

INFRASTRUCTURE FOR CARBON CAPTURE: TECHNOLOGY, POLICY, AND ECONOMICS

CO2 EOR State Deployment Work Group

Presentation to

NARUC Webinar

May 15, 2017

Overview

- Background on State CO₂-EOR Deployment Work Group
- States' Carbon Capture Incentive Recommendations
 - *Federal Tax and Other Incentives*
 - *State Tax Policy Options*
- States' CO₂ Pipeline Infrastructure Recommendations
- Next Steps for the Work Group

Growing State Support for Carbon Capture & CO₂-EOR

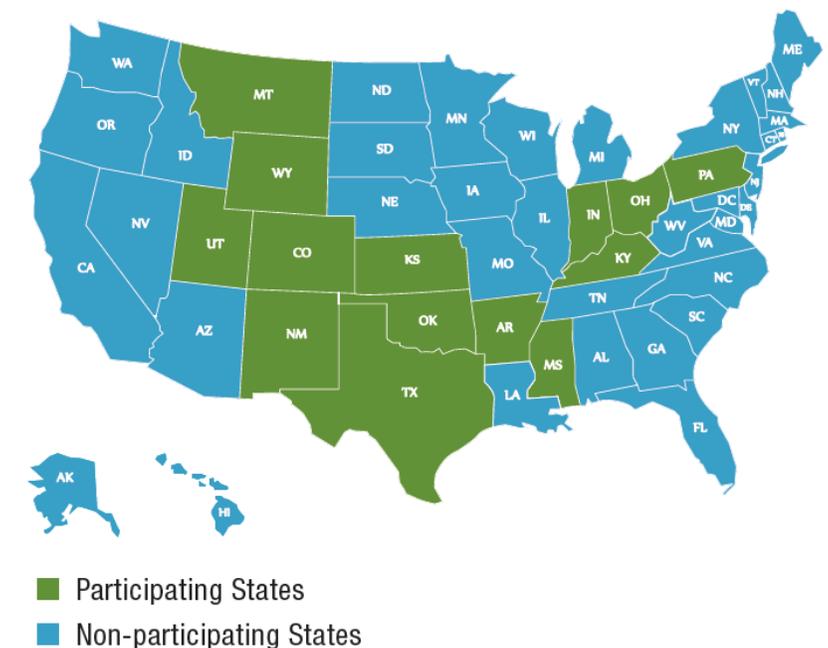
Governors, legislators and utility commissioners across the U.S. have signaled growing support for federal and state policies to foster commercial deployment of carbon capture and CO₂-EOR.

Year	Organization	Resolution Highlights
2015	Western Governor's Association	Recognized economic and environmental benefits of carbon capture and CO ₂ -EOR; called on Congress to extend and strengthen the federal Sec. 45Q tax credit.
2015	Southern States Energy Board	Emphasized need for federal incentives and state policy measures.
2016	National Association of Regulatory Utility Commissioners	Highlighted economic, energy production and carbon mitigation benefits, and the importance of state and federal action.

Formation of State CO₂-EOR Deployment Work Group

- Co-convened by Governors Matt Mead (R-WY) and Steve Bullock (D-MT).
- Launched in 3Q 2015:
 - *Officials from 14 states;**
 - *Leading industry and NGO stakeholders; and*
 - *CO₂-EOR experts.*
- Seven meetings to date to review modeling results, develop and agree on recommendations, and finalize reports, letters and other work products.
- Funding from the Hewlett Foundation.

