EERC
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018 · Grand Forks, ND 58202-9018 · P. 701.777.5000 · F. 701.777.5181
www.undeerc.org

September 16, 2019

Ms. Karlene Fine
North Dakota Industrial Commission
ATTN: Oil and Gas Research Program
State Capitol – 14th Floor
600 East Boulevard Avenue, Department 405
Bismarck, ND 58505-0840

Dear Ms. Fine:

Subject: EERC Proposal No. 2020-0039 Entitled "PCOR Initiative to Accelerate CCUS Deployment"

The Energy & Environmental Research Center (EERC) is requesting cost-share funding from the Oil and Gas Research Program (OGRP) for the PCOR Initiative, which has been awarded by the U.S. Department of Energy as a 5-year program to identify and address onshore regional storage and transport challenges facing commercial deployment of carbon capture, utilization, and storage (CCUS) in a region comprising 11 U.S. states and four Canadian provinces.

Enclosed please find an original and one copy of the subject proposal along with a check for $100. The EERC, a research organization within the University of North Dakota, an institution of higher education within the state of North Dakota, is not a taxable entity; therefore, it has no tax liability.

This transmittal letter represents a binding commitment by the EERC to complete the project described in this proposal. If you have any questions, please contact me by telephone at (701) 777-5193, by fax at (701) 777-5181, or by e-mail at nwildgust@undeerc.org.

Sincerely,

Neil Wildgust
Assistant Director for Geoscience and Engineering

Charles D. Gorecki, CEO
Energy & Environmental Research Center

NW/kal

Enclosures

c/enc: Brent Brannan, OGRC

Oil and Gas Research Program

North Dakota

Industrial Commission

Application

Program Title: PCOR Initiative to Accelerate CCUS Deployment

Applicant: Energy & Environmental Research Center

Principal Investigator: Neil Wildgust

Date of Application: September 16, 2019

Amount of Request: $2,000,000 ($500,000 for agreed scope, $1,500,000 contingent on additional future scope from DOE)

Total Amt. of Proposed Project: $6,254,617

Duration of Project: 5 years

Point of Contact (POC): Neil Wildgust

POC Telephone: (701) 777-5193

POC E-Mail Address: nwildgust@undeerc.org

POC Address:

15 North 23rd Street, Stop 9018

Grand Forks, ND 58202-9018

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ABSTRACT

The Energy & Environmental Research Center (EERC) proposal entitled "PCOR Initiative to Accelerate CCUS Deployment" has been selected for an award from the U.S. Department of Energy (DOE). The project will run for 5 years and build on the success of the previous PCOR (Plains CO_2 Reduction) Partnership in developing carbon capture, utilization, and storage (CCUS) technology.

Objective: The PCOR Initiative goal is to identify and address regional storage and transport challenges facing commercial CCUS deployment in a region comprising 11 U.S. states and four Canadian provinces.

Expected Results: The PCOR Initiative will play a vital role in accelerating CCUS deployment in North Dakota and the wider region by providing the premier regional forum for industry, policy makers, regulators, and other stakeholders to identify and address key technology, infrastructure, policy/regulatory, and business case challenges.

Duration: 5 years (October 1, 2019 – September 30, 2024).

Total Program Cost: The total value of the currently scoped project is $6,254,617. This proposal requests a total of $2,000,000 from the Oil and Gas Research Program (OGRP); $500,000 for the currently agreed scope of work and an additional $1,500,000 to be set aside for anticipated increased scope and cost-share requirements from DOE in Years 2–5. DOE will provide $5,000,000 of cash for the current scope. The North Dakota Industrial Commission (NDIC) Lignite Research Program (LRP) will also provide $500,000, with an additional $1,500,000 for future additional scope. In-kind contributions will be received for the current scope from research partners: University of Wyoming ($128,823) and University of Alaska at Fairbanks ($125,794). Consistent with the previous PCOR Partnership and support letters for this new PCOR Initiative, the EERC anticipates sustained industry partnership and stakeholder engagement in the form of annual partnership fees. Those attendant contributions will be reported to NDIC as received, increasing the total value of the program.

Participants: DOE, NDIC (OGRP and LRP), University of Wyoming, University of Alaska.

PROJECT DESCRIPTION

The Energy & Environmental Research Center (EERC) has been selected for an award of $5,000,000 from U.S. Department of Energy (DOE) for the PCOR Initiative, to foster the development of infrastructure and accelerate carbon capture, utilization, and storage (CCUS) deployment in the northwest quadrant of North America, comprising 11 U.S. states and four Canadian provinces (Figure 1). The initiative retains the PCOR brand name because of the success of the preceding PCOR (Plains CO_2 Reduction) Partnership Program efforts related to CCUS. The PCOR Initiative will utilize a significant network of organizations to address the critical challenges outlined in DOE Funding Opportunity Announcement (FOA) DE-FOA-0002000. This region is rich in fossil fuel resources, CO_2 sources, and storage options, thereby providing all essential elements necessary for infrastructure development and widespread CCUS deployment. ***Our vision is for the PCOR Initiative to be the premier regional forum to promote CCUS infrastructure and accelerate CCUS deployment, thus enabling very low greenhouse gas emissions for current and future plants that use coal and other fossil fuels.*** The PCOR Initiative anticipates dynamic growth in support, building on over 120 partner companies and organizations of the PCOR Partnership (Appendix A). Our team also includes the partners associated with Project Tundra, which constitutes the largest planned capture of CO_2 in the world from a power generation facility. With many partners actively engaged in commercial projects, the PCOR Initiative will harness a powerful team to advance and accelerate regional CCUS deployment.

Goals and Objectives: The goal of the PCOR Initiative is to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS in an expanded region, compared to past initiatives. To achieve this endeavor, the PCOR Initiative 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 and needs; and 4) promote regional technology transfer.

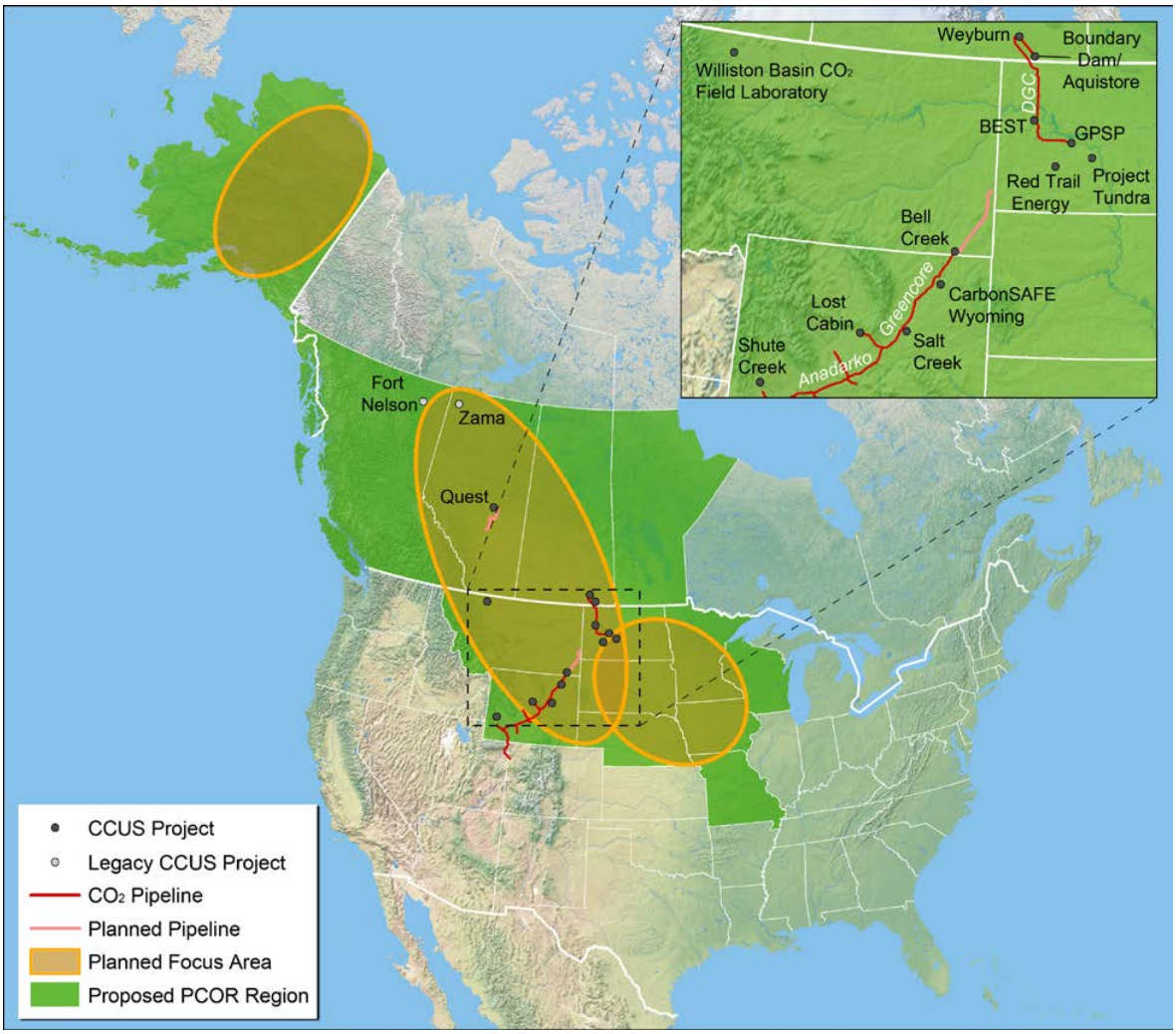

Figure 1. Map of the PCOR Initiative region, including current CO_2 pipeline routes.

Methodology: The EERC and project partners will collaborate to identify and address challenges facing CCUS deployment. 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 risk assessment and machine learning 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 Initiative region. Potential business case scenarios will be evaluated, taking into account 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 meetings, webinars, reports, and conference presentations/papers. These activities will facilitate knowledge sharing and support DOE program goals.

PCOR Initiative work will be divided into four main activities summarized below.

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

1.1 – Characterization. CO_2 storage technical issues and opportunities in the PCOR Initiative region will be identified. Stacked storage complexes, the primary focus, may include unconventional reservoirs and basal formations; potential uncertainties will be investigated, including seal properties, basement faulting, and stress regimes. Existing data developed during previous and ongoing EERC- and partner-led activities and applied research projects will provide added value.

