



U.S. DEPARTMENT OF
ENERGY

Fossil Energy and
Carbon Management

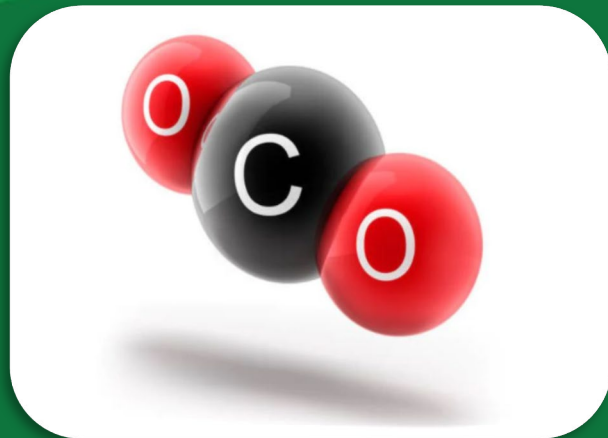
Carbon Transport Program: Challenges & Solutions

Regional Decarbonization Series – Alaska Workshop

Robert Smith

*Carbon Transport and Storage (CTS) Program
Office of Fossil Energy and Carbon Management*

May 8, 2024



Key Messages

Carbon Management Technology...



...works and is essential for meeting climate goals.



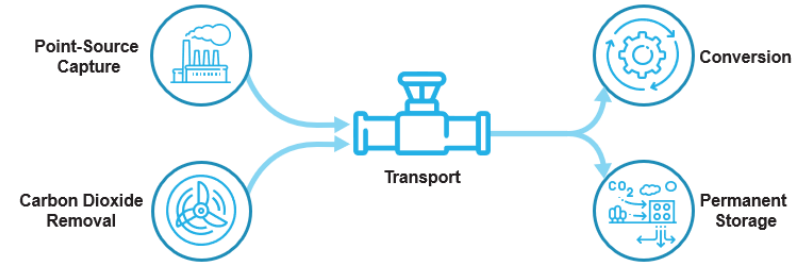
...is ready for commercial liftoff in the U.S. after recent policy advances.



...requires more policy, private investment, and collaboration to unlock its full potential.



CO₂ Transport Must Expand Rapidly



Today

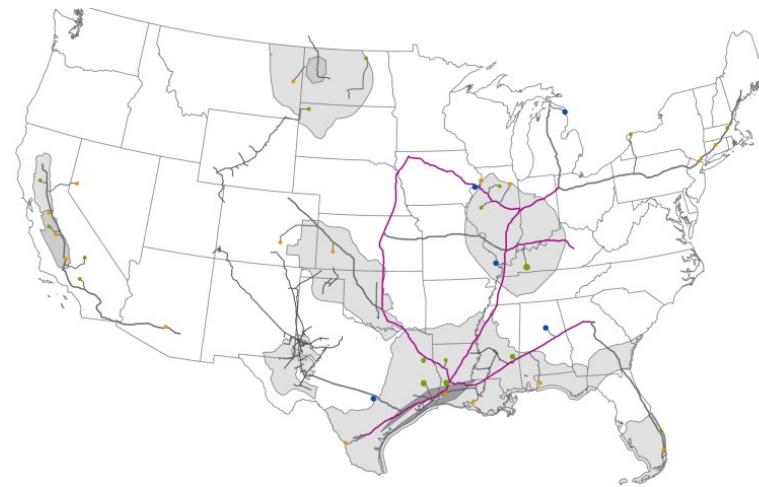
2030

2050



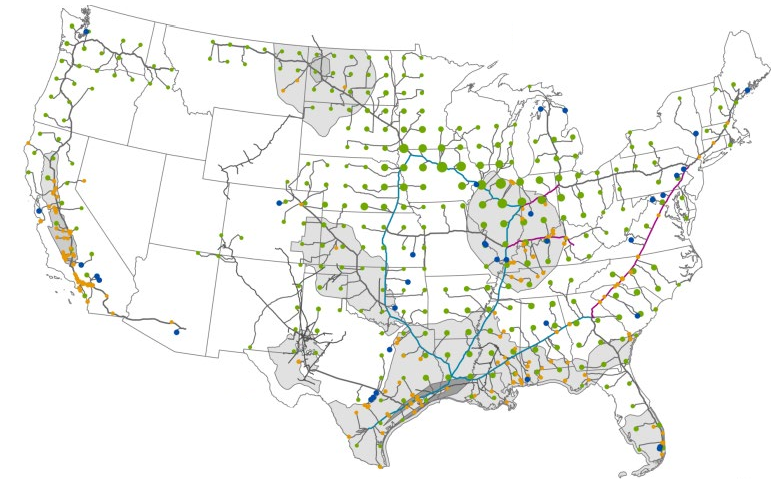
Existing CO₂ Pipeline Mileage (2023)

