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UNIVERSITY OF
NORTH DAKOTA



Critical Challenges. Practical Solutions.



Energy & Environmental Research Center (EERC)

Plains CO₂ Reduction Partnership Initiative to Accelerate Carbon Capture, Utilization, and Storage Deployment (FE0031838)

U.S. Department of Energy National Energy Technology Laboratory
Carbon Storage Virtual Project Review Meeting
September 8, 2020, 11:50 a.m. EDT

Kevin Connors
PCOR Partnership Project Manager

OUR VISION

TO LEAD THE WORLD IN **DEVELOPING
SOLUTIONS** TO ENERGY AND
ENVIRONMENTAL CHALLENGES.

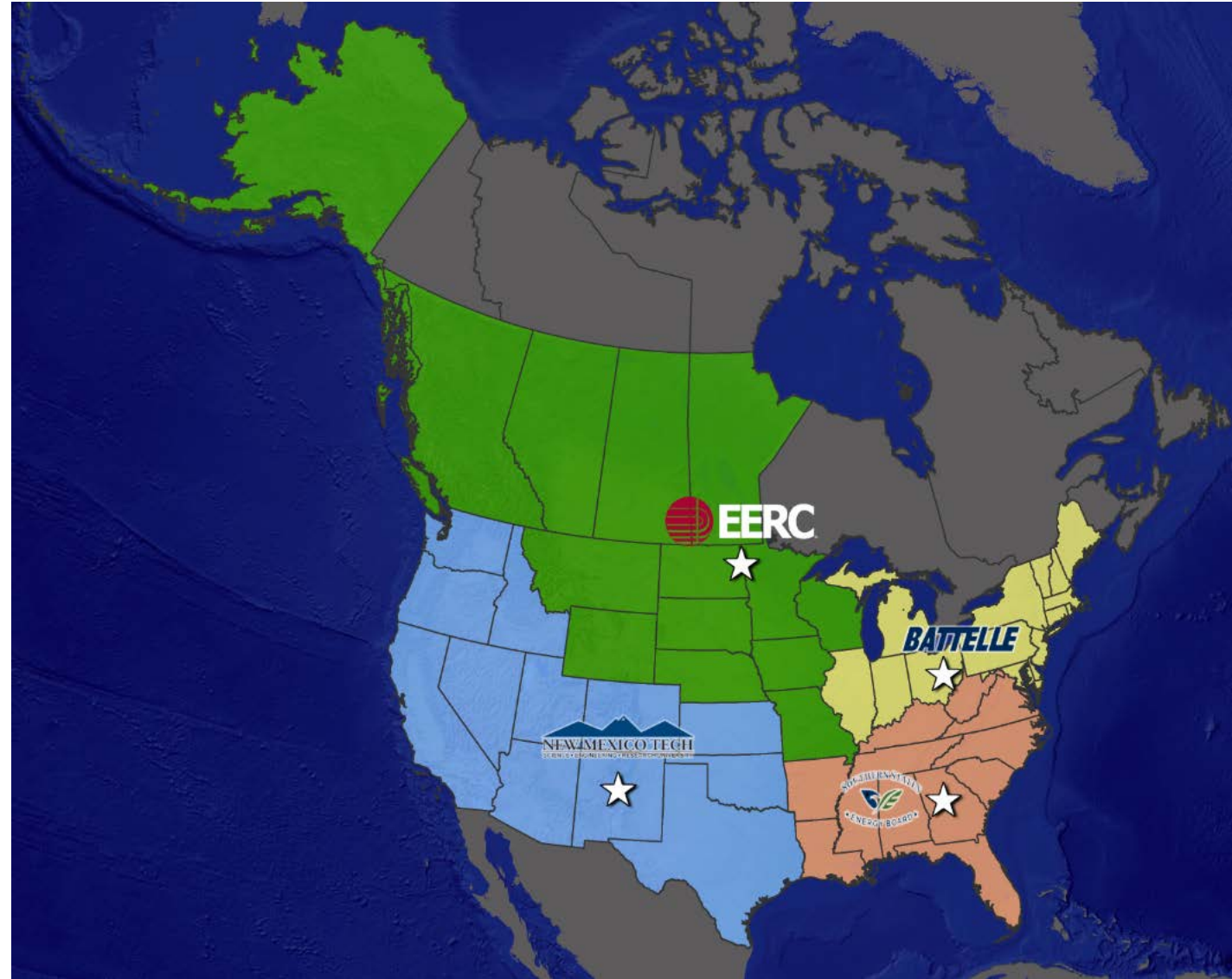


REGIONAL CARBON SEQUESTRATION PARTNERSHIPS (RCSP)

RCSP Initiative Goal:

Identify and address regional storage and transport challenges facing commercial CCUS deployment.

- Wisconsin, Iowa: Coordinating with Battelle.
- Montana: Coordinating with New Mexico Institute of Technology.
- Missouri: Coordinating with Battelle and the Southern States Energy Board.



