



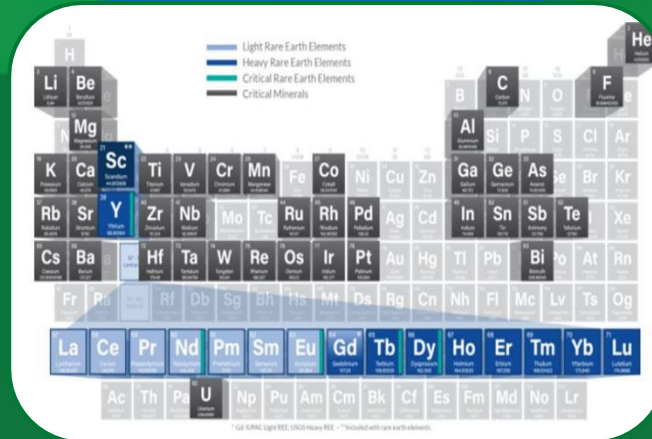
U.S. DEPARTMENT OF  
**ENERGY**

Fossil Energy and  
Carbon Management

# CO<sub>2</sub> Transport Applied RD&D Workshop Report Summary

Carbon Transport and Storage  
*Office of Fossil Energy and Carbon Management*

October 31, 2023



# Agenda

- Inaugural workshop took place Feb 21-23 in Columbus, Ohio
- Broad and diverse perspectives shared (e.g., 100+ attendees)
- Participation by various stakeholders including Labor, Industry, Academia, Standards Bodies, NGO's, etc.
- Technical topics discussed included:
  - Ongoing Industry Initiatives
  - CO<sub>2</sub> Impurities
  - Co<sub>2</sub> Specific Leak Detection and Emergency Response
  - Repurposing of Existing Infrastructure for CO<sub>2</sub> Service
  - Developing and Connecting with Other Modes of CO<sub>2</sub> Transport /Intermodal Hubs



<https://www.netl.doe.gov/carbon-management/carbon-storage/transport>

# Workshop Key Themes



**CO<sub>2</sub> Transport Workshop RD&D themes over the next five years**

# Workshop Key Takeaways

**Based on the individual perspectives shared, DOE took away the following with respect to carbon transport:**

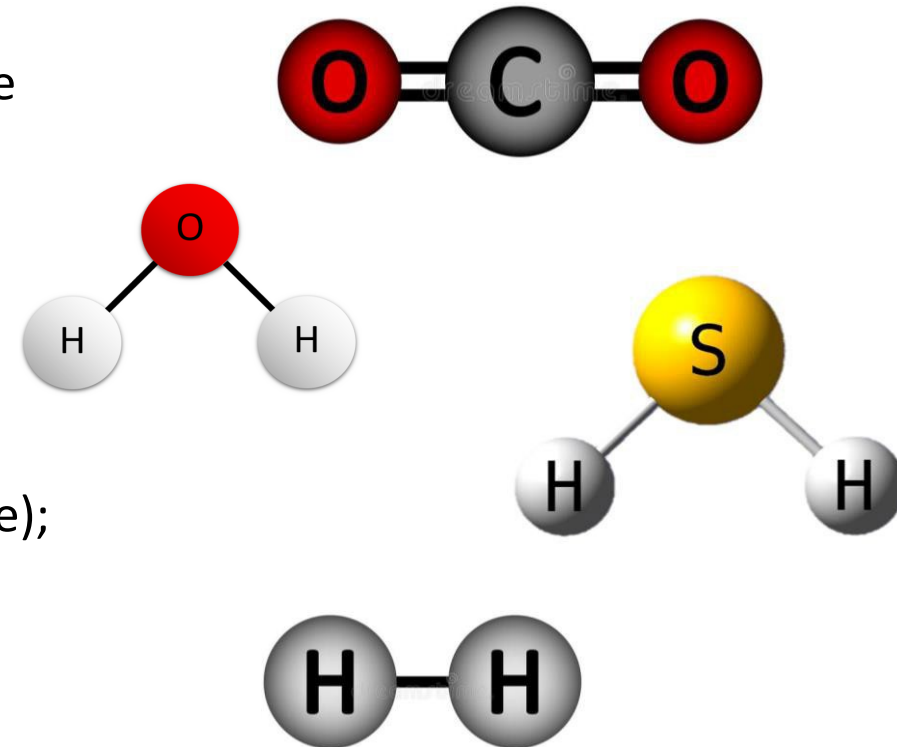
- Develop a CO<sub>2</sub> transport consortium to coordinate RD&D efforts and facilitate communication among stakeholders;
- Compile and curate information in an open access platform to facilitate gap analyses;
- Accelerate experimental and modeling RD&D efforts to keep pace with the timeline for CO<sub>2</sub> transport demonstration projects and at-scale deployment;
- Create pathways to engage and grow the workforce in an equitable, inclusive, and accessible manner;
- Engage the public in two-way communication.