5,500+ miles of pipelines



Modeling from Princeton's Net-Zero America Study (2020)

11,000+ miles of pipelines



Modeling from Princeton's Net-Zero America Study (2020)

13,000+ miles of trunk pipelines
52,000+ miles of spur pipelines

A network of rail, truck and ship/barge transport with intermodal hubs must also expand in addition to pipelines



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Carbon Transport Challenges

- Safety/environmental oversight requirements & standards
- Federal/state project siting/permitting
- Securing land easements for new construction
- CO₂ quality for modal transportation specification
- Technical, integrity and emergency response
- Custody transfer metering & 45Q
- Modal cost optimization via techno-economic analysis & life cycle assessment



Source: Network Dispatches



Source: NAP



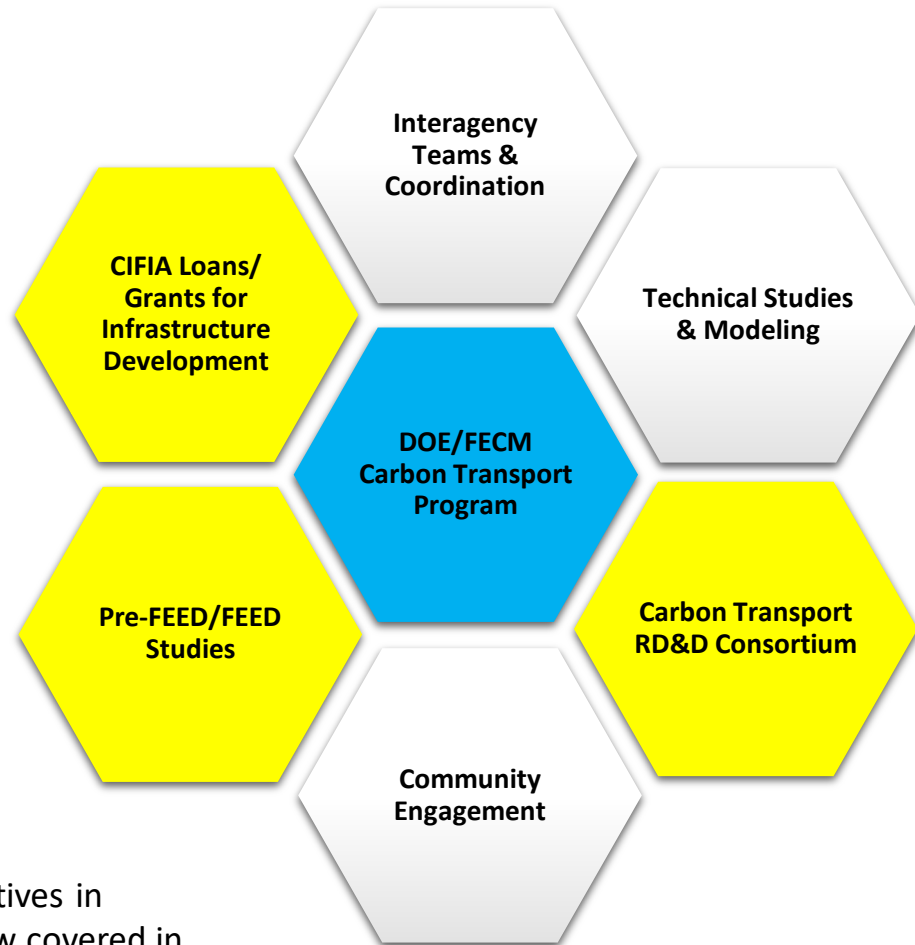
Source: Catalyst Today, Vol 410.




