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U.S. DOE's Office of Carbon Management: Programs and Opportunities

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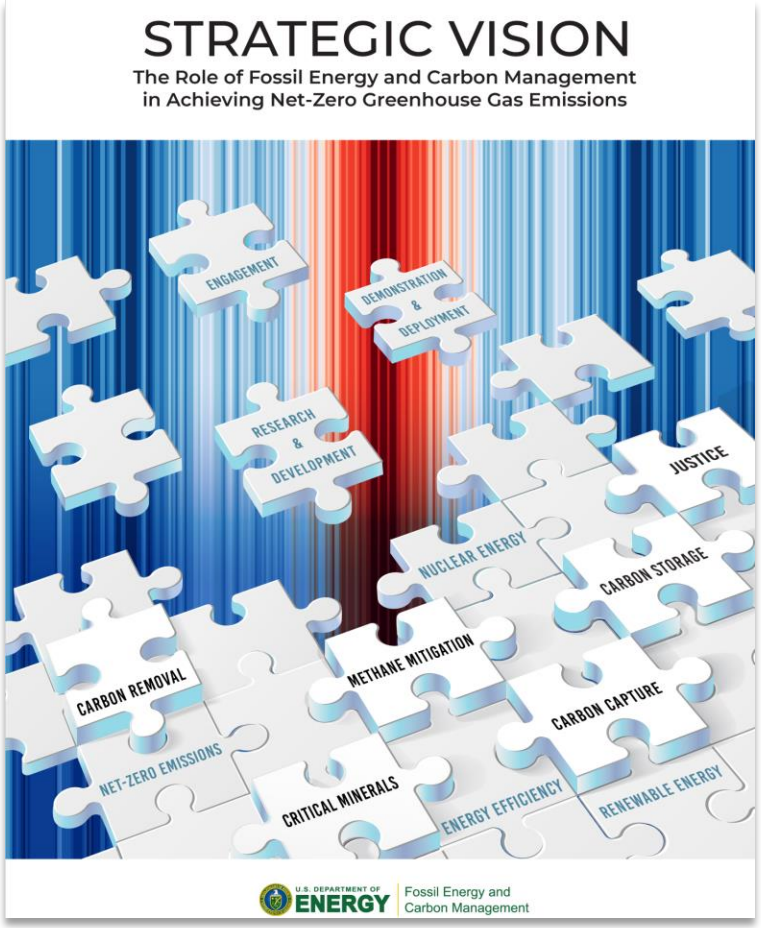
U.S. DEPARTMENT OF ENERGY
Fossil Energy and Carbon Management

