
GREAT PLAINS INSTITUTE
CARBON CAPTURE COALITION
Welcome to DAC Dialogues
Bridging Policy and Innovation for Direct Air Capture Deployment
April 9, 2024

Great Plains Institute

Overview and Mission

- Nonpartisan, nongovernmental organization focused on energy policy and technology.
- Goal is to accelerate the transition to net-zero carbon emissions for the benefit of people, 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 and remove CO_2 for beneficial use and permanent storage.

Carbon Management Program Goal

We lead GPI's regional and national efforts to achieve the economywide deployment of carbon management and industrial decarbonization technologies critical to reaching midcentury net zero goals while prioritizing economic, jobs, environmental, and community benefits. We work with regional and federal governments, tribal nations, industry, labor, nonprofit organizations, and local communities to achieve responsible deployment that centers people in this transition.

Carbon Action Alliance

Industrial Innovation Initiative

a partnership between Great Plains Institute and World Resources Institute

REGIONAL CARBON CAPTURE DEPLOYMENT INITIATIVE

CARBON CAPTURE COALITION

"All hands on deck" to achieve economywide deployment of carbon management in the U.S."

Session Goals and Outcomes

DAC Dialogues:

- Foster synergies between state and federal policy and industry implementation efforts and highlight opportunities for innovation and collaboration across jurisdictions.
- Address key barriers to DAC deployment through open dialogue.

Key Objective:

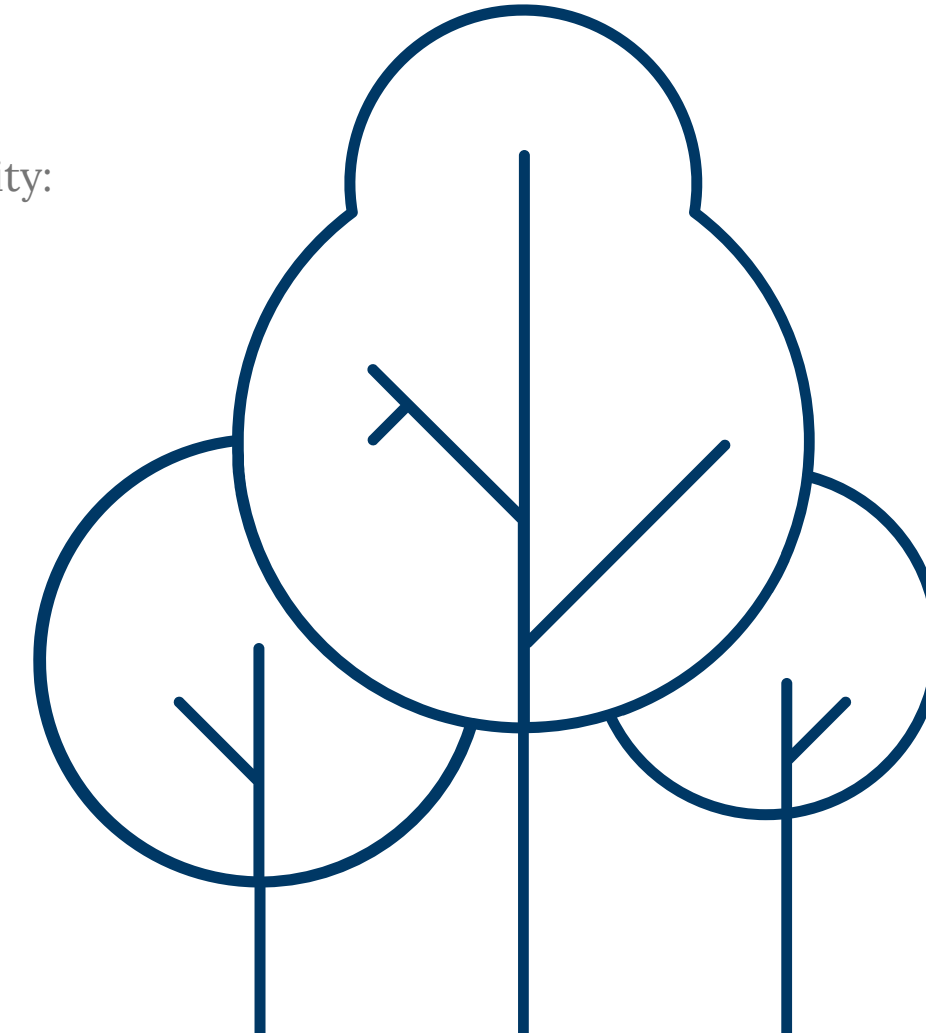
- Identify and address regulatory, financial, and logistical barriers to DAC deployment.

Session Outcomes:

- Potential working group on direct air capture
- Identification of policy needs, strategies, and recommendations.

Agenda

- 8:00 – 9:00 AM: *Registration and Welcome Breakfast*
- 9:00 AM - 9:30 AM: Opening Remarks and Introductions
- 9:30 – 10:30 AM: Collaborative Solutions for DAC Resource Sustainability: Navigating Energy, Water, and Land Challenges
- 10:30 – 10:50 AM: *Networking break*
- 10:50 – 11:05 AM: State Legislative Landscape
- 11:05 AM – 12:00 PM: State Regulatory Dynamics for DAC Projects
- 12:00 – 12:45 PM: *Lunch*



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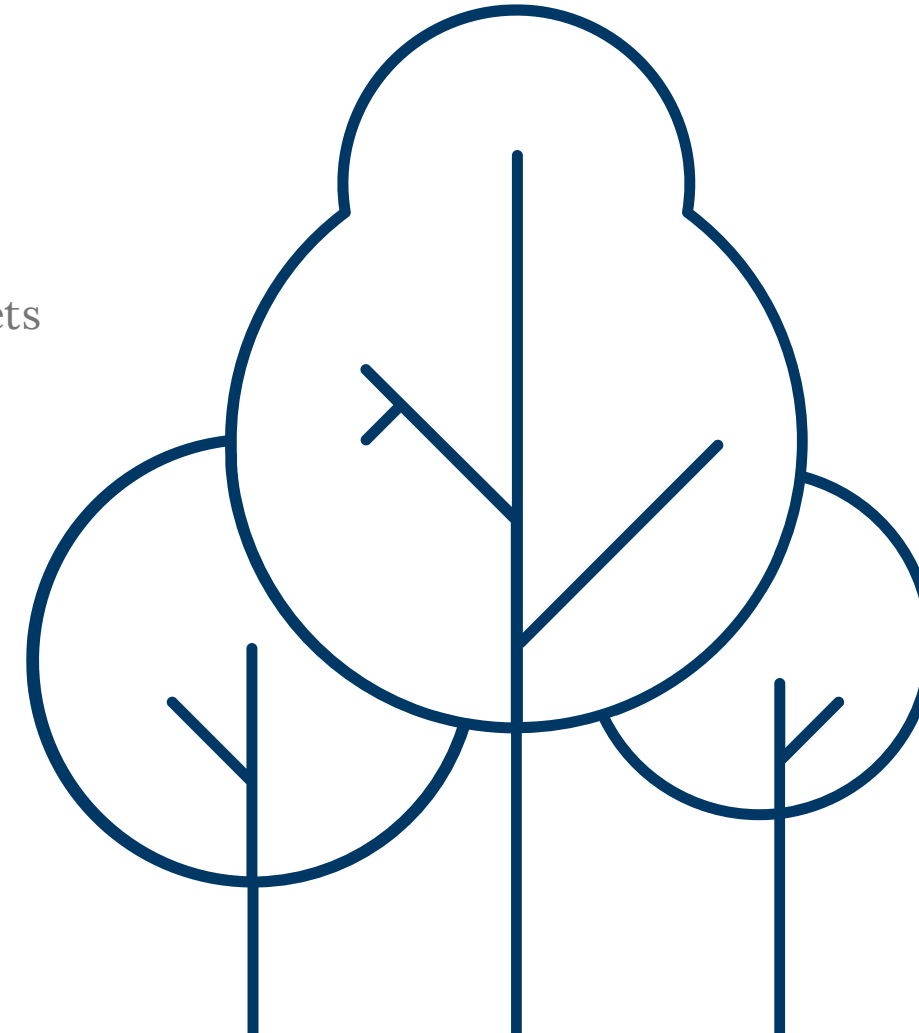
Agenda

- 12:45 – 1:10 PM: Rhodium DAC Hubs Jobs Analysis Preview and Feedback Session
- *1:10 – 1:15 PM: Short Break*
- 1:15 – 1:55 PM: DAC Hubs and Beyond: Reflecting on Federal Program Support
- *1:55 – 2:00 PM: Short Break*
- 2:00 – 2:15 PM: DOE's Insights into Federal Regulations & Carbon Markets
- 2:15– 3:05 PM: Exploring Federal Procedural Pathways and Regulatory Landscape for DAC
- *3:05 – 3:20 PM: Networking Break*
- 3:20 – 4:20 PM: Driving State and Federal DAC Market Development
- 4:20 – 4:25 PM: Final Remarks and Next Steps
- *5:00 PM – 7:00 PM Reception*



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CO_2NNECT

Please contact Carrie Danner (cdanner@gpisd.net) for more information about the event.