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Carbon Transport Initiatives



 Initiatives in yellow covered in next few slides



Transport Initiatives can Enable Solutions

- Coordinate project developments
- Nurture government policy synergies
- Remove technical barriers
- Transfer research outputs into outcomes
- Accurately inform communities
- Quantify emissions profile
- Optimize costs and system routing
- Improve NEPA preparedness
- Mature project readiness
- Finance infrastructure development

Transport Pre-FEED/FEED Studies

Pre-FEED Objective:

To support advancements in infrastructure engineering and conceptual design needed for large-scale transport projects.

FEED Objective:

Accelerate the planning and development of CO₂ transportation infrastructure by a variety of modes, such as through rail, trucks, ships, and pipelines.

Front-End Engineering Design for CO₂ Transport

FEED Scope:

- **Engineering and Design Package**
 - Route report and map (i.e., wetlands and environmental)
- **Design basis document**
- **Critical safety and risk assessments**
 - Air dispersion and potential impact radius study, Emergency Response Plan, and redundant safety design
- **Environment, Safety & Health and Regulatory Plan analysis**
- **Community Benefits Plan**
- **Cost and Business Case**



CO₂ Transportation Infrastructure Finance & Innovation Program of Loans & Grants

BIL Funding: \$2.1B with credit subsidy of approx. \$20B

Objective: Offers access to capital for large-capacity, common-carrier CO₂ transport infrastructure projects to transport CO₂ from points of capture to conversion facilities and/or storage wells.

Transport Modes: Pipeline, rail, truck, ship & barge



*CIFIA funding of up to 80% of project costs

CIFIA Program*

Loans

New & re-purposed transport infrastructure

Future Growth Grants

Building excess capacity on new/existing infrastructure



Some CIFIA Program Key Eligibility Requirements

- Is a common carrier CO2 transportation infrastructure project in the United States, with total project costs greater than \$100 million, that will transport CO2 captured from anthropogenic sources and/or ambient air by pipeline, shipping, rail, or other transportation infrastructure for storage or use.
- Can attract public and/or private investment to fund Project costs not covered by the CIFIA Loan, as evidenced by binding commitments and/or expressions of interest from other potential funders.
- Will publish a publicly available tariff with just and reasonable rates, terms, and conditions for nondiscriminatory CO2 transportation service.

NOTE: See “CIFIA Program Guide” for the full list of requirements



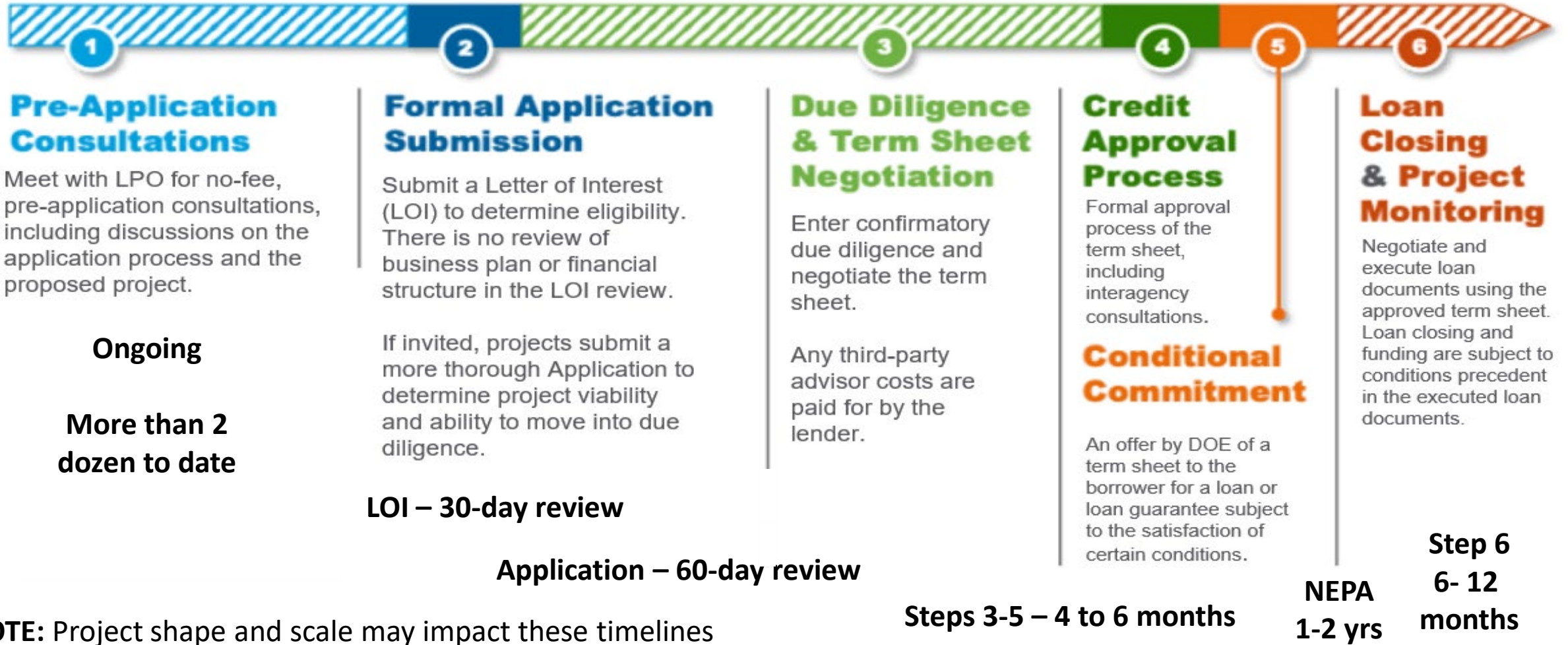
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[Click here to visit the CIFIA
Program webpage](#)