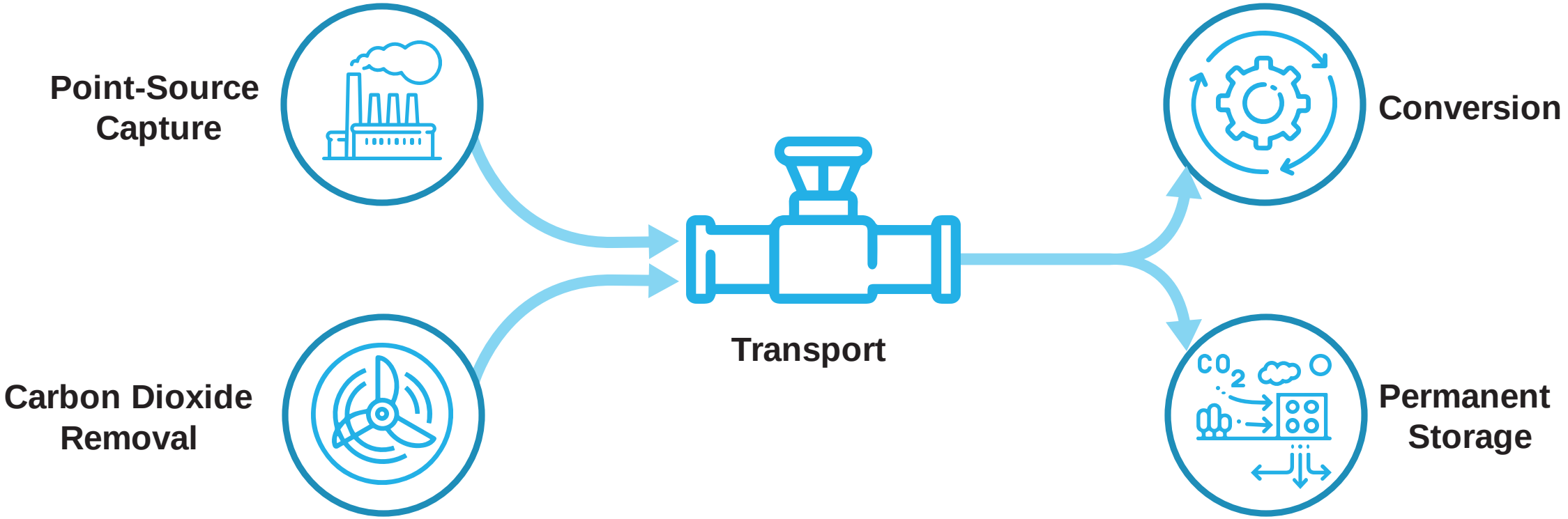
Fossil Energy and Carbon Management Overview



- Two areas of focus:
  - Carbon management
  - Resource sustainability
- Office of Carbon Management:
  - ~$450M annual budget
  - TRL 3-5 grant funding:
    - Engineering studies
    - Benchtop research
    - Small pilots and demos