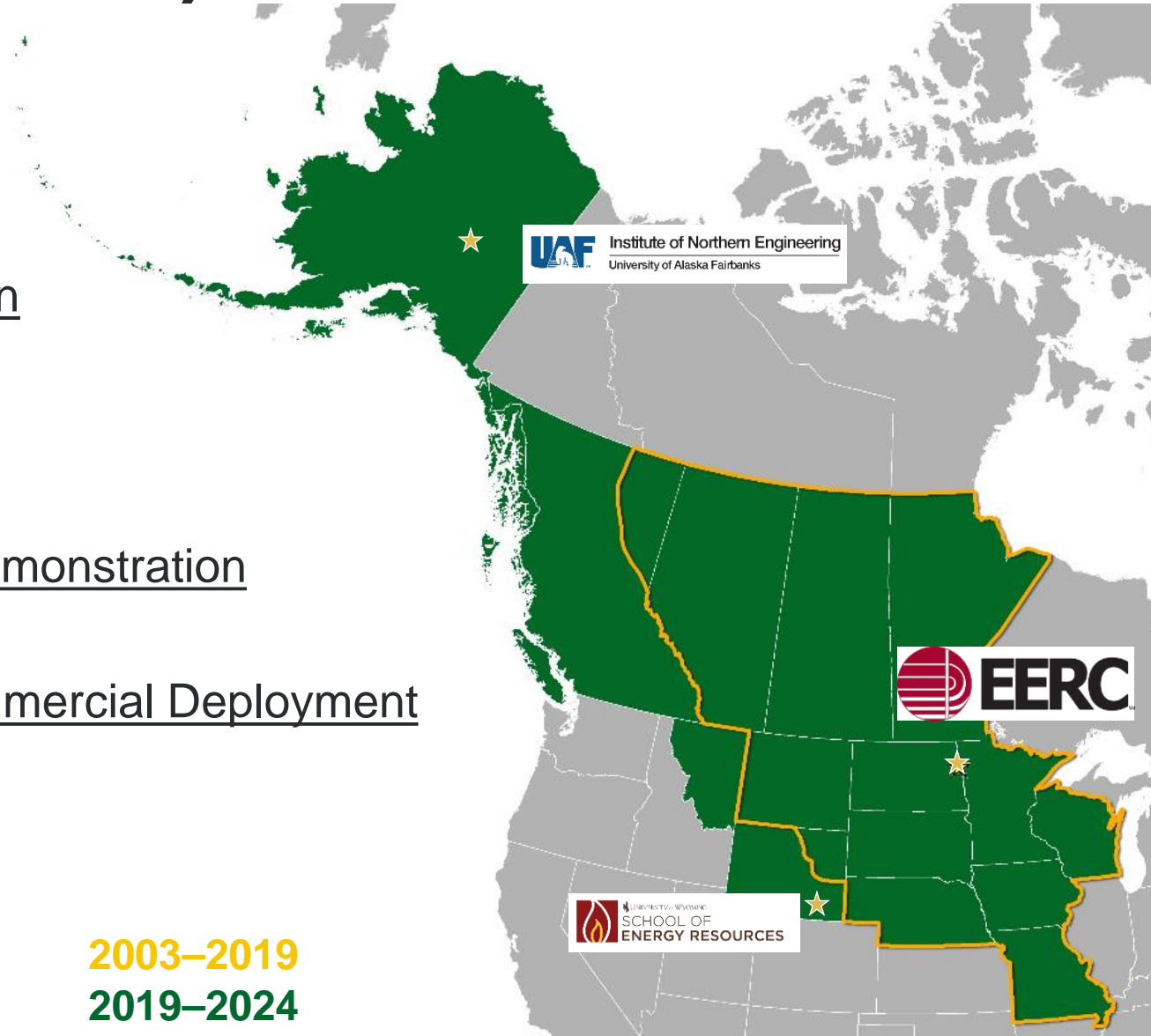
PLAINS CO₂ REDUCTION (PCOR) PARTNERSHIP

2003–2005 – PCOR Partnership: Characterization

2005–2008 – PCOR Partnership: Field Validation

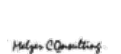
2007–2019 – PCOR Partnership: Commercial Demonstration

2019–2024 – *PCOR Partnership Initiative*: Commercial Deployment



2003–2019

2019–2024



PCOR PARTNERSHIP

Five key messages relate to:

1. Our engaged membership.
2. Outstanding regional CCUS potential.
3. CCUS works! We have demonstrated:
 - a) Low risks of storage.
 - b) Successful monitoring, verification, and accounting (MVA).
4. Economic and environmental benefits.
5. Active public engagement and outreach.