Introductions

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Collaborative Solutions for DAC Resource Sustainability

Navigating Energy, Water, and Land Challenges

9:30 to 10:30 AM

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Discussion Questions

Small Group Discussion 1: Identifying Resource Barriers/Issues/Challenges (15 minutes)

- What are the key challenges for integrating DAC systems with renewable energy sources?
- What are the challenges associated with land availability and water usage for deploying and operating DAC plants?

Discussion Questions

Small Group Discussion 2: Addressing Resource Barriers with Policy Solutions (15 minutes):

- What are potential policy solutions for access to grid power, including renewable energy sources for DAC facilities?
- What are the key policy solutions for maximizing land and water use efficiency for DAC facilities?

Discussion Questions

Large Group Discussion: Report Out

(20 minutes)

One member from each group *please* volunteer to report the summary and key points from the discussion within 5 minutes to the group

Networking break

10:30 to 10:50 AM

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State Legislative Landscape

10:50 to 11:05 AM

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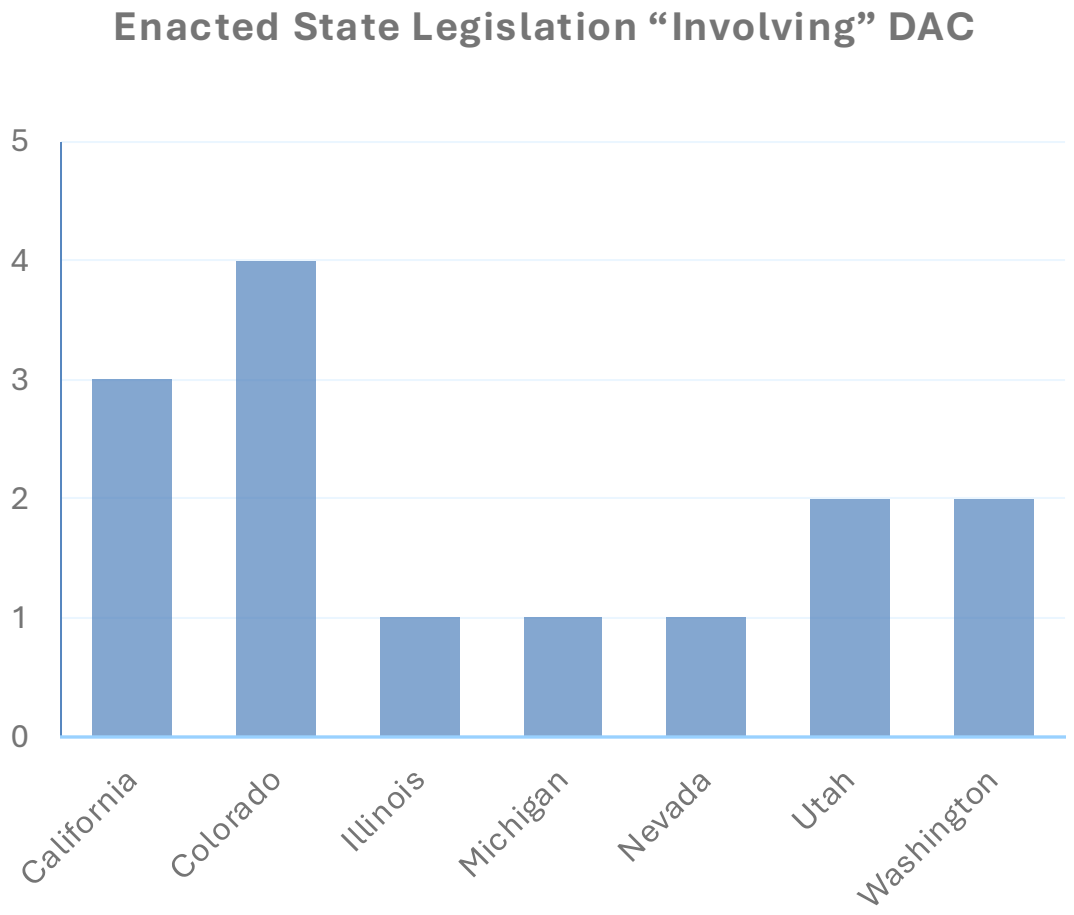
DAC Legislation

Almost 60 state bills mentioning DAC have been introduced over the past five years.

13 state bills with *new* mentions of DAC have been enacted.



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DAC Legislation

2021

- CA SB 27: Carbon Sequestration Registry.

2022

- CA Requires CARB to adopt regulations for CCUS and DAC by Jan 1, 2025.
- CA Carbon Removal Innovation Program.
- CO Industrial and Manufacturing Operations Clean Air Grant Program.
- IL Task force to investigate installing DAC at the Prairie State Generation Campus
- MI Nuclear task force report, one paragraph on DAC
- UT HB244: Lays groundwork for regulatory oversight of geological carbon storage, including DAC.

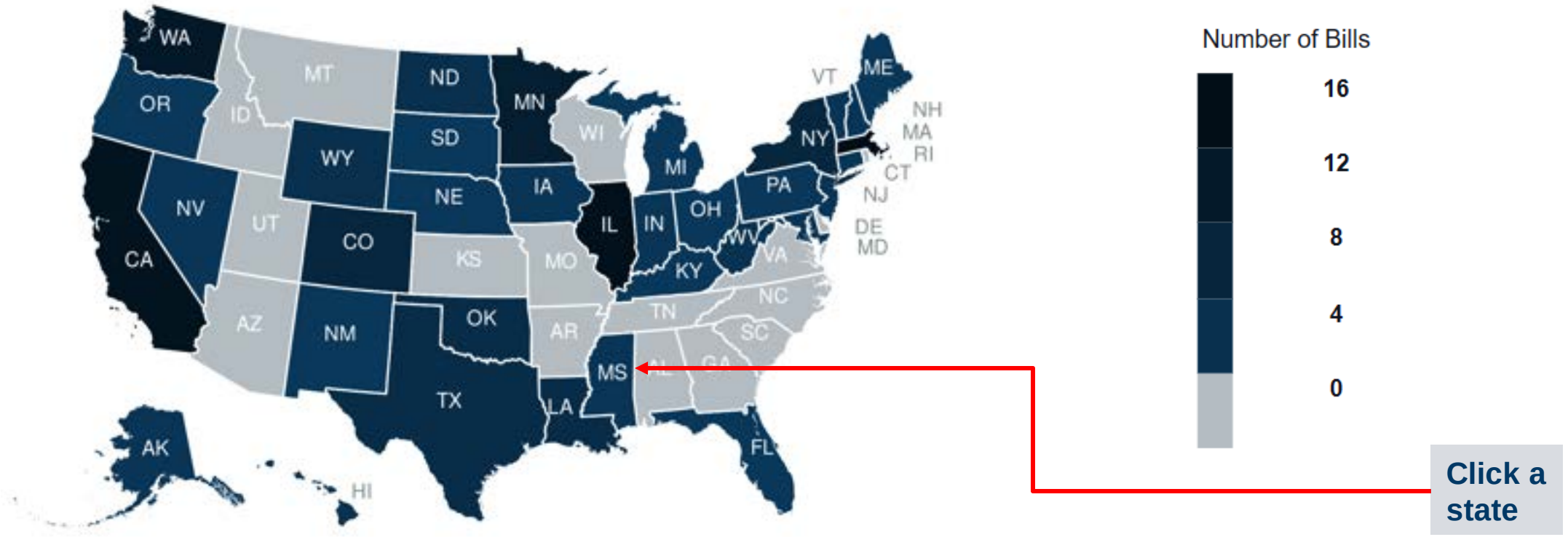
2023

- CO Roadmap for carbon management
- CO Geothermal Electricity Grant.
- CO Tax Credits for Greenhouse Gas Emissions Reduction Improvements.