1.2 – Technology Validation. Collaborations with industry partners, state regulators, and other stakeholders will help establish research needs for validating key technologies associated with reducing uncertainty in CO_2 plume predictions (location and stabilization), pressure front development, and subsurface integrity. These activities will focus on technologies for optimizing storage and ensuring storage permanence. Example topics to be explored include methods of evaluating and mitigating networks of legacy wellbores and assessing potential induced seismicity risks.

1.3 – MVA Strategies. The project team will evaluate the viability of existing and novel MVA strategies for detecting CO_2 plume movement and verifying containment (e.g., real-time seismic monitoring).

Strengths and weaknesses of recent technology advancements, cost efficiencies, and regulatory requirements will be considered. The project team will respond to the needs of the regional CCUS industry to address site-specific challenges related to MVA, including applicability of MVA strategies to unconventional and stacked reservoirs and/or demonstrating storage permanence.

***1.4 – Risk Management*.** Lessons learned from over a decade of risk management experience gained in previous CCUS projects will be leveraged to improve risk assessment methods, with reviews identifying principal risk categories, risk descriptions, risk probabilities, and impact scoring. Subject matter experts and PCOR Initiative regulatory roundup participants will provide feedback on the risk management process, including mitigation strategies.

2 – Data Collection, Sharing, and Analysis. Collaboration with other DOE Fossil Energy (FE)-funded researchers will improve understanding of CO_2 storage impacts, facilitating data sharing, development and validation of software tools, and development of machine learning-based tools/methods. Data sets will be shared via the DOE National Energy Technology Laboratory (NETL) Energy Data eXchange (EDX).

3 – Regional Infrastructure. The regional needs, challenges, and potential economic impacts related to the development of CO_2 transportation infrastructure will be evaluated by assessing existing infrastructure, scale-up challenges and needs and techno-economic and socioeconomic impacts.

***3.1 – Assessment and Techno-Economic Analysis*.** Integrated data sets of CO_2 emission sources, geologic storage targets, and current/potential pipeline infrastructure will be used to identify optimal source–sink matching networks. Techno-economic analyses will evaluate infrastructure buildout scenarios.

***3.2 – Scale-Up Challenges*.** Industry/partner input will identify the regional scale-up challenges (e.g., financial, technical, policy) and specific state initiatives to incentivize CO_2 transportation development. Development of site/route readiness factors for the region will allow for the ranking of the buildout scenarios identified in 3.1 above. Optimal areas for CCUS development will be identified.

3.3 – Socioeconomic Impacts. CCUS development impacts will be assessed for optimal development areas. State- and regional-scale assessments will identify potential economic benefits of CCUS developments, particularly the potential for job retention and creation in targeted areas.

***3.4 – Public and Industry Outreach*.** Stakeholders will be consulted on business case challenges and opportunities associated with CCUS to build societal and industry support. Groups targeted for engagement may include PCOR Initiative members, government officials, industry, and the public.

4 – Technology Transfer. Stakeholders will be consulted and informed about CCUS technologies. Nontechnical challenges to CCUS deployment 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. Meetings, presentations, and webinars will be used to disseminate learnings. Developed materials will be shared with DOE to support broader Fossil Energy program goals.

***4.1 – Nontechnical Challenges*.** Project team experience, combined with knowledge gained through other task activities, will help inform regional stakeholders of nontechnical challenges. Emphasis will be placed on infrastructure development strategies and regulatory frameworks, the latter being addressed by regulatory roundup meetings of engaged regulators from the region.

4.2 – Global CCUS Leadership. Regional technology transfer between PCOR Initiative members and among a wider section of CCUS stakeholders will be through scheduled project meetings, collaboration, and related dissemination of knowledge including the PCOR Initiative website. Webinars will be used to provide an effective medium to share the CCUS knowledge base accessed and enhanced by PCOR Initiative activities. Ultimately, the dissemination of knowledge through the project will extend beyond the PCOR Initiative region and support international engagement and knowledge sharing.

***4.3 – Business Cases*.** Scenarios will be identified, reviewed, and developed for CCUS projects in the primary focus areas of the project, working closely with vested industry partners. The effects of existing tax policies (e.g., 45Q) on infrastructure development and investment in innovative CCUS business

arrangements will be assessed. Findings will be disseminated through PCOR Initiative activities and meetings. Life cycle analyses may be used to help frame business case development.

4.*4 – Support DOE.* CCUS communication materials such as journal articles, conference papers, reports, fact sheets, presentations, and the website will be provided to support DOE; key researchers will attend selected conferences to disseminate knowledge gained through project activities.

Anticipated Results: The PCOR Initiative will play a vital role in accelerating CCUS deployment in North Dakota and beyond, by providing the premier regional forum for industry, policy makers, regulators, and others to identify and address key challenges. Specific outcomes of the program will include 1) collaborative solutions to technical challenges that will increase regulatory and business confidence in CCUS technology, 2) advanced knowledge transfer and data sharing for technology advancement, 3) acceleration of CCUS deployment through evaluation and promotion of infrastructure requirements and techno-economic assessment, and 4) Increased confidence in business cases supporting CCUS projects.

Facilities, Resources, and Techniques to Be Used: The EERC employs a multidisciplinary staff of about 200 and has 254,000 square feet of state-of-the-art offices, laboratories, and technology demonstration facilities, which enable staff to address a wide variety of research topics. In addition to the PCOR Initiative and the preceding PCOR Partnership Program, the EERC has a wide portfolio of past and current applied research projects covering the entire CCUS value chain. The University of Wyoming (UW) similarly has a range of CCUS expertise and active projects, while the University of Alaska at Fairbanks (UAF) has established research collaborations with the oil industry, including for the North Slope oil fields with the most significant CCUS potential in Alaska.

Environmental and Economic Impacts While Program Is under Way: CCUS projects bring significant economic benefits, in addition to the environmental benefit of managing carbon emissions. The PCOR

Initiative can boost CCUS deployment by assisting ongoing projects such as Project Tundra and Red Trail Energy's CCUS project and providing technology and business confidence for new projects.

Ultimate Technological and Economic Impacts: The acceleration of CCUS deployment in North Dakota and through the wider region will dramatically improve availability of CO_2 for enhanced oil recovery (EOR), increasing production from and extending the life of oil fields with the associated boost to jobs and revenues. Established CO_2 supplies will also support technology advancements to realize vast EOR potential in unconventional reservoirs such as the Bakken. In a carbon-constrained world, CCUS offers a path to reduced net emissions from oil and gas production.

Why the Project Is Needed: CCUS deployment still faces policy, regulatory, and investment challenges, and successful projects require collaboration between multiple stakeholders. Build-out of infrastructure can be coordinated across jurisdictions and between stakeholders to maximize deployment opportunities. The PCOR Initiative will play a vital role in addressing challenges to deployment, made more urgent by factors including the time limits on current 45Q tax legislation (projects must begin construction by 2024).

STANDARDS OF SUCCESS

The degree to which the PCOR Initiative has contributed to accelerated deployment of CCUS projects will determine a successful program outcome. The level of engagement with partners and stakeholder organizations will provide a metric of successful engagement. Products that will provide a measure of success include 1) meetings for knowledge transfer and collaboration (annual member meetings with supplementary regulators' and technical advisory board meetings, plus ad hoc webinars on key emerging issues) and 2) a series of topical reports for DOE and PCOR partners detailing the results of technical, infrastructure, techno-economic, socioeconomic, and business case assessments.

Investment by OGRC in the PCOR Initiative will help grow state oil production while managing carbon emissions and other environmental constraints. The PCOR Initiative will develop the long-term

regional vision of the PCOR Partnership and enhance the established leadership role in CCUS deployment that North Dakota has achieved through such measures as Class VI primacy, favorable business environments, and state tax policies. Class VI primacy assures continuity of CO_2 storage oversight from NDIC, as is currently managed under the Class II program. North Dakota stands to gain from CCUS deployment through economic benefits associated with increased EOR opportunities as identified by the PCOR Partnership and related EERC efforts, including the Bakken Production Optimization Program (BPOP). The pipeline from Beulah to Saskatchewan and the extension of the Greencore pipeline into North Dakota (Figure 1) illustrate how a regional approach to infrastructure development is essential for positive outcomes and attendant economic benefits to be realized. The establishment of reliable CO_2 supplies from Project Tundra and similar regional efforts would provide a boost to the potential for EOR technologies to increase and extend both conventional and unconventional oilfield production from the state, by transitioning from rich gas as an interim and limited EOR working fluid to more abundant CO_2. Reporting on successful outcomes from the PCOR Initiative will occur through meetings, webinars, website content, and publicly available DOE reports.

BACKGROUND/QUALIFICATIONS

The EERC is a high-tech, nonprofit branch of the University of North Dakota. Resumes of key personnel are provided in Appendix B. Neil Wildgust, Assistant Director for Geoscience and Engineering, will serve as Principal Investigator. Charles Gorecki, EERC CEO; John Harju, EERC Vice President for Strategic Partnerships; and Ed Steadman, EERC Vice President for Research, will serve as Senior Program Advisors. Dr. Erin Phillips will lead the UW work. At UAF, Brent Sheets will lead PCOR Initiative efforts.

MANAGEMENT

The EERC manages over 200 contracts a year, with over 1330 clients in 53 countries. Systems are in place to ensure that projects are managed within budget, schedule, and scope. Mr. Wildgust will oversee the entire program, including integration of tasks, collaboration with stakeholders and

organization of meetings. The EERC will be responsible for coordination and execution of tasks and dissemination of results, with assistance provided by program partners. Annual meetings will be scheduled to provide updates on research activities and discuss the direction of future activities.

TIMETABLE

This effort is proposed as a 5-year program (October 1, 2019 – September 30, 2024). Figure 2 summarizes the preliminary program timetable. Additional timetable detail will be developed as the program evolves.

