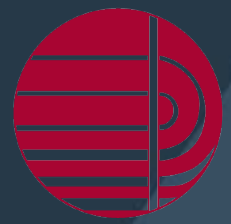


EERC | UND UNIVERSITY OF NORTH DAKOTA

Critical Challenges. Practical Solutions.

Energy & Environmental Research Center (EERC)

Development of Carbon Storage

USEA Regional Decarbonization Workshop

Anchorage, Alaska

May 8, 2024

John A. Hamling

Assistant Vice President for Strategic Partnerships

PCOR PARTNERSHIP

2003 – PRESENT

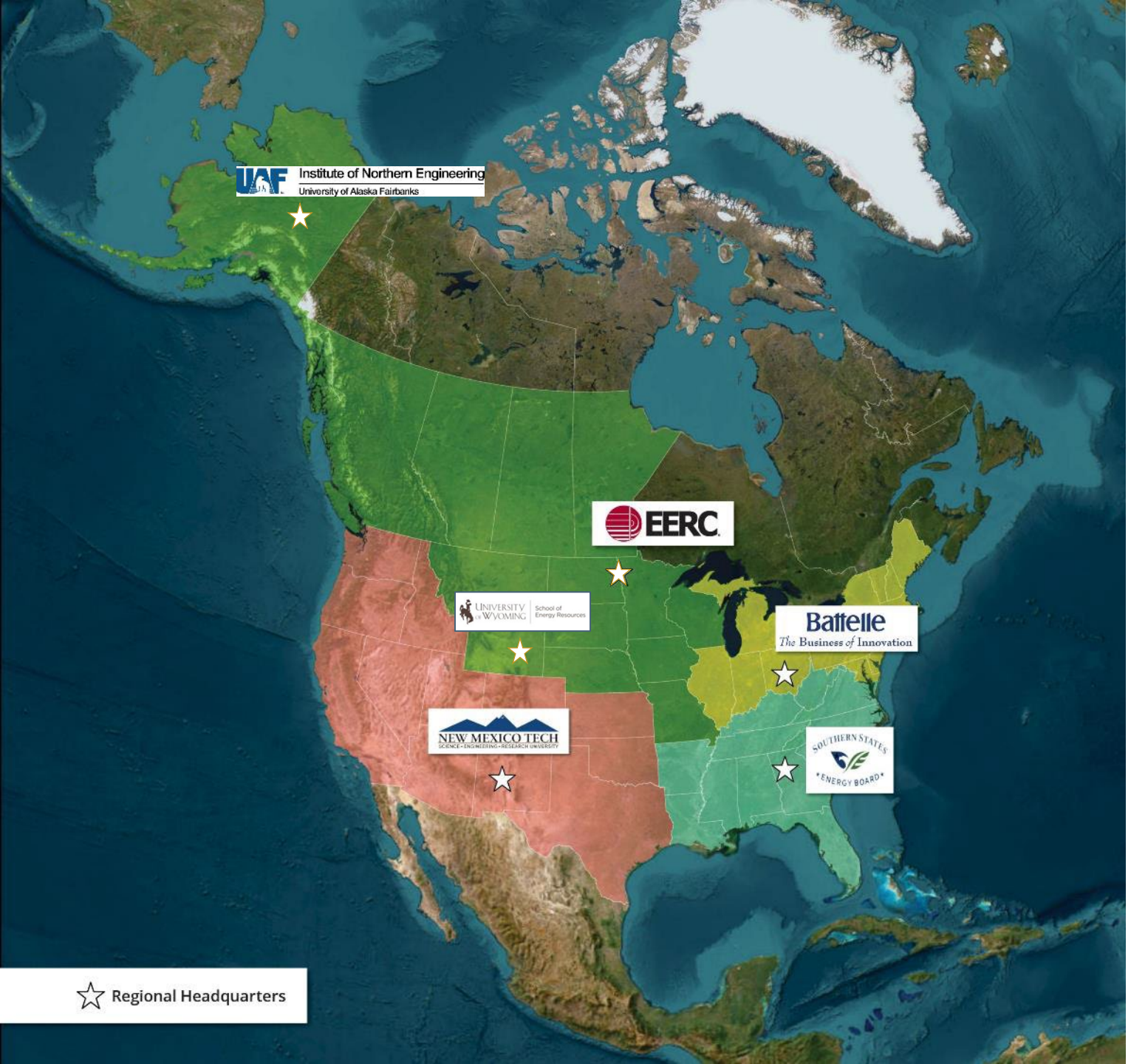
The Plains CO_2 Reduction (PCOR) Partnership addresses regional capture, transport, use, and storage challenges facing commercial carbon capture and storage (CCS)/carbon capture, utilization, and storage (CCUS) deployment. The Partnership focuses on the following:

- Strengthening the technical foundation for geologic CO_2 storage and enhanced oil recovery (EOR)
- Regional characterization
- Advancing capture technology
- Improving application of monitoring technologies
- Promoting integration among capture, transportation, use, and storage industries
- Facilitating development of regulatory frameworks
- Providing scientific support to policymakers
- Enabling and advancing deployment of CCS/CCUS

The partners inform priorities.