FIGURE ES-2: CO₂-EOR State Deployment Work Group – Participating States



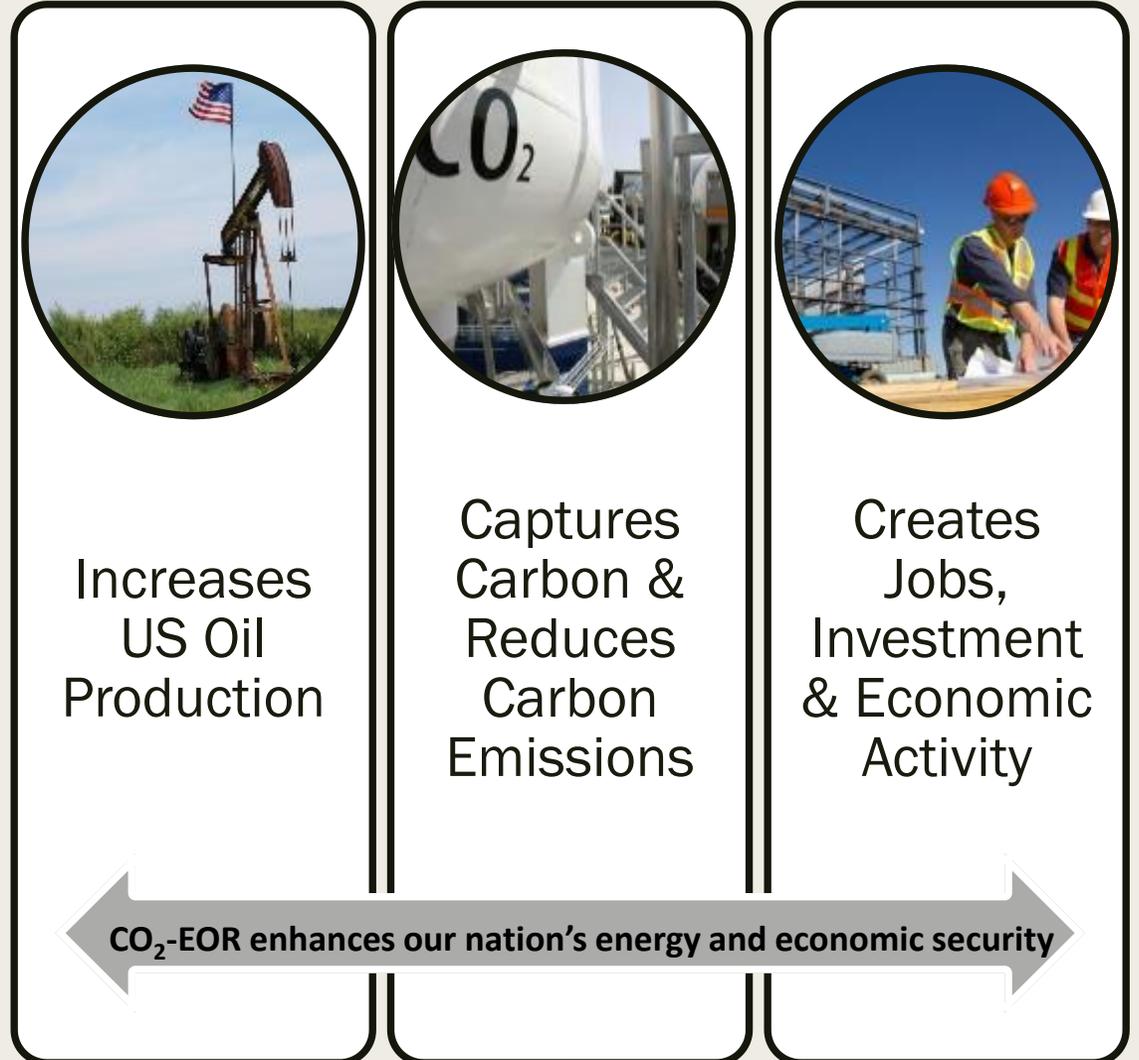
*State participation varies and includes governors' staff, cabinet secretaries, utility commissioners and agency and commission staff. Kansas and New Mexico are not currently represented in the Work Group.

State CO₂-EOR Deployment Work Group Objectives

- Help policy-makers and stakeholders better understand states' potential for CO₂-EOR, & evaluate which strategies and state and federal policies can best achieve that potential;
- Make recommendations to states and the federal government;
- Support state policy-makers in implementing strategies and policies developed through Work Group analysis and deliberations, including multi-state efforts; and
- Encourage enactment of federal policies that complement state priorities through coordinated efforts of governors, other state policy-makers and stakeholders.