# RD&D Area of Interest #1:

## IMPACT OF CO<sub>2</sub> IMPURITIES ON ASSET INTEGRITY

### CO<sub>2</sub> IMPURITIES MANAGEMENT

- Guide materials selection, standards, and potential regulations by better understanding integrity threats and their evolution over time periods corresponding to asset operational life;
- Determine the effect CO<sub>2</sub> stream impurities has on materials, corrosion, and fluid behavior through testing and modeling;
- Create a testing protocol to complement ongoing work and coordinate experimental and modeling efforts;
- Scale up the size and duration of tests (i.e., small scale to large scale);
- Progress odorant additives applications.





# RD&D Area of Interest #2:

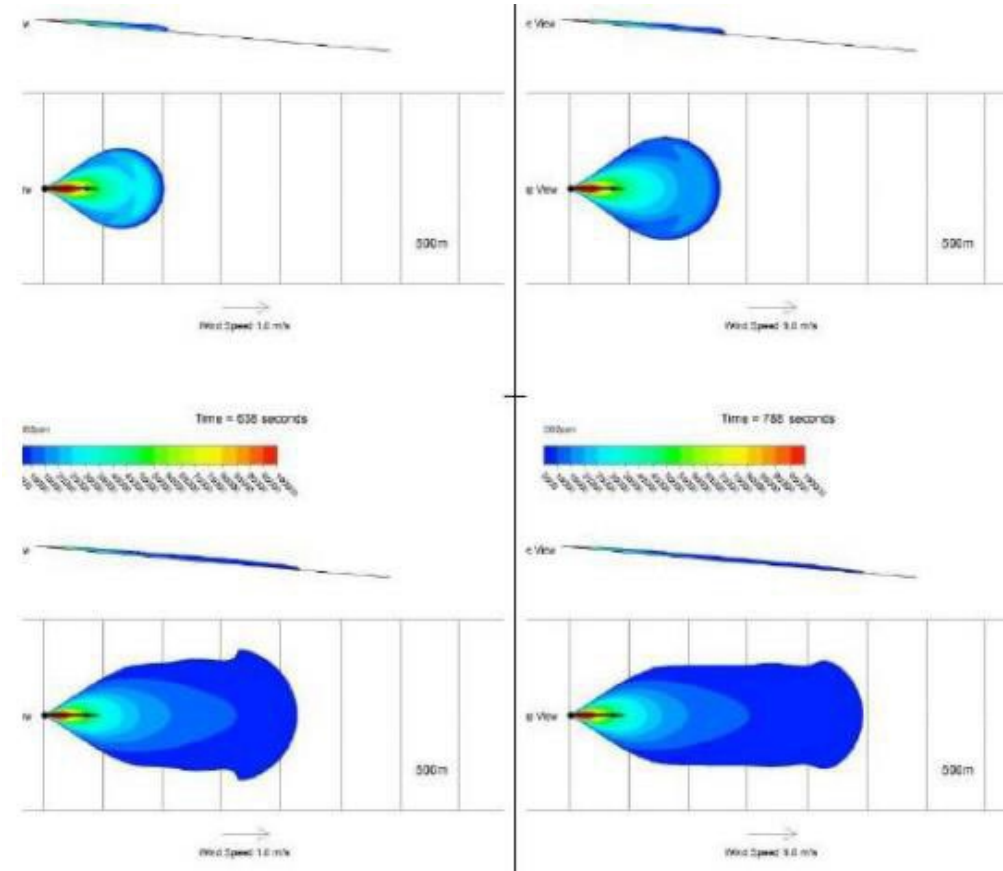
## CO<sub>2</sub>-SPECIFIC LEAK DETECTION AND EMERGENCY RESPONSE PROTOCOLS

### LEAK DETECTION

- Compile relevant existing research and models, as well as lessons learned from industry, in a centralized open repository;
- Advance computational and sensor technologies specific to CO<sub>2</sub> service.