PCO2R Partnership — PARTNERSHIP MEMBERS

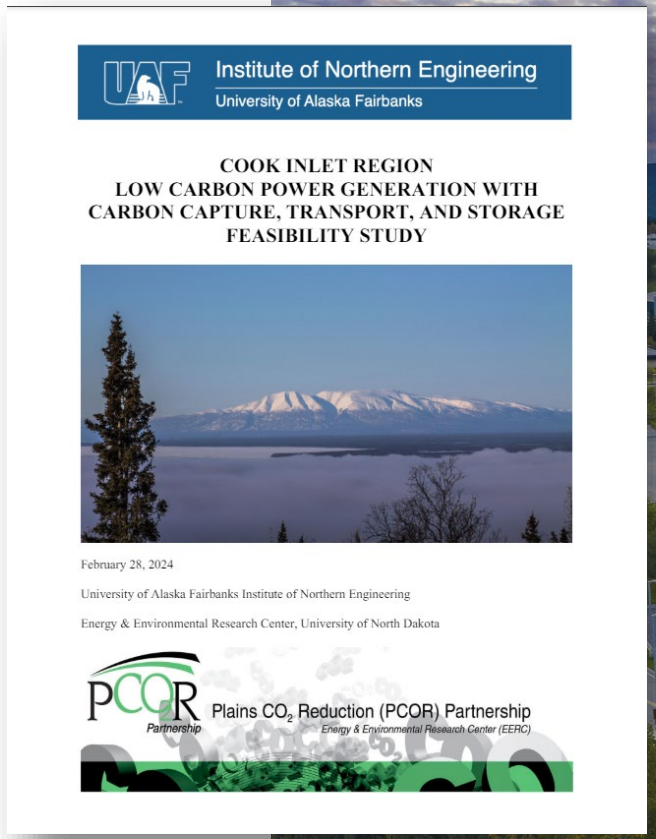
U.S. DEPARTMENT OF ENERGY | NETL NATIONAL ENERGY TECHNOLOGY LABORATORY | EERC UNIVERSITY OF NORTH DAKOTA | North Dakota Industrial Commission | UAF Institute of Northern Engineering, University of Alaska Fairbanks | University of Wyoming School of Energy Resources