2003

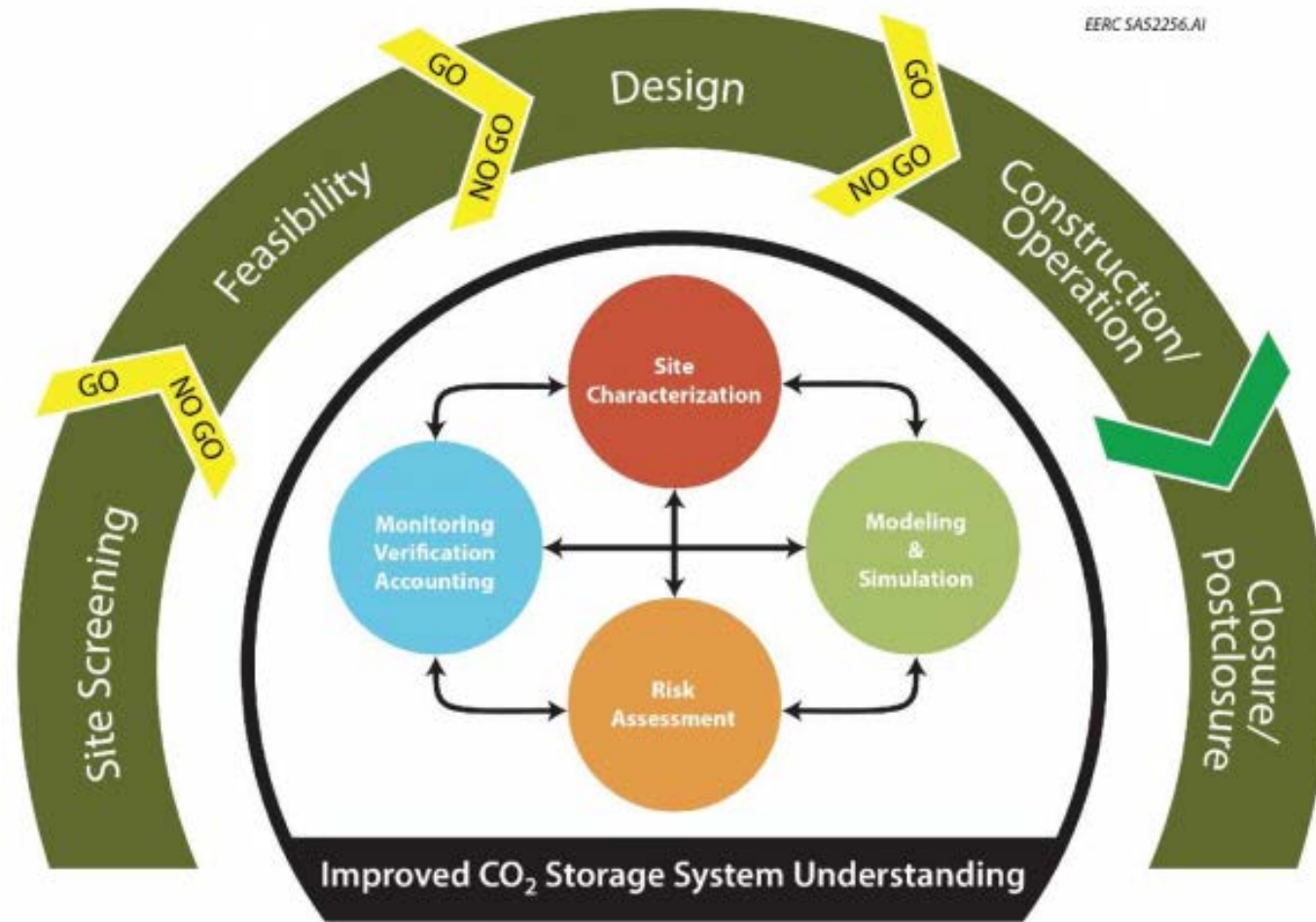
PCOR PARTNERSHIP INITIATIVE

The PCOR Partnership Initiative is addressing regional capture, transport, use, and storage challenges facing commercial CCUS deployment. The Initiative is focusing on:

- Strengthening the technical foundation for geologic CO₂ storage and enhanced oil recovery.
- Advancing capture technology.
- Improving application of monitoring technologies.
- Promoting integration between capture, transportation, use, and storage industries.
- Facilitating regulatory frameworks.
- Providing scientific support to policy makers.



ADAPTIVE MANAGEMENT APPROACH



PCOR PARTNERSHIP INITIATIVE TASK OVERVIEW

Technical Challenges

- Geologic Characterization
- Storage Performance and Optimization
- MVA Strategies
- Risk Management

Data Collection, Sharing, and Analysis

- NRAP Validation
- Machine Learning
- Risk-Based Area of Review (AOR)

Regional Infrastructure

- Techno-Economic Analysis
- Infrastructure Scale-Up Challenges
- Socioeconomic Impacts
- Public and Industry Outreach

Nontechnical Challenges

- Policy and Regulatory Challenges
- Business Models
- Pathways to Commercial Deployment



Image credit – EERC

TECHNICAL CHALLENGES

- Geologic Characterization
- Storage Performance and Optimization
- MVA Strategies
- Risk Management



