



Energy & Environmental Research Center

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April 28, 2023

Mr. Reice Haase
Deputy Executive Director
North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
State Capitol, 14th Floor
Bismarck, ND 58505-0840

Dear Mr. Haase:

Subject: Quarterly Progress Report for the Period of January 1 – March 31, 2023, “PCOR Partnership Initiative to Accelerate CCUS Deployment”; Contract Nos. FY20-XCI-226 and G-050-096

Attached please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5236 or by email at kconnors@undeerc.org.

Sincerely,

DocuSigned by:

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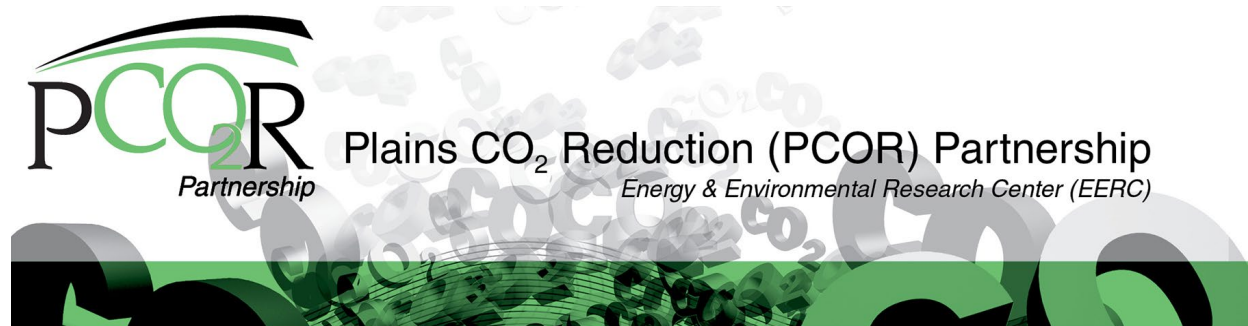
Kevin C. Connors
Assistant Director for Regulatory Compliance
and Energy Policy

KCC/rlo

Attachment

c/att: Michael Holmes, Lignite Energy Council
Brent Brannan, North Dakota Industrial Commission (NDIC) Department of Mineral
Resources, Oil and Gas Division
Karen Tyler, NDIC

c: Jamie Mitzel, EERC



PCOR PARTNERSHIP INITIATIVE TO ACCELERATE CCUS DEPLOYMENT

Quarterly Technical Progress Report

(for the period January 1 – March 31, 2023)

Prepared for:

Reice Haase

North Dakota Industrial Commission
600 East Boulevard Avenue, Department 405
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Contract Nos. FY20-XCI-226 and G-050-96

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April 2023

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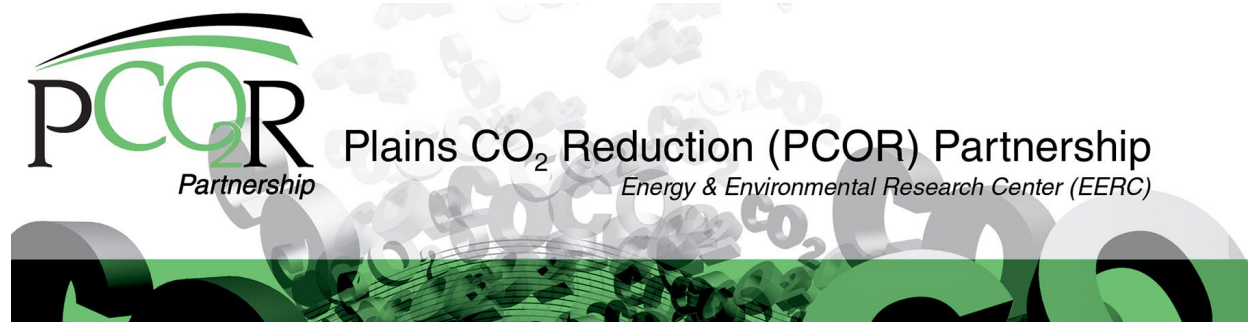
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PCOR PARTNERSHIP INITIATIVE TO ACCELERATE CCUS DEPLOYMENT

Quarterly Progress Report

January 1 – March 31, 2023

EXECUTIVE SUMMARY

The Plains CO₂ Reduction (PCOR) Partnership, funded by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL), the North Dakota Industrial Commission Oil and Gas Research Program and Lignite Research Program, and more than 240 public and private partners, is accelerating the deployment of carbon capture, utilization, and storage (CCUS) technology. The PCOR Partnership is focused on a region comprising ten U.S. states and four Canadian provinces in the upper Great Plains and northwestern regions of North America. It is led by the University of North Dakota Energy & Environmental Research Center (EERC), with support from the University of Wyoming (UW) and the University of Alaska Fairbanks (UAF).