PCOR PARTNERSHIP REGIONAL INITIATIVE PROGRAM

Institute of Northern Engineering

University of Alaska Fairbanks


Institute of Northern Engineering
University of Alaska Fairbanks

COOK INLET REGION
LOW CARBON POWER GENERATION WITH
CARBON CAPTURE, TRANSPORT, AND STORAGE
FEASIBILITY STUDY

February 28, 2024

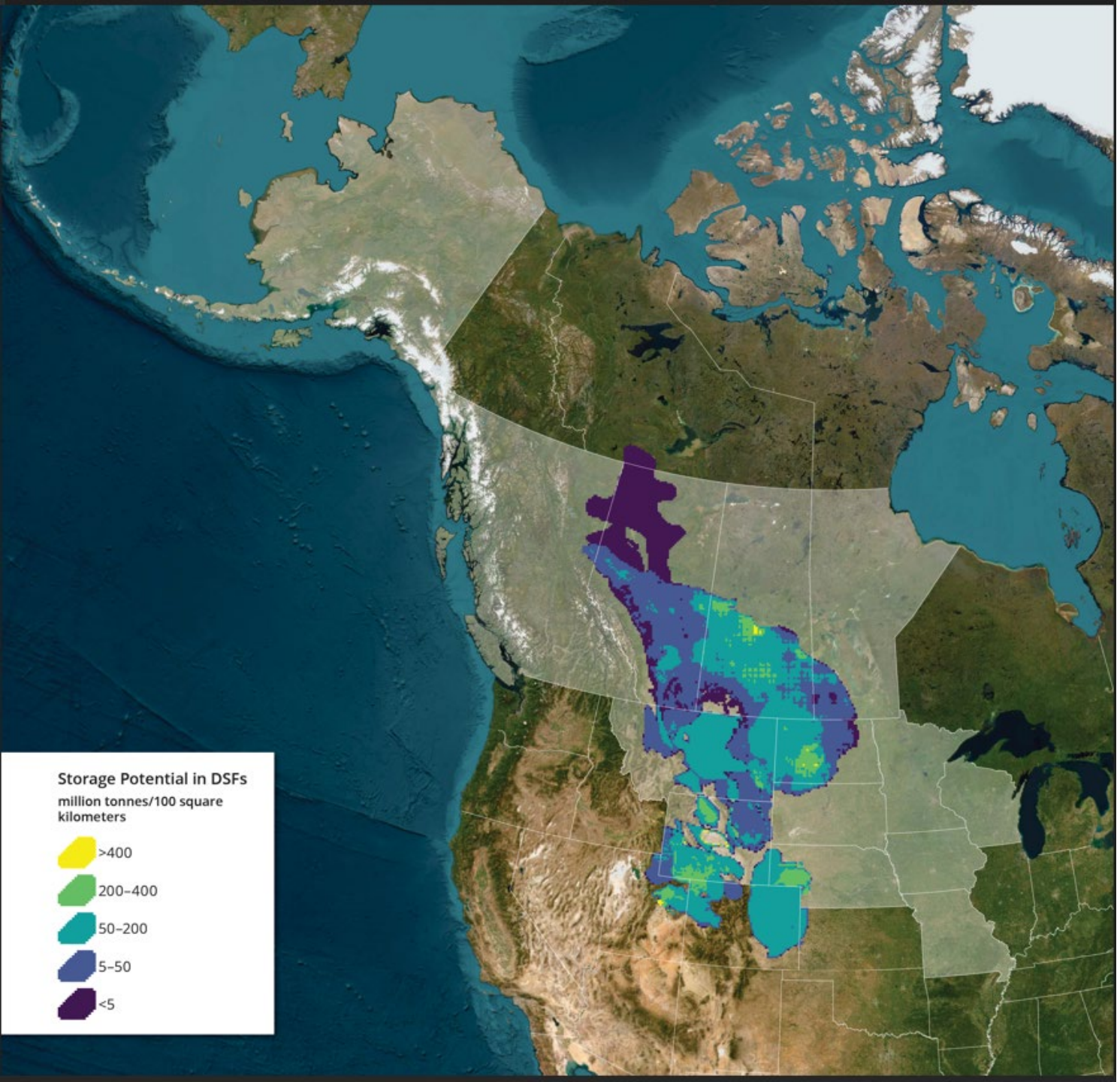
University of Alaska Fairbanks Institute of Northern Engineering

Energy & Environmental Research Center, University of North Dakota

PCO2R Partnership
Plains CO_2 Reduction (PCOR) Partnership
Energy & Environmental Research Center (EERC)