Image credit – EERC

DATA COLLECTION, SHARING, AND ANALYSIS

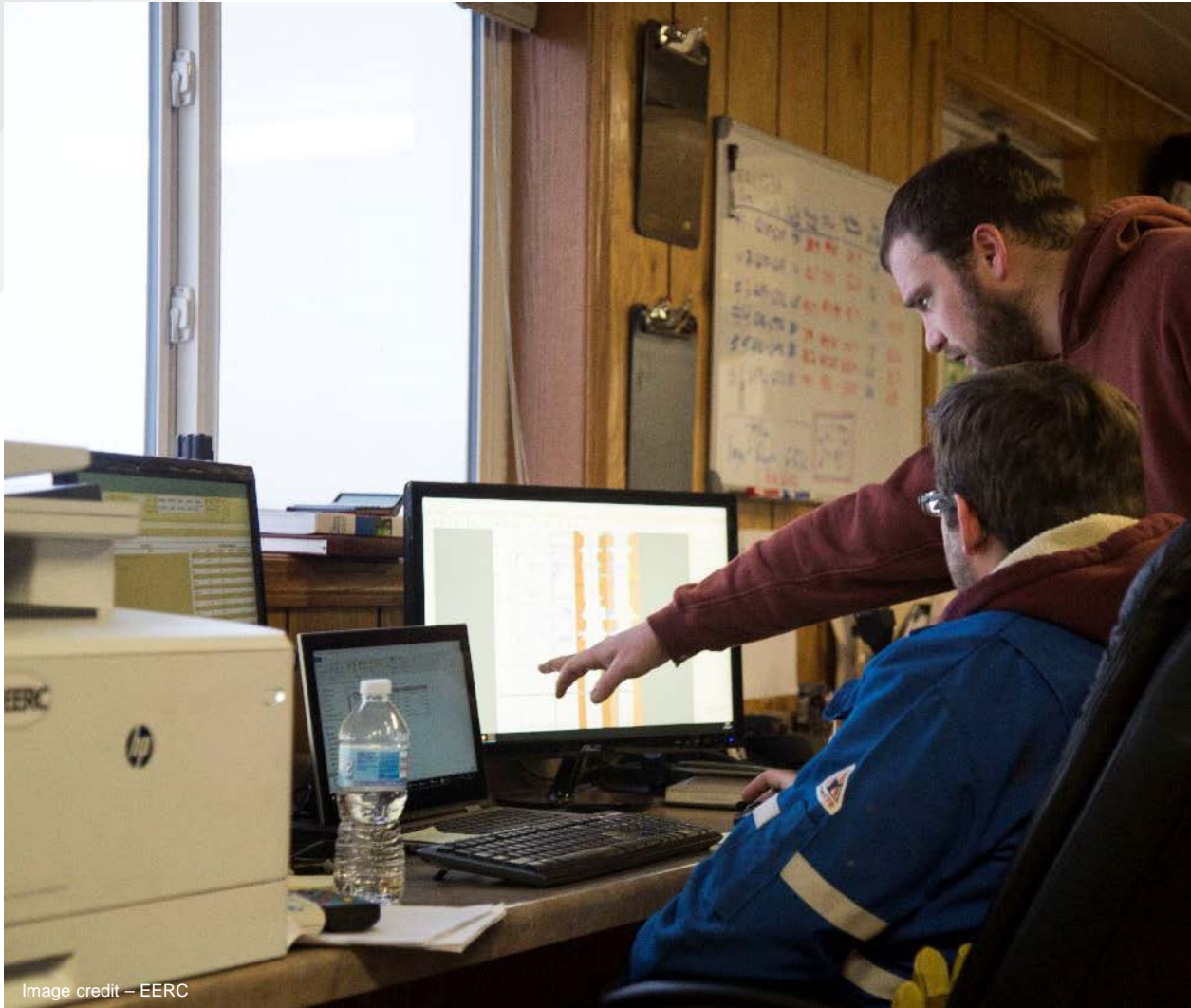


Image credit – EERC

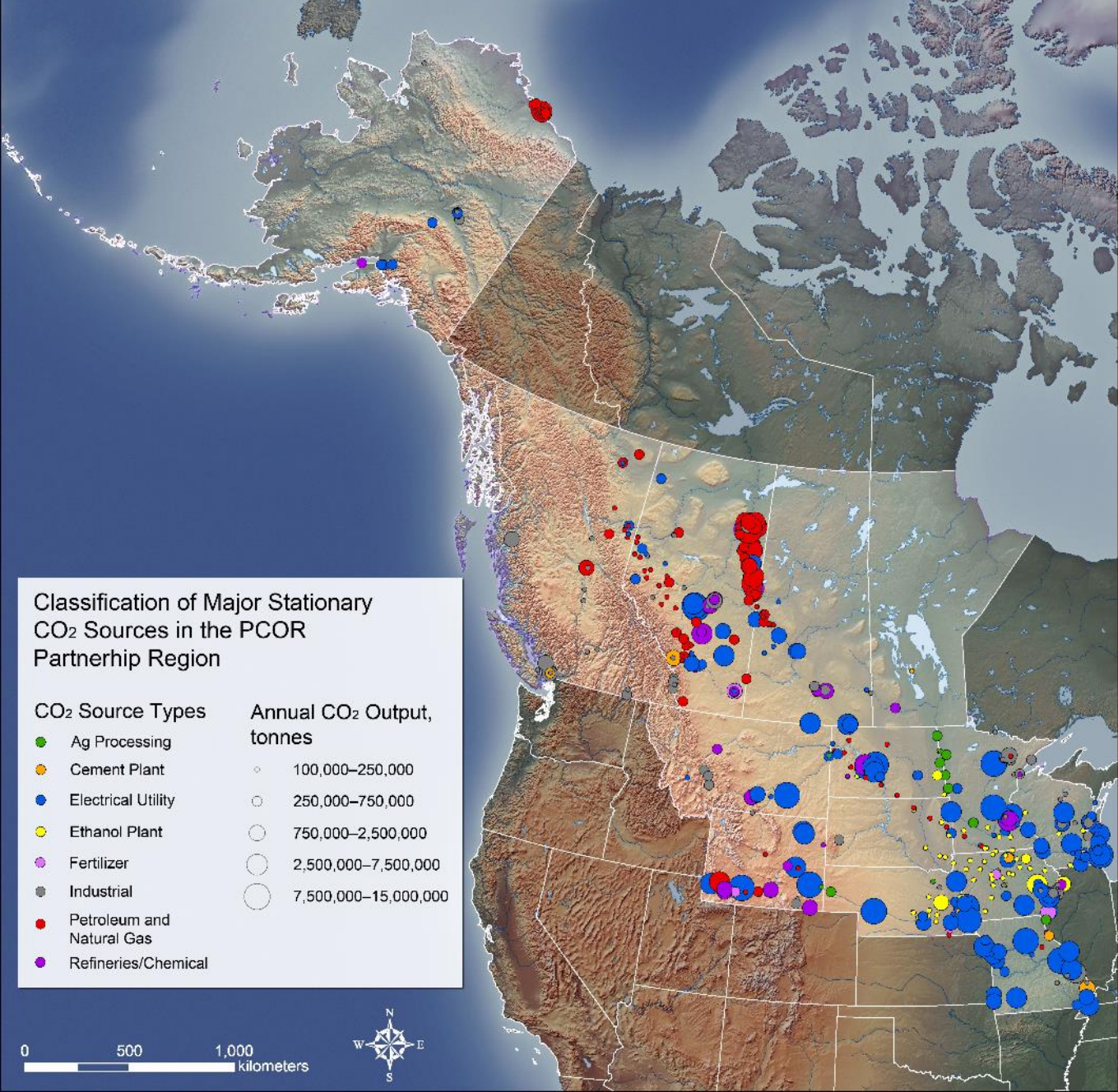
- NRAP Validation
- Machine Learning
- Risk-Based Area of Review (AOR)