Federal appropriation for FY2022 funding directed DOE to make available no less than \$20 million for the Regional Carbon Sequestration Partnership (RSCP) Program. In compliance with this, a letter proposal was submitted to the DOE project manager on April 26, 2022, requesting \$5 million in FY2022 funding from DOE. The letter proposal also included value-added scope totaling \$4 million, should additional funding from DOE be available beyond the \$5 million FY2022 funding. On December 12, 2022, DOE published Funding Opportunity Announcement (FOA) No. DE-FOA-0002799, which states, “A difference between the ongoing work [of the Regional Initiatives, including the PCOR Partnership] and the work sought under this FOA is that Applicants under this FOA must focus their efforts within one or more specific, more narrowly-defined geographic area(s) rather than over a broad region of the U.S.” At the time of this quarterly report, the status of the letter proposal submitted April 26, 2022, is unknown.

We received eight requests for information on the PCOR Partnership through the public website. Presentations on the PCOR Partnership were given to three prospective partners. Eight new members were welcomed to the PCOR Partnership, bringing the membership to 251 as of March 31, 2023: Marubeni-Itochu Tubulars America Inc.; Hunting Energy Services; Emerson Automation Solutions; Hitachi Industrial Equipment & Solutions America, LLC; Sumitomo Corporation of Americas; Bank of North Dakota; Wyoming Oil & Gas Conservation Commission; and Stress Engineering Services, Inc.

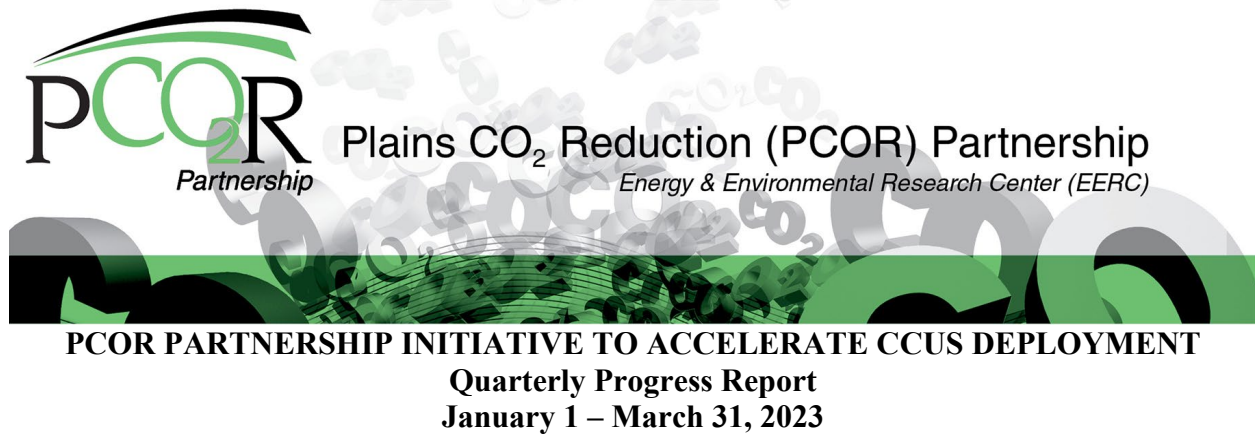
The revised project management plan (PMP) that was submitted to DOE on December 15, 2022, was approved by the federal project manager (FPM).

Two deliverables, (D)9 – Infrastructure, Scale-Up, and Techno-Economic Assessments report and D10 – NRAP Testing and Validation report (Part 2), were completed and submitted to project sponsors this quarter. Milestone (M)9 – Regulatory Roundup Scheduled was also completed this quarter.

The PCOR Partnership debuted its first newsletter to project partners on March 2, 2023. This first newsletter highlighted the successes of 2022 and provided a save-the-date for the 2023 Annual Meeting. The EERC expects to distribute the newsletter to all PCOR partners on a regular basis.

The PCOR Partnership gave several presentations this quarter: Energy Progress & Innovation Conference (EPIC) (January 25, 2023, in Bismarck, North Dakota), the Annual Research Institute of Innovative Technology for the Earth (RITE) CCUS Workshop (January 24, 2024, in Japan), and the Saskatchewan Energy Regulation Division Ministry of Energy and Resources (January 27, 2023, virtually).

Numerous white papers continue to be under development by the EERC team as well as the subrecipient teams at UW and UAF. Two white papers were submitted this quarter, topics including well testing for CO₂ storage sites and step rate tests.



INTRODUCTION

The Plains CO₂ Reduction (PCOR) Partnership, funded by the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL), the North Dakota Industrial Commission (NDIC) Oil and Gas Research Program and Lignite Research Program, and more than 240 public and private partners, is accelerating the deployment of carbon capture, utilization, and storage (CCUS) technology. The PCOR Partnership is focused on a region comprising ten U.S. states and four Canadian provinces in the upper Great Plains and northwestern regions of North America. It is led by the University of North Dakota Energy & Environmental Research Center (EERC), with support from the University of Wyoming (UW) and the University of Alaska Fairbanks (UAF).

