

# Carbon Capture and Sequestration – a West Virginia Perspective

Presented to:  
Gas & Oil Association of West Virginia  
Winter Meeting

Presented by:  
David M. Flannery  
Step toe & Johnson PLLC

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AEP's 20 MW CCUS project at the Mountaineer Plant in West Virginia



# Challenges for Fossil Fuels in the US

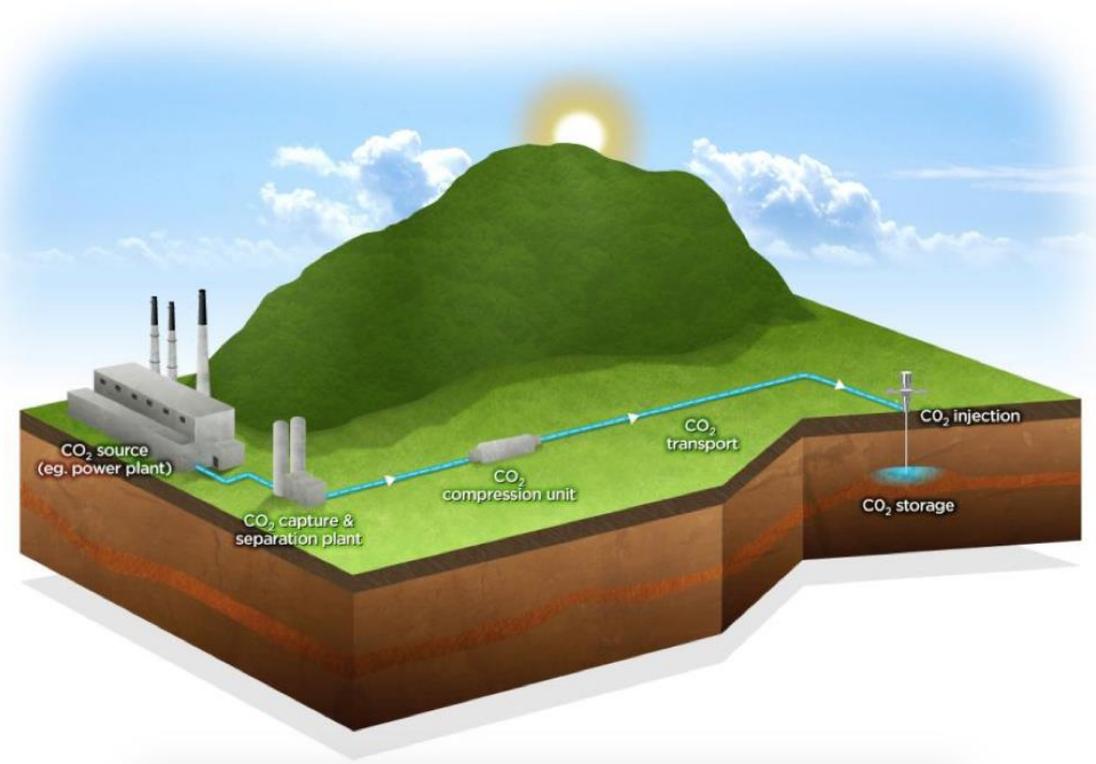
- Concerns related to greenhouse gas emissions are requiring both the fossil fuel industry and users of fossil fuels to find ways to offset or lower emissions
- Obligations at both the national and state level, as well as in corporate board rooms, are pushing toward a carbon neutral position in the next 20-40 years
- It is imperative that the fossil fuel industry and those that rely on fossil fuels for energy and manufacturing production prepare to ensure that fossil fuels have a seat at the table as a viable source of energy into the future
- Former USDOE Secretary Ernest Moniz testimony\*: configuring the electric power grid must be “matched to the mix of critical generation and storage technologies: variable renewables wind and solar, batteries and long duration storage, advanced nuclear technologies (fission and fusion), fossil power plants with carbon capture, utilization and sequestration (CCUS)”.