2024

- UT 452: Establishes a fund for regulatory expenses related to CO_2 storage facilities, including DAC projects.

2024 State Legislative Tracking



Explore our Tracker *for more detail on key bills enacted or under consideration in states this legislative session. The tracker is neither exhaustive nor complete. If you're aware of legislation that is not listed, please email us.*

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DAC 2024 (or current session)

- 18 mentions this session
- Seven notable bills.
- Definitions and several funding mechanisms mentioned.
- Tax credit
- Aviation fuel
- Regulation

- **CO HB24-1346: (**expands the commission's authority to regulate DAC facilities).
- **HI SB 2451 and SB 1002:** requires the Hawaii State Energy Office and the Natural Energy Institute to develop and submit reports on plans for constructing at least one DAC plant in the state by 2029).
- **HI HB 389:** introduces tax credit to incentivize entities, including DAC facilities, to capture and store CO_2.)
- **MA 2096:** Lists methods of CO_2 removal, including DAC with funding facilitated through a reverse auction mechanism.
- **MN SF 4225 and 4011, MNH.F.4322:** Defines sustainable aviation fuel as liquid fuel derived from biomass, gaseous carbon oxides from biomass or DAC or green electrolytic hydrogen.
- **NY A 3223:** DAC considered for CO_2 offsets, part of requirements for facilities meeting emission reduction targets.
- **UT 452: (enacted)** Establishes a fund for regulatory expenses related to CO_2 storage facilities, including those from DAC projects.

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Key themes

- Over 90 Bills introduced or carried over to 2024
- Few mentions of DAC
- Diverse focus, including carbon transport, storage, and low carbon fuel standards.
- Louisiana, Illinois, and Hawaii lead in bill count per state.

- **Incentives and Economic Development**
  - Establishment of revenue funds and fee structures
  - Sustainable aviation fuel definitions
  - Integration of carbon capture for state incentives
- **CO_2 Transport Infrastructure**
  - Regulation of pipeline standards and siting
  - Measures limiting eminent domain
  - Anticipating PHMSA regulatory guidance
- **Ownership and Regulation of Pore Space**
  - Governance of pore space ownership
  - Long-term liability modifications
  - Adoption of unitization principles
- **Storage Moratoriums and Safety Standards**
  - Detailing prohibited storage locations/environmental protection
  - Extending notification timeframes

CO_2 Transport

Legislative activity related to CO_2 pipelines has increased over the past two years Throughout 2023, most proposed bills were in the Midwest and failed to pass. Moving into 2024, this momentum has persisted with the introduction of many bills spanning the Midwest and various regions.

Examples (Not Enacted):

- **Louisiana HB 389**: 10-year CO_2 transport moratorium in specific nature areas
- **California AB 2623**: Expands intrastate CO_2 pipeline regulations, mandates safety requirements.
- **Illinois SB 2860**: Prohibits eminent domain use for CO_2 pipeline easements.
- **Illinois HB 4835 & SB 3441**: Proposes CO_2 pipeline construction halt until federal safety standards are revised.
- **Iowa SF 2097**: Mandates new safety standards for CO_2 pipelines.

Examples (Enacted):

- **South Dakota SB 201:** Establishes guidelines for CO_2 pipelines.
- **South Dakota HB 1186:** Sets legal frameworks for CO_2 pipeline easements.

CO_2 Storage

Rights regarding CO_2 storage pore space (AL HB 327 and SB 230).

Establishing or modifying regulatory frameworks for CO_2 storage facilities (CO HB 24-1346, MN SF 5048, PA SB 831, LA HB 516, LA HB 937).

Establishment of funds for monitoring and regulating CO_2 storage facilities (AL HB 327 and SB 230).

Addressing environmental concerns and liability transfer for CO_2 storage activities (CO HB 24-1346, LA HB 289, PA SB 831, WV HB 5045 and SB 596, NM SB 215).

Unitization of pore space or amalgamation of pore space (AL HB 327 and SB 230, CO HB 24-1346, LA HB 516, PA SB 831).

Financing

- Tax Credits
- Project Financing Assistance
- Regulatory Fee Framework
- Revenue Allocation

Project funding

- California, AB 2731 makes qualified CO_2 capture facilities **eligible for financing**.
- Hawaii H.B. 389 introduces a **tax credit** to incentivize entities, including DAC facilities, to capture and store CO_2.
- Kentucky Senate Bill 313 introduces incentives to promote the production and adoption of sustainable aviation fuel. This bill offers **tax credits**, including incentives for sustainable aviation fuel facilities with significant investments.
- Utah HB 124 (**enacted**) expands the definition of emissions reduction projects to include carbon capture utilization and storage, making them eligible for **high-cost infrastructure development tax credits**.

State Funding

- Louisiana HB 934 focuses on the allocation of revenue generated from CO_2 storage on state lands and water bottoms, proposing amendments to ensure proper **allocation of funds into the state treasury and to the respective parish**.
- Pennsylvania SB 831 also **sets fees** associated with administrative hearings and other regulatory processes
- New York's A 8469 proposes to establish an **economy-wide cap and invest program** that incorporates carbon capture technologies to fulfill emissions reduction obligations. This ambitious initiative aims to incentivize the adoption of carbon capture technologies across various sectors of the economy.

Enacted

- Carbon transport regulations
- Carbon storage fund
- Definition of carbon-negative
- Closure and long-term liability
- Tax credit

- **Mississippi SB 2059** classifies bioenergy from biomass as renewable and carbon neutral. When paired with carbon capture and storage, it becomes carbon-negative.
- **South Dakota SB 201** requires pipeline companies to report on CO_2 operations, including whether they claim a tax credit under 26 U.S.C. § 45Q for carbon storage in that year. The bill allows counties to impose surcharges and addresses taxation, enforcement, and liability aspects related to CO_2 pipeline operations.
- **South Dakota HB 1186** establishes legal frameworks for granting, recording, and terminating CO_2 pipeline easements.
- **Utah HB 124** includes carbon capture utilization and storage, or other emissions reduction technology in the definition of an emissions reduction project. The bill adds emissions reduction projects to the definition of "infrastructure," making them eligible for a high-cost infrastructure development tax credit.
- **Utah HB 452** repeals two existing funds and establishes the **“**Carbon Dioxide Storage Fund**”** as a special revenue fund. The fund finances regulatory expenses for storage facilities, including construction, operation, and pre-closure activities. It also funds permitting, inspection, monitoring, investigation, reporting, long-term monitoring, remediation, and repair of storage facilities and injection wells.
- **West Virginia HB 5045** and **SB 596** extend the period for issuing a completion certificate after CO_2 injections to at least 50 years, with compliance requirements. The bill also clarifies that releasing liability from the operator to the state does not exempt current or former owners or operators from liability arising from noncompliance with underground injection control laws, regulations, or permits.

State Regulatory Dynamics for DAC Projects

11:05 AM to 12:00 PM

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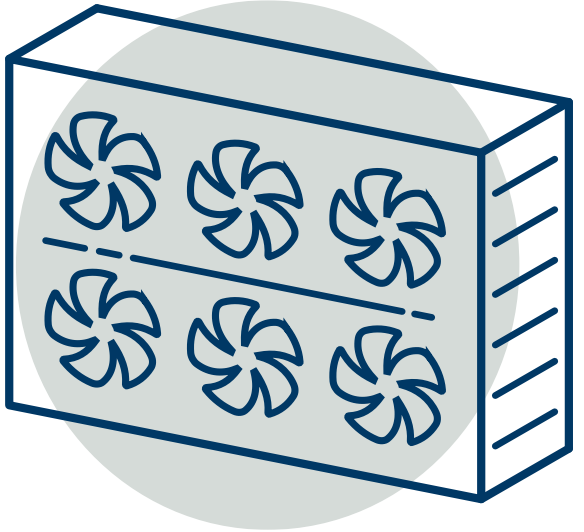
DAC Siting

Current legislation does not address the siting of DAC facilities.

Implications:

- Lack of legislation addressing siting could lead to:
- Uncertainty for DAC projects.
- Potential delays in deployment.
- Challenges in securing suitable locations.



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Discussion Questions

Small Group Discussion: Key State Policies Necessary for DAC Deployment (30 minutes)

- What are the key regulatory requirements and permitting processes that could be streamlined for timely and responsible deployment of DAC facilities?

- What are the gaps in the current permitting processes?

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Discussion Questions

Large Group Discussion: Incentivizing State Policy Development (20 minutes)

- Are there any general thoughts on responses on the need for state-level policies for DAC deployment that were mentioned in the report-out from the groups?