The Case for Federal, State Support for CO₂-EOR

- CO₂-EOR offers extraordinary benefits for our nation
- Market forces, federal policies and some state policies are driving industry to reduce emissions
- Carbon capture with CO₂-EOR compares cost-effectively with other forms of zero- or low-emission generation



The Case for Federal, State Support for CO₂-EOR

- Turns carbon dioxide from a liability into a **valuable commodity**
- US has the potential to produce an estimated **28 billion barrels of economically recoverable oil** with today's industry best practices
- Provides **fiscal benefits** at a time when the federal government and many states face budget challenges.
- Directly supports **high-paying jobs** across a range of sectors.

Putting the Puzzle Together: State & Federal Policy Drivers for Growing America's Carbon Capture & CO₂-EOR Industry

- Major report released in December.
- Includes detailed modeling analyses, rationale and recommendations for carbon capture and EOR deployment as a national priority.
- Represents Work Group analysis and deliberations, including private sector stakeholders and CO₂-EOR experts.



Work Group Recommends a Package of Federal Incentives

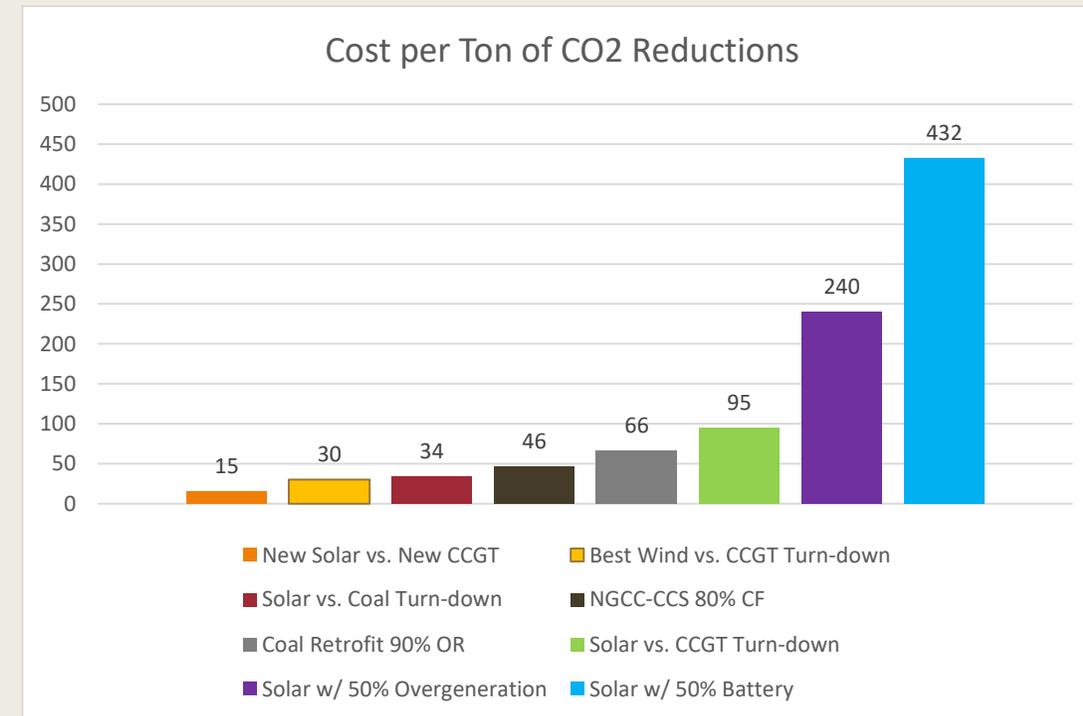
- Project-level financial feasibility modeling shows that a package of federal incentives is needed to mitigate risk and uncertainty in commercial deployment of carbon capture projects.
- Based on priority and impact on project feasibility, the Work Group urges Congress and the Administration to:
 1. *Extend, reform and expand the existing Section 45Q Tax Credit for Carbon Dioxide Sequestration to increase its value, make it financially certain and provide for greater eligibility and flexibility for project developers;*
 2. *Establish federal price stabilization contracts, or contracts for differences, for CO₂ sold from capture facilities to EOR operators to eliminate the risk of price volatility that deters private investment in carbon capture projects; and*
 3. *Make carbon capture eligible for tax-exempt private activity bonds and master limited partnerships to provide debt and equity, respectively, on favorable terms.*