\* (<https://www.congress.gov/117/meeting/house/111362/witnesses/HHRG-117-IF00-Wstate-MonizE-20210322.pdf>)



# What is Carbon Capture Utilization and Sequestration?

- Carbon Capture Utilization and Sequestration, generally known as CCS or CCUS, is an anthropogenic carbon emission reducing technology that can help lower greenhouse gas emissions created when burning fossil fuels
- Generally, CCS is a three-step process:
  1. Capture – carbon dioxide is separated from other gases at its emitting source, like coal and natural-gas-fired electric generation facilities
  2. Transport – the captured carbon dioxide is compressed and transported by pipelines, road, or ship to storage sites
    - 3a. Utilization – oil and gas production
    - 3b. Sequestration – the captured carbon dioxide is injected into underground geologic formations for permanent storage



# Challenges for CCUS

- Cost

- CCUS technology of the scale needed to sequester large amounts of CO<sub>2</sub> has not been readily available
- Cost associated with removing CO<sub>2</sub> and delivering and sequestering the gas has meant that most projects need significant public dollars
- CCUS technology is being refined with the hopes of moving toward economic viability
- Not all Fossil Fuels are Equal. The differences in levelized costs per ton of CO<sub>2</sub> avoided are estimated by some:
  - Natural Gas - \$21.5/ton
  - Coal-fired - \$78/ton





# Council of Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration, June 30, 2021

“To avoid the worst impacts of climate change and reach President Biden’s goal of net-zero emissions by 2050, we need to safely develop and deploy technologies that keep carbon pollution from entering the air and remove pollution from the air.”

“The report we are releasing today outlines a framework for how the U.S. can accelerate carbon capture technologies and projects in a way that benefits all communities.”



# American Jobs Plan

<https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/>

- Increasing support for CCUS research, development, demonstration, and deployment;
- Enhancing the Section 45Q tax incentive for CCUS to make it direct pay and easier to use for hard-to-decarbonize industrial applications, direct air capture, and retrofits of existing power plants;
- Advancing a technology-inclusive Energy Efficiency and Clean Electricity Standard;
- Ensuring a robust and effective regulatory regime; and
- Supporting efforts to ensure that CCUS technologies are informed by community perspectives and deliver desired climate, public health, and economic goals.

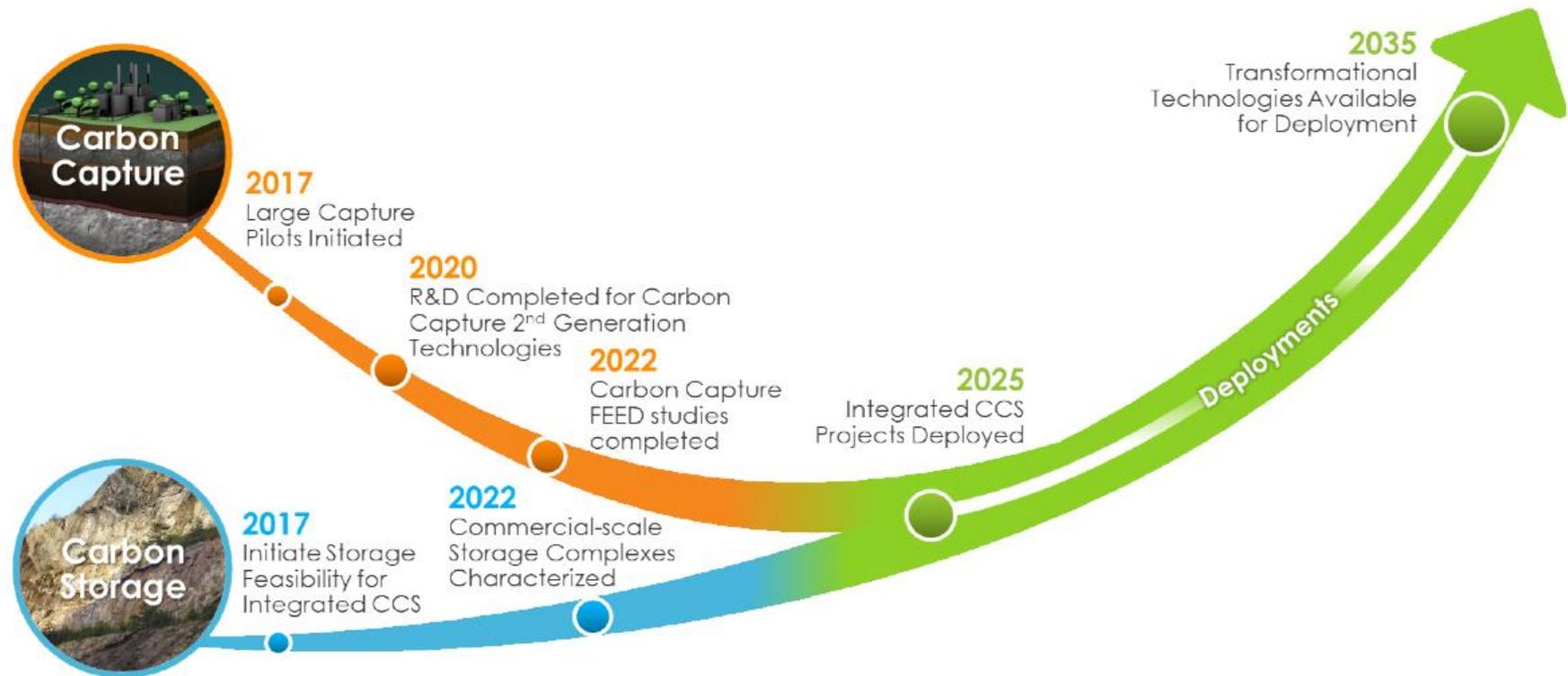
# Providing an Environment to Encourage CCS - SCALE Act