Lunch

12:00 PM to 12:45 PM

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Rhodium Group

The Economic Benefits of Direct Air Capture Hubs

South Texas DAC Hub and Project Cypress

Preliminary – DO NOT CITE

Energy & Climate

April 9th, 2024

Galen Bower, Nathan Pastorek, Whitney Jones, and Ben King

About Rhodium Group

Rhodium Group is an independent research provider with deep expertise in policy and economic analysis. We help decision-makers in both the public and private sectors navigate global challenges through objective, original, and data-driven research and insights. Our key areas of expertise are China's economy and policy dynamics, and global climate change and energy systems. More information is available at www.rhg.com.

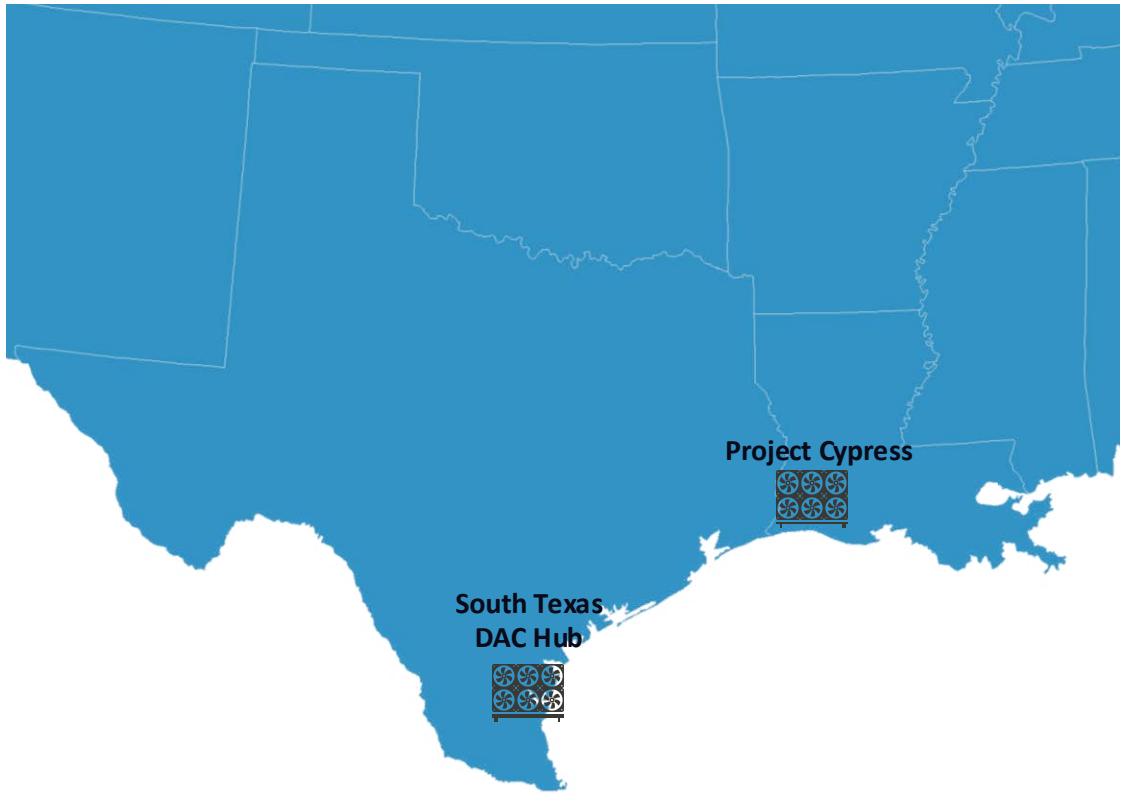
Contents

Analysis overview and objectives

The Economic Benefits of Direct Air Capture Hubs

- The Regional Direct Air Capture Hubs program will ultimately provide $3.5B in funding to four commercial-scale DAC hub projects. At the time of this analysis, the DOE has announced two projects: the South Texas DAC Hub in Texas and Project Cypress in Louisiana (see map).
- The Great Plains Institute commissioned Rhodium Group to conduct an independent analysis exploring the direct economic benefits (capital investment and job creation) associated with constructing and operating the announced DAC hubs.

Announced DAC Hub Locations



Source: Rhodium Group.

Preliminary – DO NOT CITE

Methodology and assumptions

Cost research

Review of public and private industry cost estimates and expert interviews to develop estimates of capital costs and ongoing O&M costs for DAC facilities as well as for onshore CO_2 storage.

Employment analysis

IMPLAN's state-level tools to translate costs into the employment analysis.

NREL's Jobs and Economic Development Impact (JEDI) model for the on-site solar employment analysis at the South Texas DAC Hub.

Outputs

Reported employment numbers represent in-state jobs related to the construction, engineering, materials, equipment, energy, and labor to build and operate the hubs. Employment estimates do not include upstream supply chain jobs or induced jobs.

South Texas DAC Hub

Key information about the South Texas DAC Hub

Kleberg County, Texas

Plant Attributes

- The plant is expected to have 1 million metric tons (MMt) of annual CO_2 capture capacity.
- This plant will use Carbon Engineering's liquid solvent DAC technology.
- This hub will include on-site CO_2 injection and storage and on-site solar power.

Industry Stakeholders

- Owner: 1PointFive (Occidental subsidiary)
- DAC Technology Provider: Carbon Engineering (Oxy Low Carbon Ventures/Occidental subsidiary)
- Expected EPC contractor: The Worley Group

Investment

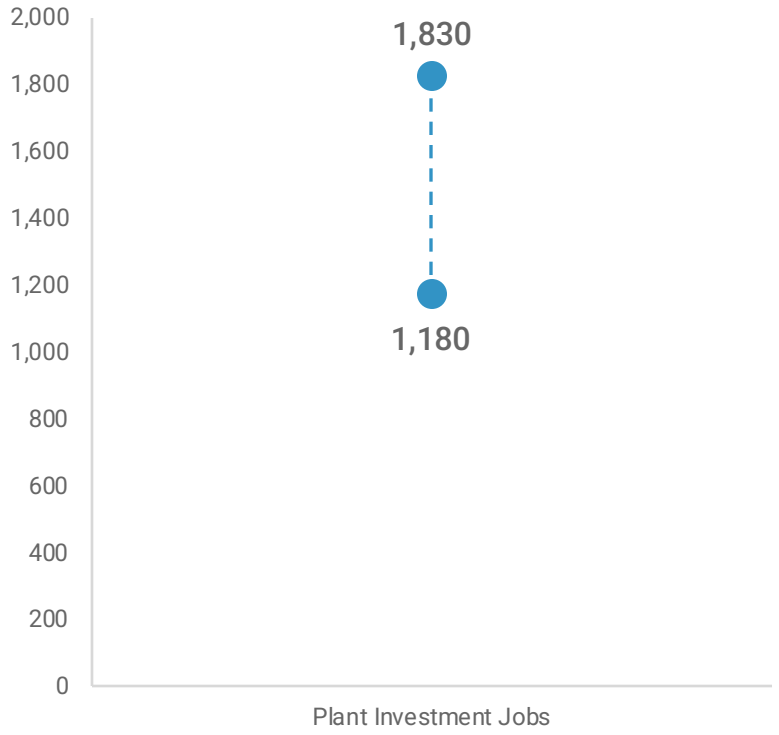
- Rhodium estimates a total investment of $1.3 to $2 billion will be required to support building this DAC plant.
- The federal government has committed approximately $600 million in funding to this project under the Infrastructure Investment, and Jobs Act (IIJA).