### EMERGENCY RESPONSE

- Advance CO<sub>2</sub> dispersion modeling capabilities to inform emergency response protocols and real-time response;
- Expand understanding of CO<sub>2</sub> exposure health risks;
- Leverage existing organizational models for pipelines as templates for founding a Center for CO<sub>2</sub> Safety.



# RD&D Area of Interest #3:

## REPURPOSING OF EXISTING INFRASTRUCTURE FOR CO<sub>2</sub> SERVICE

### REPURPOSING INFRASTRUCTURE

- Compile and efficiently leverage existing information, especially component materials and lessons learned from industry
- Conduct gap analyses and related RD&D to address materials standards
- Develop LCA and TEA tools to support repurposing infrastructure
- Create checklists of considerations to guide repurposing efforts

# RD&D Area of Interest #4:

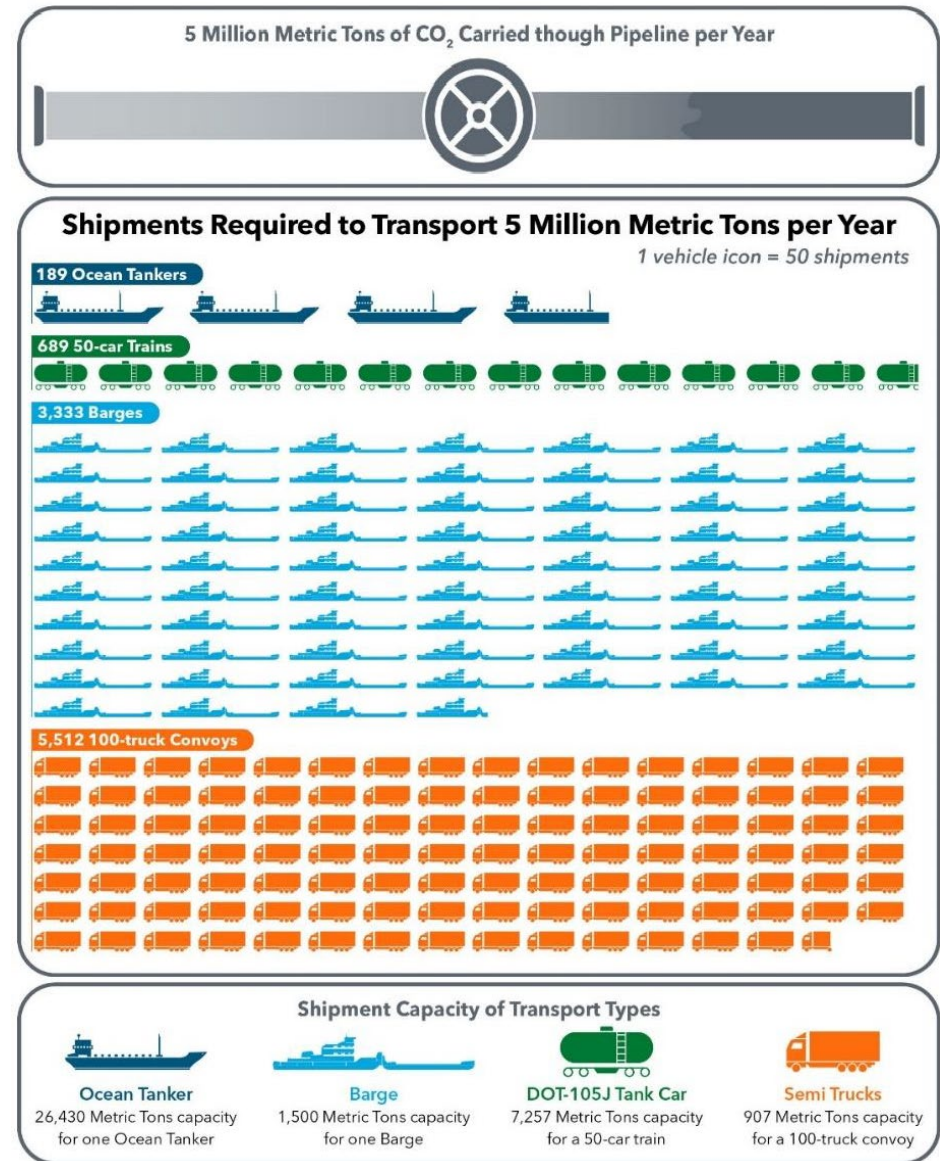
## REPURPOSING OF EXISTING INFRASTRUCTURE FOR CO<sub>2</sub> SERVICE DEVELOPING AND CONNECTING WITH OTHER MODES OF CO<sub>2</sub> TRANSPORT & INTERMODAL HUBS

### DEVELOPMENT

- Many U.S. sources produce small amounts of CO<sub>2</sub> at the individual level but collectively produce approx. 128 million MT of CO<sub>2</sub>/year;
- Develop of TEA and LCA tools across various scales and transportation systems.