BUDGET

The estimated initial cost for the proposed effort is $6,254,617, as shown in Table 1. DOE has already confirmed $5,000,000 of funding as the EERC and DOE are currently in final negotiations. $2,000,000 of cost share is requested from the NDIC OGRP: $500,000 for the initial scope of work and an additional $1,500,000 to be set aside for anticipated increased scope and cost-share requirements from DOE in Years 2 to 5. The EERC will make a separate request of $2,000,000 from the NDIC Lignite Research Program: $500,000 for the initial scope of work and $1,500,000 for future additional scope. In-kind cost share in the amount of $128,823 will be provided by UW and another $125,794 from UAF. Letters of commitment for the in-kind providers can be found in Appendix A. Budget notes can be found in Appendix C.

CONFIDENTIAL INFORMATION

This proposal has no confidential information.

TAX LIABILITY

The EERC, a department within the University of North Dakota, is a state-controlled institution of higher education and is not a taxable entity; therefore, it has no tax liability to the state of North Dakota or any of its political subdivisions.

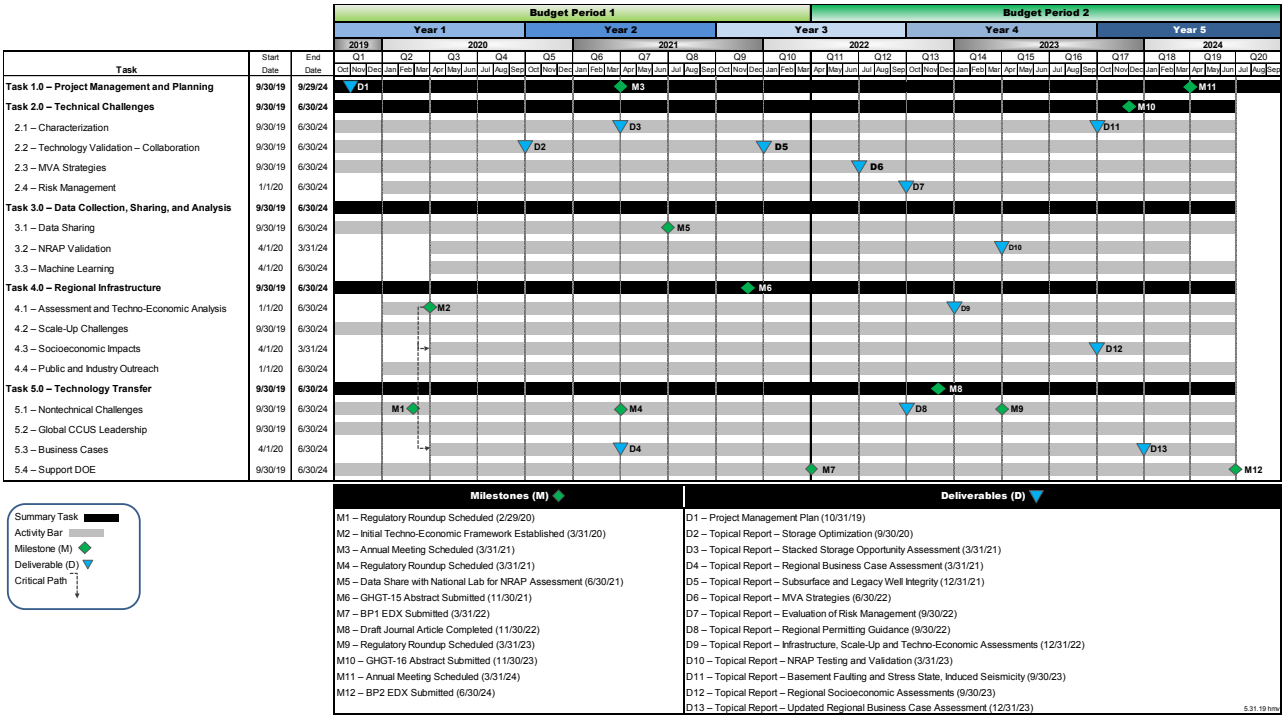

Figure 2. Preliminary timetable.

Table 1. Budget Breakdown

Project Associated Expense	NDIC OGRP Share (Cash)	NDIC LRP Share (Cash)	Cost Share (Cash & In-Kind)	Total Project
Labor	$ 332,173	$ 332,155	$ 2,194,155	$ 2,858,483
Travel	$ -	$ -	$ 200,282	$ 200,282
Supplies	$ -	$ -	$ 11,630	$ 11,630
Subcontractor - University of Wyoming	$ -	$ -	$ 501,674	$ 501,674
Subcontractor -University of Alaska	$ -	$ -	$ 500,047	$ 500,047
Subcontractor -Techno-Economic & Socio-Economic Evaluation	$ -	$ -	$ 60,000	$ 60,000
Rents & Leases - Audio/Visual Services	$ -	$ -	$ 63,500	$ 63,500
Communications	$ 48	$ -	$ 9,867	$ 9,915
Printing & Duplicating	$ 4	$ 70	$ 2,581	$ 2,655
Food	$ -	$ -	$ 35,065	$ 35,065
Laboratory Fees & Services				
Graphics Services	$ -	$ -	$ 44,351	$ 44,351
Software Solution Services	$ -	$ -	$ 28,496	$ 28,496
Engineering Services Fee	$ -	$ -	$ 1,703	$ 1,703
Total Direct Costs	$ 332,225	$ 332,225	$ 3,653,351	$ 4,317,801
Facilities & Administration	$ 167,775	$ 167,775	$ 1,346,649	$ 1,682,199
Total Cash Requested	**$ 500,000**	**$ 500,000**	**$ 5,000,000**	**$ 6,000,000**
In-Kind Cost Share				
University of Wyoming	$ -	$ -	$ 128,823	$ 128,823
University of Alaska	$ -	$ -	$ 125,794	$ 125,794
Total In-kind Cost Share	**$ -**	**$ -**	**$ 254,617**	**$ 254,617**
TOTAL PROJECT COSTS	**$ 500,000**	**$ 500,000**	**$ 5,254,617**	**$ 6,254,617**

* Additional cash and/or in-kind contributions from industry are anticipated and will be reported to NDIC as received.

PATENTS/RIGHTS TO TECHNICAL DATA

Development of patentable technologies is not expected.

STATUS OF ONGOING PROJECTS

The EERC is currently engaged in three OGRP-funded projects (Table 2), all current on deliverables.

Table 2. Current EERC Projects Funded by OGRP

Project Title	Contract Award No.
iPIPE: Intelligent Pipeline Integrity Program	G-046-88
Bakken Production Optimization Program 2.0	G-040-080
Emerging Issues	G-000-004

APPENDIX A

PCOR PARTNERS AND DOE AWARD LETTERS OF SUPPORT

Figure 1. The team: PCOR Initiative team and previous Plains CO_2 Reduction Partnership members. Circled organizations have provided letters of commitment as of May 31, 2019.

Commitment Letters from Third Parties

The Team

Project and Cost-Share Partners

Energy & Environmental Research Center
NDIC Lignite Research Development and Marketing Program
NDIC Oil & Gas Research Program
University of Alaska
University of Wyoming

Elected Officials

U.S. Representative Kelly Armstrong
U.S. Senator Kevin Cramer
U.S. Senator John Hoeven
North Dakota Governor Doug Burgum
Wyoming Governor Mark Gordon
Wyoming State Senator Michael Von Flatern

U.S. National Laboratories

Idaho National Laboratory
Los Alamos National Laboratory
Pacific Northwest National Laboratory

U.S. Government and/or Trade Associations

Carbon Utilization Research Council
Energy Capital Economic Development
Interstate Oil & Gas Compact Commission
Missouri Department of Natural Resources
Montana Board of Oil and Gas Conservation
Nebraska Oil and Gas Conservation Commission
North Dakota Department of Environmental Quality
North Dakota Department of Mineral Resources, Oil and Gas Division
North Dakota Geological Survey
North Dakota Petroleum Council
North Dakota Pipeline Authority
North Dakota Public Service Commission
Public Service Commission of Wisconsin
South Dakota Department of Environment and Natural Resources
South Dakota Public Utilities Commission
University of Wyoming Enhanced Oil Recovery Institute
Wyoming Department of Environmental Quality
Wyoming Infrastructure Authority
Wyoming Mining Association
Wyoming Public Service Commission
Wyoming State Geological Survey

Canadian Organizations

BC Oil and Gas Commission
CMC Research Institutes
Natural Resources Canada
Petroleum Technology Research Centre
Saskatchewan Ministry of Energy and Resources

Industrial Partners*

AE2S
Air Products and Chemicals, Inc.
ALLETE
ALLETE Clean Energy
Ballantyne Oil, LLC
Basin Electric Power Cooperative
BNI Energy, Ltd.
Class VI Solutions, Inc.
ClearPath, Inc.
Computer Modelling Group, Inc.
Dakota Gasification Company
Delft Inversion
Denbury Resources, Inc.
Eagle Operating, Inc.
ES Xplore, LLC
Equinor
GE Research
Great River Energy
GroundMetrics
Ham's Well Service
Membrane Technology & Research
Minnkota Power Cooperative, Inc.
Nebraska Public Power District
NextStream CO2 LLC
North American Coal Corporation
Nuverra Environmental Solutions
Omaha Public Power District
OtterTail Power Company
Outsource Petrophysics, Inc.
Peabody
Prairie Public Broadcasting, Inc.
Red Trail Energy, LLC
SaskPower
Schlumberger Technology Corporation
SOG Resources
Tri-State Generation and Transmission Association, Inc.
WBI Energy, Inc.

Technical Advisory Board Commitment

Stefan Bachu, Innotech Alberta
Stacey Dahl, Minnkota Power Cooperative, Inc.
James Erdle, Computer Modelling Group, Inc.
Lynn Helms, North Dakota Department of Mineral Resources, Oil and Gas Division
Michael Holmes, Lignite Energy Council
L. Stephen Melzer, Melzer Consulting
Simon O'Brien, Shell Canada Energy
Kate Ryan, Denbury Resources, Inc.

** Cost share has been committed by numerous industrial partners; additional cost share is anticipated throughout the project.*

EERC
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May 31, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The Energy & Environmental Research Center (EERC) is delighted to be a critical cog in a world-class team of engaged constituents that together are proposing the project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Initiative region of the United States and Canada, is very much aligned with our long history and institutional interest in developing CCUS technology. The EERC, and its key stakeholders have benefitted greatly from the efforts of the existing PCOR Partnership and numerous CCUS-related research programs at the EERC.

As CEO of the EERC, I am delighted to supply this letter of support and to enumerate my full support, as well as the backing of the entire EERC leadership team, toward this effort.

