</td>
<td>80 - 130</td>
<td>800 – 1,800</td>
</tr>
<tr>
<td>Kansas</td>
<td>750</td>
<td>240 – 370</td>
<td>2,300 – 4,600</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>2,000</strong></td>
<td><strong>670 – 1,050</strong></td>
<td><strong>6,200 – 12,400</strong></td>
</tr>
</tbody>
</table>
45Q tax credits make CCUS projects economically feasible.

- Up to $35/tonne for EOR and $50/tonne for saline aquifer storage for CO$_2$ injected and stored

Kansas operators are well-positioned

- Kansas candidate oil fields have been delineated
- Within pathway of possible large-scale CO$_2$ pipeline system

CO$_2$ captured in NE and KS ethanol plants could be transported to Kansas oil fields cheaply - $14 per tonne ($0.75/mcf).

- Kansas oil production could increase by 28% (10 million BO/yr) through EOR
Plausible Kansas business scenarios and their economics

- Three scenarios of varying scale
  1. Point-to-point (ethanol plant to oil field)
  2. Kansas-Nebraska system (15 ethanol plants to Kansas oil fields)
  3. Regional pipeline system with off ramps in KS (Midwest gathering system – delivery to West Texas)

- EOR, saline aquifer storage, until new technologies enter the market
Initial mapping analysis
State CO$_2$ EOR Deployment Work Group

Source: Crabtree (2018), Midwest Region Meeting
Challenges and Opportunities

• Legislation to regulate capture, transportation, injection and storage
• Allowances for eminent domain to be used for pipeline right-of-way and pooling of pore space
• Streamlining the U.S. EPA UIC Class VI well permit process
  – state primacy would further support development of commercial-scale CCS
• Effective public outreach is critical for support of State regulatory changes, and for public acceptance
  – induced seismicity
  – economic impact and opportunity
Key Points for Discussion and Action

- KGS is taking a lead in guiding regional stakeholders to enable CCUS projects
- Policy and regulatory changes needed for CCUS deployment in KS
  - Draft Statues
  - Meetings: September 17th and October 14th
  - Finalize by January, 2020
  - Comments are welcome
- UIC Class VI primacy
  - Example of ND, WY, and LA – invite for discussion
- 48A tax credits
  - Discussion with Shannon Angielski being scheduled
    - Carbon Utilization Research Council Executive Director
- 45Q tax credits and California's Low Carbon Fuel Standard
- Other discussion topics are welcome
- Please, support this initiative and sign Call to Action
- Development of a Kansas CCUS Industry Consortium
Primary Enforcement Authority for the Underground Injection Control Program

- See "https://www.epa.gov/uic/primary-enforcement-authority-underground-injection-control-program"
Questions?