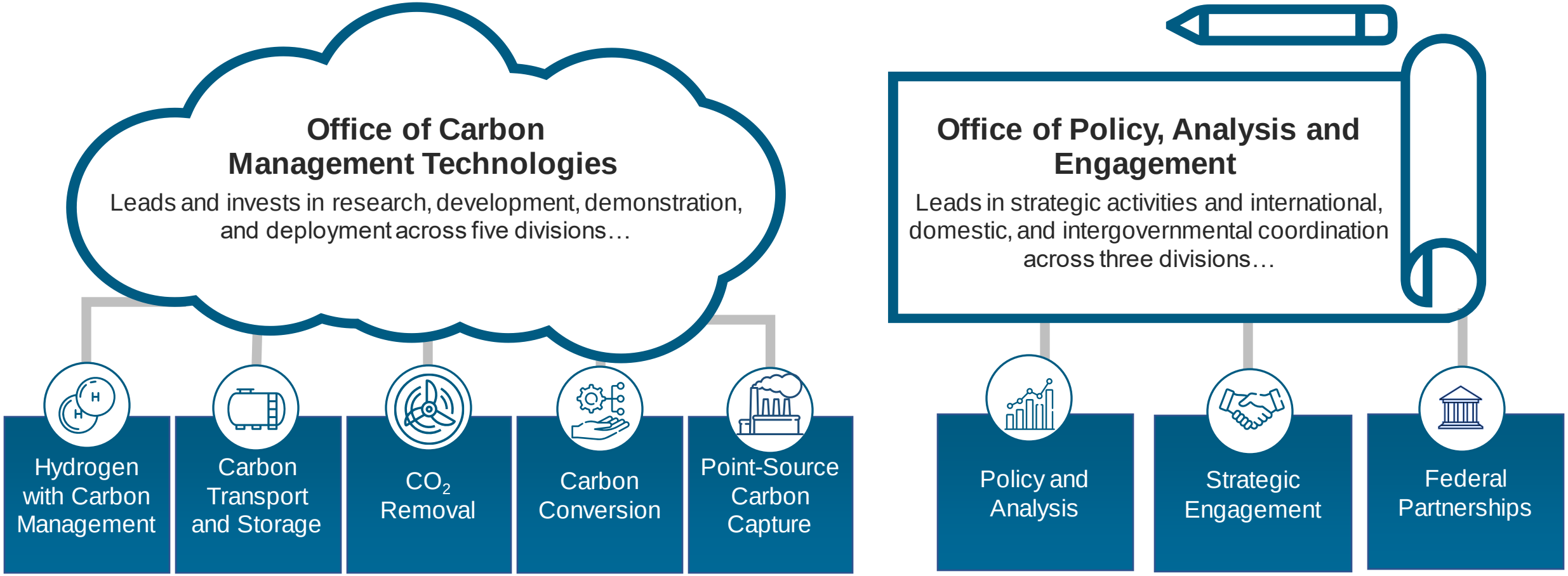
Source: FECM 2022 Strategic Vision

Carbon management is a *system of technologies*

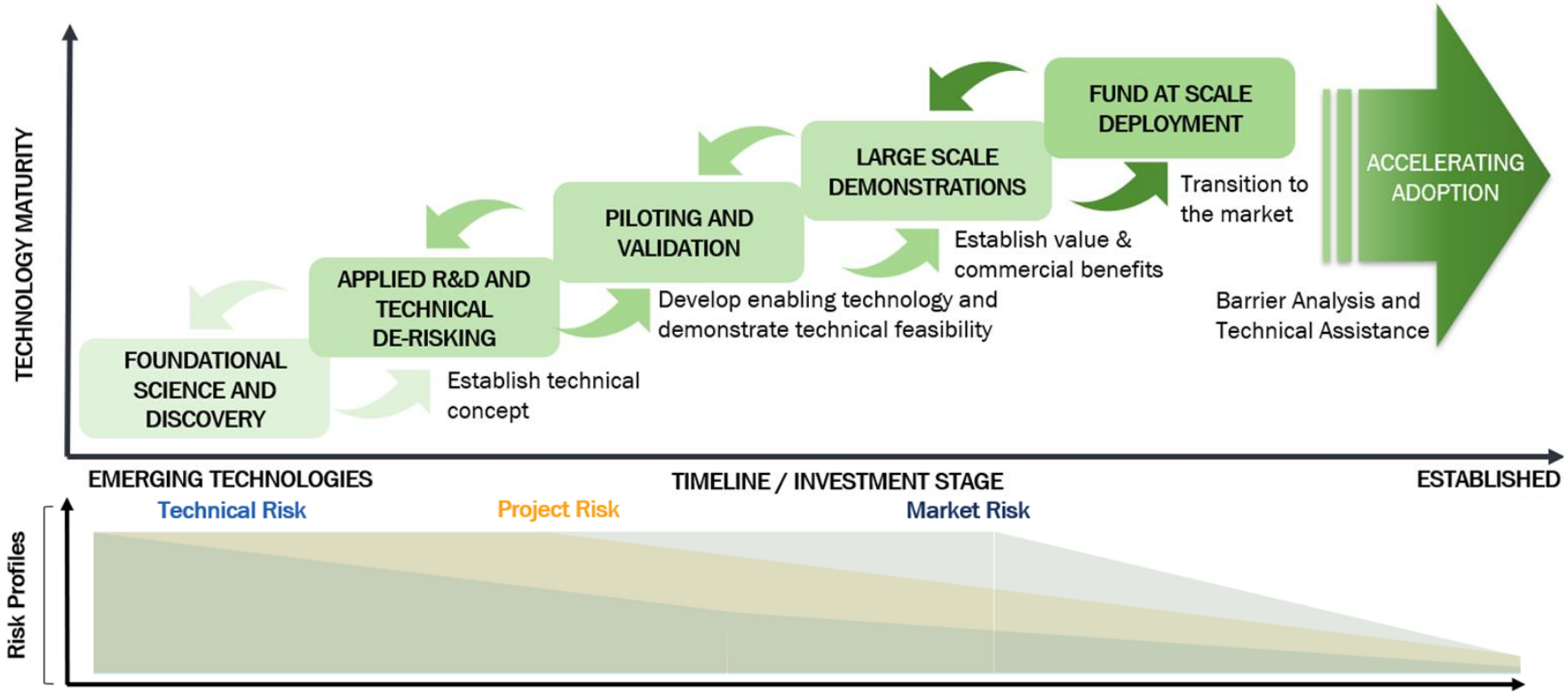


Office of Carbon Management

Focused on minimizing the environmental and climate impacts of fossil fuels and industrial processes, while working to achieve net-zero GHG across our economy