The goal of the PCOR Partnership is to identify and address regional capture, transport, and storage challenges facing commercial deployment of CCUS in an expanded region, compared to past Regional Carbon Sequestration Partnership project phases. To achieve this goal, the PCOR Partnership will meet the following objectives:

1. Address key technical challenges by advancing critical knowledge and capabilities.
2. Facilitate data collection, sharing, analysis, and collaboration.
3. Evaluate regional infrastructure challenges/needs and promote infrastructure development.
4. Promote regional technology transfer.

The project goal and objectives will be accomplished through five tasks over two budget periods (BPs), corresponding to a 5-year period of performance. The EERC and project partners will collaborate to identify and address technical challenges facing deployment of CCUS in multiple categories, including stacked storage opportunities, CO₂ storage performance and monitoring, and risk assessment. The EERC will work with PCOR Partnership members and regional stakeholders to promote the development of infrastructure and large projects within the PCOR Partnership region. This development will then provide best practices throughout the United States for wide-scale deployment of CCUS technologies. Existing data sets and technologies will be analyzed and evaluated to highlight current challenges limiting commercial

adoption of CCUS as well as to identify potential solutions. The project team will support DOE's National Risk Assessment Partnership (NRAP) and machine learning (ML) initiatives by drawing on data sets and experience available through the team. Assessments of infrastructure, site readiness, techno-economics, and socioeconomics will provide an overview of the CCUS landscape within the defined PCOR Partnership region. Potential business case scenarios will be evaluated, accounting for current economic incentives to identify opportunities in CCUS project development. Technology transfer activities will inform and educate CCUS stakeholders of project learnings through annual membership meetings, regulatory roundup meetings, Technical Advisory Board (TAB) meetings, webinars, reports, and conference presentations/papers. These activities will facilitate knowledge sharing and support DOE program goals.

ACCOMPLISHMENTS

Task 1.0 – Project Management and Planning

The objective of Task 1.0 is to manage and direct the project in accordance with a project management plan (PMP) to meet all technical, schedule, and budget objectives and requirements. Activities will be coordinated in order to effectively accomplish the work. The project manager (PM) will ensure that project plans, results, and decisions are appropriately documented and project reporting and briefing requirements are satisfied.

Significant accomplishments for Task 1.0 during the reporting period include the following:

- Held progress meetings with subrecipients UAF and UW.
- Held regular progress update meetings with the federal project manager (FPM).
- Submitted a revised PMP to DOE on December 15, 2022, that was approved by the FPM on January 11, 2023. The revised PMP included the following changes:
 - Deliverable (D) 9 – Report – Infrastructure, Scale-Up, and Techno-Economic Assessments due date moved to March 31, 2023.
 - D15 – PCOR Partnership Atlas – due date moved to March 31, 2024.
- Held discussions with prospective members regularly. The PCOR Partnership currently has 251 members. Welcomed new members Marubeni-Itochu Tubulars America Inc.; Hunting Energy Services; Emerson Automation Solutions; Hitachi Industrial Equipment & Solutions America, LLC; Sumitomo Corporation of Americas; Bank of North Dakota; Wyoming Oil & Gas Conservation Commission; and Stress Engineering Services, Inc.
- Presented “Plains CO₂ Reduction (PCOR) Partnership” at the Energy Progress & Innovation Conference (EPIC) in Bismarck, North Dakota, on January 25, 2023.

- Attended and presented at the Annual RITE (Research Institute of Innovative Technology for the Earth) CCUS Workshop in Japan on January 24, 2023 (Figures 1 and 2).
- In March, the EERC PM, Kevin Connors, was appointed a member of the Carbon Dioxide Capture, Utilization and Sequestration Non-Federal Lands Permitting Task Force. The White House Council on Environmental Quality (CEQ) sought nominations for this task force as well as the CCUS Federal Lands and Outer Continental Shelf Permitting Task Force. The members chosen for each of the task forces will be formally appointed once the task forces are chartered under the Federal Advisory Committee Act.
- Continued planning for the TAB meeting to be held May 2 and 3, 2023, in Washington D.C.
- Continued planning for the 2023 Annual Membership Meeting to be held in Grand Forks, North Dakota, September 26–27, 2023.

Next steps to accomplish the goals under Task 1.0 include the following:

- Begin planning the next PCOR Partnership Invitational with UAF and UW.
- Continue tracking progress on project deliverables (D) and milestones (M) (see Tables 1 and 2).

Task 2.0 – Technical Challenges

In Task 2.0, the project team will support regional deployment of CCUS programs by focusing on key technical challenges in the PCOR Partnership region related to stacked storage opportunities; storage performance; monitoring, verification, and accounting (MVA) technology; and subsurface integrity. The EERC will collaborate with PCOR Partnership members to identify knowledge gaps and address regional challenges through targeted webinars, workshops, reports, and papers.