REGIONAL INFRASTRUCTURE

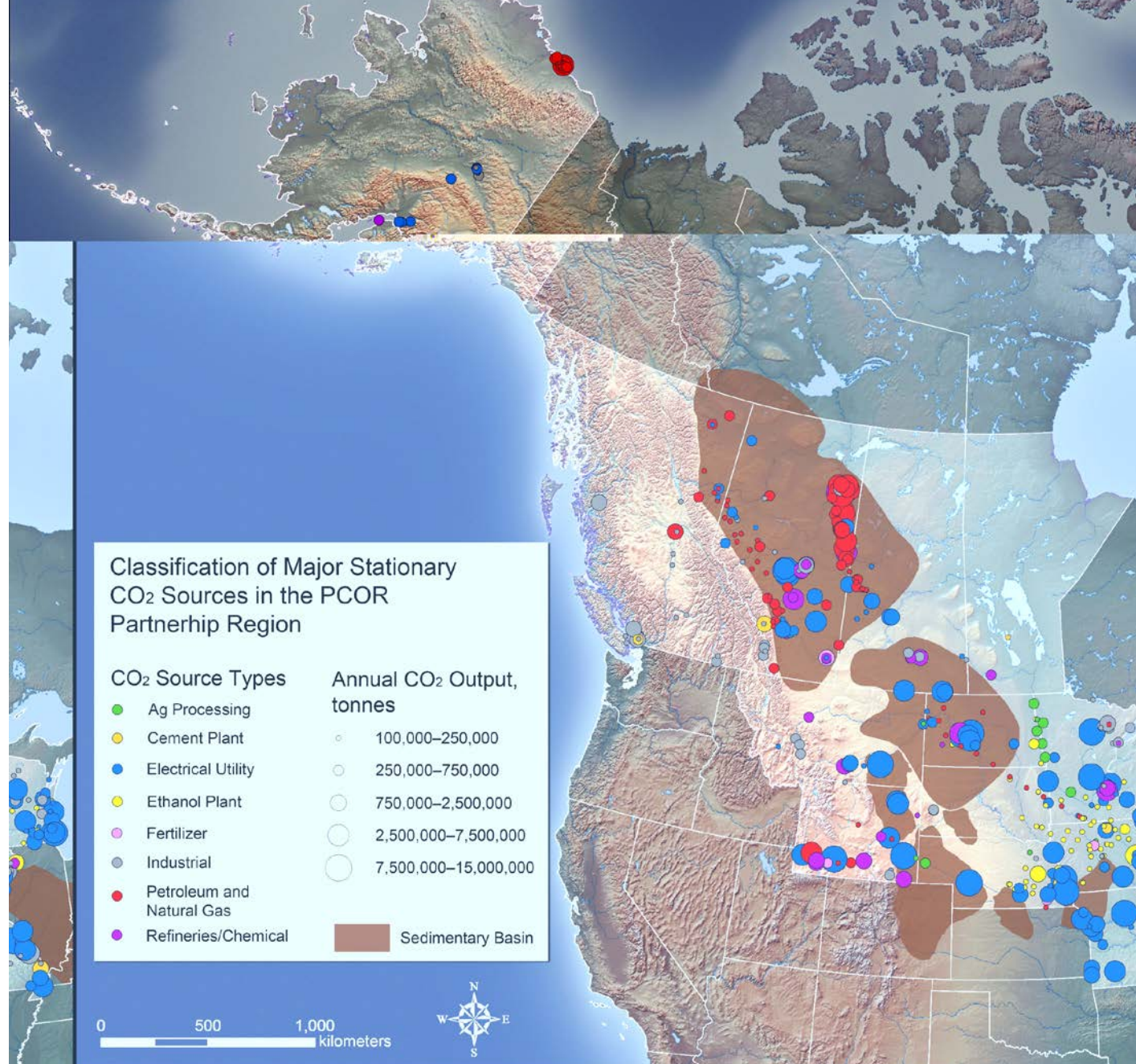
- Techno-Economic Analysis
- Infrastructure Scale-Up Challenges
- Socioeconomic Impacts
- Public and Industry Outreach