SEDIMENTARY BASINS

SEDIMENTARY BASINS AND LARGE STATIONARY SOURCES



ASSESSED STORAGE POTENTIAL IN DEEP SALINE FORMATIONS

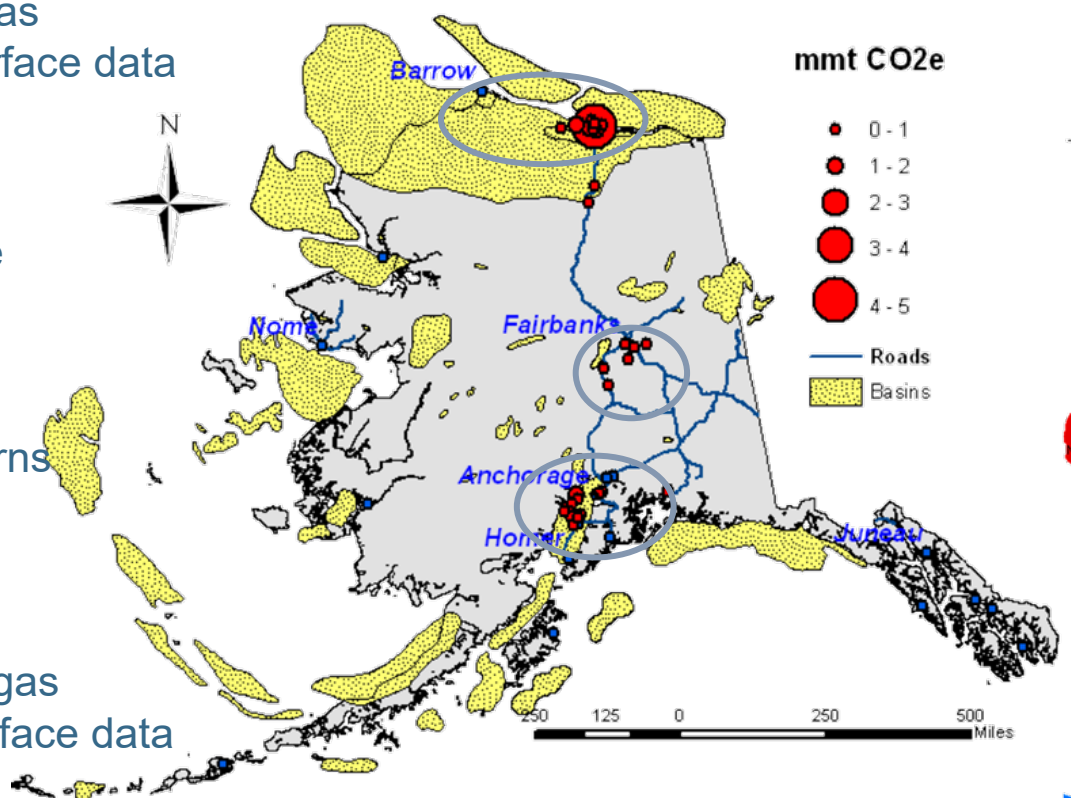
*DSF = deep saline formation

Alaska CO_2 Sources and Storage Potential

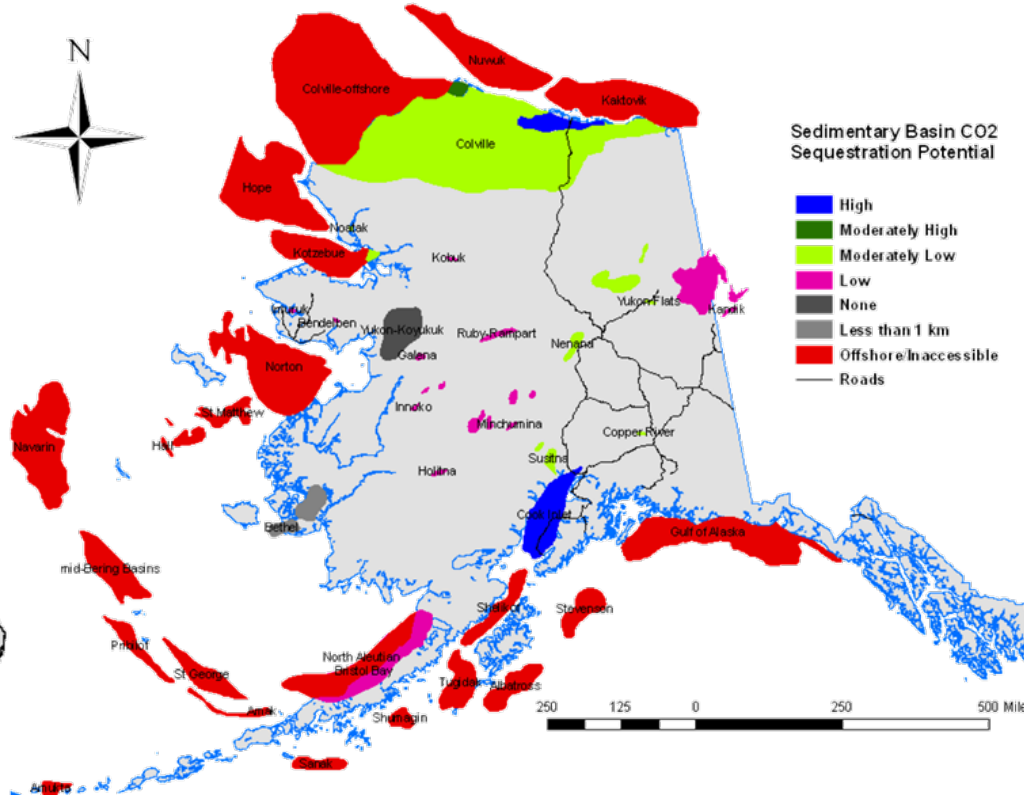
North Slope
- Natural gas-fired
- Low-cost natural gas
- Oil and gas subsurface data

Interior
- Coal-fired
- Limited subsurface data
- Subsurface poorly understood, cap rock concerns