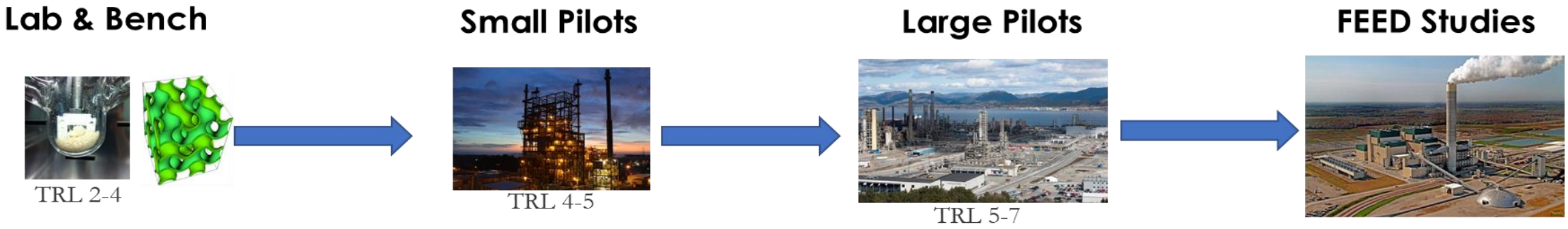


US DOE's Role in the Research, Development, Demonstration, & Deployment (RDD&D) Continuum



Industrial and Power Plant Capture Program

Integrated Approach to Accelerate Technology Development



- Develop capture technologies across industrial and power sectors
- Reduce capital expenditures and operating expenses under a wide range of feed conditions
- Achieve high capture efficiencies (>95%)
- Maximize co-benefit pollutant removal
- Engineering-based simulation
- Create low-carbon supply chains (i.e., cement, steel, hydrogen, etc.)

DOE has demonstrated that point-source capture is technically feasible

Carbon Capture Retrofit on Ethanol Production

Archer Daniels

2010

Carbon Capture Retrofit on Hydrogen Production

Air Products

2013

Carbon Capture Retrofit on Coal-Fired Power Plant

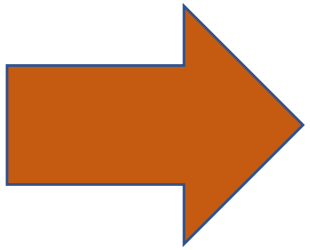
Petra Nova

2016

BIL funding is critical for shaping the carbon management industry

>$12B Over Five Years

Grants
Loans
Credits



Expected Development

- 6+ carbon capture demonstration projects and several new small-scale pilots
- 4+ direct air capture hubs
- 100+ new dedicated CO_2 storage wells
- New CO_2 pipelines and transportation networks (~10,000 miles moving 10Ms tons CO_2/yr)

45Q will be main business driver moving forward.

	**Significant Price Incentives**	• **Saline Storage Credits**
		  ○ **$85/metric ton** (industry and power)
		  ○ **$180/metric ton** (direct air capture)
		• **EOR/Conversion Credits**
		  ○ **$60/metric ton** (industry and power)
		  ○ **$130/metric ton** (direct air capture)

	**Easier to Finance on Credit Value**	• **Reduced facility size thresholds** – enables more industrial and small emitters to participate • **Direct + transferability of credits** should make more investible
	**More Time**	• 10 year commence construction window • 12 year of credit window • Uptake might be slow, but once first of a kind projects de-risked, industry uptake could be on the order of 10Ms-100Ms tons/year

Estimates of 300M+ tons CO_2 capture by 2035

Optimized CO2 transport and storage network deployment modeling under 45 Q.
Source: Great Plains Institute (2022)

Scaling up community, stakeholder, and Tribal engagement to help ensure project success

Successful deployment of carbon management projects and infrastructure to meet our climate goals will depend on public acceptance and support.

