

A nighttime photograph of an industrial facility, likely a refinery or chemical plant, situated along a body of water. The facility is illuminated with numerous lights, and its reflection is visible on the water's surface. The sky is dark with some clouds. The image is split vertically, with the left half showing the industrial scene and the right half being a solid blue background with white text.

Billions of Dollars Catalysts for Multi-Gigaton Opportunities: Innovations and Demonstrations in Hydrogen, Direct Air Capture, and Carbon Management

*NASEO National Meeting
St. Petersburg, FL*

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Background on Great Plains Institute

An independent nongovernmental organization focused on energy policy and technology.

Mission:

Transforming the energy system to benefit the economy and the environment.

Objectives:

- Increase energy efficiency and productivity.
- Decarbonize electricity production.
- Electrify the economy and adopt zero and low-carbon fuels.
- Capture carbon for beneficial use and permanent storage.



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Great Plains Institute: Leading Federal and State Initiatives in Carbon Management and Industrial Decarbonization



**Industrial
Innovation
Initiative**

a partnership between Great Plains Institute and
World Resources Institute



**Carbon Action
Alliance**



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Bipartisan Infrastructure Investment & Jobs Act:		
Large Scale Pilot Projects	\$937 M over four-year period	Request for Information -- January 2022
Demonstration Programs	\$2.537 B over four-year period	Funding Opportunity Announced -- September 2022
Direct Air Capture Technologies Prize Competitions	a) PRECOMMERCIAL.— \$15,000,000 for fiscal year 2022 (b) COMMERCIAL.— \$100,000,000 for fiscal year 2022.	Request for Information -- January 2022
Carbon Utilization Program	\$310 M over five-year period	Funding Opportunity Announced -- Initial tranche of \$16.5 M -- September 2022
Carbon Capture Technology Program (front-end engineering and design program)	\$100 M over five-year period	Funding Opportunity Announced -- September 2022
Direct Air Capture Hubs (creates 4 regional DAC hubs)	\$3.5 B over five-year period	Notice of Intent -- May 2022

Bipartisan Infrastructure Investment & Jobs Act – SCALE Act:		
Carbon dioxide transportation infrastructure finance and innovation (CIFIA):	\$2.1 billion over five-years	Anticipated to open early October
Carbon storage validation & testing:	\$2.5 billion over five years	Funding Opportunity Announced -- September 2022
Front-end engineering and design studies for transport & storage	\$100 million over five years	NOI: August 2022 FOA: September 2022
Secure geologic storage permitting for Class VI activities at EPA	\$75 million over five years	
Regional Clean Hydrogen Hubs for six to ten hydrogen hubs	\$7 billion , available until expended, additional \$1 billion available as part of hydrogen hub program	FOA: September 2022

45Q Tax Credit: Existing Policy & Enacted Changes from Inflation Reduction Act

Current 45Q Tax Credit Amounts		Inflation Reduction Act Enacted 45Q Credits: Industry & Power	Inflation Reduction Act Enacted 45Q Credits: Direct Air Capture
For dedicated secure geologic storage of CO ₂ in saline or other geologic formations	\$50 per ton	\$85 per ton	\$180 per ton
For carbon utilization projects to convert CO or CO ₂ into useful products (e.g., fuels, chemicals, products)	\$35 per ton	\$60 per ton	\$130 per ton
For secure geologic storage of CO ₂ in oil and gas fields through enhanced oil recovery	\$35 per ton	\$60 per ton	\$130 per ton