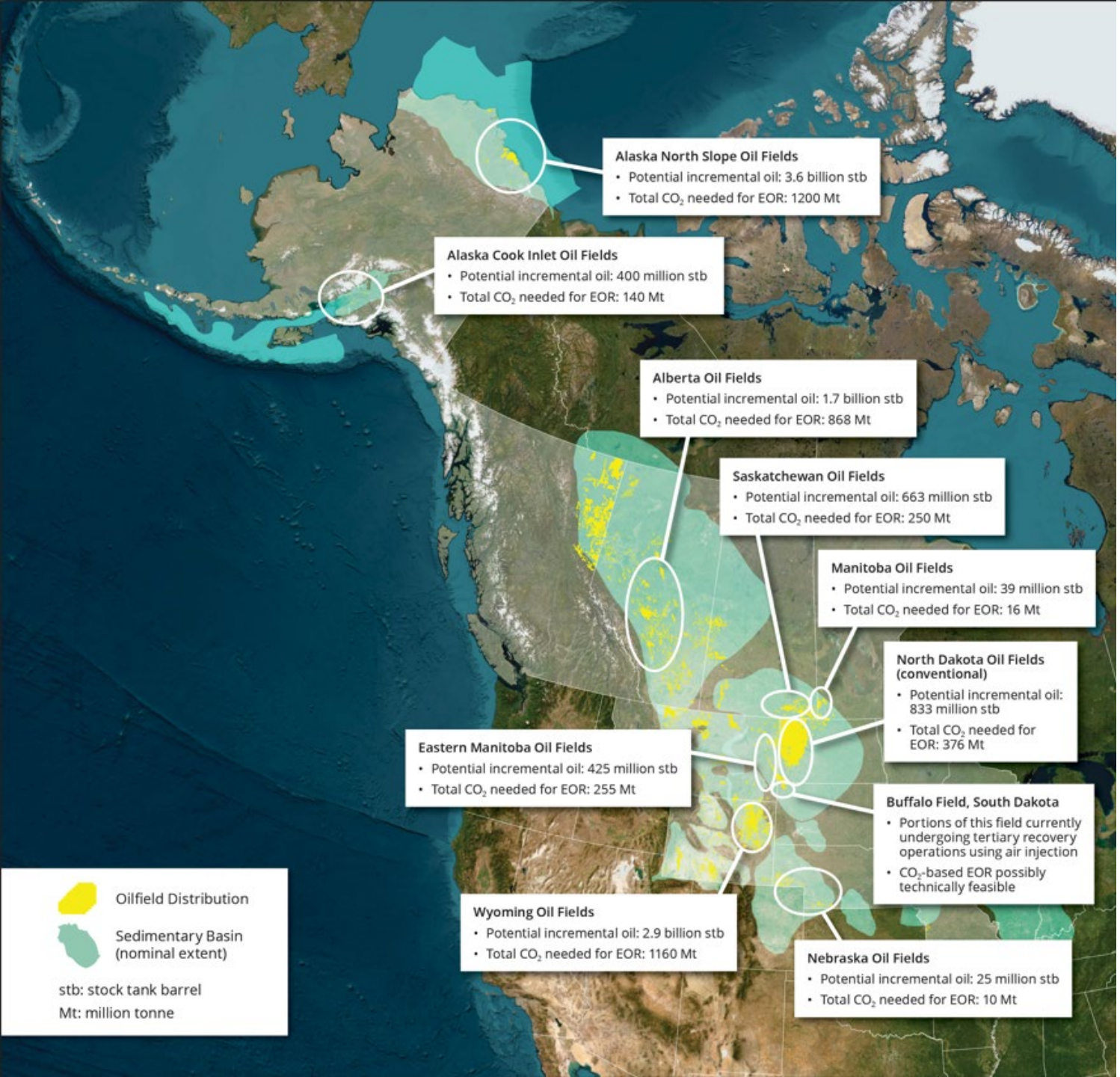
Southcentral
- Natural gas-fired
- High cost, scarce natural gas
- Oil and gas subsurface data
- ARCCS project proposed



CO_2 Stationary Sources (red) and Deep Sedimentary Basins (yellow)