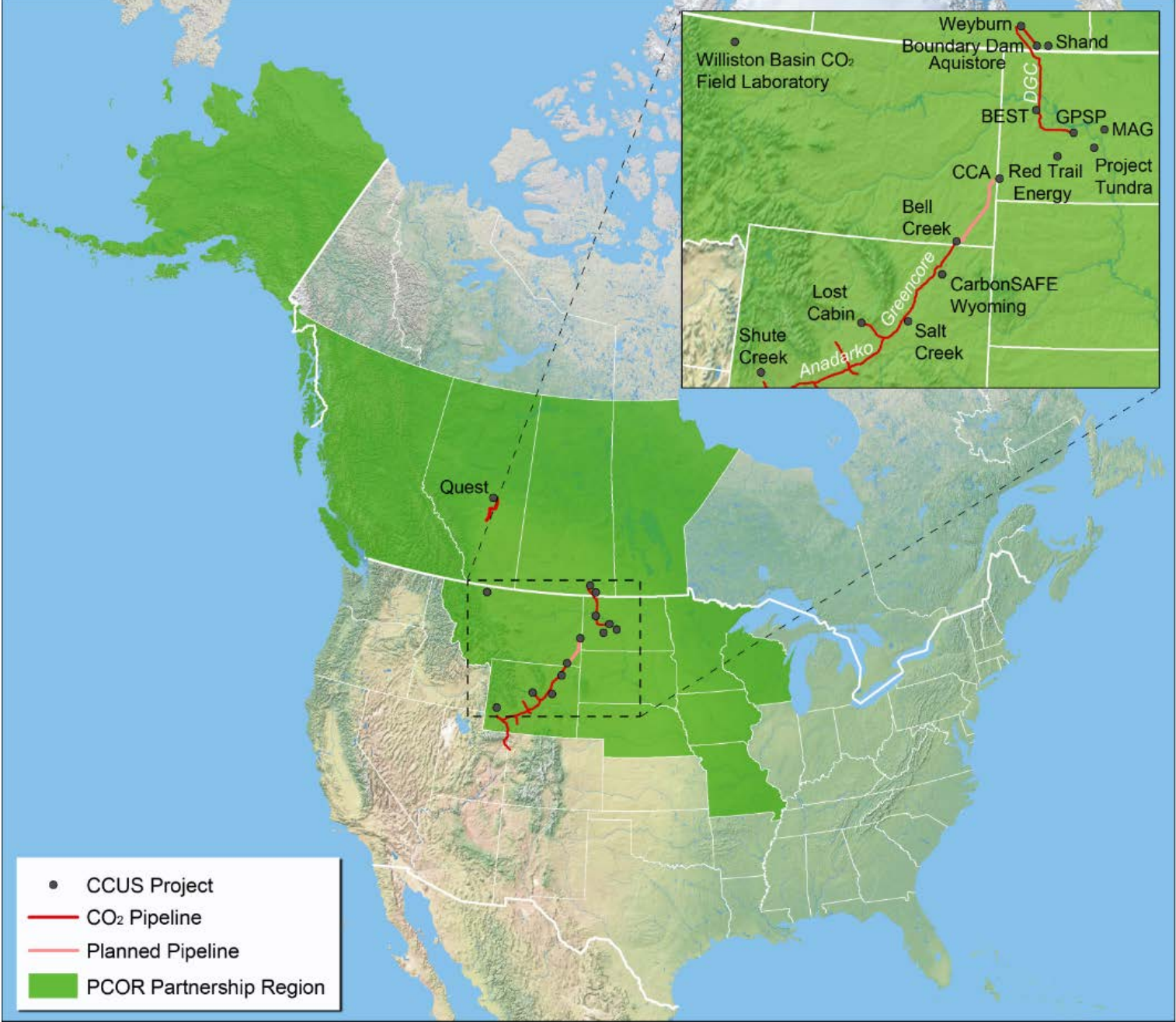
REGIONAL SOURCES



REGIONAL SOURCES



PCOR PARTNERSHIP: CCUS ACTIVITIES

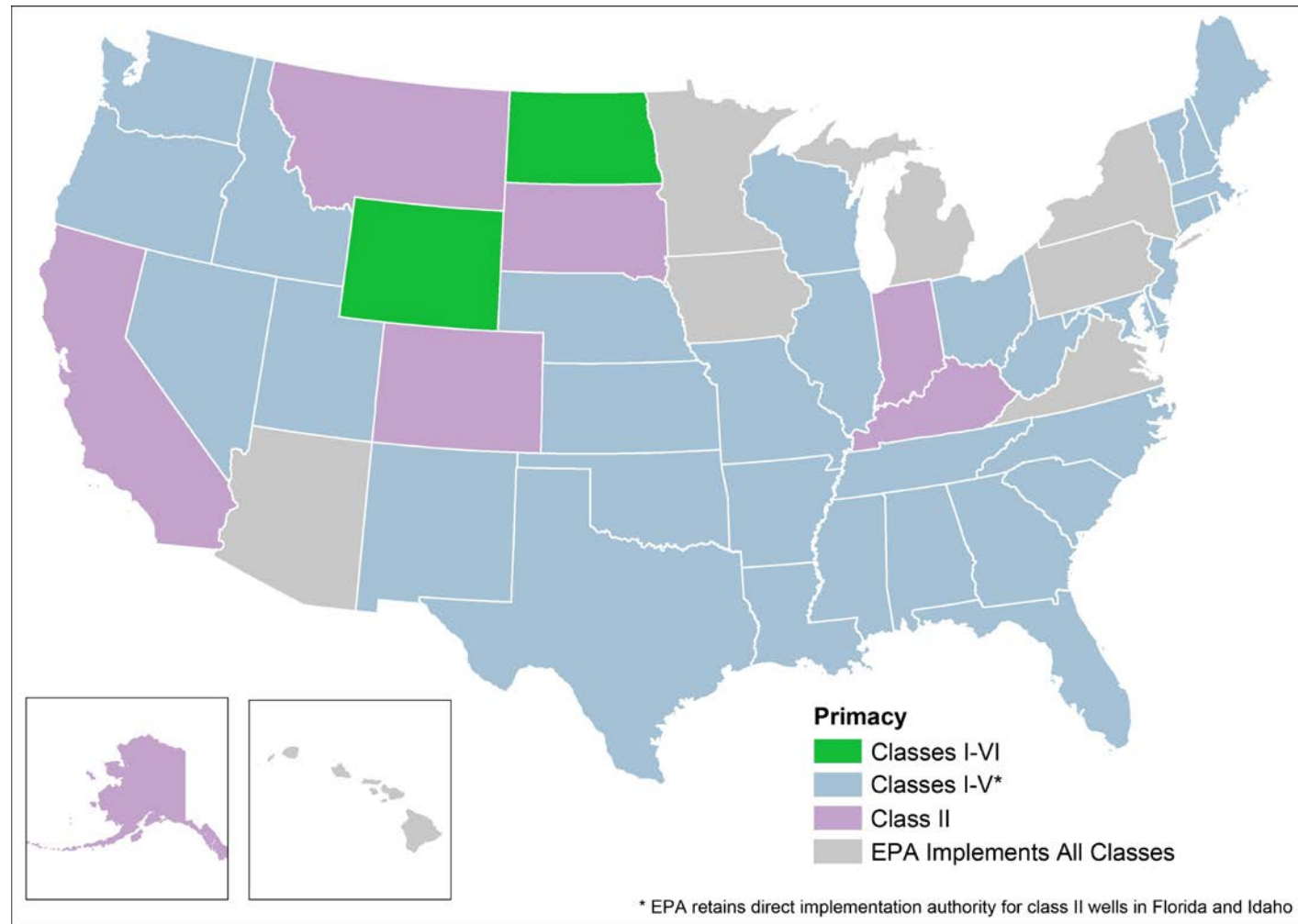


NONTECHNICAL CHALLENGES

- Policy and Regulatory Challenges
- Business Models
- Pathways to Commercial Deployment