CIFIA Loan Application Process



NOTE: Project shape and scale may impact these timelines



Fossil Energy and Carbon Management



[Click here to visit the CIFIA Program webpage](#)

CIFIA Loan Pre-Application Consultations

FREE CONSULTATION!!

Potential applicants to CIFIA may request free, informal Pre-Application Consultations with DOE by visiting the CIFIA webpage at www.energy.gov/lpo/cifia or by sending an email to CIFIA@hq.doe.gov.

During Pre-Application Consultations, DOE will:

1. Evaluate Project eligibility for CIFIA,
2. Determine whether the project is ready to proceed with a CIFIA Application,
3. Discuss the phases of the process to get a CIFIA Loan, and
4. Answer questions that the potential Applicant may have.

Based on Pre-Application Consultations, DOE/LPO may invite potential Applicants to submit a Letter of Interest on Projects deemed Ready to Proceed.



CIFIA Future Growth Grant Eligibility Requirements

Future Growth Grant (FGG) Funding Opportunity Announcement (FOA) now issued!
LPO also posts revised CIFIA Guidance Document on CIFIA Program Website

In General: A FGG application must meet CIFIA program eligibility requirements of a base project and additional requirements stated in the FOA. Grant applications will follow a similar process of an LOI and Application as described in the FOA.



Source: Virginia Mercury

FOA Issue Date:	05/02/2024
Submission Deadline for Full Applications:	07/30/2024 5:00pm ET
Expected Date for DOE Selection Notifications:	12/12/2024
Expected Timeframe for Award Negotiations:	12/17/2024 – 4/30/2025



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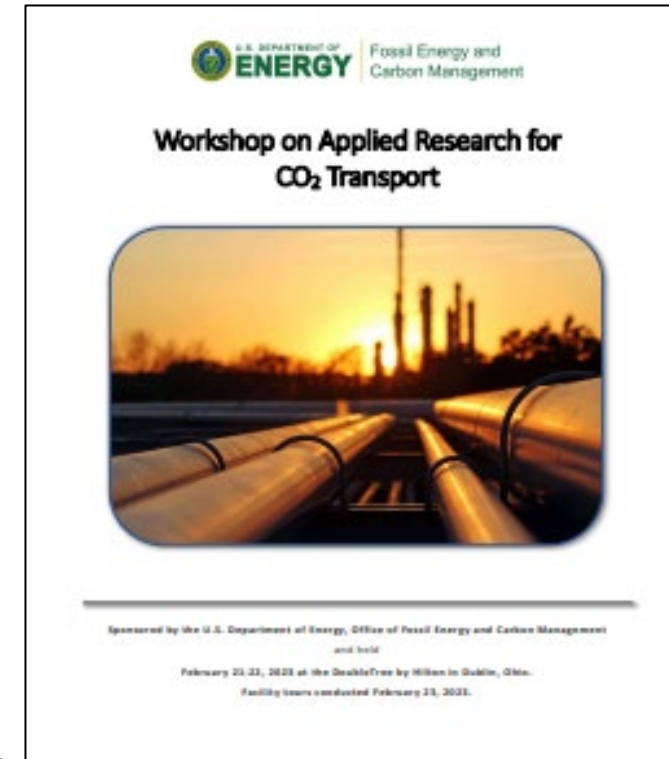
[Click here for CIFIA
FGG Opportunities](#)