Progress on Task 2.0 is as follows:

- Began developing an outline and work on D11 – Basement Faulting and Stress State, Inducted Seismicity report.
- Continued internal reviews on the white paper on approaches to geomechanical evaluations.



Figure 1. PCOR Partnership presentation at the Annual RITE CCUS Workshop in Japan on January 24, 2023.



Figure 2. Participants of the Annual RITE CCUS Workshop visited the Tomakomai CCS site on the island of Hokkaido.

Table 1. Project Deliverables

Deliverable No. and Title	Planned Completion Date	Actual Completion Date	Verification Method	Comments
D1 – PMP	30 days after contract definitization	2/21/2020	PMP file submitted to DOE PM	
D2 – Report – Storage Optimization	4/30/2021	4/30/2021	Topical report submitted to DOE PM	Moved from 12/31/2020.
D3.A – Report – Stacked Storage Opportunity Assessment	8/31/2021	8/31/2021 (E.S.) 11/12/2021 (Full report)	Topical report submitted to DOE PM	Moved from 6/30/2021.
D3.B – Report – Stacked Storage Scenario Geomechanical Modeling	3/31/2022	3/31/2022	Topical report submitted to DOE PM	Created a second D3 report.
D4 – Report – Regional Business Case Assessment	12/31/2021	12/17/2021	Topical report submitted to DOE PM	Moved from 3/31/2021.
D5 – Report – Subsurface and Legacy Well Integrity	12/31/2021	12/30/2021	Topical report submitted to DOE PM	
D6 – Report – MVA Strategies	6/30/2022	6/30/2022	Topical report submitted to DOE PM	
D7 – Report – Evaluation of Risk Management	9/30/2022	9/30/2022	Topical report submitted to DOE PM	
D8 – Report – Regional Permitting Guidance	9/30/2022	9/30/2022	Topical report submitted to DOE PM	Two reports submitted for D8.
D9 – Report – Infrastructure, Scale-Up, and Techno-Economic Assessments	3/31/2023	3/31/2023	Topical report submitted to DOE PM	The revised PMP moving the due date to 3/31/23 was approved by DOE on 1/11/23.
D10 – Report – NRAP Testing and Validation	3/31/2023	12/17/2021 (Part 1) 3/31/2023 (Part 2)	Topical report submitted to DOE PM	To be provided in two parts.
D11 – Report – Basement Faulting and Stress State, Induced Seismicity	9/30/2023		Topical report submitted to DOE PM	
D12 – Report – Regional Socioeconomic Assessments	9/30/2023		Topical report submitted to DOE PM	
D13 – Report – Updated Regional Business Case Assessment	12/31/2023		Topical report submitted to DOE PM	
D14 – Report – Risk-Based Area of Review	1/31/2021	1/29/2021	Topical report submitted to DOE PM	Moved from 12/31/2020.
D15 – PCOR Partnership Atlas	6/30/2021 and 3/31/2024	6/30/2021	Atlas submitted to DOE PM	The revised PMP moving the due date to 3/31/24 was approved by DOE on 1/11/23.
D16 – Enabling Sustainable Monitoring for CCUS	6/30/2024		Topical report submitted to DOE PM	
D17 – PCOR Partnership Initiative Road Map	5/31/2024		Topical report submitted to DOE PM	

Table 2. Milestone Status Report

Milestone No. and Title	Planned Completion Date	Actual Completion Date	Verification Method	Comments
M1 – Regulatory Roundup Scheduled	2/29/2020	3/31/2020	Reported in subsequent quarterly report	
M2 – Initial Techno-Economic Framework Established	4/30/2020	4/28/2020	Reported in subsequent quarterly report	
M3 – Annual Meeting Scheduled	3/31/2021	3/29/2021	Reported in subsequent quarterly report	
M4 – Regulatory Roundup Scheduled	3/31/2021	3/29/2021	Reported in subsequent quarterly report	
M5 – Data Share with National Lab for NRAP Assessment	6/30/2021	6/30/2021	Reported in subsequent quarterly report	Files added to EDX. ¹
M6 – GHGT-16 ² Abstract Submitted	1/31/2022	1/14/2022	Reported in subsequent quarterly report	
M7 – BP1 EDX Submitted	3/31/2022	3/31/2022	Reported in subsequent quarterly report	
M8 – Draft Journal Article Completed	11/30/2022	9/30/2022	Reported in subsequent quarterly report	
M9 – Regulatory Roundup Scheduled	3/31/2023	3/31/2023	Reported in subsequent quarterly report	
M10 – GHGT-17 Abstract Submitted	1/31/2024		Reported in subsequent quarterly report	
M11 – Annual Meeting Scheduled	3/31/2024		Reported in subsequent quarterly report	
M12 – BP2 EDX Submitted	6/30/2024		Reported in subsequent quarterly report	

¹ Energy Data eXchange.² 16th International Conference on Greenhouse Gas Control Technologies.