- The Storing CO<sub>2</sub> and Lowering Emissions Act (SCALE Act)
  - Bipartisan legislation would enable CO<sub>2</sub> transport and storage infrastructure required to scale up carbon capture, removal, use, and storage across domestic industries
  - The SCALE Act focuses on three key areas:
    - A federal financing mechanism for CO<sub>2</sub> transport and storage infrastructure and leveraging economies of scale by reducing the overall costs associated with interconnected systems buildout
    - Supports development of saline geologic storage resources and implementation of the EPA permitting program on CO<sub>2</sub> injection for secure geologic storage
    - Grants for states and municipalities to acquire low- and zero-carbon products derived from CO<sub>2</sub> and carbon oxides



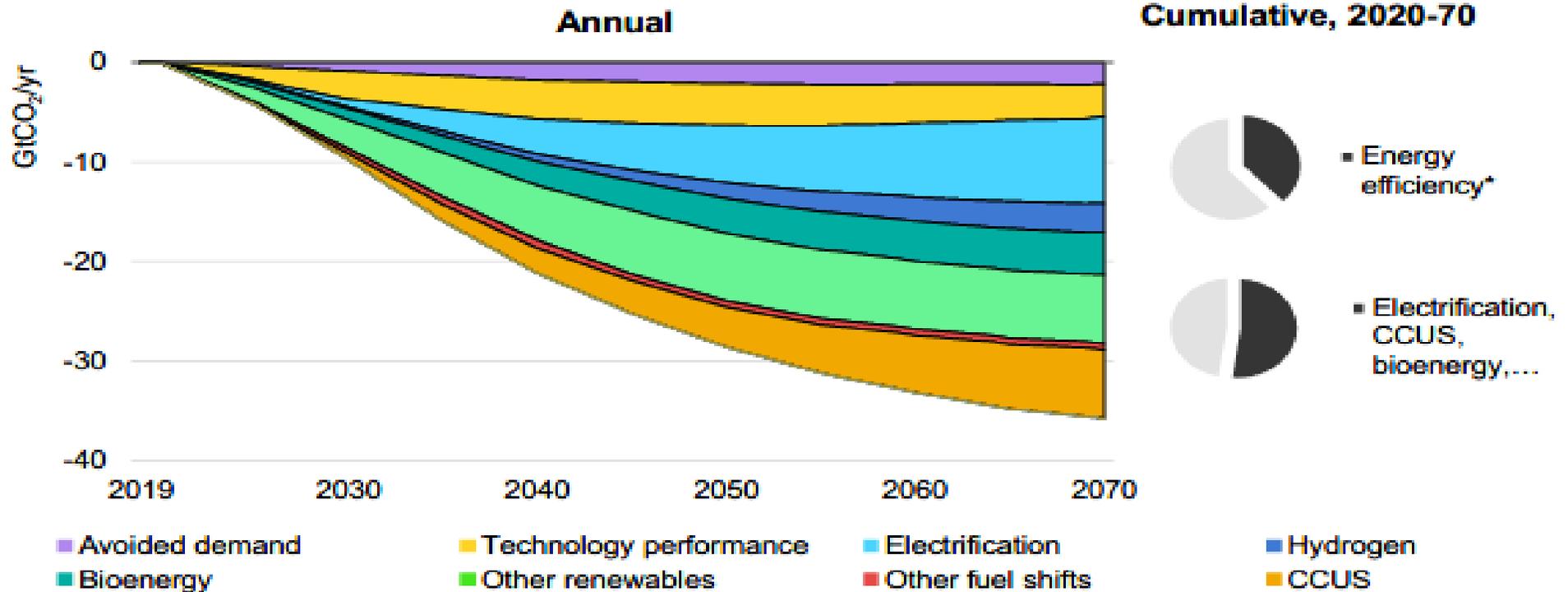
# Integrated R&D Approach for Commercial Scale Deployment of CCS