I look forward to this exciting opportunity to continue working closely with EERC staff, along with the other members of the PCOR Initiative.

Sincerely,

Thomas A. Erickson
CEO

TAE/rss

INDUSTRIAL COMMISSION OF NORTH DAKOTA

LIGNITE RESEARCH, DEVELOPMENT AND MARKETING PROGRAM

Governor,
Doug Burgum
Attorney General,
Wayne Stenehjem
Agriculture Commissioner,
Doug Goehring

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am writing to confirm the Lignite Research Council's (LRC's) commitment to join the team being assembled by the Energy & Environmental Research Center (EERC) to investigate regional storage and transport challenges facing commercial deployment of CCUS. This investigation is outlined in the subject proposal entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

LRC is focused on near-term, practical research and development projects that provide the opportunity to preserve and enhance development of North Dakota's abundant lignite resources. In an increasingly carbon-constrained world, the growth of lignite-based energy production requires innovative and environmentally sound options for managing CO_2. Carbon capture, utilization and storage (CCUS) can provide those options. We believe that the proposed PCOR Partnership initiative will help LRC, our member organizations, and the state of North Dakota plan for the commercial development of CCUS. As such, LRC is committed to supporting this excellent research opportunity.

As part of its support, LRC can offer cash cost share of at least $625,000, and up to $2,000,000, over a 5 year period. Availability of this cost share is contingent upon submission of a proposal to the North Dakota Lignite Research Program, approval by LRC and the North Dakota Industrial Commission, and the execution of a mutually negotiated agreement of acceptable terms and conditions with all project sponsors.

We look forward to collaborating with DOE, EERC, and the rest of the team on this important project.

Sincerely,

Michael Holmes
Director and Technical Advisor
Lignite Research Development and Marketing Program

LIGNITE RESEARCH COUNCIL

Jason Bohrer, Chairman / Mike Holmes - Director and Technical Advisor
jasonbohrer@lignite.com / mikeholmes@lignite.com
Lignite Research Council
P.O. Box 2277
Bismarck, ND 58502

Phone: (701) 258-7117 FAX: (701) 258-2755

INDUSTRIAL COMMISSION OF NORTH DAKOTA

Karlene Fine
Executive Director & Secretary
Industrial Commission of North Dakota
600 E. Boulevard Avenue
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INDUSTRIAL COMMISSION OF NORTH DAKOTA
OIL AND GAS RESEARCH COUNCIL

Governor
Doug Burgum
Attorney General
Wayne Stenehjem
Agriculture Commissioner
Doug Goehring

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Cost-Share Support for EERC Proposal 2019-0147 in Response to DOE Funding Opportunity No. DE-FOA-0002000

The North Dakota Industrial Commission's (NDIC's) Oil & Gas Research Program (OGRP) is pleased to support the Energy & Environmental Research Center (EERC) in the subject proposal entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment." The OGRP is a state/industry program established by the North Dakota Legislature in 2003 with a mission that includes promoting the wise and efficient use of energy, and supporting research and educational activities concerning oil and natural gas exploration and production. We see CCUS as an important technology for the stewardship and development of energy in North Dakota, and believe the proposed initiative will help us accomplish our mission by addressing challenges facing CCUS deployment. As such, we are excited to partner with the EERC on this opportunity.

As part of its support, the OGRP can offer cash cost share of at least $625,000, and up to $2,000,000. Availability of this cost share is contingent upon the EERC's submission of a proposal to OGRP, approval by the Oil & Gas Research Council and NDIC, and the execution of a mutually negotiated agreement of acceptable terms and conditions with all project sponsors.

Again, I express our interest in and support for the proposed project, and look forward to working with the U.S. Department of Energy, EERC, and other project participants.

Sincerely,

Brent Brannan
Director
North Dakota Oil and Gas Research Program

Andrew M. Gray, CRA, CPRA, CFRA
Associate Director
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UNIVERSITY OF ALASKA FAIRBANKS

Office of Grants and Contracts Administration

P.O. Box 757880, Fairbanks, Alaska 99775-7880

30 May 2019

Mr. Neil Wildgust
Assistant Director for Geoscience and Engineering
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 28202-9018

Re: Letter of Commitment for project funded under DE-FOA-0001837

Dear Dr. Wildgust:

University of Alaska Fairbanks is pleased to collaborate with the Littoral Power Systems on the proposal entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment," which will be submitted to for funding by the DOE Fossil Energy Office. The Principal Investigator from UAF is Dr. Mohabbat Ahmadi, Associate Professor in the Department of Petroleum Energy.

UAF will participate in Budget Periods 1 and 2 of this proposal, scheduled for 9/30/2019 to 9/30/2024. To meet the DOE-required cost share of 20% of Total Project Costs, UAF has identified the following resources.

Yr1=$39,837 (source: UAF salary, benefits, and related F&A)
Yr2=$40,633 (source: UAF salary, benefits, and related F&A)
Yr3=$41,446 (source: UAF salary, benefits, and related F&A)
Yr4=$13,309 (source: UAF salary, benefits, and related F&A)
Yr5=$14,373 (source: UAF salary, benefits, and related F&A)

The appropriate administrative and programmatic personnel at UAF are aware of the pertinent federal regulations and policies, and we are prepared to enter into a subcontract with the University of North Dakota that ensures compliance with all such policies, should this proposal be funded. A statement of work and all other requested material for this proposal are attached.

If you need additional information, please feel free to call my office at (907) 474-1851.

Sincerely,

Andrew M. Gray, Associate Director
University of Alaska Fairbanks

UNIVERSITY OF WYOMING

School of Energy Resources
1020 Lewis Street, Laramie, Wyoming.
Dept. 3012, 1000 E. University Ave., Laramie, WY 82071-2000
(307) 766-6851 • fax (307) 766-6701 • www.uwyo.edu/ser

5/22/19

Mr. Neil Wildgust
Assistant Director for Geoscience and Engineering
Energy and Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 28202-9018

Dear Mr. Wildgust:

Subject: University of Wyoming School of Energy Resources Letter of Commitment in support of the Energy and Environmental Research Center's Application to the U.S. Department of Energy Funding Opportunity Announcement (FOA) DE-FOA-0002000 "Regional Initiative to Accelerate CCUS Deployment."

The University of Wyoming School of Energy Resources (UW) is pleased to support the Energy and Environmental Research Center (EERC) in its proposal entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment," in response to the U.S. Department of Energy Funding Opportunity Announcement (FOA) DE-FOA-0002000, "Regional Initiative to Accelerate CCUS Deployment." UW has wide-ranging experience with geologic CO_2 storage research projects, including the currently active Phase II (Storage Complex Feasibility) of the U.S. Department of Energy's CarbonSAFE Program at Dry Fork Station, for which the EERC is also a partner. UW looks forward to drawing on our knowledge from active and past projects to support the EERC in their proposal.

UW will provide the EERC with assistance and advice related to technical challenges, regional infrastructure, and technology transfer issues associated with CO_2 storage. The scope of work for UW is explained in the attached document.

The total estimated budget for the proposed scope of work is $753,288. UW requests $601,314 from the EERC and $151,974 will be provided in cost-share contributed by the University Of Wyoming School Of Energy Resources.

We are happy to have the opportunity to work with the EERC as a partner in the PCOR Partnership Region. Please contact me with any questions at (307) 766-6800 or ephilli8@uwyo.edu.

Sincerely,

Dr. Erin Phillips
Research Scientist
UW School of Energy Resources

Approved by:

Mark Northam
University of Wyoming School of Energy Resources

KELLY ARMSTRONG
AT-LARGE, NORTH DAKOTA
COMMITTEE ON THE JUDICIARY
COMMITTEE ON OVERSIGHT & REFORM
SELECT COMMITTEE ON THE CLIMATE CRISIS

Congress of the United States
House of Representatives
Washington, DC 20515

WASHINGTON OFFICE:
1004 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-2611

DISTRICT OFFICES:
3217 FIECHTNER DRIVE, SUITE B
FARGO, ND 58103
(701) 353-6665

220 EAST ROSSER AVENUE
228 FEDERAL BUILDING
BISMARCK, ND 58501
(701) 354-6700

WWW.ARMSTRONG.HOUSE.GOV

May 24, 2019

Mr. John A. Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I write to express my support for the Energy & Environmental Research Center's (EERC) to be considered for funding by the Department of Energy (DOE) "Plains CO2 Reduction (PCOR) Partnership Initiative to Accelerate Carbon Capture Utilization and Storage (CCUS) Deployment."

North Dakota is at the forefront of energy development and production. Our state continues to investigate long-term strategies that incorporate all energy resources—traditional and emerging—to meet the Nation's growing energy demand in an environmentally responsible manner. CCUS is vital for advancing environmental stewardship and energy development. I believe the EERC proposed initiative will identify and address critical challenges regarding the commercial deployment of CCUS, which will help North Dakota accomplish its energy and environment goals.

I support the EERC's efforts and look forward to the exciting opportunities it will afford North Dakota, the PCOR Partnership region, and the Nation.

Sincerely,

Kelly Armstrong
Member of Congress

KEVIN CRAMER
NORTH DAKOTA

SUITE 400
RUSSELL BUILDING
WASHINGTON, DC 20510
202–224–2043

United States Senate

May 24, 2019

Mr. John A. Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Harju:

I am writing to express my support for the Energy & Environmental Research Center's (EERC's) efforts to secure Department of Energy (DOE) funding for the "PCOR Partnership Initiative to Accelerate CCUS Deployment."

North Dakota is at the forefront of energy development and production. Our state continues to implement long-term, innovative strategies to meet the nation's growing energy demand in an environmentally responsible manner. Carbon capture, utilization, and storage (CCUS) is important for the stewardship and development of energy in North Dakota, and I believe the EERC's proposed initiative to identify and address critical challenges facing commercial deployment of CCUS will help North Dakota accomplish our energy goals.

I strongly support the EERC's efforts and look forward to the exciting opportunities this work will bring to the state of North Dakota, the PCOR Partnership region, and our nation in resolving our energy challenges.