Construction and Installation

Numbers reflect a 1MMt capture capacity plant

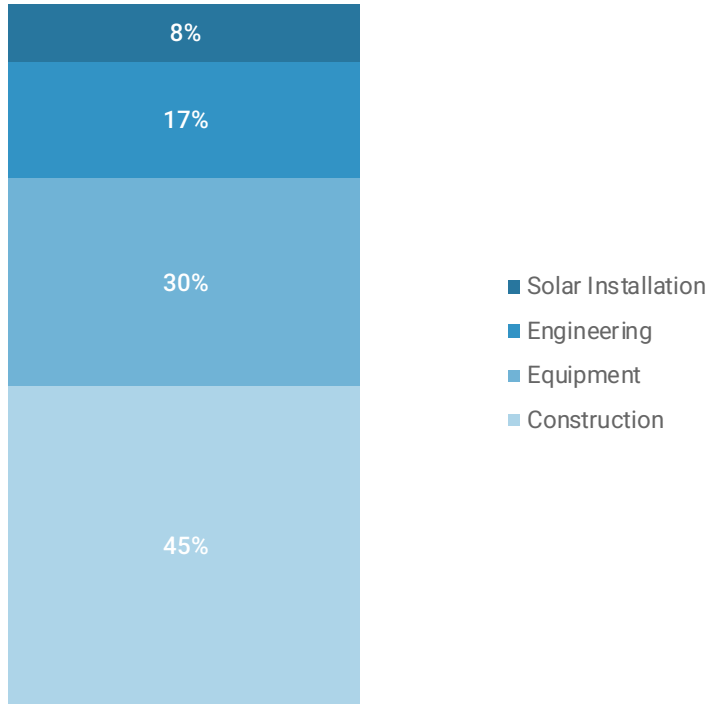
Plant Investment Jobs

Average annual jobs over 5-year construction period



Breakdown of Plant Investment Jobs

Percentage of jobs by industry



- Includes 110 to 140 average annual jobs associated with on-site solar installation.
- This hub will have on-site CO_2 injection and storage. An additional 10 to 15 average annual jobs are associated with establishing these wells.

Source: Rhodium Group analysis, Keith et al. 2018, National Academies of Sciences, Engineering, and Medicine (NASEM), Department of Energy, NREL.
Notes: Values reflect a range of liquid solvent DAC plant cost and performance estimates. Plant investment, solar installation, and CO_2 storage investment jobs are annualized over an assumed 5-year construction period.

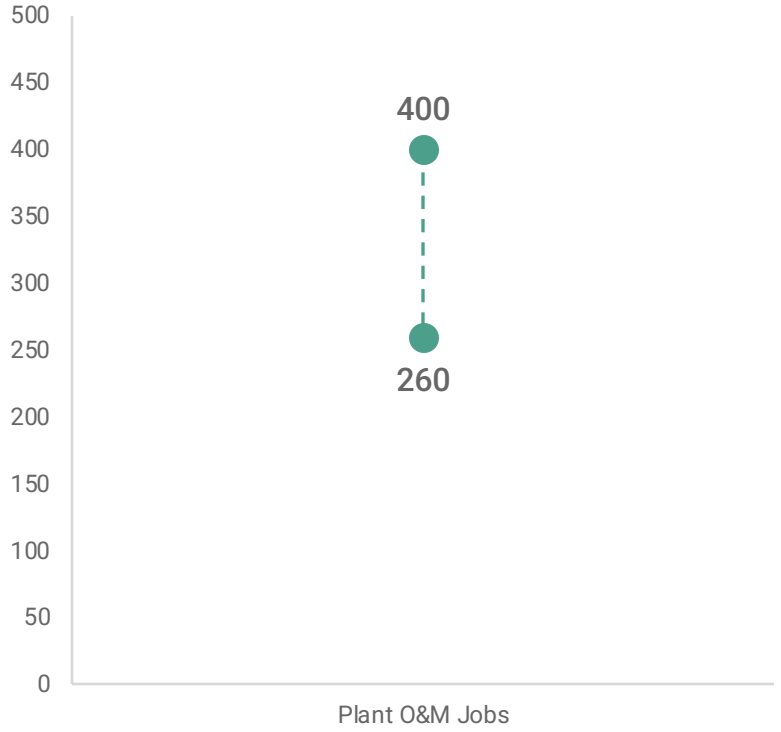
Preliminary – DO NOT CITE

Operations and Maintenance (O&M)

Numbers reflect a 1MMt capture capacity plant

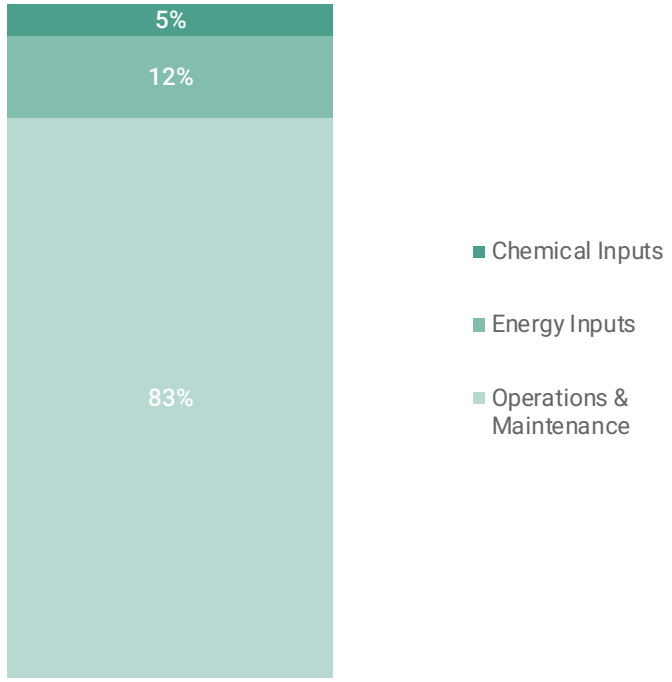
Ongoing O&M Jobs

Average annual jobs over the lifetime of the plant



Breakdown of O&M Jobs

Percentage of ongoing jobs by industry



- Additionally, 6 to 9 ongoing jobs are associated with the 1MMt of annual CO_2 storage.

Source: Rhodium Group analysis, Keith et al. 2018., NASEM, Department of Energy, NREL.
Notes: Values reflect a range of liquid solvent DAC plant cost and performance estimates. We expect liquid solvent DAC plants to be operational for about 20-25 years. Ongoing CO_2 injection and storage jobs are associated with just the 1MMt from the DAC facility; however, project leads have indicated they are open to storing CO_2 from other projects in the area. Project assumes an injection depth of 10,000 feet.

Project Cypress DAC Hub

Key Information about Project Cypress

Calcasieu Parish, Louisiana

Plant Attributes

- The plant is expected to have 1 million metric tons (MMt) of annual CO_2 capture capacity.
- This plant will use a combination of DAC methods, both Climeworks' solid sorbent technology and Heirloom's mineralization technology.

Industry Stakeholders

- Owner: Batelle
- DAC Technology Providers: Climeworks Corporation and Heirloom Carbon Technologies
- Expected CO_2 Offtaker: Gulf Coast Sequestration

Investment

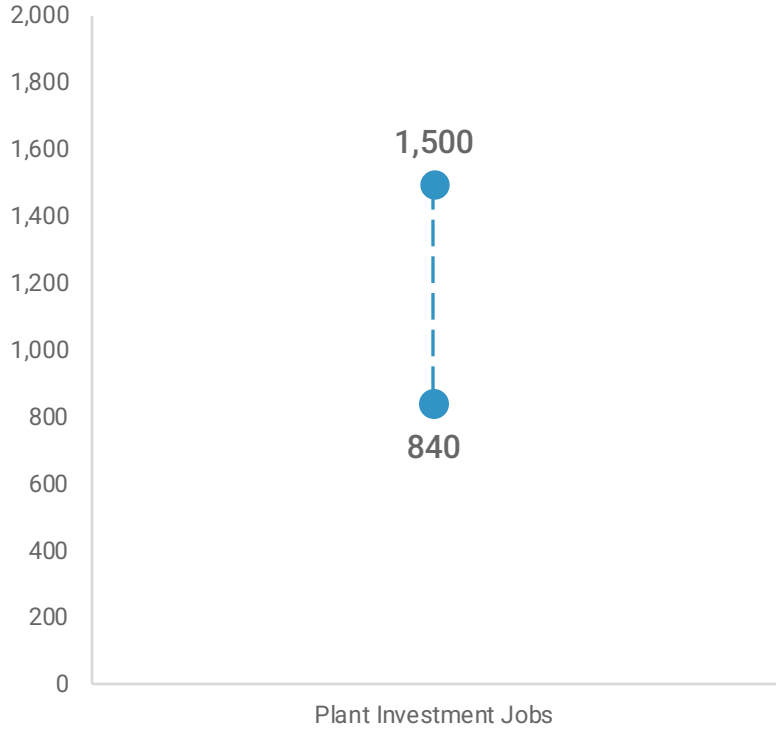
- Rhodium estimates a total investment of $1.0 to $1.7 billion will be required to support building this DAC plant.
- The federal government has committed approximately $600 million in funding to this project under the Infrastructure Investment, and Jobs Act (IIJA).