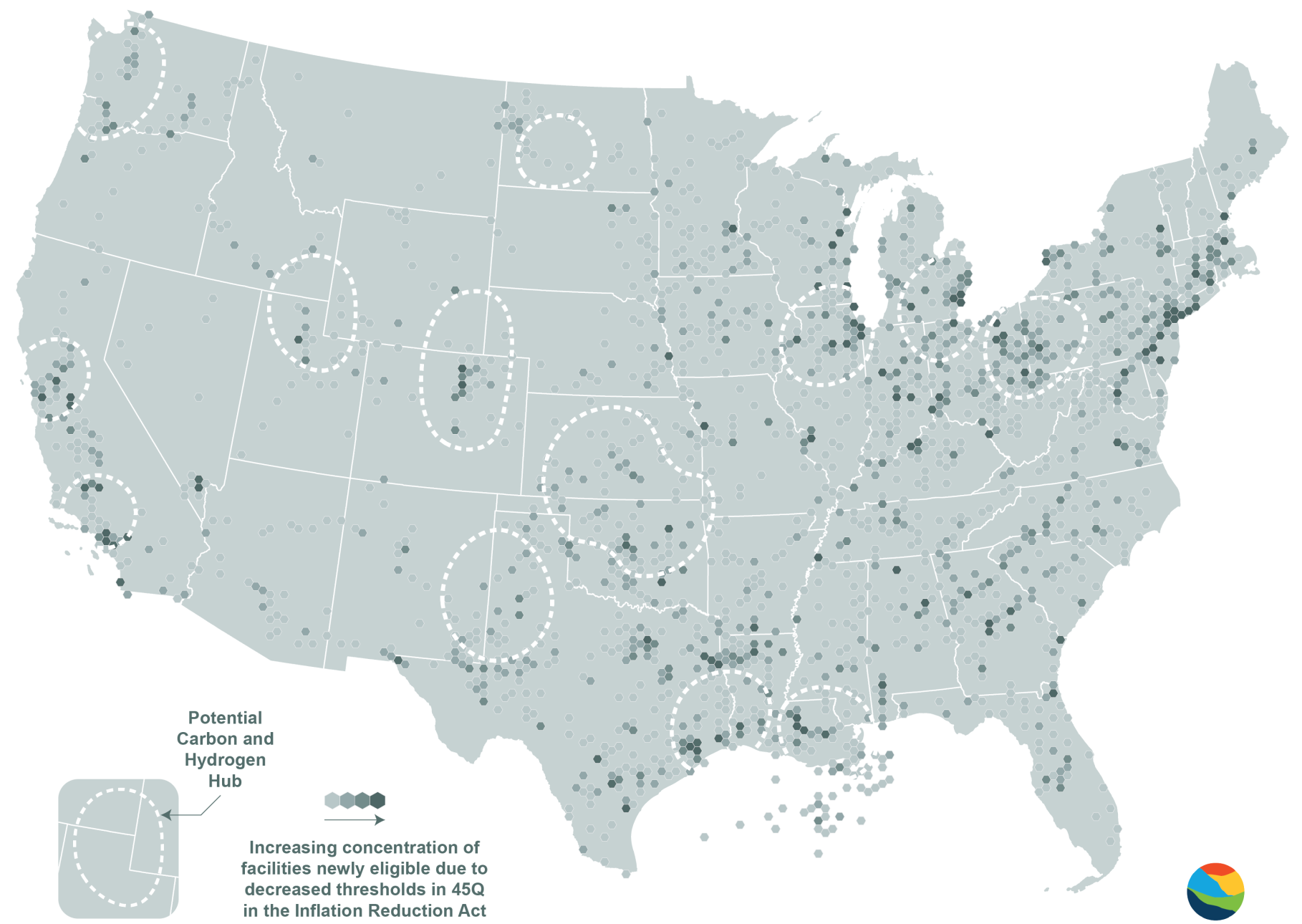
Timing: Current 45Q authorization: Projects must begin construction before January 1, 2026 and may claim the credit for up to 12 years after being placed in service.
 IRA proposed 45Q authorization: Projects must commence construction before January 1, 2033 and may claim the credit for up to 12 years after being placed in service.
Eligibility: Carbon capture and direct air capture projects that either capture and utilize or geologically store carbon oxides are eligible to claim the tax credit.

45Q Tax Credit: Existing Policy & Enacted Changes from Inflation Reduction Act

Current 45Q Annual Carbon Capture Thresholds in metric tons of CO ₂ /CO per year		Inflation Reduction Act Enacted 45Q Reduced Annual Carbon Capture Thresholds in metric tons of CO ₂ /CO per year	
Direct air capture facilities	100,000 or more	Direct air capture facilities	1,000 or more
Carbon utilization projects	25,000 – 500,000	Carbon utilization projects	Carbon utilization projects are subject to the individual project thresholds
Industrial facilities (e.g., ethanol, steel, cement, and chemicals)	100,000 or more	Industrial facilities (e.g., ethanol, steel, cement, and chemicals)	12,500 or more
Electric generating units (e.g., coal, natural gas and biomass-fired powered plants)	500,000 or more	Electric generating units (e.g., coal, natural gas and biomass-fired powered plants)	18,750 or more

Timing: Current 45Q authorization: Projects must begin construction before January 1, 2026 and may claim the credit for up to 12 years after being placed in service.
 IRA proposed 45Q authorization: Projects must commence construction before January 1, 2033 and may claim the credit for up to 12 years after being placed in service.
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Newly Eligible Facilities due to Lower Thresholds in 45Q