U.S. Department of Energy, Brian Anderson Presentation, May 19, 2021





**Figure 2.1 Global energy sector CO<sub>2</sub> emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2019-70**



IEA 2020. All rights reserved.

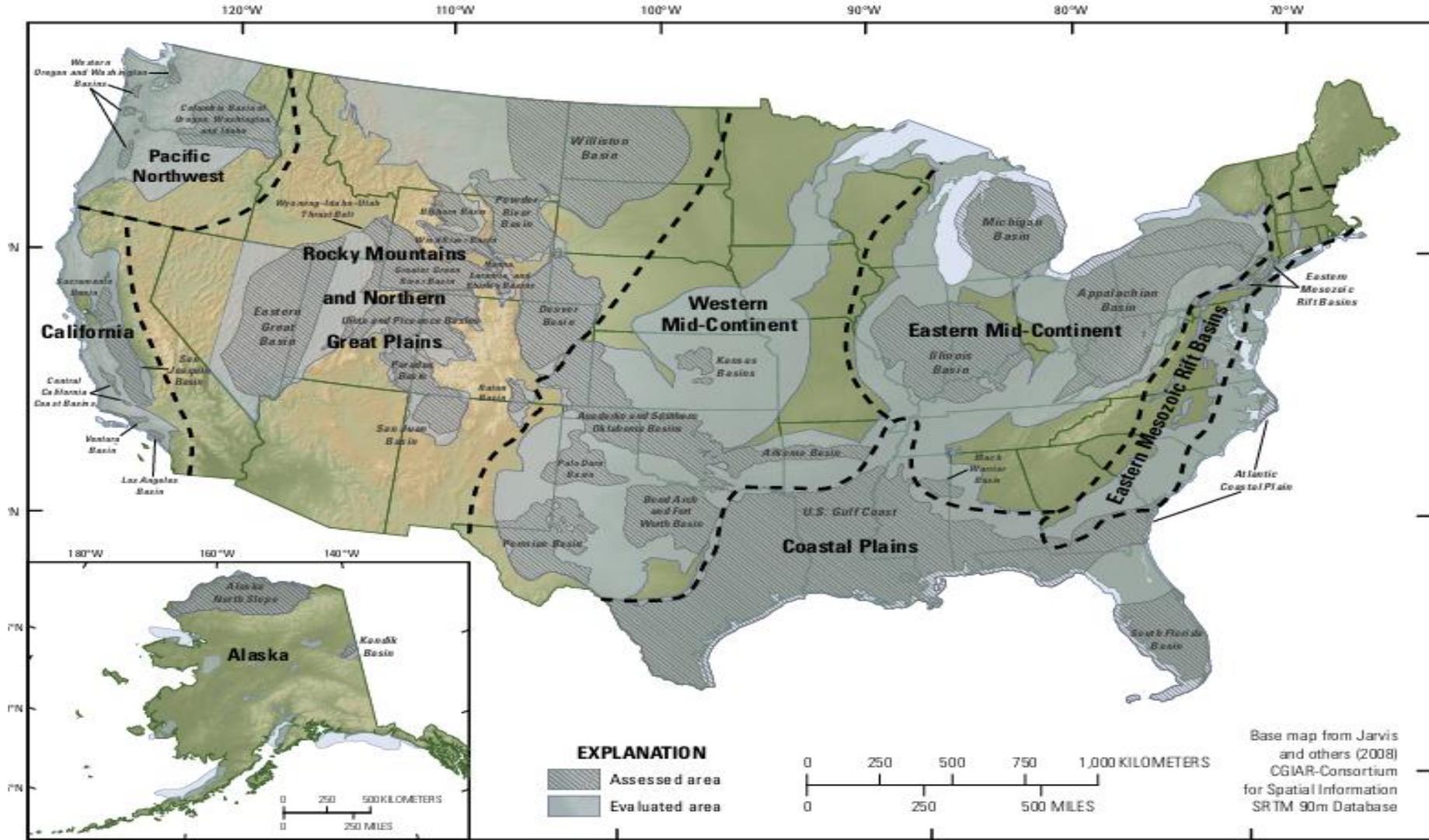
\* Energy efficiency includes enhanced technology performance as well as shifts in end-use sectors from more energy-intensive to less energy-intensive products (including through fuel shifts).