- Continued collaboration for the field effort at the Red Trail Energy (RTE) CCS site. Activities included the following:
 - The EERC team is operating an electric vibe (eVibe) for both active and static sourcing operations. Mechatronics eVibe and components for remote on-demand service were installed as an additional source for the scalable, automated, sparse seismic array (SASSA) method. The EERC is currently operating the eVibe as a remote source for the SASSA method for monitoring CO₂ plume extents. The current eVibe rental operations end August 2023.
 - Continued processing eVibe data from the east–west 2D line, including quality control of Stryde records from the 2D line recorded in Quarter 4 of 2022.
 - Sourced an additional north–south 2D eVibe line.
 - SkyGeo shipped (January 2023) artificial reflectors to Grand Forks for assembly and deployment at the RTE site.
 - The 6C station is in service and is currently recording ambient noise at the site. The EERC has installed open-source Swarm software that will allow for viewing the 6C station data in real time.

- The 3D mechanical earth model (MEM) was completed for the RTE project to calculate surface deformation based on predicted pressure from numerical simulation.
- PCOR partner RITE funded the collection of a repeat 3D vertical seismic profile (VSP) on March 5–6, recorded with casing-conveyed distributed acoustic sensing (DAS) fiber. Processing of the repeat VSP was initiated.
- UW continued work on draft documents to advance the PCOR Partnership knowledge in topics under Task 2.0, including the following:
 - Formation Outlines for Minnelusa, Hulett, and Lakota Formations and Associated Seals – The EERC provided feedback and comments to UW on November 21. UW is currently incorporating this feedback into updated versions of the formation outlines.
 - Formation Outlines for Storage Reservoirs and Seals in the Rock Springs Uplift – UW is currently incorporating feedback from the EERC into formation outlines for the Rock Springs uplift.
 - Basement Faulting and Stress State, Induced Seismicity – UW is currently working on a project analyzing paleostress and fractures in the eastern Bighorn Mountains and western Black Hills, which flank the Powder River Basin. UW is also building a database of existing fracture and fault data for all Wyoming basins. This work will eventually contribute to the EERC’s D11. UW and the EERC will discuss direction of the work in the coming months.

Next steps to accomplish the goals under Task 2.0 in the coming quarter include the following:

- Continue RTE field activities: meet weekly with contractor SkyGeo to review interferometric synthetic aperture radar (InSAR) data for historical analysis and modeling to inform decision making for artificial reflector installation.
- Finalize white papers.
- Continue to work on the development of basement faulting and stress state, induced seismicity report (D11).

Task 3.0 – Data Collection, Sharing, and Analysis

In Task 3.0, the project team will collaborate with other DOE Fossil Energy Carbon Management (FECM)-funded researchers to improve understanding of CO₂ injection and storage impacts. The project team will work with national laboratories to facilitate data sharing, support the development and validation of NRAP tools with site-specific data, and participate in development of ML-based tools/methods in a commercial setting.

Progress on Task 3.0 is as follows:

- Subtask 3.1 – Data Sharing

- The EERC continues to identify and catalog data sets that will be generated through the PCOR Partnership and available for upload to EDX for M12 – BP2 EDX Submitted.
- Subtask 3.2 – NRAP Validation
 - Finished testing of the NRAP-Open-IAM and developed a draft report that is currently under internal review. The report compares the results from NRAP-Open-IAM against the results for an identical storage complex and overburden stratigraphy in the Analytical Solution for Leakage in Multilayered Aquifers (ASLMA) FORTRAN-based semianalytical model.
 - The additional NRAP-Open-IAM testing was submitted as D10 Part 2 (March 31, 2023) (D10 Part 1 was submitted on December 17, 2021).
- Subtask 3.3 – Machine Learning
 - The EERC continues to track the historical work (Phase 1) and the ongoing work (Phase 2) conducted under the SMART (Science-informed Machine Learning for Accelerating Real-Time Decisions in Subsurface Applications) Initiative and look for ways to incorporate these learnings into the PCOR Partnership region.
 - UW continues to work on classification of the total dissolved solids (TDS)-based well log interpretation report.

Next steps to accomplish the goals under Task 3.0 in the coming quarter include the following:

- Continue to explore the use of ML-based predictive modeling techniques to use geophysical well logs to classify aquifers located throughout the PCOR Partnership region.

Task 4.0 – Regional Infrastructure

The objective of Task 4.0 is to evaluate the regional needs, challenges, and potential economic impacts related to the development of safe and environmentally sound CO₂ transportation infrastructure to accelerate commercial CCUS project deployment. This evaluation will be accomplished by assessing existing infrastructure, scale-up challenges and needs, and techno-economic and socioeconomic impacts in the PCOR Partnership region and will be communicated through outreach activities.