Sincerely,

Kevin Cramer
United States Senator

JOHN HOEVEN
NORTH DAKOTA
338 RUSSELL SENATE OFFICE BUILDING
TELEPHONE: (202) 224-2551
FAX: (202) 224-7999
hoeven.senate.gov

United States Senate
WASHINGTON, DC 20510

COMMITTEES:
AGRICULTURE
APPROPRIATIONS
ENERGY AND NATURAL RESOURCES
INDIAN AFFAIRS

May 24, 2019

Mr. John A. Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy Funding Opportunity Announcement No. DE-FOA-0002000

I am writing to express my support for the Energy & Environmental Research Center's (EERC's) efforts to secure funding through Department of Energy (DOE) for the "Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment."

North Dakota is at the forefront of energy development and production. Our state continues to investigate long-term strategies that utilize an all-the-above energy strategy to meet the nation's growing energy demands in an environmentally responsible manner. Carbon capture, utilization, and storage (CCUS) is a critical piece of both the development of energy and environmental stewardship in North Dakota. I believe the EERC's proposed initiative to identify and address critical challenges facing commercial deployment of CCUS will assist North Dakota in accomplishing our energy goals.

I strongly support the EERC's efforts and look forward to the exciting opportunities this work will bring to the state of North Dakota, the PCOR Partnership region, and our nation in resolving our energy challenges.

Sincerely,

John Hoeven
U.S. Senator

State of
North Dakota
Office of the Governor

Doug Burgum
Governor

May 24, 2019

Mr. John A. Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Harju:

North Dakota is at the forefront of energy development and production. Our state continues to investigate long-term strategies that incorporate all energy resources—traditional and emerging—to meet the nation's growing energy demand in an environmentally responsible manner. Carbon capture, utilization, and storage (CCUS) is important for the stewardship and development of energy in North Dakota, and the EERC's proposed initiative to identify and address critical challenges facing commercial deployment of CCUS will help North Dakota accomplish its energy goals.

North Dakota strongly supports the EERC's efforts to secure funding through DOE for the "PCOR Partnership Initiative to Accelerate CCUS Deployment". This work will bring exciting opportunities to the state of North Dakota, the PCOR Partnership region, and our nation in resolving our energy challenges.

Sincerely,

Doug Burgum
Governor

600 E Boulevard Ave. • Bismarck, ND 58505-0001 • Phone: 701.328.2200 • www.governor.nd.gov

May 29, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm my support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). My administration and the State of Wyoming are keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. We have an established track record of leadership in all three areas and want to continue to drive forward. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the state's numerous enhanced oil recovery operations are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming leadership with CCUS policy and projects, includes:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the Wyoming Legislature and state agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground

Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette.

- Another $5 million investment came from the Tri-State Generation and Transmission Association in addition to $1 million from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into valuable products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean-coal and related carbon management technologies at the University of Wyoming.

- Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

I support the PCOR partnership initiative and look forward to further updates about its progress. It is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette-based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely,

Mark Gordon
Governor

WYOMING SENATE

5-17-2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm our support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

SENATE DISTRICT 24 • 1318 Columbine Dr • Gillette, WY 82718 • TELEPHONE 307.680.4744
EMAIL mvonflatern@wyoming.com • WEB SITE http://legisweb.state.wy.us

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely Yours.

Michael VonFlatern

SENATE DISTRICT 24 • P O Box 986 • Gillette, Wyoming 82717 • **TELEPHONE** (307) 686-2946
EMAIL mvonflatern@wyoming.com• **WEB SITE** http://legisweb.state.wy.us

SENATE DISTRICT 24 • P O Box 986 • Gillette, Wyoming 82717 • TELEPHONE (307) 686-2946
EMAIL mvonflatern@wyoming.com• WEB SITE http://legisweb.state.wy.us

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Idaho National Laboratory is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing technology to support CCUS. In particular, data sharing and knowledge transfer from commercial and applied research projects made available through the PCOR Partnership would be very valuable for the further development and testing of National Risk Assessment Partnership (NRAP) tools.

Idaho National Laboratory, therefore, recognizes the significant value offered by collaboration with the PCOR Partnership, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Christopher Wright Ph.D.
Idaho National Laboratory

Los Alamos
NATIONAL LABORATORY
EST. 1943

Science Program Office, Applied Energy
Los Alamos National Laboratory
PO Box 1663, P288
Los Alamos, NM 87545
505-665-4595

Symbol: SPO-AE-19-023
Date: May 20, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

Los Alamos National Laboratory is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal—to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada—is very much aligned with our interests in developing science-based technology to support CCUS.

One area of particular interest is collaboration on the validation of NRAP tools using field data from the PCOR region. As one of the NRAP national labs, Los Alamos has led and contributed to development and application of many of the predictive tools of relevance to the PCOR effort; we see great opportunity for the development of ROMs for new types of reservoirs and operational strategies (ROMs are empirical models for capturing the physics of fluid flow rapidly) and the integration of these ROMs into an assessment model to understand potential leakage impacts which can inform monitoring strategies. While we realize the initiative is not focused on a particular operation/site, we believe application and validation of the NRAP models can help PCOR understand the variation in reservoirs and post injection scenarios across the region. By collaborating with PCOR through data sharing, Los Alamos can help the NRAP effort in validation of the toolset.

Additional areas of collaboration opportunity include machine learning and other Los Alamos capabilities (e.g., SimCCS). Application of machine learning to subsurface challenges is an area of particular interest across several Los Alamos mission areas, including energy; indeed, it is an

extension of ROM development and virtual learning that is central to NRAP, and it is showing great promise for a variety of novel monitoring strategies. SimCCS—a coupled engineering-economic geospatial-optimization model—has garnered significant interest in assessments of sources and sinks at a regional scale. We look forward to exploring other collaboration opportunities as well.

Los Alamos National Laboratory, therefore, recognizes the significant value offered by collaboration with the PCOR Partnership, subject to an award from DOE. We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Melissa Fox
Director, Applied Energy Programs
Los Alamos National Laboratory

Pacific Northwest
NATIONAL LABORATORY
Proudly Operated by Battelle Since 1965

902 Battelle Boulevard
P.O. Box 999, MSIN K5-18
Richland, WA 99352
(509) 372-4201
sheena.kanyid@pnnl.gov
www.pnnl.gov

May 17, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Proposal for participating on EERC Proposal 2019-0147, "PCOR Partnership Initiative to Accelerate CCUS Deployment", in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The Pacific Northwest National Laboratory (PNNL) operated by Battelle for the U.S. Department of Energy (DOE) is pleased to participate with the EERC on the above project.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing technology to support CCUS. In particular, data sharing and knowledge transfer from commercial and applied research projects made available through the PCOR Partnership would be very valuable for the further development and testing of National Risk Assessment Partnership (NRAP) tools.

Pacific Northwest National Laboratory, therefore, recognizes the significant value offered by collaboration with the PCOR Partnership, subject to an award from DOE, and we look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

PNNL is a United States Department of Energy (US DOE) Federally Funded Research and Development Center (FFRDC), as such, and in accordance with the FOA, the value of, and funding for PNNL will come through the US DOE field work proposal system. Additionally, as an FFRDC, we will not be a cost sharing participant.

Technical questions regarding this collaboration should be referred to Dr. Christopher Brown at christopher.brown@pnnl.gov or (509) 371-7381. Contractual questions should be referred to the undersigned at the number above.

Thank you,

Sheena L. Kanyid
Senior Contracts Specialist
Pacific Northwest National Laboratory

U.S. DEPARTMENT OF ENERGY

1050 Thomas Jefferson Street, NW
Suite 700
Washington, DC 20007
(202) 298-1850 Phone
(202) 338-2416 Fax
curc@vnf.com
www.curc.net

CURC CARBON UTILIZATION RESEARCH COUNCIL
ADVANCING FOSSIL ENERGY SOLUTIONS

May 28, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The Carbon Utilization Research Council is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our members' interests in developing CCUS. CURC and its membership have benefitted greatly from knowledge and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

CURC recognizes the significant value offered by membership of the PCOR Partnership and its contributions thus far to advancing a national CCUS industry, and hopes to continue to benefit from further collaborative efforts with the newly defined PCOR Partnership, subject to a DOE award.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Shannon Angielski

Shannon Angielski
Executive Director
Carbon Utilization Research Council

Energy CAPITAL
Economic Development

Stimulate and facilitate a diverse economy through business retention, expansion, and recruitment.

May 22, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

Energy Capital Economic Development is committed to the growth, development and advancement of technology that will build a diverse and strong economy in Wyoming. We strongly support the development of environmentally sound projects that will benefit our region and the nation. The purpose of this letter is to confirm our support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

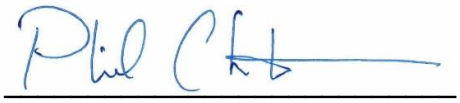
- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming

Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely,



Phil Christopherson
Chief Executive Officer

INTERSTATE Oil & Gas COMPACT COMMISSION

P.O. Box 53127 Oklahoma City, Oklahoma 73152-3127
900 N.E. 23rd Street Oklahoma City, Oklahoma 73105
Phone: 405.522.8380 Web: iogcc.ok.gov

May 24, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Re: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Harju:

The Interstate Oil and Gas Compact Commission (IOGCC) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, aligns with IOGCC's efforts to support our member states in developing an appropriate regulatory framework for CCUS. IOGCC has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

IOGCC, therefore, recognizes the significant value offered by participating in the activities of the PCOR Partnership and looks forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership by supporting this new initiative.