Transport Research, Development & Demonstration

Summary Report: February 2023 Research Workshop

Key Takeaway #1: “Develop a CO₂ Transport Consortium”

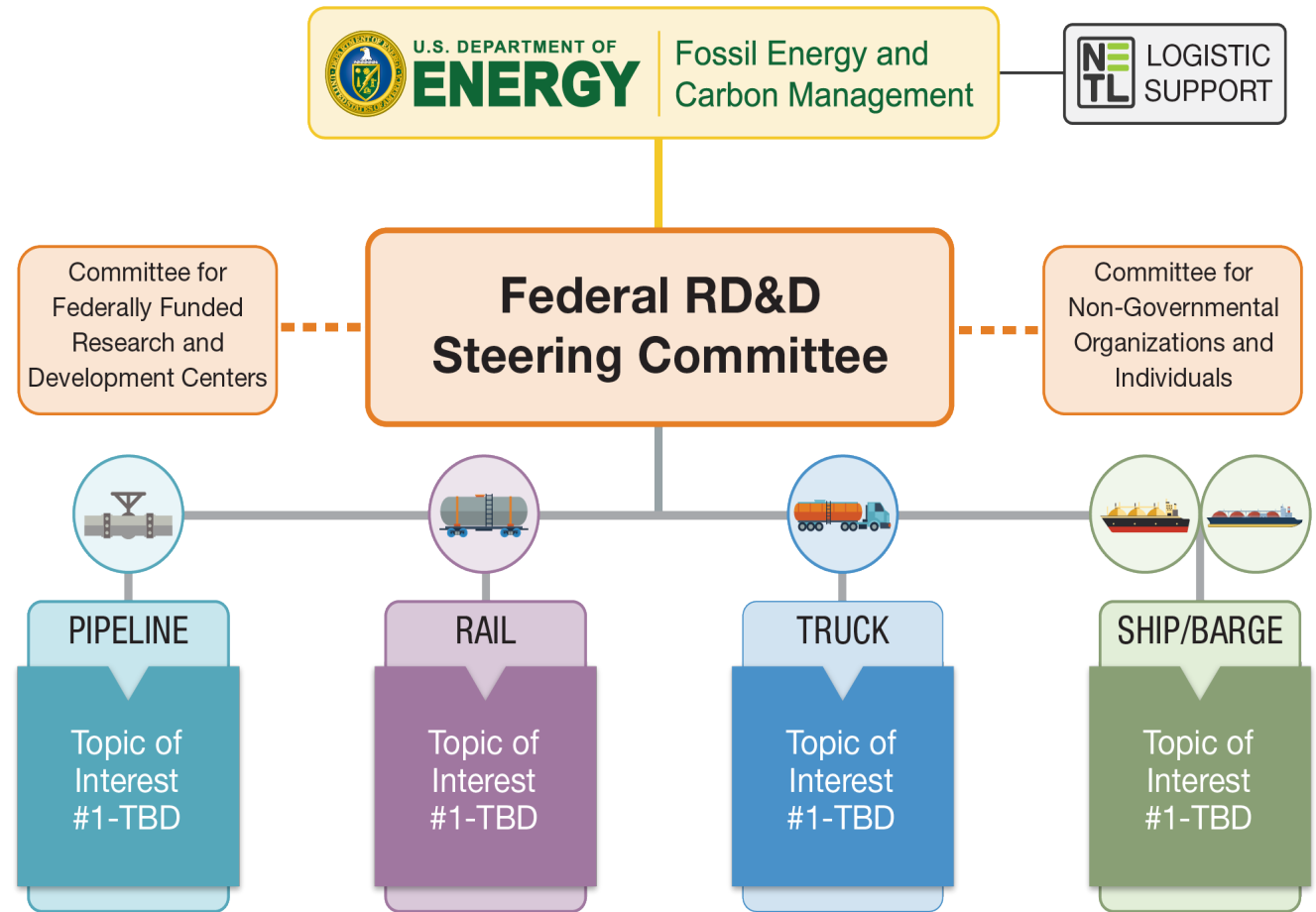
- Suggested future consortium would intend to:
 - Identify/address technical barriers that will expedite transportation infrastructure deployment;
 - Connect/facilitate communication among any interested stakeholders;
 - Compile/curate CO₂ transport information in an open access platform.
- DOE would consider individual perspectives from the consortium when planning future potential funding opportunities and collaborations with federal agencies, national labs, academia, private researchers, etc.