Work Group Recommends that States Optimize Tax Policies to Encourage Carbon Capture and EOR Deployment

- In conjunction with improved federal incentives, states can positively affect project feasibility by optimizing taxes common to oil and gas-producing states.
 - The Work Group reviewed:
 - *Sales taxes on equipment purchased to build a carbon capture facility;*
 - *Property taxes on the carbon capture facility;*
 - *Sales taxes on equipment acquired to adapt an oilfield to CO₂-EOR operations; and*
 - *Oil and gas taxes, such as production and severance taxes.*
- Based on life-of-project modeling of carbon capture and EOR portions of integrated projects, **certain targeted reductions in state taxes can beneficially impact project economics equivalent to roughly an \$8 per barrel increase in the price of oil**, which is significant compared to existing federal incentives.

Work Group Calls for a Balanced, Cost-Effective Approach to Carbon Emissions Reductions

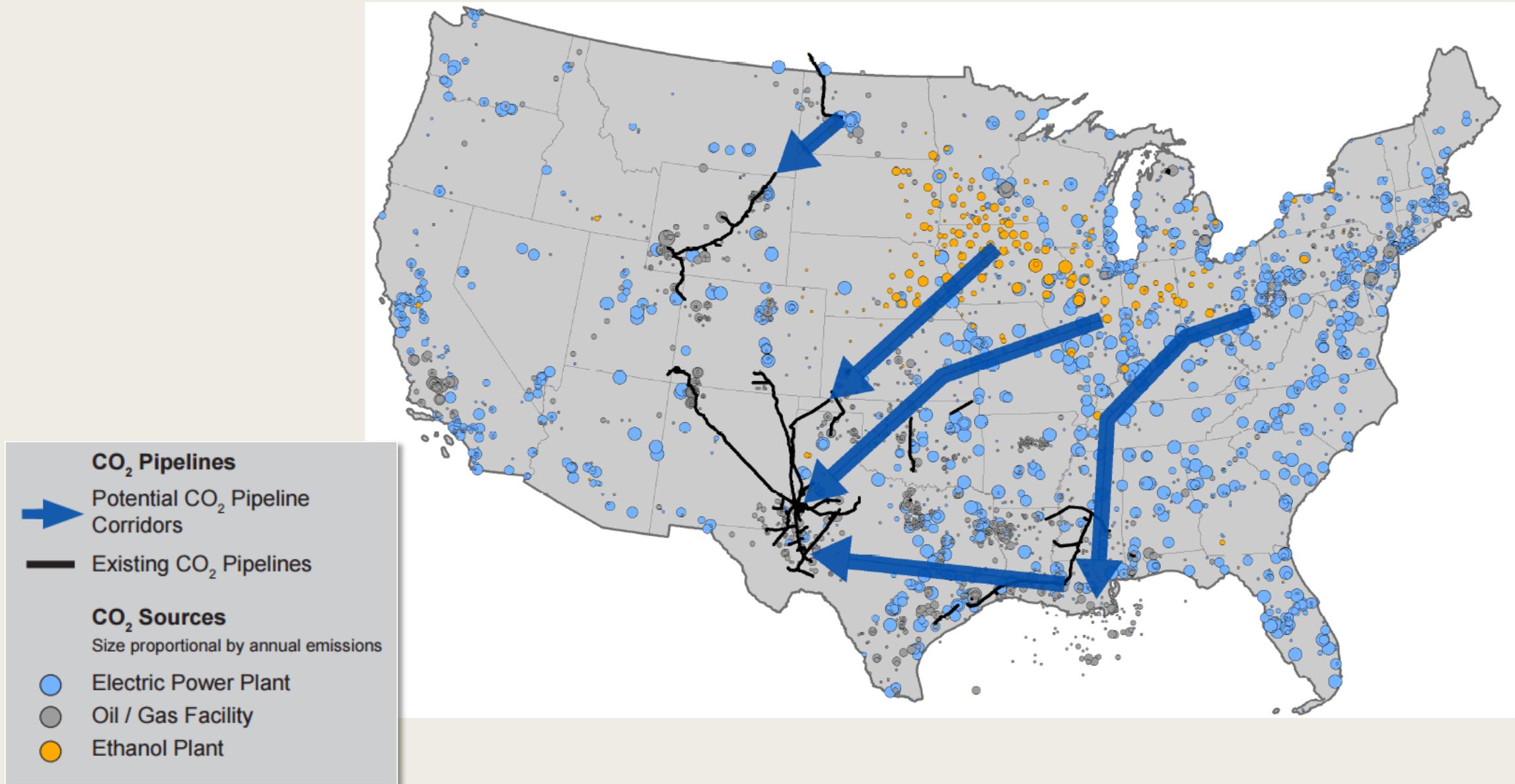
- Carbon capture merits federal and state policy support to accelerate commercial deployment, as has been done successfully for other energy technologies.
- As policies and markets drive industry to reduce emissions, carbon capture deserves equivalent support as a critical component of a broader, cost-effective portfolio of carbon mitigation options.
- Based on cost per ton of CO₂ emissions avoided, power plant capture with EOR already compares cost-effectively with other options, especially at higher reduction levels. Retrofitting an existing coal plant is in the middle of the cost curve for low- and zero-carbon generation options.