Progress on Task 4.0 is as follows:

- D9 – Infrastructure, Scale-Up, and Techno-Economic Assessments report was prepared and submitted to DOE and NDIC on March 31, 2023.
- Internal reviews continued of the white papers on the PCOR Partnership hydrogen CCUS road map and CO₂ stream impurities.

- The white paper entitled “Applications and Value of Well Testing for Carbon Dioxide Storage Sites” was submitted to DOE and NDIC on January 12, 2023.
- Work continued for CCUS project development and infrastructure buildout (D9). The EERC evaluated source–sink relationships and infrastructure development using a SimCCS tool in order to identify future project development scenarios and investigated and compiled the latest economics around capture and infrastructure development for use in the techno-economic analysis of development scenarios for reporting. The results of this work were reported in D9.
- Stress Engineering Services, Inc., is working as a subcontractor to provide the PCOR Partnership with basic guidelines and white papers on two topics: 1) considerations for selecting corrosion-resistant alloys material for use in CO₂ storage and utilization applications and 2) use of carbon steel (CS) pipelines with CO₂ streams containing H₂S and for repurposing CS pipelines previously used in H₂S service for CO₂ streams without H₂S.
 - The EERC has reviewed and provided comments on the guidelines and white papers, and the documents are undergoing finalization at the time of this reporting. It is expected these documents will be shared with the PCOR partners when finalized.
 - Stress Engineering presented at the American Association of Drilling Engineers conference in January 2023 and promoted the guidelines on corrosion-resistant alloys work.
 - Stress Engineering anticipates publishing the corrosion-resistant alloys work in a journal—currently undetermined.
- UW continued work on draft documents to advance the PCOR Partnership knowledge in topics under Task 4.0, including the following:
 - Infrastructure, Scale-Up, and Techno-Economic Assessments – UW’s deliverable was submitted to the EERC on February 8, 2023. The EERC incorporated UW contributions into D9.
 - Hydrogen Production with CCS Opportunities – UW submitted a revised draft based on EERC comments and changes on March 17, 2023. It is currently being reviewed by the EERC.
 - Social License for Wyoming’s Energy Future – A summary was presented to the EERC in January 2023 and will be released through UW outreach channels. Work has also started on the Q-study. UW is finalizing interviews with people who work on energy-related issues in Wyoming. These interviews will be concluded in February 2023, and the results of both the survey and the Q-study will be analyzed and summarized in a final report to the EERC completed by May 31, 2023.
- Members of UAF, as part of the Regulatory Workgroup, met multiple times over the quarter:
 - February 6 to review omnibus legislation newly introduced by the governor of Alaska.
 - March 6 to present to the Alaska Senate Resources Committee.

- March 10 to present at the Alaska Industry Alliance meeting in Kenai, Alaska.
- UAF submitted to the EERC a first draft of a deliverable on CO₂ corrosion inhibitor literature review and included a preliminary CO₂ corrosion inhibitor testing proof of concept.

Next steps to accomplish the goals under Task 4.0 in the coming quarter include the following:

- Continue to ship the PCOR Partnership Atlas (D15) to new PCOR Partnership members.
- Evaluate socioeconomic impacts (e.g., job creation and retention) of CCUS development in the PCOR Partnership region as part of D12.

Task 5.0 – Technology Transfer

Task 5.0 will inform and educate stakeholders about CCUS technologies. Nontechnical challenges to CCUS deployment in the PCOR Partnership region will be identified and assessed, with an emphasis on regulatory issues and solutions. Business case scenarios for CCUS projects will be identified, reviewed, and developed. Outcomes of this task will be transferred to stakeholders through meetings, presentations, and webinars. Developed materials will be shared with DOE to support its broader FECM program goals.

Progress on Task 5.0 is as follows:

- The EERC presented (virtually) “Regulatory Framework for Geologic Storage of Carbon Dioxide” to the Saskatchewan Energy Regulation Division Ministry of Energy and Resources on January 27, 2023.
- The EERC created and distributed on March 2, 2023, the *PCOR Pioneer* newsletter. This first newsletter highlighted the successes of 2022 and provided a save-the-date for the 2023 Annual Meeting. The EERC expects to distribute the newsletter to all PCOR partners on a regular basis.
- The EERC presented at the University of North Dakota Law Review Symposium in Bismarck, North Dakota, on March 23, 2023.
- The PCOR program manager testified before the Alaska House Resources Committee on February 24, 2023, highlighting the PCOR Partnership and the benefits of CCS. The Alaska legislature is currently considering key legislation that will enable commercial CCS deployment in the state. The PCOR program manager also testified on March 22, 2023, before the Alaska Senate Resources Committee.
- The EERC submitted the white paper entitled “Class VI Injection Well Step Rate Test Procedure Recommendations” to DOE and NDIC on January 12, 2023.