Carbon Management Workshop in Pueblo, CO
April 2024

Map of U.S. DOE Carbon Management R&D and CO2 Sources as part of the "Heartlands Region"

DRAFT PRELIMINARY – UNDER ONGOING DEVELOPMENT

Legend

- Disadvantaged Communities (CEJST)
- Tribal Lands

DOE Carbon Management RD&D

- Hydrogen Hubs
- Point Source Carbon Capture - Industry
- Point Source Carbon Capture - Power
- Carbon Removal
- Direct Air Capture Hub
- Carbon Conversion
- Carbon Storage
- Carbon Transport Area
- Class VI Permits
- CO_2 Pipelines

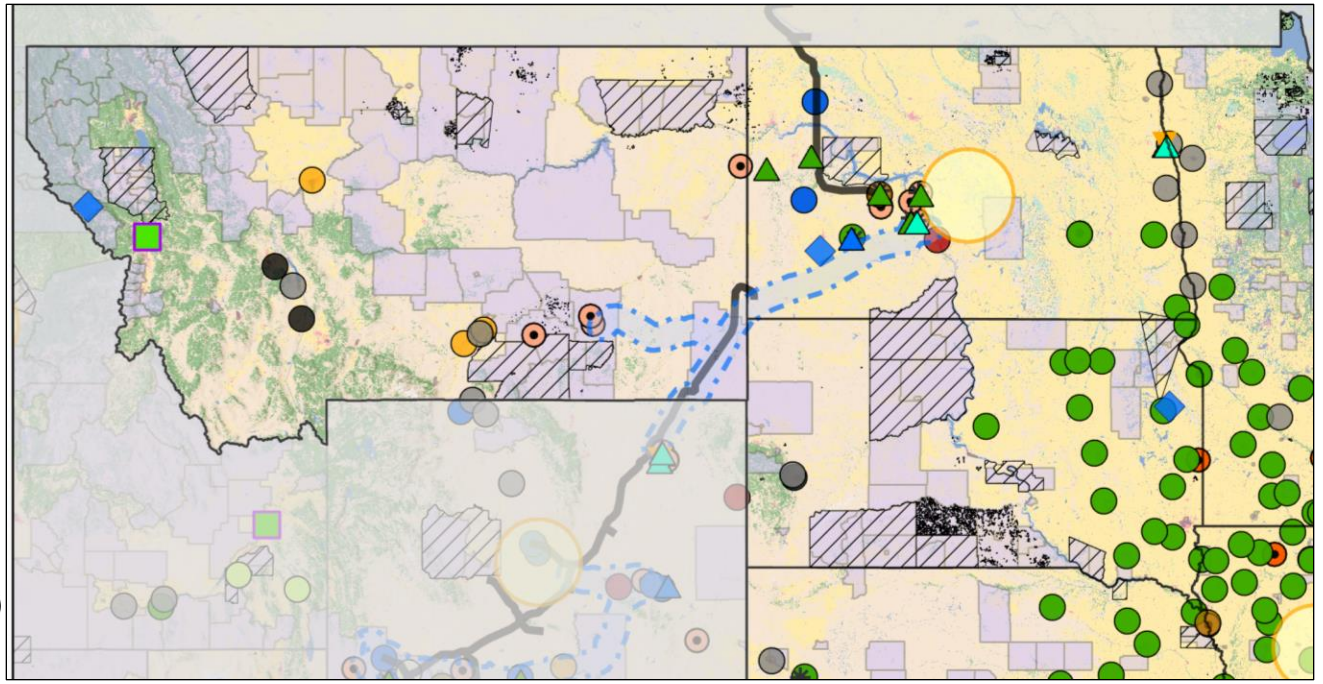
CO_2 Sources

Industrial Facilities

- Ammonia/Synfuel
- Bioethanol
- Cement
- Glass
- Hydrogen (merchant)
- Iron and Steel - Blast Furnace (BF)/ Basic Oxygen Furnace (BOF)/Coke
- Lime
- Natural Gas Processing
- Petrochemical
- Pulp and Paper
- Refining (with on-site hydrogen production)
- Refining (without on-site hydrogen production)