Sincerely,

Lori Wrotenbery

Lori Wrotenbery
Executive Director
Interstate Oil and Gas Compact Commission

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

May 28, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Missouri Department of Natural Resources is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Missouri Department of Natural Resources has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Missouri Department of Natural Resources, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support or a cash contribution, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Jerry Prewett
Deputy Director
Missouri Geological Survey
Missouri Department of Natural Resources

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION
BOARD OF OIL AND GAS CONSERVATION

STEVE BULLOCK, GOVERNOR

OIL AND GAS CONSERVATION DIVISION

STATE OF MONTANA

May 14, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The Montana Board of Oil and Gas Conservation is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. The Montana Board of Oil and Gas Conservation has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The Montana Board of Oil and Gas Conservation, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

James W. Halvorson

Jim Halvorson
Administrator
Montana Board of Oil and Gas Conservation

DIVISION OFFICE
1539 11th AVENUE
PO BOX 201601
HELENA, MONTANA 59620-1601
(406) 444-6731

TECHNICAL AND
SOUTHERN FIELD OFFICE
2535 ST. JOHNS AVENUE
BILLINGS, MONTANA 59102-4693
(406) 656-0040

NORTHERN FIELD OFFICE
201 MAIN STREET
PO BOX 690
SHELBY, MONTANA 59474-0690
(406) 434-2422

STATE OF NEBRASKA
OIL AND GAS CONSERVATION COMMISSION
PO BOX 399
SIDNEY, NEBRASKA 69162-0399
(308) 254-6919
Fax (308) 254-6922
www.nogcc.ne.gov

May 15, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Support for EERC Proposal 2019-0147
U.S. DOE Funding Opportunity No. DE-FOA-0002000

Dear Mr. Harju:

The Nebraska Oil and Gas Conservation Commission is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled, "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of Carbon Capture, Utilization, and Storage (CCUS), in the newly defined PCOR Partnership region of the United States and Canada, is in alignment with our interest in future tertiary recovery projects in Nebraska which would utilize Carbon Dioxide. Because of the probable reserve increase due to Carbon Dioxide injection, both our Commission and the State of Nebraska could benefit from this project. Therefore, we will support this new initiative with the provision of in-kind support where possible, subject to an award from USDOE.

We look forward to continue working with the EERC and the members of the PCOR Partnership in the future.

Sincerely,

NEBRASKA OIL AND GAS CONSERVATION COMMISSION

William H. Sydow

William H. Sydow
Director

whs01719 EERC.doc

NORTH Dakota | Environmental Quality
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May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

The North Dakota Department of Environmental Quality (NDDEQ) supports the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal – to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada – is aligned with our interests in developing CCUS. As a region rich in fossil fuel resources, the knowledge and collaboration opportunities gained as part of this proposal is considered critical as we move to a new national energy generation paradigm. We have historically benefited from EERC's research in this area.

The NDDEQ, therefore, recognizes the significant value offered by membership of the PCOR Partnership and is pleased to support this new initiative in the future.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

L. David Glatt, P.E., Director
North Dakota Department of Environmental Quality

LDG:dlp
xc: Reice Haase, Governor's Office

918 East Divide Avenue | Bismarck ND 58501-1947 | Fax 701-328-5200 | deq.nd.gov

Director's Office 701-328-5150
Division of Air Quality 701-328-5188
Division of Municipal Facilities 701-328-5211
Division of Waste Management 701-328-5166
Division of Water Quality 701-328-5210
Division of Chemistry 701-328-6140
2635 East Main Ave
Bismarck ND 58501

North Dakota Geological Survey

Edward C. Murphy - State Geologist

Department of Mineral Resources

Lynn D. Helms - Director

North Dakota Industrial Commission

https://www.dmr.nd.gov/ndgs/

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The ND Geological Survey is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of carbon capture, utilization, and storage (CCUS) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. The ND Geological Survey has benefitted greatly from the knowledge gained and the collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The ND Geological Survey, therefore, recognizes the significant value offered by membership in the PCOR Partnership and supports this new initiative with in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Edward C. Murphy
State Geologist

NORTH DAKOTA
PETROLEUM
COUNCIL

100 West Broadway, Ste. 200 | P.O. Box 1395 | Bismarck, ND 58501-1395
701.223.6380 | ndpc@ndoil.org | www.NDOil.org

May 25, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Harju:

The North Dakota Petroleum Council (NDPC) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. NDPC has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

NDPC, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will continue to vigorously support this new initiative with consultation and other unenumerated in-kind support, should the project be selected for award by DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Ron Ness, President
North Dakota Petroleum Council

INDUSTRIAL COMMISSION OF NORTH DAKOTA
NORTH DAKOTA PIPELINE AUTHORITY

Governor
Doug Burgum
Attorney General
Wayne Stenehjem
Agriculture Commissioner
Doug Goehring

May 22, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

North Dakota Pipeline Authority (NDPA) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. NDPA has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

NDPA, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Justin J. Kringstad, Director
North Dakota Pipeline Authority

Public Service Commission
State of North Dakota

600 East Boulevard, Dept. 408
Bismarck, North Dakota 58505-0480
Web: www.psc.nd.gov
E-mail: ndpsc@nd.gov
Phone: 701-328-2400
ND Toll Free: 1-877-245-6685
Fax: 701-328-2410
TDD: 800-366-6888 or 711

May 29, 2019

Mr. John Harju
Vice President for Research
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The North Dakota Public Service Commission is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in promoting and developing low CO2 energy options for our state. The North Dakota Public Service Commission has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The North Dakota Public Service Commission, therefore, recognizes the significant value of the proposed initiative, and will support this effort by collaborating on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Brian Kroshus
Chairman
North Dakota Public
Service Commission

Julie Fedorchak
Commissioner
North Dakota Public
Service Commission

Randy Christmann
Commissioner
North Dakota Public
Service Commission

Public Service Commission of Wisconsin

Rebecca Cameron Valcq, Chairperson
Ellen Nowak, Commissioner
Mike Huebsch, Commissioner

4822 Madison Yards Way
P.O. Box 7854
Madison, WI 53707-7854

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

We write to express our support for the Energy & Environmental Research Center's (EERC) proposed project entitled "PCOR Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interest in developing low carbon energy options for our state.

As Commissioners with the Public Service Commission of Wisconsin, we recognize the significant value of the proposed initiative and will support this effort through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Ellen Nowak
Commissioner
Public Service Commission of Wisconsin

Mike Huebsch
Commissioner
Public Service Commission of Wisconsin

DL:01687151

Telephone: (608) 266-5481
Home Page: http://psc.wi.gov

Fax: (608) 266-3957
E-mail: pscrecs@wisconsin.gov

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

May 28, 2019

Mr. Charles D. Gorecki
Director of Subsurface Research and Development
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for Energy & Environmental Research Center Proposal 2019-0147 in Response to U.S. Department of Energy Funding Opportunity Announcement No. DE-FOA-0002000

The South Dakota Department of Environment and Natural Resources is pleased to support the Energy & Environmental Research Center's proposed project entitled "Plains CO_2 Reduction Partnership Initiative to Accelerate Carbon Capture, Utilization, and Storage Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of carbon capture, utilization, and storage in the newly defined Plains CO_2 Reduction Partnership region of the United States and Canada, could be a game changer in the world of enhanced oil recovery projects.

South Dakota has no unconventional oil development. However, we do have enhanced oil recovery in conventional oil fields, which we hope will be included in the Initiative, because enhanced recovery is an important part of the foundation of the oil industry in South Dakota.

If enhanced oil recovery in conventional oil fields is included in the Initiative, the South Dakota Department of Environment and Natural Resources recognizes the potential value to further enhanced recovery methods offered by membership of the Plains CO_2 Reduction Partnership and will look to support this new initiative with provision of in-kind support subject to an award from Department of Energy.

We look forward to this exciting opportunity to continue working closely with the Energy & Environmental Research Center and other members of the Plains CO_2 Reduction Partnership.

Sincerely,

Steven M. Pirner
Secretary

Gary Hanson, Chairman
Chris Nelson, Vice Chairman
Kristie Fiegen, Commissioner

South Dakota
PUBLIC UTILITIES COMMISSION
500 East Capitol Avenue
Pierre, South Dakota 57501-5070
www.puc.sd.gov

(605) 773-3201
Consumer Hotline
1-800-332-1782
Email
puc@state.sd.us

May 30, 2019

Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki,

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy Funding Opportunity Announcement No. DE-FOA-0002000

The South Dakota Public Utilities Commission supports the Energy & Environmental Research Center proposed project titled PCOR Initiative to Accelerate Carbon Capture, Utilization and Storage Deployment.

The objective of the EERC proposal is to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS in the newly defined PCOR Partnership region of the United States and Canada. This goal aligns with our commission's interest in continued use of baseload resources for our state.

We recognize the value of the EERC's proposed initiative and will support this effort as appropriate, subject to an award from DOE.

We look forward to continuing our work with the EERC and other members of the PCOR Partnership.

Sincerely,

Gary Hanson

Chris Nelson

Kristie Fiegen

UNIVERSITY OF WYOMING

ENHANCED OIL RECOVERY INSTITUTE

http://eoriwyoming.org/

2435 King Boulevard
Box 6
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Casper, WY 82604

tel (307) 315-6441
fax (307) 315-6440

May 26, 2019

Dr. Erin Phillips, Research Scientist
Center for Economic Geology Research
School of Energy Resources, University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

RE: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm the Enhanced Oil Recovery Institute's (EORI) support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

EORI's scope of work in this effort will include representation at annual and technical meetings and support for graduate student studies on CCUS business case development and infrastructure analysis.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock

Enhanced Oil Recovery Institute

Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Should you have any questions or require anything further, please do not hesitate to reach out at your convenience. I can be reached at steven.carpenter@uwyo.edu, at 513-460-0360 (cell), or 307-315-6442 (office).

Respectfully,

Steven M. Carpenter

Dr. Steven M. Carpenter
Director

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

DEQ

Mark Gordon, Governor

Todd Parfitt, Director

May 29, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm our support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely,

Kevin Frederick
Administrator, Water Quality Division
Wyoming Department of Environmental Quality

May 24, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm our support for your partnership role in the Plains CO2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO2-EOR) are amendable to incidental CO2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.
- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE - a global competition to develop breakthrough technologies that will convert CO2 emissions from power plants and industrial facilities into value products such as building materials - will be hosted at the ITC.
- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.
- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.
- The State of Wyoming remains one of the only states to possess CO2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO2 to existing oil fields that are suitable for CO2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO2 pipelines.

Sincerely,

Jason Begger
Executive Director

Wyoming Infrastructure Authority
325 W 18th Street, Suite 1 · Cheyenne, WY 82001
307-635-3573 · www.wyia.org

WYOMING MINING ASSOCIATION
1401 Airport Parkway, Ste. 230 - Cheyenne, WY 82001 - (307)-635-0331

May 20, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The Wyoming Mining Association (WMA) is a statewide trade organization that represents and advocates for 26 mining company members producing bentonite, coal, trona and uranium. WMA also represents 120 associate member companies, one railroad, two electricity co-ops, and 200 individual members.