Notes: CCUS = carbon capture, utilisation and storage. See IEA (2020a) and the ETP model documentation for the definition of each abatement measure. Hydrogen includes low-carbon hydrogen and hydrogen-derived fuels such as ammonia.

Energy Technology Perspectives 2020, Special Report on Carbon Capture, Utilisation and Storage, International Energy Agency



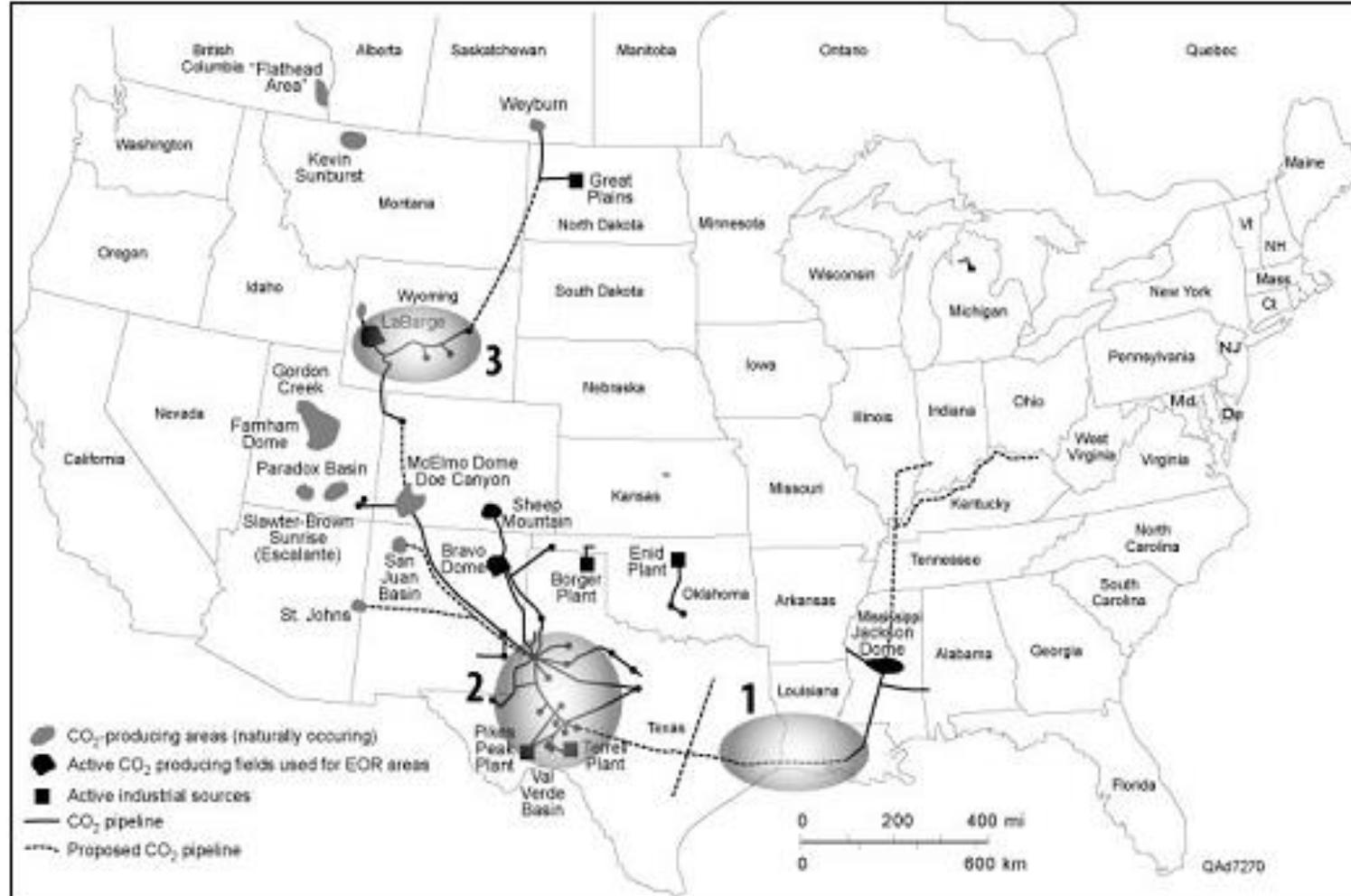
**ASSESSMENT OF GEOLOGIC CO<sub>2</sub> STORAGE RESOURCES: 36 AREAS (PATTERN) AREAS WERE ASSESSED**  
 NATIONAL ASSESSMENT OF GEOLOGIC CARBON DIOXIDE STORAGE RESOURCES—RESULTS; U.S. GEOLOGICAL SURVEY  
 GEOLOGIC CARBON DIOXIDE STORAGE RESOURCES ASSESSMENT TEAM; SEPTEMBER 2013.