### CONNECTION

- Support development of intermodal CO<sub>2</sub> carriers compatible with transportation via truck, rail, barge, or ship;
- Improve metering of CO<sub>2</sub> for monitoring, reporting, and verification purposes to accurately track CO<sub>2</sub> storage levels.



Visual comparison between freight modes to transport 5 million metric tons of CO<sub>2</sub>. This annual volume is approximately equal to total CO<sub>2</sub> emitted from one 680 MW power-generation station.





# Funding Pathways

- **DOE FECM Field Work Proposals (FWPs)**

Enables DOE FECM to directly allocate funds to DOE FECM national laboratories and facilities, including when the laboratory applicant is a partner on a DOE FECM proposal submitted by a different entity

- **DOE FECM Cooperative Agreements advertised through Funding Opportunity Announcements (FOAs)**

Enables transfer of DOE FECM funds to grant recipients. The Carbon Capture Technology Program, FEED for CO<sub>2</sub> Transport (DE-FOA-0002730) is an example FOA funded by BIL

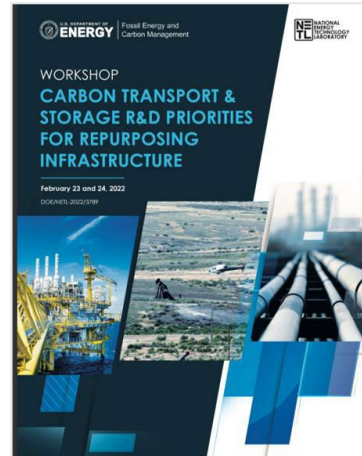
- **DOE FECM Cooperative Research and Development Agreements (CRADAs)**

Enables the DOE FECM national laboratories and one or more parties (e.g., industry) to collaborate on RD&D efforts in the DOE FECM mission space. An example call is the 2021 H2@Scale Laboratory CRADA Call. H-MAT Consortium is the product of a CRADA

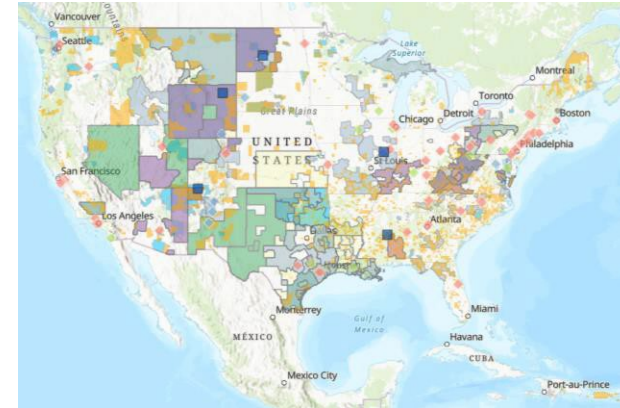
# Resources and Engagement Opportunities



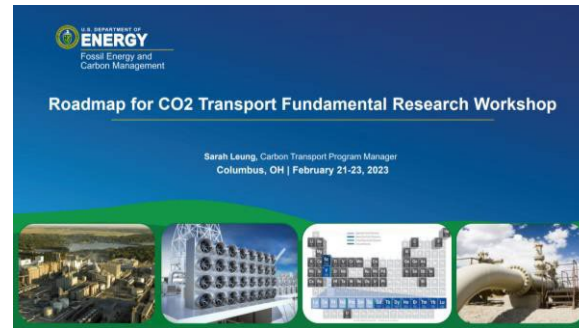
[FECM Strategic Vision](#)



[Workshop R&D Priorities for Repurposing Infrastructure](#)



[Carbon Matchmaker](#)



[DOE's Roadmap for CO2 Transport Fundamental Research Workshop \(2023\)](#)



[Industrial Decarbonization Roadmap](#)



[Carbon Management Collegiate Competition](#)



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# Questions?

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