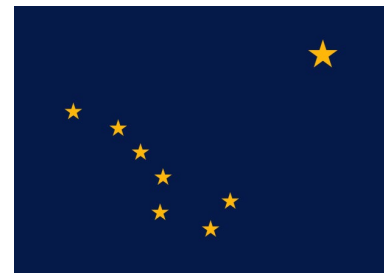
Carbon Transport Research, Development & Demonstration Consortium

Consortium Benefits

1. Work sharing and reduced costs
2. Increased credibility
3. Improve chances to achieve goals
4. Growing network of knowledge
 - Increased access to experts
 - Increased access to organizations
 - Increased access to peer reviewed knowledge
 - Increased access to intermodal transport companies
5. Access to funding resources



Alaska: Carbon Transport Summary

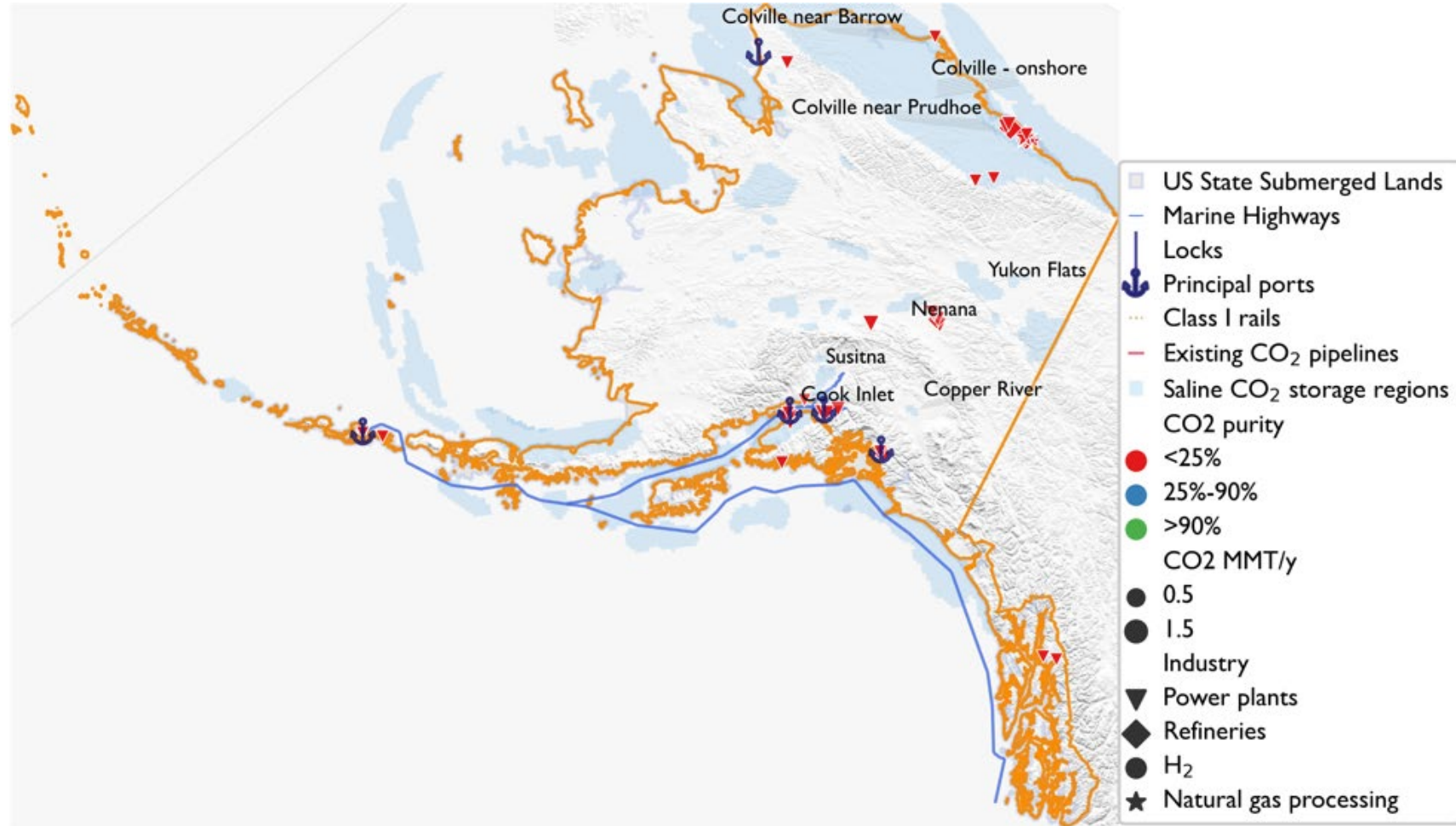


- Alaska has potential for rapid CCS development, with the Cook Inlet and Colville Basin being promising storage prospects.
 - As compared to the U.S. gulf coast region.
- No existing CO₂ pipelines but existing pipeline ROWs, marine, highway, and rail systems.
- No currently pending EPA Class VI permit well applications to store CO₂ , but potential to store CO₂ in existing oil reservoirs via EOR using Class II wells.
 - Several basins for saline storage of CO₂, including Cook Inlet in the south and the Colville Basin near Prudhoe in the North Slope of Alaska



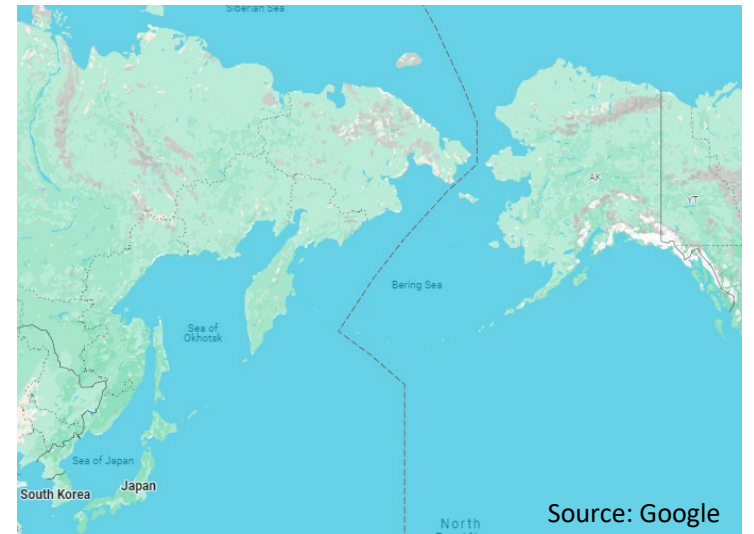
Future Carbon Transport Picture

1. Alaska can play a role in multi-modal and intermodal transportation of CO₂ leveraging export/import capabilities in the marine shipping industries.
2. Pipelines can connect port hub receiving to areas of permanent storage.



Enabling Actions: CO₂ Marine Transportation from Asia-Pacific

- Identify coastal emission clusters that can support hub development within leading decarbonization regions
- Identify complimentary storage sites with excess and available resources
- Assess technical and economic feasibility for carbon transportation hub developments and carrier designs
- Pursue collaborations across CCS value chain to develop consortiums for formal project development
- Kick-off formal project with consortium partners



Future Outlook

CIFIA Loans/Grants:

- Fully execute CIFIA loan and grant program

FEED Studies:

- Award as many FEED studies (All individual modes + Multimodal & Intermodal applications) as possible

Strategic Studies and Tools:

- Continue funding and developing as needed (e.g., LCA/TEA studies in development)

Carbon Transport Consortium:

- Launch via Request For Information #3330, further develop, and solve technical challenges

Interagency Coordination

- Teams to connect and leverage expertise in land use management & transport



Thank You!



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<https://www.energy.gov/fe/office-fossil-energy>

Sign up to receive DOE FECM's email updates [here](#).

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