Power Plants

- Coal
- Natural Gas



Map of U.S. DOE Carbon Management R&D, CO2 Sources. Map cropped to include MT, ND, & SD.

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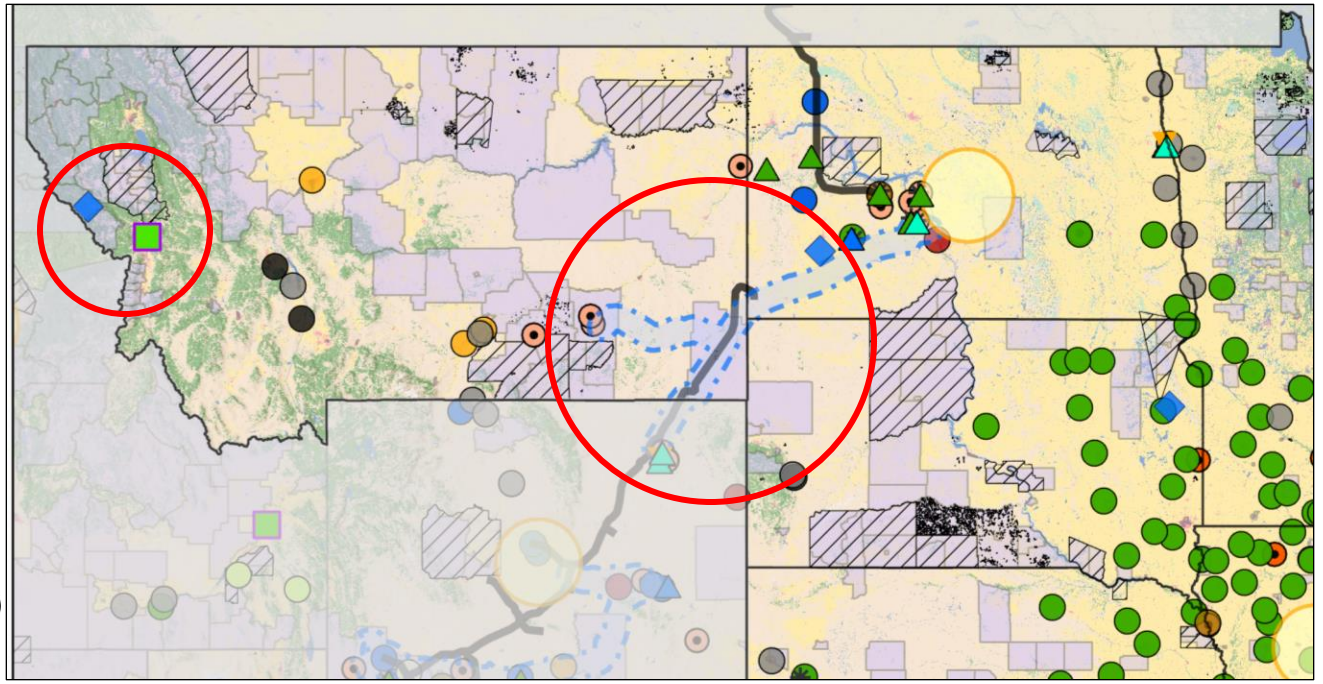