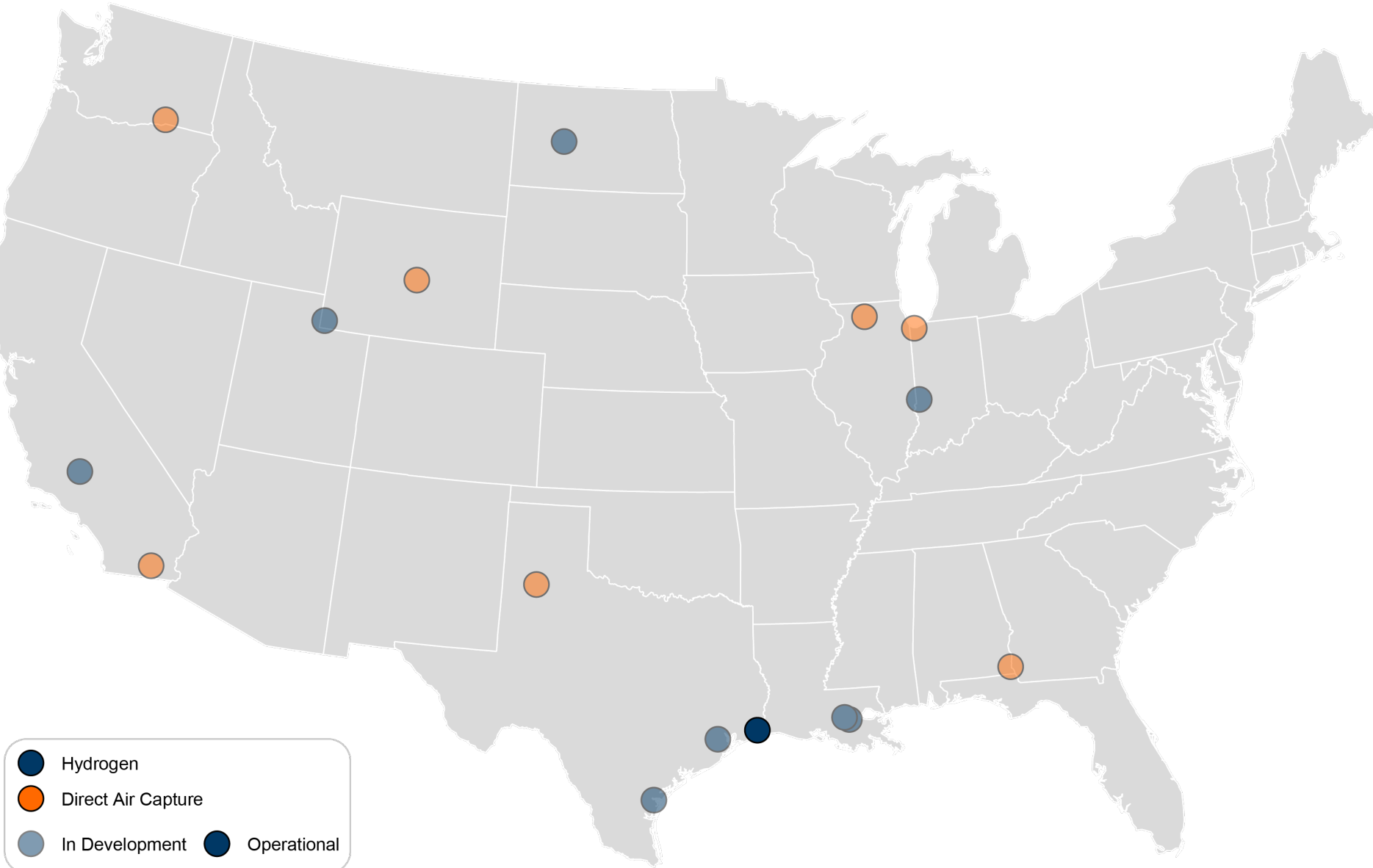


Potential Carbon and Hydrogen Hub

Increasing concentration of facilities newly eligible due to decreased thresholds in 45Q in the Inflation Reduction Act

Data from U.S. Environmental Protection Agency Office of Atmospheric Programs, Greenhouse Gas Reporting Program (GRGHP), 2020. Data accessed August, 2022.