The purpose of this letter is to confirm our support for your partnership role in the Plains CO2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO2-EOR) are amendable to incidental CO2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and

Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

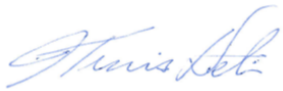
- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO2 to existing oil fields that are suitable for CO2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO2 pipelines.

Thank you for your consideration.

Best regards,



Travis Deti
Executive Director

THE STATE OF WYOMING

GOVERNOR
Mark Gordon

Public Service Commission

Hansen Building • 2515 Warren Avenue • Suite 300 • Cheyenne, Wyoming 82002
Ph. (307) 777-7427 • Fax (307) 777-5700 • psc.wyo.gov

COMMISSIONERS
Kara B. Fornstrom, Chairman
Mary A. Throne, Deputy Chair
Michael Robinson, Commissioner

SECRETARY AND CHIEF COUNSEL
Christopher Petrie
COMMISSION ADMINISTRATOR
Marci Norby

May 29, 2019

Dr. Erin Phillips, Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming, Dept. 4902
Energy Innovation Center, Room 307
1000 E. University Ave.
Laramie, WY 82071-2000

Re: LETTER OF COMMITMENT IN SUPPORT OF THE UNIVERSITY OF WYOMING CENTER FOR ECONOMIC GEOLOGY RESEARCH'S APPLICATION FOR A PARTNERSHIP ROLE IN THE PLAINS CO_2 REDUCTION (PCOR) PARTNERSHIP INITIATIVE TO ACCELERATE CCUS DEPLOYMENT, IN RESPONSE TO THE U.S. DEPARTMENT OF ENERGY'S REGIONAL INITIATIVE TO ACCELERATE CCUS DEPLOYMENT (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely,

Kara B. Fornstrom

KARA B. FORNSTROM, CHAIRMAN

KFB/ae

WYOMING STATE GEOLOGICAL SURVEY

P.O. BOX 1347, LARAMIE, WY 82073
307-766-2286 • 307-766-2605 (fax)
wsgs-info@wyo.gov • www.wsgs.wyo.gov

DIRECTOR & STATE GEOLOGIST
Erin Campbell

May 16, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Support for the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm our support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center

for Economic Geology Research) led the development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

The PCOR partnership initiative is a critical next phase in advancing CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project.

Sincerely,

Dr. Erin Campbell
Wyoming State Geologist and Director of the Wyoming State Geological Survey

BC Oil & Gas COMMISSION

May 14, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

RE: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The British Columbia Oil and Gas Commission (Commission) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is aligned with our interests. The Commission has benefitted from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The Commission recognizes the value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, knowledge transfer and attendance at meetings, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Richard Slocomb, P.Eng.
Vice President, Reservior, Drilling Engineering & Technical Services
BC Oil and Gas Commission

2950 Jutland Road
Victoria BC V8T 5K2

MAILING
PO BOX 9331 Stn Prov Govt
Victoria BC V8W 9N3

T 250.419.4400
F 250.794.5390

www.bcogc.ca

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

CMC Research Institutes is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. At CMC Research Institutes, our mission is to support the advancement of technologies to reduce carbon emissions in large-scale industry. We help innovators within large corporations and small companies scale-up and prove their greenhouse gas-reducing technologies by providing facilities to field test, develop and demonstrate early-stage innovations. We offer access to scientists, engineers and technologists who work with clients to solve design and process challenges. We recognize the significant value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, knowledge transfer and attendance at meetings, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

CMC RESEARCH INSTITUTES, INC.

S. Odendahl

Sandra Odendahl, P.Eng., CFA
President & CEO

CMC Research Institutes
3535 Research Road NW, Calgary, Alberta, Canada T2L 2K8
t: 647-463-7740 web: cmcghg.com email: Sandra.odendahl@cmcghg.com

Natural Resources Canada | Ressources naturelles Canada

May 10, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Natural Resources Canada is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Natural Resources Canada has a long history of collaboration with the EERC and has benefitted greatly from knowledge gained and opportunities available through the existing PCOR Partnership and related research programs at the EERC. Some examples include the Zama Acid Gas project in northern Alberta in which we collaborated on reservoir and surface monitoring of CO_2, the Weyburn-Midale CO_2 monitoring project in Saskatchewan, and more recently, the Aquistore, and the joint Canada-US project to evaluate the potential for CO_2 Storage - Enhanced Oil Recovery in the Bakken reservoir in Saskatchewan and North Dakota.

Natural Resources Canada recognizes the significant value offered by membership of the PCOR Partnership and will look to support this EERC initiative through collaboration, knowledge transfer and attendance at meetings, subject to an award from DOE.

We look forward to continue working closely with the EERC and other members of the PCOR Partnership in the near future.

Sincerely,

Dean Haslip, Ph.D.
Director General, CanmetENRERGY- Ottawa
Natural Resources Canada

Canada

ptrc
Petroleum Technology Research Centre
220 - 6 Research Drive
Regina, Saskatchewan
Canada, S4S 7J7
Tel: 306-787-8290
Fax: 306-798-0408
www.ptrc.ca

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Petroleum Technology Research Centre (PTRC) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Petroleum Technology Research Centre (PTRC) has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Petroleum Technology Research Centre (PTRC), therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, potential sharing of data and attendance at meetings, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Dan MacLean
President and CEO
Petroleum Technology Research Centre (PTRC)
220-6 Research Drive
Regina, SK
S4S 7J7
Canada
dan.maclean@ptrc.ca

Saskatchewan

Ministry of Energy and Resources
1000, 2103 11th Avenue
Regina, SK Canada S4P 3Z8

May 31, 2019

Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
GRAND FORKS ND
United States of America 58202-9018

Dear Charles D. Gorecki:

RE: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

The Ministry of Energy and Resources, Government of Saskatchewan, is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. The Ministry of Energy and Resources has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The Ministry of Energy and Resources therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, knowledge transfer and attendance at meetings, subject to an award from DOE.

...2

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Cullen Stewart
Executive Director, Energy Policy

cc: Howard Loseth, Director, Energy and Resources

www.ae2s.com

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

AE2S is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. AE2S certainly appreciates the collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

AE2S, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Brett Jochim
Chief Executive Officer
AE2S Affiliated Companies (Advanced Elements, Inc.)

Advanced Engineering and Environmental Services, Inc.
1815 Schafer Street Suite 301 • Bismarck, ND 58501 • (t) 701-221-0530 • (f) 701-221-0531

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
T 610-481-4911
www.airproducts.com

May 22, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Air Products and Chemicals, Inc. is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Air Products and Chemicals, Inc. has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Air Products and Chemicals, Inc., therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of $15,000 per year for 5 years, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Dr. Geoffrey Achilles
Director, Process Gas Technology
Air Products and Chemicals, Inc.

ACT

Alan R. Hodnik
Chairman and
Chief Executive Officer

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

ALLETE is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. ALLETE has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

ALLETE, therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of either $50,000 up-front for 5 years, for the four member companies (ALLETE, ALLETE Clean Energy, BNI Energy and Minnesota Power) to join the PCOR Initiative, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Alan R. Hodnik
Chairman and Chief Executive Officer

30 West Superior Street | Duluth, Minnesota 55802-2093 | 218.355.3642 | ahodnik@allete.com

ALLETE clean energy 30 West Superior Street, Suite 200 Duluth, Minnesota 55802-2093 218.355.3232 | www.alletecleanenergy.com

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

ALLETE Clean Energy (ACE) is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. ACE has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

ACE, therefore, recognizes the significant value offered by membership in the PCOR Partnership, and as an ALLETE company, is pleased to support this new initiative. ALLETE is committed to providing cash cost share in the amount of $50,000 up-front for 5 years for the four member companies (ALLETE, ACE, BNI Energy and Minnesota Power) to join the PCOR Initiative, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Allan S. Rudeck, Jr.
President
ALLETE Clean Energy

BALLANTYNE
OIL • LLC

P.O. Box 167 • Bottineau, ND 58318 • 701-228-3011

May 28, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Ballantyne Oil, LLC is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Ballantyne Oil, LLC has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Ballantyne Oil, LLC, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support or a cash contribution, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Allen Boettcher
President
Ballantyne Oil, LLC

BASIN ELECTRIC POWER COOPERATIVE
A Touchstone Energy® Cooperative

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Basin Electric Power Cooperative (Basin Electric) is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing technically and economically feasible CCUS. Basin Electric has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Basin Electric, therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of $50,000 for a 5 year membership, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Paul Sukut
CEO & General Manager
Basin Electric Power Cooperative

1717 East Interstate Avenue | Bismarck, ND 58503 | 701.223.0441 | Fax 701.557.5336 | basinelectric.com

BNI energy

AN ALLETE COMPANY

WADE BOESHANS
President and General Manager

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

BNI Energy Inc. is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. BNI Energy has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

BNI Energy, Inc., therefore, recognizes the significant value offered by membership in the PCOR Partnership, and as an ALLETE company, is pleased to support this new initiative. ALLETE is committed to providing cash cost share in the amount of $50,000 up-front for 5 years for the four member companies (ALLETE, ALLETE Clean Energy, BNI Energy and Minnesota Power) to join the PCOR Initiative, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Wade Boeshans
President and General Manager
BNI Energy, Ltd.

Barry Freifeld
Class VI Solutions, Inc.
711 Jean St
Oakland CA 94610

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Class VI Solutions, Inc., is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Class VI Solutions has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Class VI Solutions, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Barry Freifeld, PhD
President

CLEARPATH

May 28, 2019

Mr. John Harju
Energy and Environmental Research Center
jharju@undeerc.org
15 North 23rd Street
Grand Forks, ND 58202-9018

RE: Energy and Environmental Research Center's Plains CO2 Reduction Partnership proposal (DOE/NETL FOA-2000)

Dear Mr. Harju:

ClearPath is pleased to offer this letter of support for the Plains CO_2 Reduction Partnership (PCOR) Partnership Initiative to Accelerate CCUS Deployment. ClearPath is a 501(c)3 nonprofit organization that focuses on ways to accelerate clean energy innovation with a particular focus on carbon capture, nuclear and other dispatchable technologies. To advance that mission, we develop policy and collaborate with experts in academics and industry. In the past, the technical expertise and the on-the-ground experience of the PCOR partners have proven invaluable.