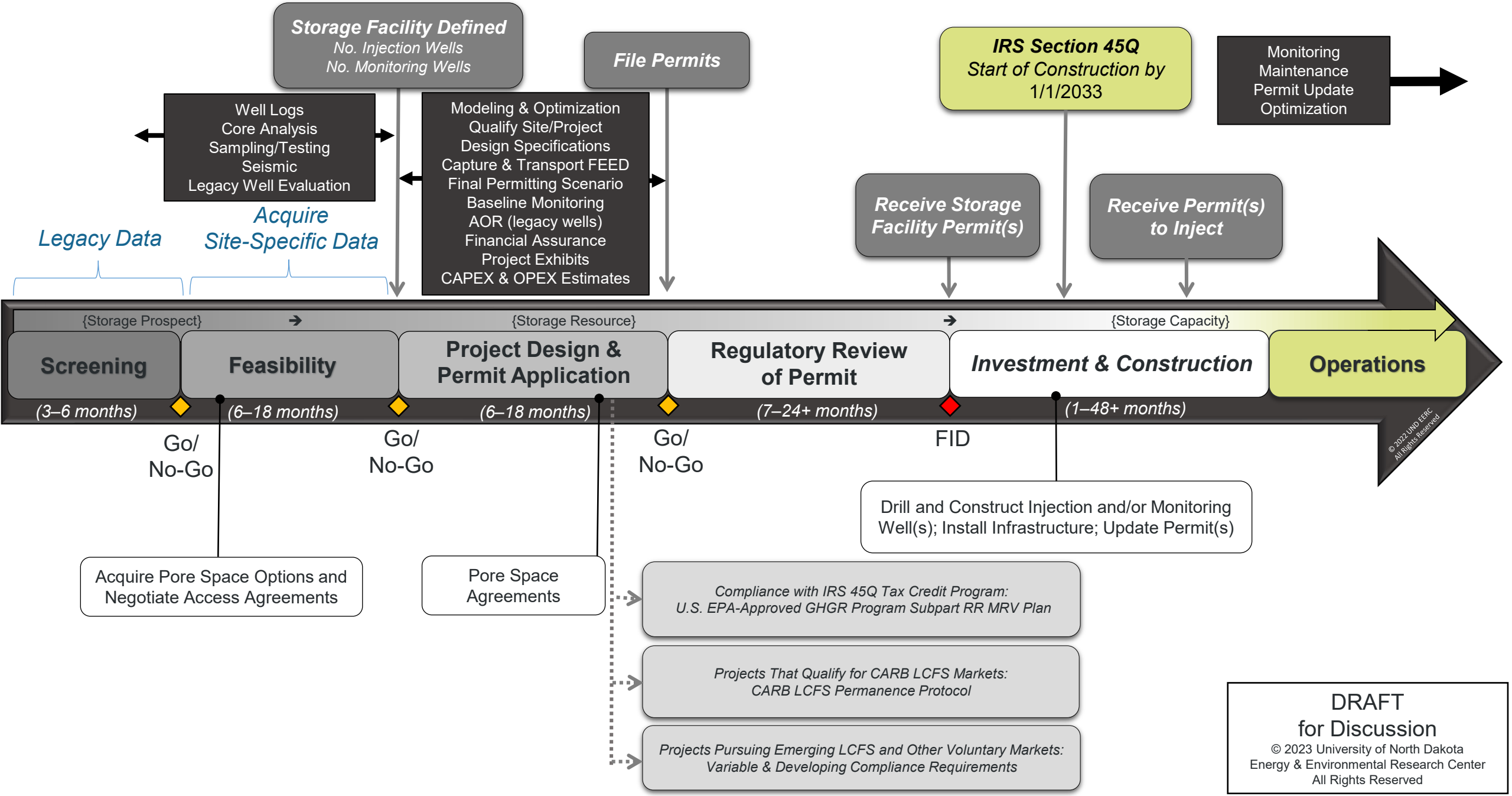
Sedimentary Basin Sequestration Potential (Shellenbaum and Clough, DNR, 2010)