- The EERC submitted the revised D8b entitled “Project Development and Permitting Strategies from the First Wave of Geologic CO₂ Storage Projects in North Dakota” to DOE and NDIC on February 6, 2023. Revisions included minor text changes for clarity and readability.
- The EERC scheduled the 2023 Regulatory Roundup Meeting for July 25–26, 2023, in Deadwood, South Dakota (M9) and continued planning the event.
- The EERC continued development of several white papers focusing on the following topics: soil gas monitoring, plume stabilization, a side-by-side comparison of the regulations around 5-year reporting, and other lessons learned through the PCOR Partnership efforts.
- The EERC continued efforts to populate the partners-only website (undeerc.org/pcorpartners) with new and updated information and enhance the user experience.
- The EERC continued discussions with the Groundwater Protection Council (GWPC) regarding a new PCOR Partnership collaboration between the EERC, GWPC, and the North Dakota Department of Mineral Resources (NDDMR) to provide technology transfer that will support the development of a state regulatory database for CO₂ storage to track permitting and regulatory reporting. GWPC is working with NDDMR to develop a permitting and reporting module for NDDMR’s current NorthSTAR database. The EERC is supporting this effort through the PCOR Partnership to provide technology transfer. All states will have access to and the ability to use the database module when complete.
- The UAF team continued to engage and hold meetings with the Alaska State CCUS Workgroup. The CCUS State Workgroup’s purpose is to accelerate commercial carbon capture, use, and sequestration in Alaska.
- UAF presented “Alaska CCUS Workgroup and a Roadmap to Commercial Deployment” to the Alaska Senate Resources Committee on March 6.
- The UAF team submitted a paper to the Society of Petroleum Engineers (SPE) on February 9. The paper, entitled “Alaska CCUS Workgroup and a Roadmap to Commercial Deployment,” will be presented at the SPE Western Regional Meeting in Anchorage, Alaska, May 22–25, 2023.
- UAF and the EERC continued work to evaluate the economic feasibility of CCUS in the Cook Inlet. This report has been finalized.
- An outline of the key policy, technical, and economic issues that Alaska CCUS projects will face was shared with the Alaska CCUS Workgroup (UAF D5 – Roadmap for Deploying Commercial CCUS in Alaska).

- UW and the EERC continue to collaborate on efforts to draft several white papers focused on permitting CCUS on federal land and lessons learned from site characterization and permitting first mover CCS projects in Wyoming. Other UW deliverable updates include:
 - Federal Land Challenges for CCS – UW submitted an updated draft to the EERC on February 1, 2023.
 - Regional Permitting Guidance – A revised draft was submitted to the EERC in February 2023.
 - Regulation and Permitting of Interstate CO₂ Plumes – UW is working with the Wyoming Department of Environmental Quality (WDEQ) on this deliverable to explore issues related to geologic storage projects in which CO₂ plumes may cross state boundaries and how states will work together to permit, monitor, and assess these projects. An outline and rough draft have been developed. UW and WDEQ expect to submit a draft report to the EERC by May 31, 2023.
- Three abstracts were accepted for presentation at the upcoming CCUS conference scheduled April 25–27, 2023, in Houston, Texas. This in-person event will unite AAPG (American Association of Petroleum Geologists), SPE, and SEG (Society of Exploration Geophysicists) and highlight current CCUS work and address related challenges:
 - Geomechanical Study for Stacked Carbon Dioxide Storage in North Dakota, an oral presentation scheduled for April 25, 2023.
 - Lessons Learned from Site Characterization Activities for Geologic CO₂ Storage Projects in North Dakota Regarding Coring, Logging, and Geophysical Surveys, an oral presentation scheduled for April 26, 2023.
 - Risk Management for CO₂ Storage Projects: Integrating Guidance Documents, Regulatory Requirements, Financial Incentives, and Best Practices, a poster presentation scheduled for April 27, 2023.
- An abstract was submitted to the 2023 Rocky Mountain Section American Association of Petroleum Geologists (AAPG) Annual Meeting that will be held in Bismarck, North Dakota, June 4–6.
- The EERC began development of several deliverable reports including D13 – Report – Updated Regional Business Case Assessment and D17 – PCOR Partnership Initiative Road Map.

Next steps to accomplish the goals under Task 5.0 in the coming quarter include the following:

- Continue updating the PCOR Partnership public and partner websites.
- Finalize the white paper “A Quantitative Approach for Demonstrating Plume Stabilization under CCS Policy Frameworks.”

CHANGES/PROBLEMS

No changes or problems at this time.

SPECIAL REPORTING REQUIREMENTS

None.