# Conceptual Expansion of Midwest System to the West

Expedited CCS Development: Challenges & Opportunities, National Coal Council, March 2011





# CLASS VI UIC RULES

40 CFR Part 144

## Goals

- Protect underground sources of drinking water
- No requirement to capture/sequester CO<sub>2</sub>

Safe Drinking Water Act does not provide authority to address:

- Capture and transport of CO<sub>2</sub>
- Property rights
- Liability transfer

# State Delegation of Class VI Program

- **Approved delegation:**

- North Dakota: 83 Fed. Reg. 17758 (April 24, 2018)
- Wyoming: 85 Fed. Reg. 64053 (October 9, 2020)

- **Primacy applications pending:**

- Arizona
- Louisiana
- West Virginia





# West Virginia Delegation of Class VI Program

WVDEP proposal to revised 47 CSR 13 “Underground Injection Control”

- Based on USEPA rule
- Reflects advanced input from USEPA
- Public hearing: July 23, 2021

WVDEP response to comments:

- There are no known Class VI wells in the state and therefore no increased regulatory burden
- No requirements go beyond USEPA rules
- Setbacks and pore space ownership are matters for Legislative consideration

Next steps:

- Approval by Legislature in 2022
- WVDEP application for delegation of federal program in 2022

# IOGCC Guidelines for States\*

- States should seek primacy of the USEPA Class VI UIC program
- States should develop their own programs to address matters not addressed under the Class VI program, such as:
  - Pore space ownership
  - Surface facilities
  - Pipelines

*\*Interstate Oil and Gas Compact Commission, Guidance for States & Provinces on Operational & Post-operational Liability of Carbon Geologic Storage, at [https://iogcc.ok.gov/sites/g/files/gmc836/f/documents/2021/guidance\\_for\\_states\\_and\\_provinces\\_on\\_operational\\_and\\_post\\_operational.pdf](https://iogcc.ok.gov/sites/g/files/gmc836/f/documents/2021/guidance_for_states_and_provinces_on_operational_and_post_operational.pdf), (September 2014)*