STORAGE POTENTIAL ASSOCIATED WITH OIL AND GAS FIELDS

ACTIVE AND DEVELOPING CCUS PROJECTS IN THE PCOR PARTNERSHIP REGION

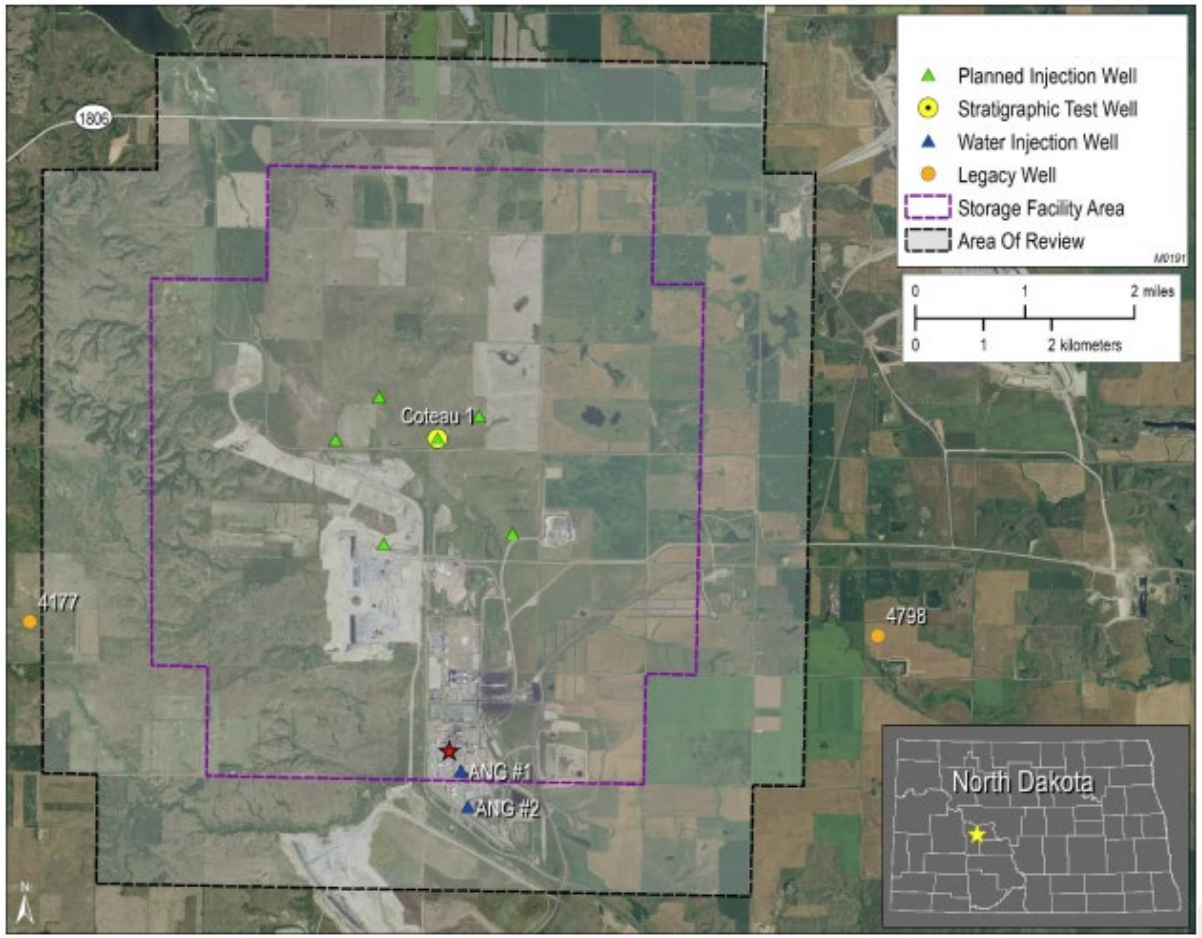
INDICATIVE TIMELINE TO IMPLEMENT CARBON CAPTURE AND GEOLOGIC STORAGE



DRAFT
for Discussion

CO_2 STORAGE FACILITY PERMIT (CLASS VI) CHECKLIST

- ❑ Pore space access
- ❑ **Geologic exhibits**
- ❑ **Area of review (AOR)**
- ❑ Supporting plans
  - ❑ Emergency and remedial response plan
  - ❑ Financial assurance demonstration plan
  - ❑ Worker safety plan
  - ❑ **Testing and monitoring plan**
  - ❑ **Well casing and cementing program**
  - ❑ Plugging plan
  - ❑ **Postinjection site and facility closure plan**
- ❑ Injection well and storage reservoir information
- ❑ Permit appendices



GEOLOGIC STORAGE FACILITY DEVELOPMENT

EQUATION FOR SUCCESS

1) Appropriate geology (characterization)
2) Proper engineering and operations design
3) Comprehensive testing and monitoring plans
4) Stakeholder engagement

+

Compliance oversight through state and/or EPA permitting and regulatory programs

AND

Ongoing monitoring

AND

Regulatory and incentive program reporting/compliance through life of project

Result: CO_2 permanently stored with robust protections

ND–AK CCUS SUMMIT

Objective: Information sharing among North Dakota and Alaska legislators, regulators, and industry experts

- Tours:
  - Active Class VI injection project
  - Coal-fired power plant preparation for UIC Class VI permitting

PCOR PARTNERSHIP — EERC

December 4–5, 2023, BISMARCK, NORTH DAKOTA

Tuesday, December 5, 2023 — Epic Conference Room 335

TIME	ACTIVITY	DISCUSSION LEADER(S)
7:30 a.m.	*Breakfast (provided)*	
8:15 a.m.	**Welcome and Introductions**	Kevin Connors Senator Dale Patten
8:30 a.m.	Meeting Overview	Kevin Connors
8:45 a.m.	**Setting the Stage for the Day: Everything You Need to Know about North Dakota CCUS**	
	• PCOR Partnership – Fostering Key Partnerships and Building the Technical Foundation	Kevin Connors
	• North Dakota Energy R&D Program	Reice Haase
	• North Dakota Clean Sustainable Energy Authority	Senator Dale Patten Representative Glenn Bosch
	• North Dakota's Carbon Management Vision	Lynn Helms Senator Rich Wardner
9:30 a.m.	**Establishing the Regulatory Certainty**	
	North Dakota's Legal and Regulatory Frameworks:	Lynn Helms
	• Implementing a Resource Management Framework	
	• Class VI Well Primacy Application Process	
	• Permitting CO_2 Storage	Kevin Connors
10:15 a.m.	*Break*	
10:30 a.m.	**Alaska's Road to Regulatory Framework**	
	• Class VI Primacy Process Update	Commissioner Brett Huber
	• Pending Legislation and Continued DNR Work	Haley Paine
11:00 a.m.	**Alaska Project Updates**	
	• Consortium Updates on DOE Applications – Direct Air Capture and Point Source Capture	Kyle Kohman, Brooke Ivy, Liam Zsolt
	• ARRCS Project (CarbonSAFE Phase II)	Brent Sheets, Rob Power
12:00 Noon	*Business Lunch (provided)*	
1:00 p.m.	**Current Opportunities and Future Challenges**	
	• North Dakota Public Perceptions and Attitudes Toward Coal and CCUS	Jonathan Fortner
	• Carbon Capture on Coal-Fired Power Plants	Mike Holmes
2:00 p.m.	**Topical Discussion**	Kevin Connors
	• Creating Value for the State, Industry, and Communities	
	• Areas of CCUS Implementation Uncertainty or Concerns for Alaska Legislators	
	• Policy and Regulatory Lessons Learned from North Dakota	
	• North Dakota CCUS Design Considerations and Approaches to Operational Flexibility	
	• Gasification Plant and Enhanced Oil Recovery	
3:00 p.m.	*Adjourn*	