Construction and Installation

Numbers reflect a 1MMt capture capacity plant

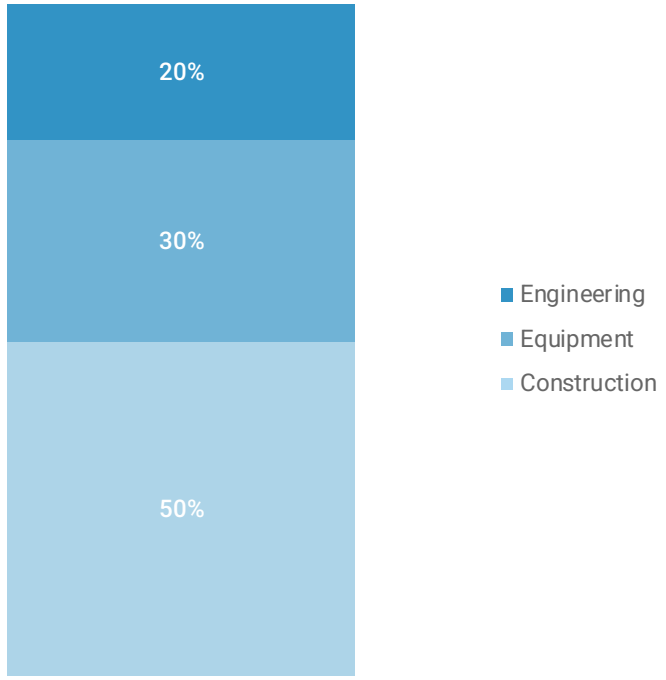
Plant Investment Jobs

Average annual jobs over 5-year construction period



Breakdown of Plant Investment Jobs

Percentage of jobs by industry



- In addition, 10 to 15 average annual jobs are associated with establishing CO_2 injection and storage wells.

Source: Rhodium Group analysis, NASEM, Heirloom, Department of Energy.
Notes: Values reflect a range of solid sorbent and mineralization DAC plant cost and performance estimates. We expect DAC plants to be operational for about 20-25 years. Plant investment, solar installation, and CO_2 storage investment jobs are annualized over an assumed 5-year construction period.

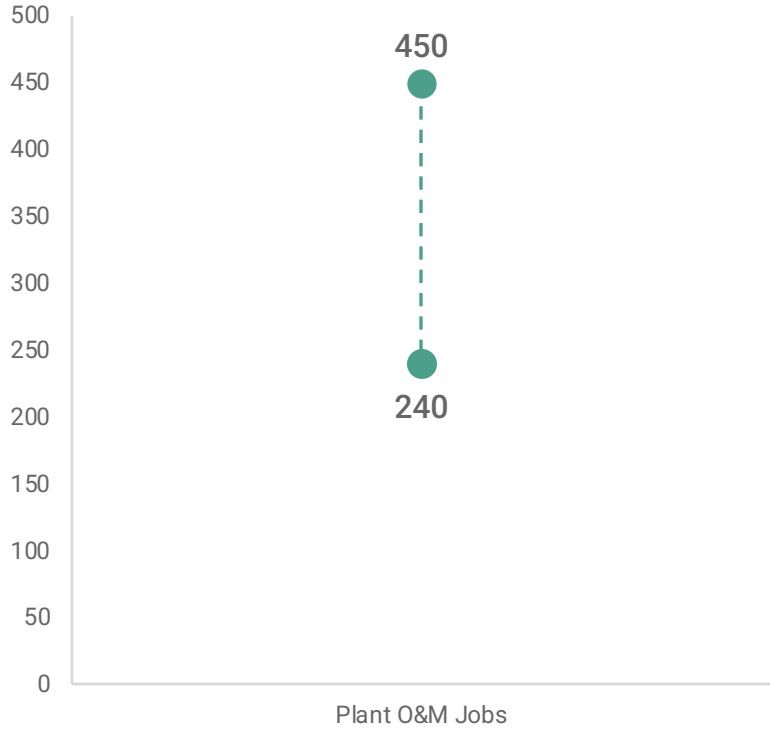
Preliminary – DO NOT CITE

Operations and Maintenance (O&M)

Numbers reflect a 1MMt capture capacity plant

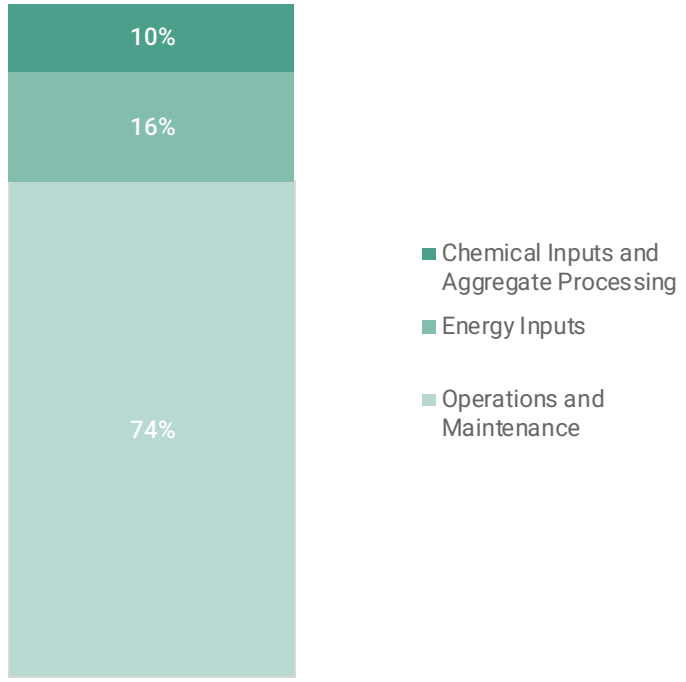
Ongoing O&M Jobs

Average annual jobs over the lifetime of the plant



Breakdown of O&M Jobs

Percentage of ongoing jobs by industry



- Additionally, 8 to 10 ongoing jobs are associated with the 1MMt of annual CO_2 storage.

Source: Rhodium Group analysis, NASEM, Heirloom, Department of Energy.
Notes: Values reflect a range of solid sorbent and mineralization DAC plant cost and performance estimates. We expect DAC plants to be operational for about 20-25 years. Ongoing CO_2 injection and storage jobs are associated with just the 1MMt from the DAC facility. Project assumes an injection depth of 8,200 feet.

Preliminary – DO NOT CITE

Complimentary Rhodium Analysis

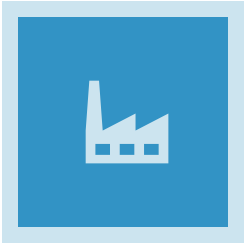
Complimentary Rhodium Analysis

Dashboard

Direct Air Capture Deployment and Economic Opportunity: State-by-State

Note

Direct Air Capture Work Force Development: Opportunities by Occupation



Dashboard

Carbon Capture and Storage Workforce Development: State-by-State

Forthcoming Report

The Landscape of Carbon Dioxide Removal and US Policies to Scale Solutions

Thoughts or questions?

- Better categorization than mineralization?
- 5-year construction period
- 50/50 split between Heirloom and Climeworks