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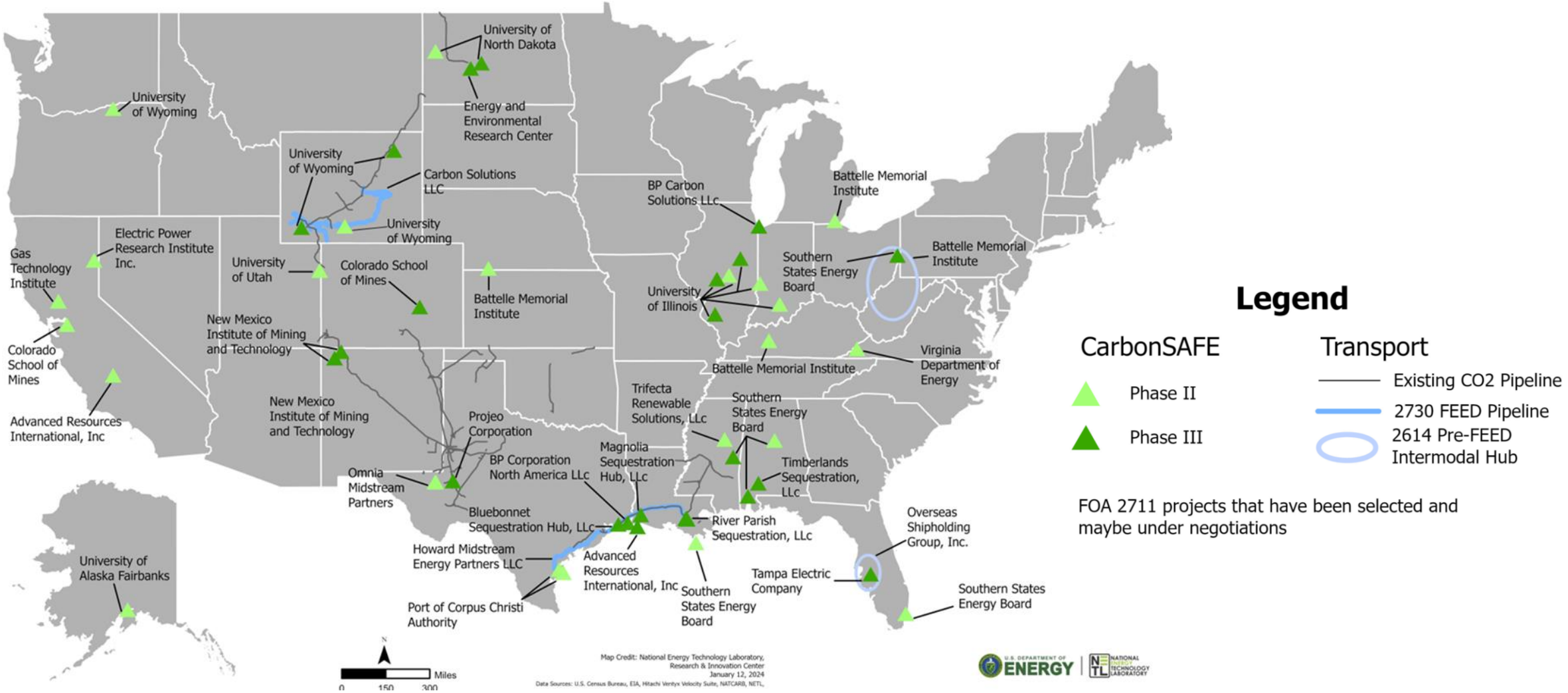
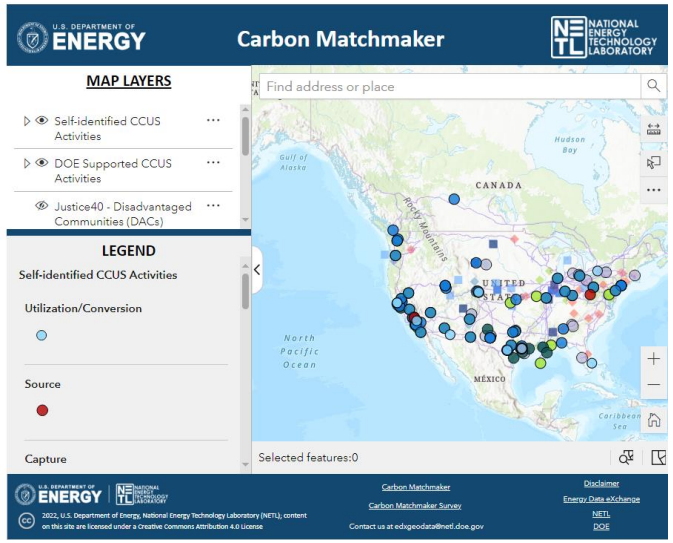
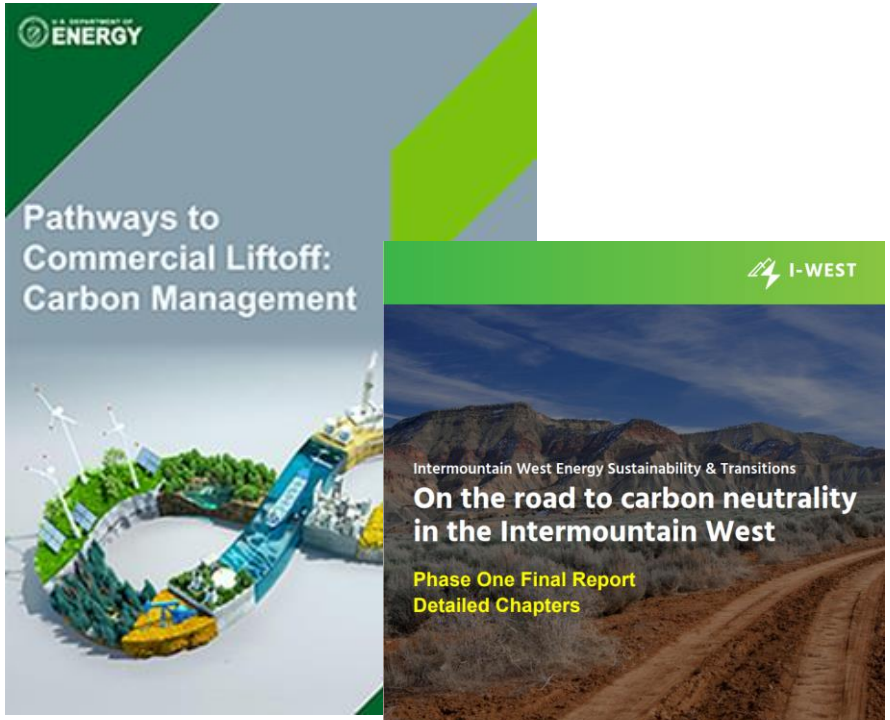
CarbonSAFE Projects throughout the U.S.



Resources



Carbon Matchmaker



Recent Reports

Educational Materials & Resources

Funding Opportunities

FECM Program	Announcement Title	Estimated Total Federal Funding	Open Date	Close Date
Carbon Management	BIL FOA 2730: Carbon Capture Technology Program, Front-End Engineering Design for CO2 Transport	$24 Million	5/9/2024	7/9/24
Carbon Management	FOA 2966: Carbon Dioxide Transportation Infrastructure Finance and Innovation (CIFIA) Program: Future Growth Grants	$500 Million	5/2/24	9/30/24
Resources Sustainability	FOA 3077: Regional Scale Collaboration to Facilitate a Domestic Critical Minerals Future: Carbon Ore, Rare Earth, and Critical Minerals Initiative	$60 Million	4/24/24	6/24/24
Carbon Management	BIL FOA 2829: Carbon Utilization Procurement Grants	$100 Million	7/24/23	4/30/25

Funding opportunities, requests for information, & notification of intent

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

Thank you!

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Office of Policy, Analysis, and Engagement

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