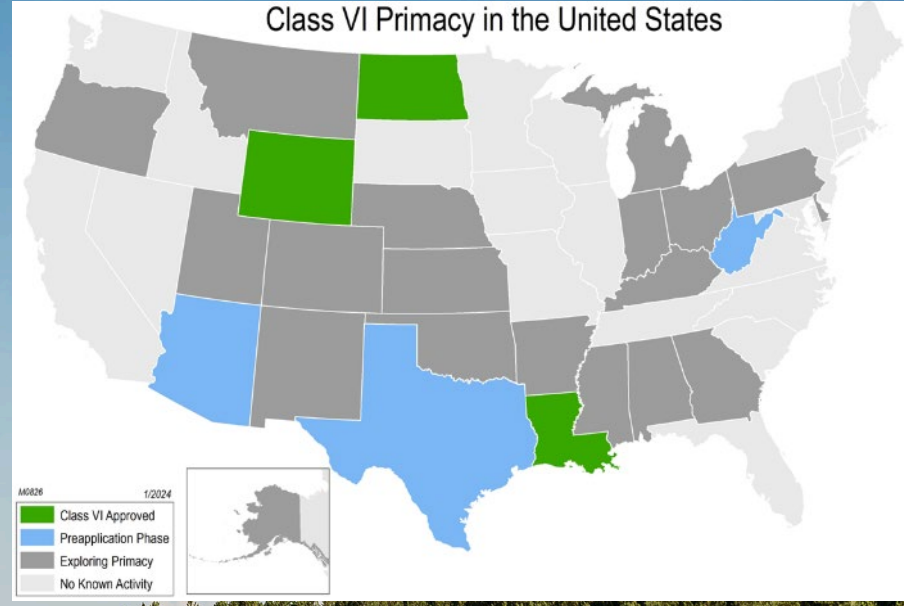
Photo from LinkedIn

REGULATORY ROUNDUP 2023

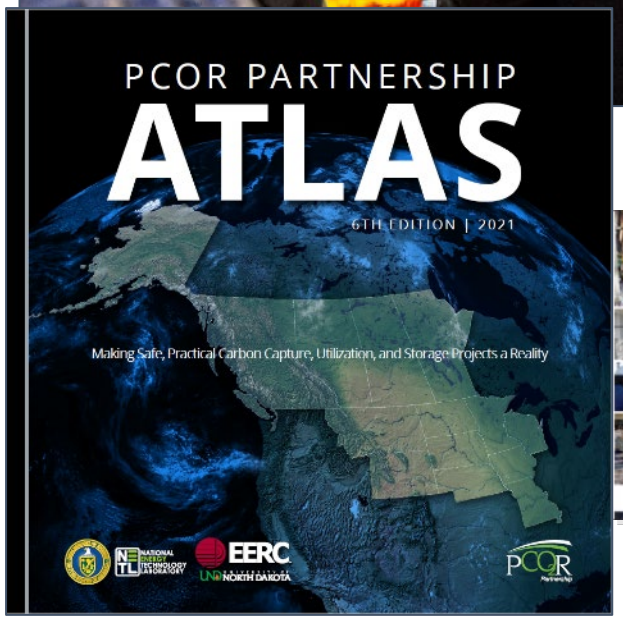
46 attendees

Regulators from 13 states and 2 Canadian provinces

Additional interest



EDUCATION AND OUTREACH



John Hamling
Assistant Vice President for Strategic Partnerships
jhamling@undeerc.org
701.777.5472

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

www.undeerc.org
701.777.5000

THANK YOU

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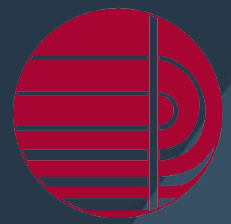

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