Galen Bower: gbower@rhg.com

Rhodium Group

The Economic Benefits of Direct Air Capture Hubs

Preliminary – DO NOT CITE

New York | California | Washington, DC | Paris
Website: www.rhg.com

Short break

1:10 PM to 1:15 PM

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DAC Hubs and Beyond

Reflecting on Federal Program Support

1:15 PM to 1:55 PM

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Federal Support on DAC

- BIL and IRA are two major pillars of federal support for DAC

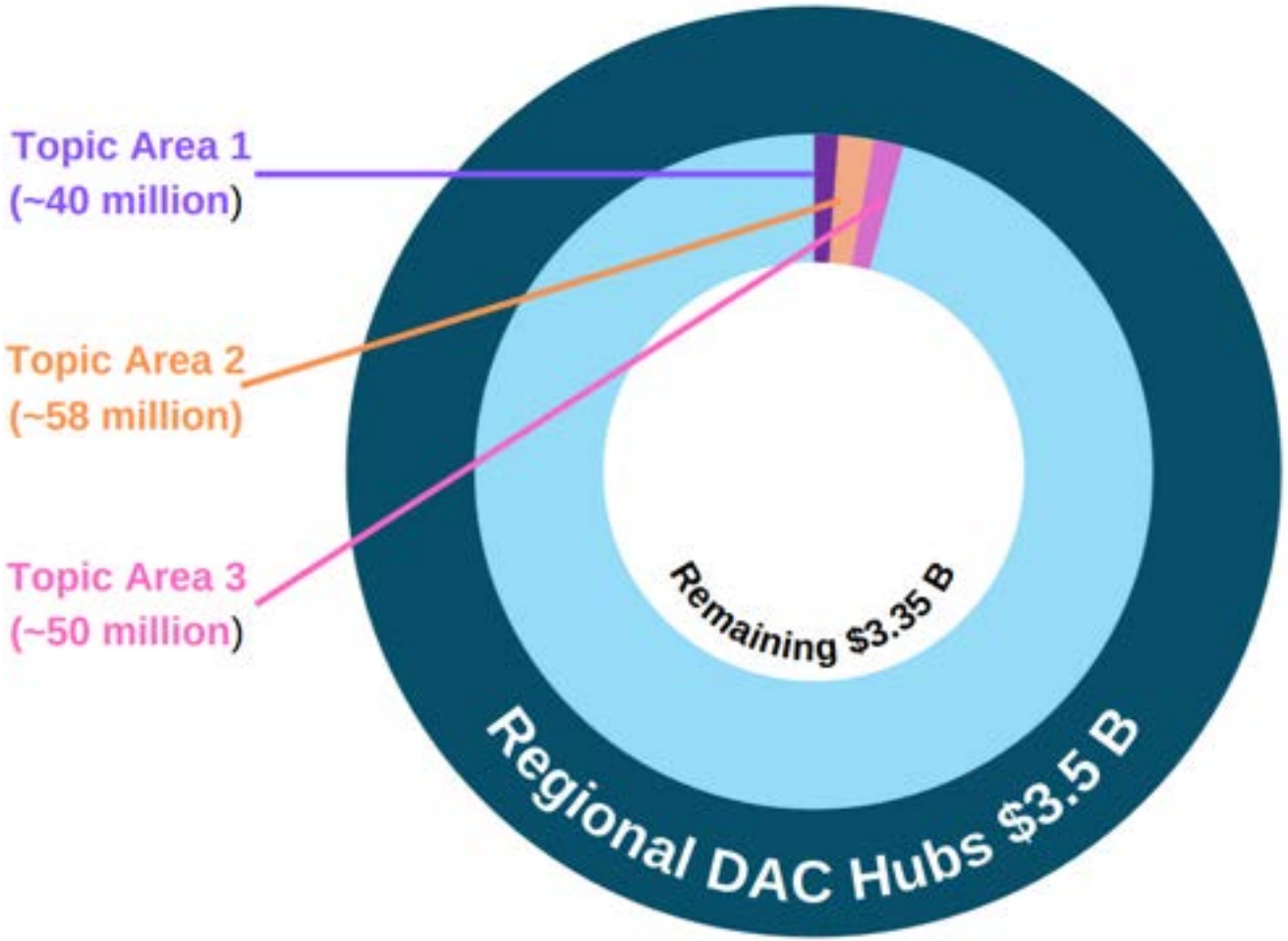
Infrastructure Investment and Jobs Act (IIJA) or Bipartisan Infrastructure Law (BIL)

- BIL allocated around $12 billion for carbon management technology for five-year period
- More than a quarter of the BIL fund or $3.5 billion is appropriated for Regional DAC Hubs

Inflation Reduction Act (IRA)

- IRA increased 45Q credit values to $180 per metric ton, $130 per metric ton and $130 per metric for geologic storage, carbon utilization, and enhanced oil recovery respectively for carbon captured through DAC

Overview on DAC Hubs Funding



- BIL appropriates 3.5 billion for Regional DAC Hubs Program from FY 2022 through FY 2026
- DOE released a FOA in December 2022 making $1.236 billion available for Regional DAC Hubs
- In August 2023, DOE awarded 14 Topic Area projects with around 40 million, 5 Topic Area projects with 58 million and selected two Topic Area 3 awardees for negotiation
- In late March 2024, DOE awarded around 50 million to Topic Area 3 awardee — Project Cypress for initial project phase

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DAC Today

- 53 DAC facilities are projected to be operational worldwide by end of 2024, capturing a combined 58 ktCO2/yr.
- In the US, over 20 plants are listed. Most facilities are small.

DAC Announced Facilities: Information and map sourced from the Direct Air Capture Coalition website

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Discussion Questions

Large Group Discussion: Potential responses to OCED's RFI on mid-scale DAC facilities (15 minutes):

- What are your thoughts on OCED’s potential program on mid-scale DAC Hub demonstration facilities?

Discussion Questions

Large Group Discussion: Assessing Federal DAC Funding (20 minutes)

- What gaps exist within current federal support and incentives in moving DAC projects forward?

- Are there any potential policy tools that the federal government could adopt for complementing on going federal support for DAC?

Short break

1:55 PM to 2:00 PM

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9 April 2024

Insights into Federal Regulations & Carbon Markets

Rory Jacobson, Division Director for Carbon Dioxide Removal
Fossil Energy and Carbon Management

DRAFT – FOR DISCUSSION ONLY

U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

DOE launches Voluntary CDR Purchasing Challenge to support carbon removal credits

- Carbon dioxide removal (CDR) plays a **crucial role** in the U.S. strategy to mitigate climate change[1] but is a small part of the overall voluntary carbon market (VCM)
- **DOE administers several programs supporting CDR,** including the $3.5B Regional DAC Hubs, $35M CDR Purchase Pilot Prize (additional $20M appropriated), and $100M Carbon Negative Shot Pilots
- However, **CDR investment must be far larger** to be on track for net-zero by 2050[2]
- To reinforce its investments, DOE is **driving private sector support through the new Voluntary CDR Purchasing Challenge** announced with a Notice of Intent in March 2024
  - Challenges other organizations to **join DOE in buying high-quality carbon removal credits** in the voluntary market
  - Creates a **public leaderboard** to drive excitement and publish purchase data
  - Requires **no new funding**
- The challenge's **major benefits include:**
  - Attracting private investment to **multiply government dollars** for much-needed CDR investment
  - **Driving market transparency with new public data** on credit purchases: price, quantity, terms, quality review, etc.
  - Improving **public resources to navigate the VCM confidently,** especially with a focus on high-quality carbon removals

Source: [1] The Long-Term Strategy of the United States, U.S. Department of State and U.S. Executive Office of the President 2021; [2] CDR.fyi data and DOE analysis

Purchases should align with DOE's Carbon Negative Shot guidelines for carbon removals

Carbon Negative Shot is a DOE-wide effort to advance high-quality, affordable CDR by 2032

Criteria	Carbon Negative Shot guidelines
Durability	Secures geologic or equivalent storage for >100 years
Cost	Has a path to <$100 per net tCO_2e for both capture and storage
Scale	Can enable gigaton-scale removal
Measurability	Supports accessible and verifiable monitoring, reporting, & verification (MRV) methods
Net negativity	Employs robust accounting of full lifecycle emissions
Community benefits	Aligns with the Responsible Carbon Management Initiative
Other	Additional, safe, legal, and no leakage

Note: CDR approaches depicted are not exhaustive
Source: Carbon Negative Shot, DOE 2021

Criteria support solution diversity across multiple approaches

ENERGY earthshots U.S. DEPARTMENT OF ENERGY | Carbon Negative™

Challenge multiplies the impact of CDR appropriations and has already elicited $35M in private commitments

DOE received ~$155M over FY22-24 combined to support CDR pilots

- CDR Purchase Pilot Prize will procure up to **$35M** in high-quality CDR credits; additional **$20M** via FY24 JES
- Carbon Negative Shot Pilots fund **a further $100M** for other CDR approaches
- The **challenge increases the impact and efficiency** of these DOE appropriations with the private sector
- Together, total funding for CDR must grow to **tens of billions** annually to be on track for net-zero by 2050

Challenge coordinates private sector groups interested in CDR to multiply impact

- Participants **buy carbon removals** themselves and report them to the challenge
  - No minimum quantity or delivery date
  - Credits must be permanent removals
- The challenge already inspired **Google to pledge $35M,** doubling DOE's initial CDR Purchase Pilot Prize funding:

*"We're proud to be the first company to pledge to **match the DOE's program dollar for dollar**"*

Randy Spock,
Google Carbon Credits and Removals Lead

Interagency Coordination Bolsters the Impact of DOE Investment Though an "All of Government" Approach

DOE pilots credit procurement, supports RD&D, and outlines MRV best practices

- DOE can **disseminate findings from the first round of purchases** to refine future iterations and advance private commitments.
- Advancing technical guidance on LCA/MRV will **help other agencies and departments improve national accounting**
- Further **coordination is underway to avoid duplicative efforts and advance information sharing**, especially in the context of high-quality CDR