Work Group Expanding Focus to Include CO₂ Pipeline Infrastructure

- In February, Work Group released *21st Century Energy Infrastructure: Policy Recommendations for Development of American CO₂ Pipeline Networks*:
 - *Calls on Trump Administration and Congress to make CO₂ pipelines a priority component of a broader national infrastructure agenda (in addition to enacting federal carbon capture incentives);*
 - *Recommends federal role to supplement private capital in financing increased capacity for large-volume, long-distance trunk CO₂ pipelines (“super-sizing” trunk pipelines achieves enormous economies of scale and enables future carbon capture and EOR project deployment); and*
 - *Urges Congress and Administration, in consultation with states, tribal governments and stakeholders, to identify and foster development of priority pipelines, including planning, streamlined permitting, and financing.*

Five Major CO₂ Pipeline Corridors Could Enable a National Energy Production and Carbon Management Infrastructure



Benefits of Proposed National CO₂ Pipeline Buildout

- Work Group recommends five major CO₂ pipeline corridors equivalent to scale and volume of Cortez pipeline, world's largest (30" diameter = 30 million tpy).
- Such an expansion could create a national infrastructure and supply up to an additional 150 million tons of CO₂ annually for EOR and storage, resulting in:
 - *Tripling of domestic EOR production, or 375 million barrels of oil per year;*
 - *1/5th reduction in U.S. oil imports from current levels, valued at \$30 billion;*
 - *Capture of over four percent of current U.S. stationary source emissions from power plants and industrial facilities;*
 - *\$75 billion of capital investment in carbon capture, CO₂ pipeline construction, and EOR equipment; and*
 - *\$30 billion of annual economic activity.*

State CO₂-EOR Deployment Work Group Next Steps

- Recommend a menu of federal CO₂ pipeline financing options to help inform federal infrastructure legislation in Congress.
- White paper on regional RTO/ISO wholesale market design and policies to ensure parity and equitable treatment for carbon capture facilities with other low and zero-carbon generation resources.
- Expand efforts to communicate Work Group priorities and recommendations to federal and state policymakers, stakeholders and the media nationally and in key states.



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