BUDGETARY INFORMATION

ENERGY & ENVIRONMENTAL RESEARCH CENTER
PLAINS CO₂ REDUCTION PARTNERSHIP INITIATIVE TO ACCELERATE CARBON CAPTURE, UTILIZATION, AND STORAGE
DEPLOYMENT
DE-FE0031838

Project-to-Date Financial Report at March 31, 2023

(\$K)	Q4 Oct - Dec 2019	Q1 Jan - Mar 2020	Q2 Apr - Jun 2020	Q3 Jul - Sep 2020	Q4 Oct - Dec 2020	Q1 Jan - Mar 2021	Q2 Apr - Jun 2021	Q3 Jul - Sep 2021	Q4 Oct - Dec 2021	Q1 Jan - Mar 2022
Baseline Cost Plan										
Federal Share	63.8	81.4	213.9	239.7	296.8	376.4	1230.8	1402.3	814.6	1388.5
Nonfederal Share	0.0	6.5	49.7	40.6	83.0	81.9	179.0	82.8	488.5	495.0
Total Planned	63.8	87.9	263.6	280.3	379.8	458.3	1409.8	1485.1	1303.1	1883.5
Cumulative Federal	63.8	145.2	359.1	598.8	895.6	1272.0	2502.8	3905.1	4719.7	6108.2
Cumulative Nonfederal	0.0	6.5	56.2	96.8	179.8	261.7	440.7	523.5	1012.0	1507.0
Cumulative Baseline Costs	63.8	151.7	415.3	695.6	1075.4	1533.7	2943.5	4428.6	5731.7	7615.2
Actual Incurred Cost										
Federal Share	63.8	81.4	213.9	239.6	296.8	376.4	1230.8	1402.3	814.6	1388.5
Nonfederal Share	0.0	6.5	49.7	40.6	83.0	81.9	179.1	82.8	488.4	495.0
Total Incurred Costs	63.8	87.9	263.6	280.2	379.8	458.3	1409.9	1485.1	1303.1	1883.5
Cumulative Federal	63.8	145.2	359.2	598.8	895.6	1272.0	2502.8	3905.1	4719.7	6108.2
Cumulative Nonfederal	0.0	6.5	56.2	96.7	179.8	261.6	440.7	523.5	1011.9	1506.9
Cumulative Incurred Costs	63.8	151.7	415.4	695.5	1075.3	1533.6	2943.5	4428.6	5731.7	7615.2
Variance										
Federal Share	0.0	(0.0)	(0.0)	0.1	0.0	(0.0)	(0.0)	0.0	(0.0)	0.0
Nonfederal Share	0.0	0.0	0.0	0.0	(0.0)	0.0	(0.1)	0.0	0.1	(0.0)
Total Variance	0.0	(0.0)	(0.0)	0.1	0.0	0.0	(0.1)	0.0	0.0	0.0
Cumulative Federal	0.0	(0.0)	(0.1)	0.0	0.0	0.0	(0.0)	0.0	(0.0)	(0.0)
Cumulative Nonfederal	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1
Cumulative Variance	0.0	(0.0)	(0.1)	0.1	0.1	0.1	(0.0)	0.0	0.0	0.0

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(\$K)	Q2 Apr - Jun 2022	Q3 Jul - Sep 2022	Q4 Oct - Dec 2022	Q1 Jan - Mar 2023	Q2 Apr - Jun 2023	Q3 Jul - Sep 2023	Q4 Oct - Dec 2023	Q1 Jan - Mar 2024	Q2 Apr - Jun 2024	Q3 Jul - Sep 2024
Baseline Cost Plan										
Federal Share	889.2	889.2	889.2	889.2	889.2	889.2	889.2	889.2	889.1	889.1
Nonfederal Share	224.6	224.6	224.6	224.6	224.6	224.6	224.6	224.6	224.6	224.5
Total Planned	1113.8	1113.8	1113.8	1113.8	1113.8	1113.8	1113.8	1113.8	1113.7	1113.6
Cumulative Federal	6997.4	7886.6	8775.8	9665.0	10554.2	11443.4	12332.6	13221.8	14110.9	15000.0
Cumulative Nonfederal	1731.6	1956.2	2180.8	2405.4	2630.0	2854.6	3079.2	3303.8	3528.4	3752.9
Cumulative Baseline Costs	8729.0	9842.8	10956.6	12070.4	13184.2	14298.0	15411.8	16525.6	17639.3	18752.9
Actual Incurred Cost										
Federal Share	1823.3	1157.3	1223.0	979.6						
Nonfederal Share	335.8	195.6	489.0	454.5						
Total Incurred Costs	2159.1	1352.9	1712.0	1434.1						
Cumulative Federal	7931.5	9088.9	10311.9	11291.5						
Cumulative Nonfederal	1842.7	2038.3	2527.3	2981.9						
Cumulative Incurred Costs	9774.2	11127.1	12839.2	14273.3						
Variance										
Federal Share	(934.1)	(268.1)	(333.8)	(90.4)						
Nonfederal Share	(111.2)	29.0	(264.4)	(229.9)						
Total Variance	(1045.3)	(239.1)	(598.2)	(320.3)						
Cumulative Federal	(934.1)	(1202.3)	(1536.1)	(1626.5)						
Cumulative Nonfederal	(111.1)	(82.1)	(346.5)	(576.5)						
Cumulative Variance	(1045.2)	(1284.3)	(1882.6)	(2202.9)						