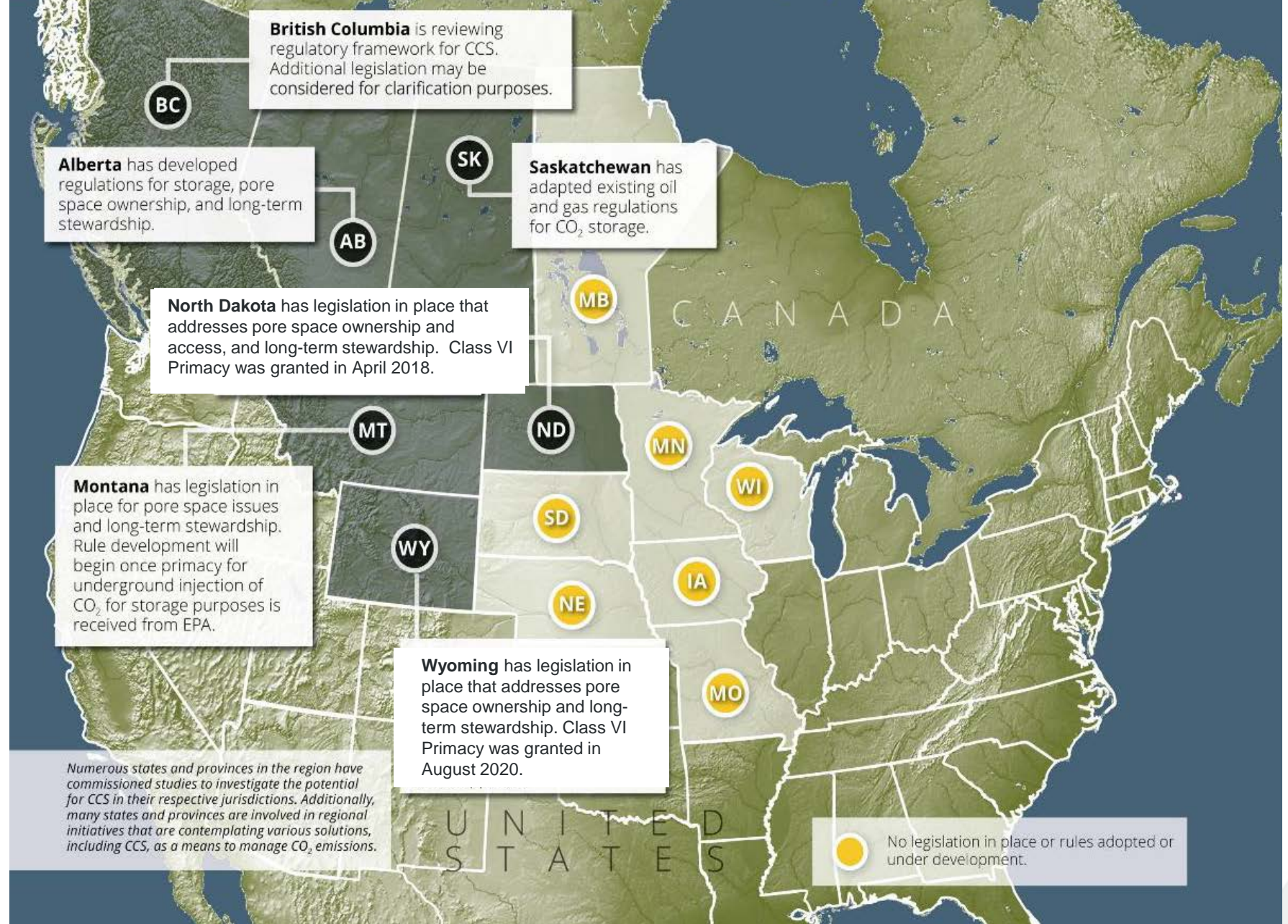


UNDERGROUND INJECTION CONTROL CLASS VI PRIMACY



Class I	Class II	Class III	Class IV	Class V	Class VI
Hazardous and nonhazardous fluids (industrial and municipal wastes).	Brines and other fluids associated with oil and gas production.	Fluids associated with solution mining of minerals.	Hazardous or radioactive wastes. This class is banned by EPA.	Nonhazardous fluids into or above a USDW and are typically shallow.	Injection of carbon dioxide for long-term storage.

ENGAGED REGULATORS



SYNERGY OPPORTUNITIES

- Developing CCUS opportunities in the region
- Catalyst for CCUS projects in the region
- Focused on infrastructure development strategies
- Ethanol Industry in the region accelerating CCUS
- CarbonSAFE Phase III
- Brine Extraction and Storage Test (BEST)



VALUABLE RESULTS



VALUABLE RESULTS MULTIPLIED



PCOR PARTNERSHIP INITIATIVE SUMMARY

Building on over 17 years of applied research in CCUS

Active region developing commercial CCUS projects.

Engaged and motivated partners

Well-equipped project team



THANK YOU





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A wide-angle photograph of a university campus. In the foreground, there are large trees with yellow and orange autumn leaves. The sun is low in the sky, creating a warm glow. In the background, there are several large, multi-story brick buildings, likely university halls or administrative buildings. A parking lot with many cars is visible in front of the buildings.

THANK YOU

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ACKNOWLEDGMENT

This material is based upon work supported by the U.S. Department of Energy National Energy Technology Laboratory under Award No. DE-FE0031838.

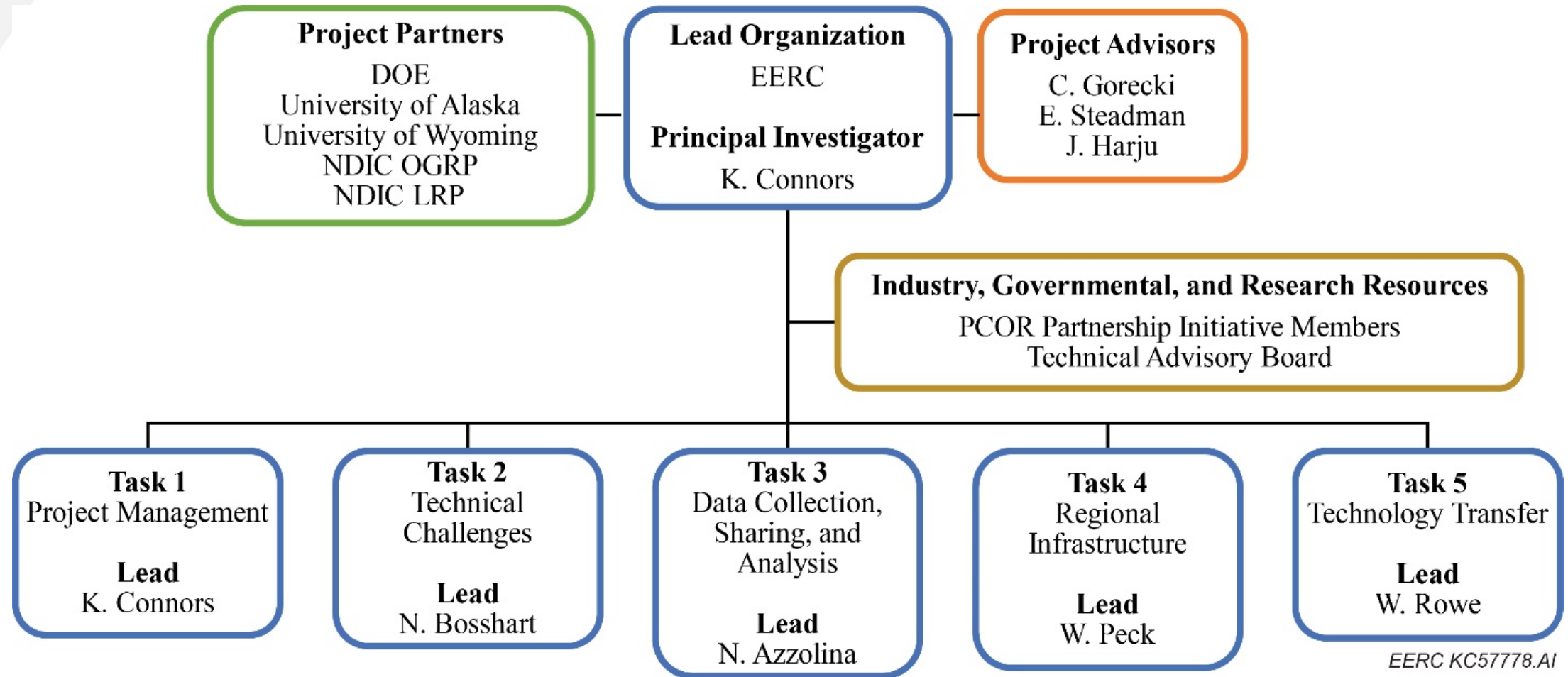
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APPENDIX