Current State of Direct Air Capture and Hydrogen with Carbon Capture and Storage



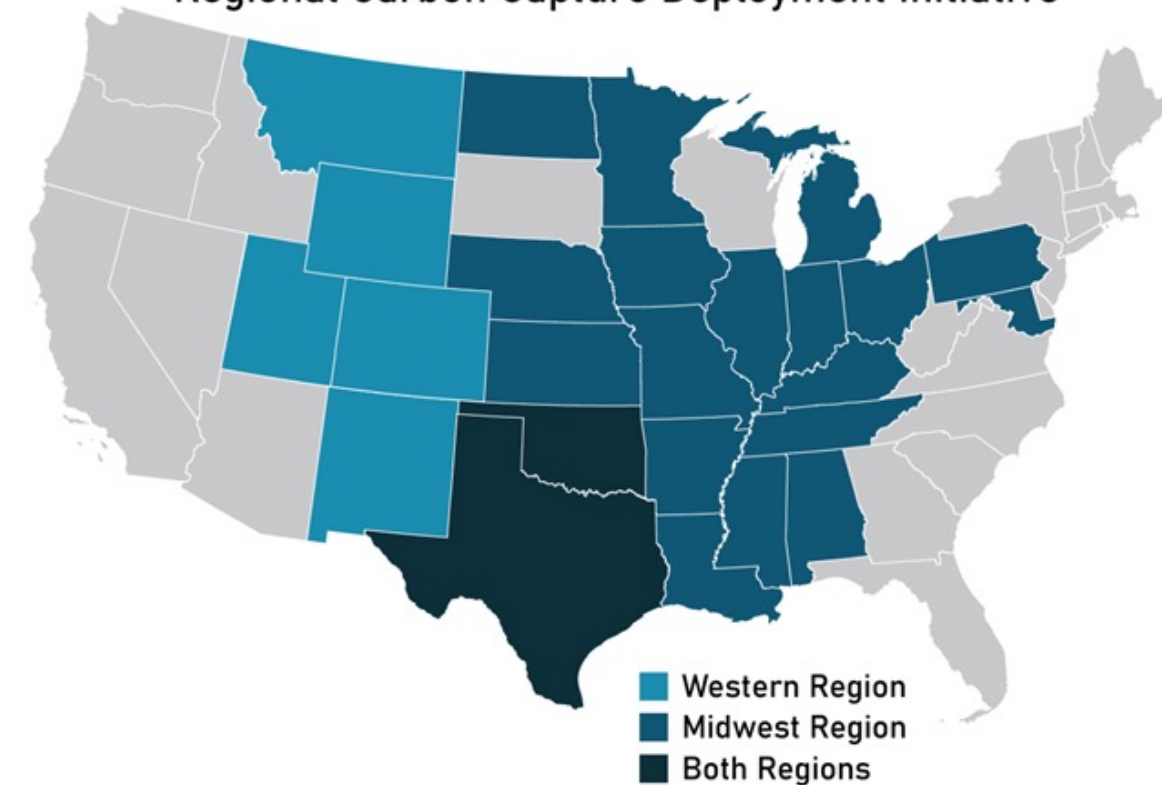
Legend:

- Dark Blue Circle: Hydrogen
- Orange Circle: Direct Air Capture
- Light Blue Circle: In Development
- Dark Blue Circle: Operational

Clean Air Task Force, US Carbon Capture Activity and Project Table, October 2022

Regional Carbon Capture Deployment Initiative / State Advocacy

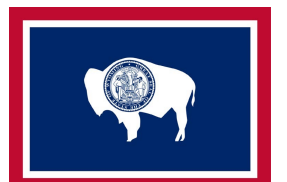
Regional Carbon Capture Deployment Initiative



- Over 800 state officials, companies, NGOs, and unions from two dozen states interested in supporting state and federal policy development.
- 26 states and growing.
- Coordinate state policymaker and stakeholder engagement, development of policy recommendations, and regional deployment modeling and jobs analysis.

State MOU for CO₂ Transport Infrastructure

- **Includes** KS, LA, MD, MT, ND, OK, PA and WY as signatories, other states considering joining
- **Recognizes** that development of CO₂ transport networks, together with financial incentives for carbon capture, can:
 - ✓ support long-term production and use of **domestic natural resources**;
 - ✓ create and preserve **high-paying jobs** in energy-producing, agricultural and industrial states; and
 - ✓ significantly **reduce net carbon emissions**
- **Provides** a collaborative mechanism to jointly develop and implement an action plan for building out regional CO₂ transport infrastructure to enable large-scale carbon management
- **Seeks** to accelerate, through state leadership and coordination, the deployment of common regional CO₂ transport infrastructure networks and carbon hubs to help industries take advantage of economies of scale