Other agencies streamline regulation and ensure safety of infrastructure and markets

- CFTC Issues proposed **Guidance on Listing of Voluntary Carbon Credit Derivative Contracts** (Dec 2023)
- SEC Adopts Rules to **Enhance and Standardize Climate-Related Disclosures for Investors** (March 2024)
- Advancements in EPA Class VI review, CEQ CCUS guidance, and forthcoming PHMSA rule on CO2 pipelines can **bolster investor and demand confidence**.
- Land/subsurface coordination with USFS, DOI (BLM, BSEE, & BOEM)

FECM administers the challenge and is currently engaging the public on how best to design it

Overall, DOE's current focus is refining the challenge design and rules. Please share input with the FECM team or to the public comment period running through May 15 at voluntaryCDRchallenge@hq.doe.gov

Goal for CDR market	Challenge role
Generating demand	• **Engagement meetings** with public and private sector carbon removal stakeholders • **Statements, endorsements, and events** • **Press** and social media coverage
Transparency	• Designing the challenge **leaderboard** to maximize usefulness and transparency • Exploring CDR purchase **data aggregation** across buyers, marketplaces, and registries
Guidance for buyers	• Designing **website** on carbon removal with information to navigate the market
Standardizing quality	• Defining challenge **credit quality guidelines,** building on Carbon Negative Shot and CDR Purchase Pilot Prize criteria

APPENDIX

Both the public and private sectors drive CDR demand; the private sector is a key catalyst over the next 5 years

Recent progress in …

	Public sector	Private sector
Funding	• Bipartisan Infrastructure Law (2021) funded CDR programs including **$3.5B Regional DAC Hubs** • $35M CDR Purchase Pilot Prize (2023) pioneered **1st government carbon removals** • Inflation Reduction Act (2022) enhanced the **45Q tax credit** to include DAC	• **$1.2B invested** in the CDR market in 2023, roughly doubling the all-time total[1] • Carbon removal purchases have **grown >5X every year** for the last 3 years[2]
Frameworks	• E.U. developing **1st government-backed Carbon Removal Certification Framework** (2024) • **California S.B. 308** (2023) proposes requiring polluters purchase state-certified CDR credits	• Prevailing guidance updated to assert many **corporate climate targets require CDR**[3] • Growing support for **separate fixed targets** for emissions reductions and CDR[4]
Summary	• Government support is gradually materializing but **likely will not create necessary demand by 2030** on its own; more funding and policy support is needed	• Private sector has a much-needed opportunity to **move rapidly to support removals** over the next 5 years

Source: [1] 2023 Investment Landscape, CDR.fyi 2024; [2] 2023 Year in Review, CDR.fyi 2024; [3] Corporate Net-Zero Standard: Version 1.1, SBTi 2023; Claims Code of Practice: v.2, VCMI 2023; [4] How to avoid carbon removal delaying emissions reductions, Carbon Gap 2023; Above and Beyond, SBTi 2024

Why should buyers participate in the challenge?

Get into the CDR space	• One of the most **high-quality, credible climate solutions** for your climate goals • Many organizations are recognizing they will **eventually need to purchase CDR** • **First movers will have an advantage** by establishing supplier relationships and beneficial terms now, given projected limited supply
Maximize your impact with the challenge	• Turbocharge **innovation and transparency** in carbon removals for everyone • Amplified impact through the **leaderboard's visibility and collective effect** • Get connected to DOE **network of high-quality suppliers** • Access to expert **purchasing resources and best practices**

Exploring Federal Procedural Pathways and Regulatory Landscape for DAC

2:15 PM to 3:05 PM

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Discussion Questions

Small Group Discussion: What federal policy do we need? (15 minutes)

- What's the potential for siting DAC on federal land?

- What federal regulations and legislation are necessary to provide clarity for the siting of DAC on federal lands?

Discussion Questions

Large Group Discussion: What are solution pathways? (15 minutes)

- What could be the pathways for achieving the federal regulation and legislation that would allow DAC facilities to be sited on federal land?

Networking break

3:05 PM to 3:20 PM

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Driving State and Federal DAC Market Development

3:20 PM to 4:20 PM

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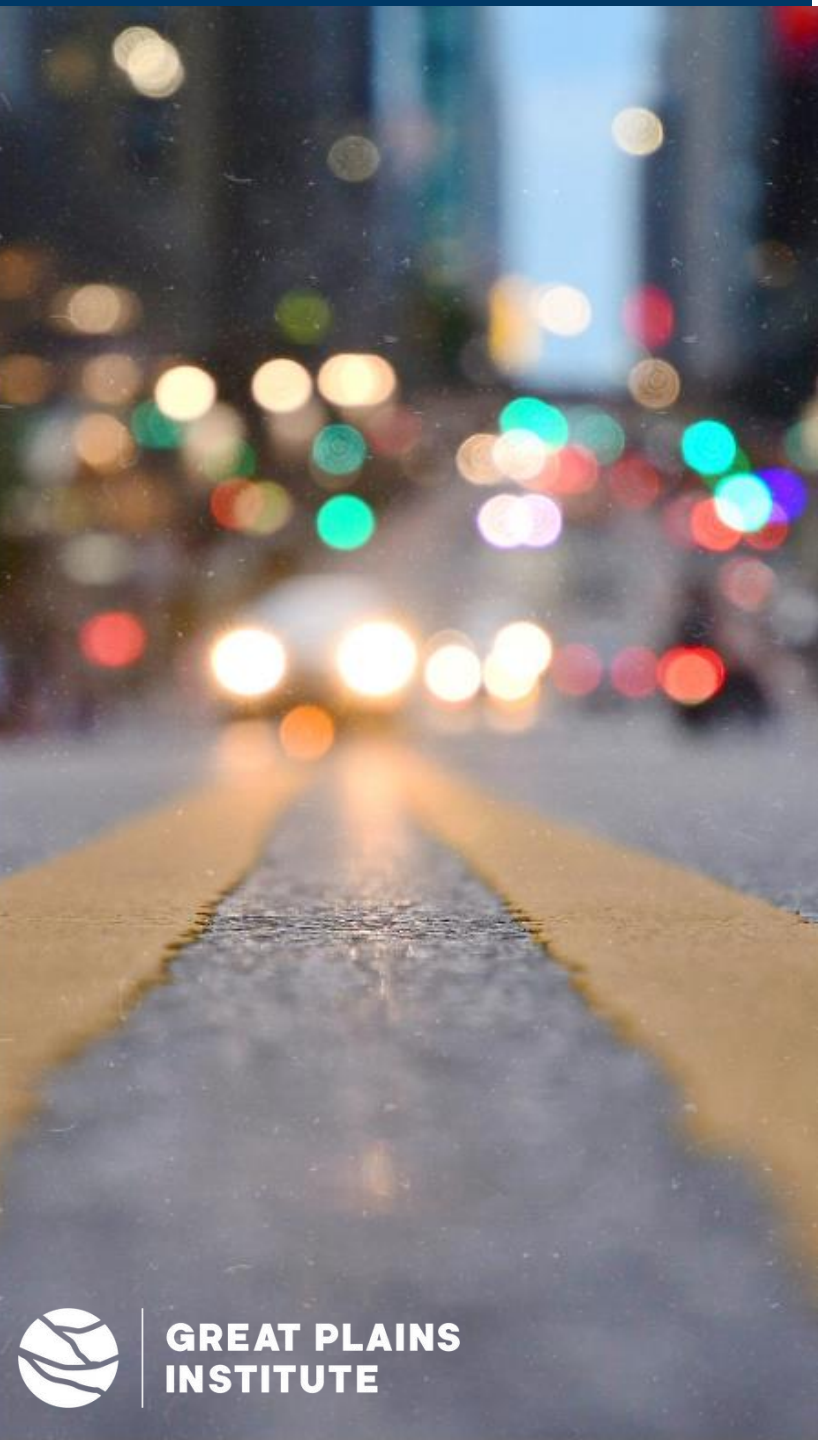

Discussion Questions

Small Group Discussion (24 minutes: 12 mins each for federal and state government)

- How can government create market signals for carbon removals from DAC?
- What could be the role of the government in standardizing and verifying the carbon removal, storage and utilization from the DAC facilities?

Discussion Questions

Large Group Discussion: (24 minutes)

- Report-outs from individual small groups about the takeaways from the last discussion (*12 minutes*)
- Any additional thoughts or comments on market development? (*12 minutes*)

Final Remarks and Next Steps

4:20 PM to 4:25 PM

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Thank you!

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