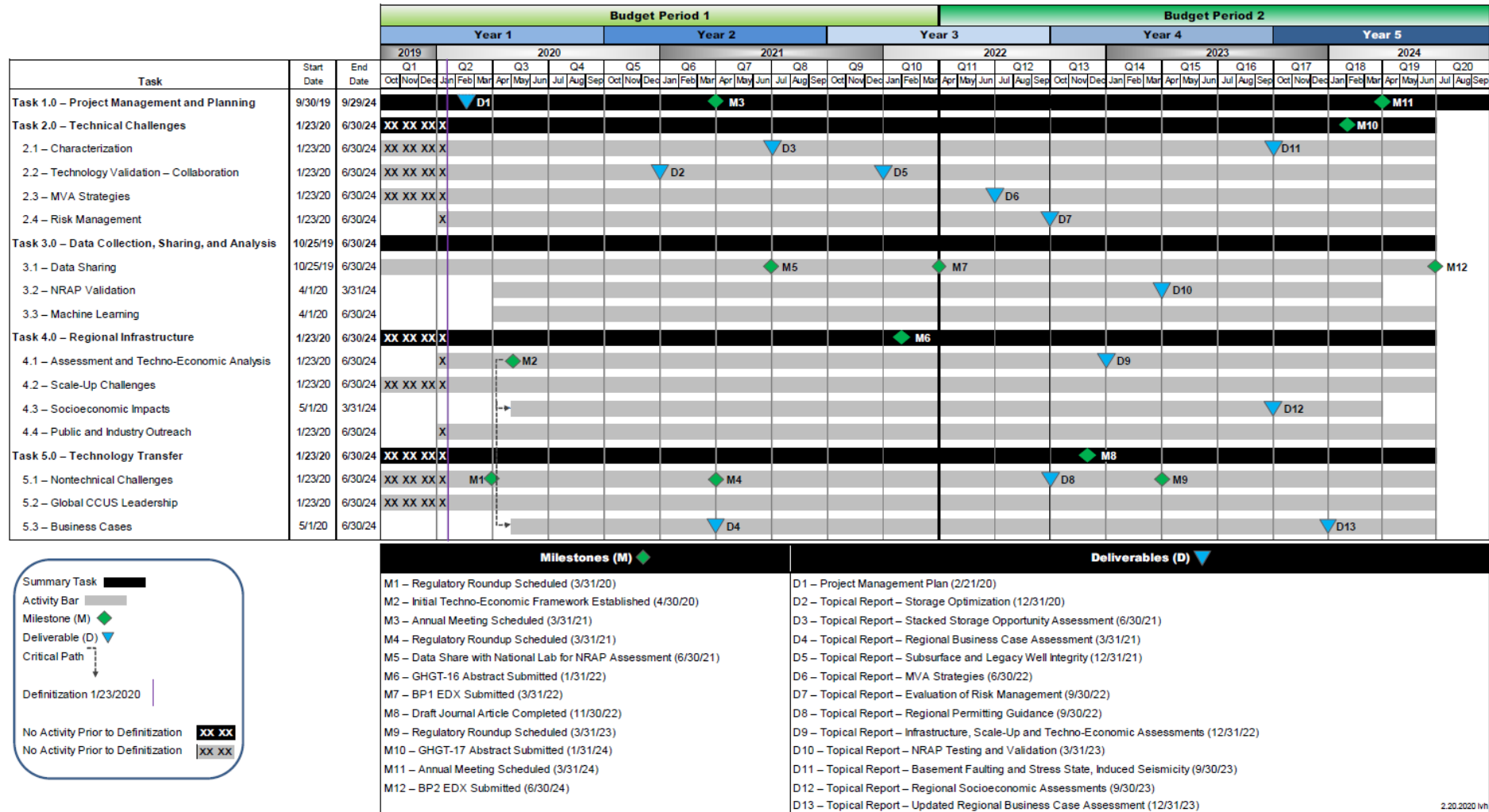
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PCOR PARTNERSHIP: ORGANIZATION CHART



EERC KC57778.AI

PCOR PARTNERSHIP: PROJECT GANTT CHART



PCOR MILESTONES

Task/ Subtask	Milestone (M) Title & Description
5.1	M1 – Regulatory Roundup Scheduled
4.1	M2 – Initial Techno-Economic Framework Established
1.0	M3 –Annual Meeting Scheduled
5.1	M4 – Regulatory Roundup Scheduled
3.1	M5 – Data Share with National Lab for NRAP Assessment
4.0	M6 – GHGT-16 Abstract Submitted
5.4	M7 – BP1 EDX Submitted
5.0	M8 – Draft Journal Article Completed
5.1	M9 – Regulatory Roundup Scheduled
2.0	M10 – GHGT-17 Abstract Submitted
1.0	M11 – Annual Meeting Scheduled
5.4	M12 – BP2 EDX Submitted

PCOR FUNDING

	BP1		BP2		Total	
	Federal	Nonfederal	Federal	Nonfederal	Federal	Nonfederal
DOE	\$3,306,096	\$—	\$1,693,904	\$—	\$5,000,000	\$—
NDIC	\$—	\$651,848	\$	\$348,152	\$—	\$1,000,000
UW	\$—	\$84,230	\$	\$44,593	\$—	\$128,823
UAF	\$—	\$91,812	\$	\$33,317	\$—	\$125,129
Total	\$3,306,096	\$827,890	\$1,693,904	\$426,062	\$5,000,000	\$1,253,952
Cost Share %	80%	20%	80%	20%	80%	20%