# NATIONAL COAL COUNCIL

Fossil Forward, Revitalizing CCS, Bringing Scale and Speed to CCS Deployment, National Coal Council,  
<https://www.nationalcoalcouncil.org/studies/2015/Fossil-Forward-Revitalizing-CCS-NCC-Approved-Study.pdf> (February 2015)

- USEPA Class VI program addresses only the underground sources of drinking water - not pore space, surface facilities, pipelines
- CCS/CCUS Deployment Challenges
  - Infrastructure for transportation and storage of massive quantities of captured CO<sub>2</sub> does not exist
  - Financing power plants with CCS is a major issue
  - Legal and regulatory issues still remain unresolved



# States With CCS Legislation

- Illinois – ownership of CO<sub>2</sub>; permitting; indemnification for certain liabilities, eminent domain
- Indiana – eminent domain; ownership of stored CO<sub>2</sub>
- Kansas – exempts state from liability
- Louisiana – eminent domain; permitting; liability transfer; ownership of CO<sub>2</sub>;
- Montana – pore space ownership; unitization; liability; ownership of CO<sub>2</sub>
- Nebraska – pore space ownership; permitting; pooling; CO<sub>2</sub> ownership by state upon completion
- North Dakota – pore space ownership; liability; ownership of CO<sub>2</sub>; unitization
- Oklahoma – ownership of CO<sub>2</sub>
- Texas – pore space ownership; permitting; tax credits; ownership of CO<sub>2</sub>
- West Virginia – permitting; property rights; interstate cooperation
- Wyoming – pore space ownership; permitting; ownership of CO<sub>2</sub>; unitization





# NORTH DAKOTA FRAMEWORK

1. Pore space owned by surface owner
2. Must have 60% owner consent
3. Pooling for others
4. Operational liability
5. Post-closure liability to state 10 years after CCS ends
6. Post-closure management
7. Pipeline development
8. Eminent domain
9. Permitting

# INITIAL WEST VIRGINIA LEGISLATION

W. Va. Code 22-11A-1, et seq. (2009)

## Addressed:

1. UIC Permitting
2. Financial responsibility
3. Exempted EOR
4. Established Work Group

## Did not address:

1. Pore space usage
2. Property issues
3. Liability
4. Eminent domain

## CCS Working Group legislative mandate:

- Recommend legislation regarding ownership and other rights and interest in pore space
- Recommend methods of facilitating the widespread use of carbon dioxide sequestration technology



# Report to the Legislature

Findings and Recommendations with Respect to the Development and Widespread Deployment of Carbon Dioxide Sequestration throughout West Virginia

<http://www.dep.wv.gov/executive/Documents/WVCCS%20Working%20Group%20Final%20Report%20-%20June%2030,%202011.pdf>



Submitted by:

The West Virginia Carbon Dioxide  
Sequestration Working Group

July 1, 2011



# WEST VIRGINIA CARBON DIOXIDE SEQUESTRATION WORKING GROUP DRAFT LEGISLATION

1. Permitting
2. Pore space usage below 2500 feet
3. Eminent domain / pooling
4. Other property interests
5. Operational liability limits
6. Post-closure liability transfer after 10 years
7. Post-closure management/trust fund
8. CCS Working Group
9. Cooperative agreements
10. Groundwater exemption
11. Preemption of local authorities
12. PSC certificate for pipelines/eminent domain

# CONCLUSIONS

1. CCS is critical to the utilization of fossil fuels as U.S. moves to net zero CO<sub>2</sub> by 2050.
2. NETL and others are focused on lowering the cost of capture, storage and utilization.
3. USEPA Class VI rule is important, but only addresses underground drinking water.
4. IOGCC and NCC urge states to seek delegation of the Class VI program and to act to address other issues such as pore space, surface operations, pipelines and liability.
5. West Virginia is already seeking delegation of Class VI program.
6. New legislation is needed to address remaining open issues such as pore space ownership and eminent domain.





# Questions?



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# Contact Information

David M. Flannery  
Steptoe & Johnson PLLC  
(304) 353-8171

[Dave.Flannery@Steptoe-Johnson.com](mailto:Dave.Flannery@Steptoe-Johnson.com)