Road Map for the Deployment of Carbon Management and Hydrogen Projects in the Commonwealth of Pennsylvania

September 2022

PA Energy Horizons Cross-Sector Collaborative

Prepared by the Great Plains Institute Carbon Management Team on behalf of Team Pennsylvania

- **Modeled deployment potential** for near-term and midcentury carbon capture opportunities in Pennsylvania, with geologic storage potential
- Developed prioritized list of **ten suggested actions** to address challenges to economy-wide deployment
- Provided in multiple formats for general use and consumption, which are hosted by Team Pennsylvania at **teampa.com**

TEAM
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Legislative Digest – Coming Soon

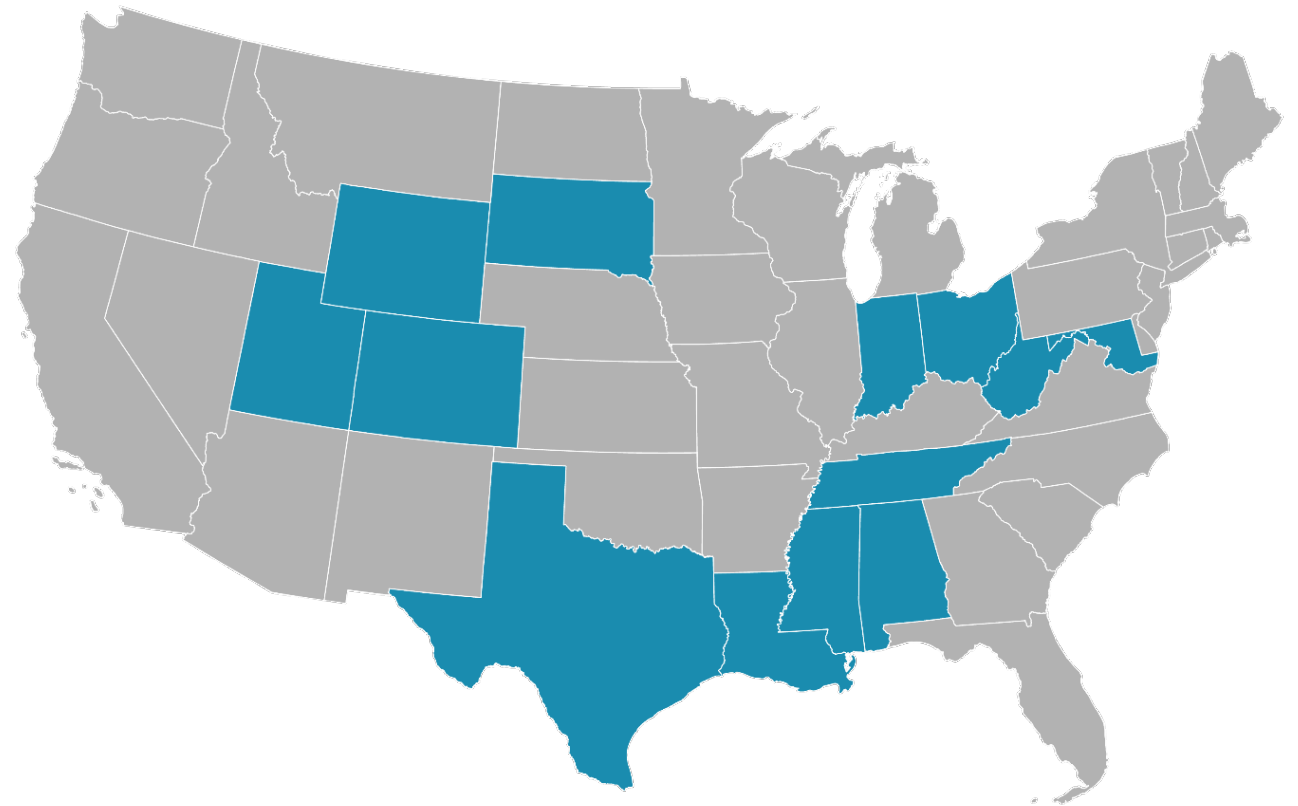
60+ bills were introduced in **26 state houses** in 2022 relating to carbon management

Topics include:

- Industrial Grant programs
- Task Force Development
- Underground Storage
- Class VI

At the state level, legislators enacted bills related to:

- Regulatory Policies and Planning.
- Financial Incentives.



*States with **signed** legislation relating to carbon management in 2022.*

Questions, Comments, Concerns



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