For nearly two decades, PCOR has been a global leader in carbon storage technologies and projects. Building on this wealth of experience and the robust regional support for carbon capture and storage technologies within the upper Midwest and Mountain regions, PCOR is strongly positioned for impact during the next iteration of the Department of Energy's regional partnerships. Since the recent expansion of the section 45Q tax credit, a concentration of announced and underdevelopment projects have emerged in the PCOR region. This organic interest will facilitate more complementary infrastructure, enabling regional policies and public familiarity with the technology – all critical factors for developing carbon capture and storage projects at scale. A continued DOE partnership will accelerate momentum for commercial projects.

We look forward to continued collaboration with the PCOR partners as we work toward our shared goal of developing more clean and affordable energy.

Sincerely,

Rich Powell
Executive Director
ClearPath, Inc.
Email: powell@clearpath.org

COMPUTER MODELLING GROUP INC.
Paragon Center One, 450 Gears Road, Suite 600 Houston, Texas, USA 77067
Tel: +1.281.872.8500
cmgl@cmgl.ca ▪ www.cmgl.ca

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Computer Modelling Group, Inc. is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Computer Modelling Group, Inc. has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Computer Modelling Group, Inc., therefore, recognizes the value of this new initiative to the CCUS industry, and will enthusiastically support the EERC and the rest of the project team through collaboration and attendance at meetings.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

James C. Erdle

James Erdle
Vice President, USA and Latin America
Computer Modelling Group, Inc.

DAKOTA GASIFICATION COMPANY
A BASIN ELECTRIC POWER COOPERATIVE SUBSIDIARY
SYNFUELS

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dakota Gasification Company is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing technically and economically feasible CCUS. Dakota Gasification Company has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Dakota Gasification Company, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support and participation in the cash cost share through Basin Electric Cooperative, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

FOR DAVE SAUER

Dave Sauer
Sr. Vice President and Chief Operating Officer
Dakota Gasification Company

May 28, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Delft Inversion is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Delft Inversion has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Delft Inversion, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Name Panos Doulgeris
Job Title Business Developer
Delft Inversion

Denbury

May 23, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Denbury Resources Inc. (Denbury) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional transport and storage challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR region of the United States and Canada, is very much aligned with our interests in developing CCUS. The PCOR Partnership Phase III large-scale field project was located at our Bell Creek enhanced oil recovery (EOR) operation in southeast Montana. During the course of this research project, the EERC successfully assessed and monitored over 5 million tons of associated CO_2 storage, incidental to our EOR operations. The research project provided an important contribution to our understanding of the oil field and management of the EOR operations, and Denbury benefited greatly from knowledge sharing and collaboration opportunities through membership of the PCOR Partnership.

Denbury enthusiastically supports this initiative through collaboration, potential provision of data, access to field sites, and in-kind support throughout our operations in Wyoming, Montana, and North Dakota, subject to a DOE award.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Matthew W. Dahan
Senior Vice President – Business Development and Technology
Denbury Resources, Inc.

Eagle
Operating Inc.

Office: 701-837-4780
Fax: 701-837-4820

May 29th, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Harju:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Eagle Operating, Inc. is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Eagle Operating, Inc. has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Eagle Operating, Inc., therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support or a cash contribution, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Robert Mau
President
Eagle Operating, Inc.

ES XPLORE

ES Xplore, LLC
1807 Ross Avenue, Suite 490
Dallas, Texas 75201
214-295-5111

May 28, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

ES Xplore is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. As a new geophysical technology imaging company, ES Xplore has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC. As well, ES Xplore continues the desire to team up and engage with EERC as they investigate other potential development programs here in the US.

ES Xplore, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Jim White, President
ES Xplore, LLC

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Equinor is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Equinor has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Hang Nguyen
Bakken Asset Manager
Global Unconventionals
Equinor

GE Research

Loucas Tsakalakos, Ph.D.
Business Program Manager – O&G

Product Mgmt. Science & Innovation Adoption
General Electric Company
One Research Circle, K1-5A27A
Niskayuna, NY 12309
Tel: (518) 387-5715
FAX: (518) 387-6030
Electronic mail: tsakalakos@ge.com

May 31, 2019

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

GE Research is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing new technologies in the CCUS space. GE Research has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

GE Research, therefore, recognizes the significant value offered by membership of the PCOR Partnership, and should this project be awarded by DOE will enter into discussions with the EERC towards support of this new initiative with potential provision of in-kind support or a cash contribution, subject to internal GE approval for such a membership.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Loucas Tsakalakos

GREAT RIVER ENERGY™

12300 Elm Creek Boulevard
Maple Grove, Minnesota 55369-4718
763-445-5000
greatriverenergy.com

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Great River Energy recognizes the significant advancements that the Energy & Environmental Research Center's (EERC's) Plains CO_2 Reduction (PCOR) Partnership has brought to the challenges of reducing greenhouse gas emissions in the United States. Yet, there is still work to be done. To that end Great River Energy supports EERC's proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment" and requests DOE's support too.

Great River Energy has been a participant in EERC's PCOR Partnership from its inception and has found value in its work products and the cross-sector collaboration afforded by the Partnership. The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS in North Dakota.

Given the historic value of the PCOR Partnership and the expected value from extending the PCOR Partnership, Great River Energy will look to support this new initiative with provision of in-kind support or a cash contribution, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

GREAT RIVER ENERGY

Jon Brekke

Jon Brekke
Vice President and Chief Power Supply Officer

5/31/2019 S:\Power Supply\Executive Assistant Files\Jon Brekke\053119 Charles Gorecki.Docx

GROUNDMETRICS

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

GroundMetrics is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. GroundMetrics has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

GroundMetrics, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Jeffrey W. Symington
Chief Operating Officer

Tel: (619) 786-8023 3954 Murphy Canyon Rd, Suite D207, San Diego, CA 92123 www.GROUNDMETRICS.com

MTR
MEMBRANE
TECHNOLOGY & RESEARCH

May 24, 2019

Dr. Erin Phillips
Research Scientist
Center for Economic Geology Research
School of Energy Resources
University of Wyoming
Energy Innovation Center, Room 307
Department 4902
1000 E. University Ave.
Laramie, WY 82071-2000

Re: Letter of Commitment in Support of the University of Wyoming Center for Economic Geology Research's Application for a partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000)

Dear Dr. Phillips:

The purpose of this letter is to confirm our support for your partnership role in the Plains CO_2 Reduction (PCOR) Partnership Initiative to Accelerate CCUS Deployment, which is led by the Energy and Environmental Research Center in Grand Forks, North Dakota. This proposal is in response to the U.S. Department of Energy's Regional Initiative to Accelerate CCUS Deployment (DE-FOA-0002000). The State of Wyoming is keenly interested in carbon capture, utilization, and storage (CCUS) technologies, projects, and policies. The PCOR partnership will allow Wyoming to join with other experienced entities to develop a regional infrastructure for the advancement of CCUS projects.

Wyoming's geology supports CCUS, and the State's numerous enhanced oil recovery operations (CO_2-EOR) are amendable to incidental CO_2 storage while oil production occurs.

The State of Wyoming is also a leader in CCUS policy and projects, including:

- Nearly a decade ago, the State of Wyoming was one of the first states to enact a comprehensive suite of laws governing CCUS projects, including pore space rights.

- Several years ago, the U.S. Bureau of Land Management, the State of Wyoming Legislature and State agencies such as the Department of Environmental Quality, the State Engineer's Office, the Oil and Gas Conservation Commission, the Office of State Lands and Investments, the State Geological Survey and the University of Wyoming's Carbon Management Institute (now Center for Economic Geology Research) led the

development of the Wyoming Carbon Underground Storage Project at the Rock Springs Uplift. The Rock Springs Uplift remains one of the better characterized deep saline CO_2 storage sites in the United States.

- In 2014 Wyoming allocated $15 million in funding for the design, construction and operation of an Integrated Test Center (ITC), which has been constructed at Basin Electric Power Cooperative's coal-based Dry Fork Station near Gillette. Another $5 million pledge came from the Tri-State Generation and Transmission Association in addition to $1 million pledged from the National Rural Electric Cooperation Association. The ITC provides space for researchers to develop economically viable uses for CO_2 emissions using 20 MW of coal-based flue gas. The NRG COSIA Carbon XPRIZE – a global competition to develop breakthrough technologies that will convert CO_2 emissions from power plants and industrial facilities into value products such as building materials – will be hosted at the ITC.

- The Center for Economic Geology Research at the University of Wyoming is currently carrying out Phase II (feasibility) studies for the DOE funded CarbonSAFE program near the Dry Fork Station outside of Gillette. A stratigraphic test well was drilled in spring 2019 and data gathered from this well are providing valuable information about the geologic characteristics of the subsurface and how much CO_2 could safely be stored at this locality. A 3D seismic survey later this year will further reduce uncertainties in our understanding of the subsurface in this area. Previously, Phase I (pre-feasibility) projects were completed under the CarbonSAFE program at both the Dry Fork and the Rock Springs Uplift study sites.

- The State of Wyoming has supported applied research in a wide variety of clean coal and related carbon management technologies at the University of Wyoming.

- The State of Wyoming remains one of the only states to possess CO_2 pipeline infrastructure. The State of Wyoming continues to advance the Wyoming Pipeline Corridor Initiative, which is a proposed pipeline network designed to connect sources of CO_2 to existing oil fields that are suitable for CO_2-EOR.

The PCOR partnership initiative is a critical next phase in advancing the State of Wyoming's interests in CCUS. The PCOR partnership will benefit from the State of Wyoming's prior CCUS investments, including the Gillette based CarbonSAFE project and significant work that Wyoming has already done on CO_2 pipelines.

Sincerely,

Brice C. Freeman

Minnkota Power
COOPERATIVE
A Touchstone Energy® Cooperative

5301 32nd Ave S
Grand Forks, ND 58201-3312
Phone 701.795.4000
www.minnkota.com

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Minnkota Power Cooperative, Inc. is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Minnkota Power Cooperative, Inc. has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Minnkota Power Cooperative, Inc., therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of either $50,000 up-front or $15,000 per year for 5 years, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Stacey Dahl

Stacey Dahl
Senior Manager of External Affairs
Minnkota Power Cooperative, Inc.

Nebraska Public Power District
Always there when you need us

JOHN H. SWANSON
Generation Strategies Manager
Phone: 402-465-3517
FAX: 402-465-3505
E-Mail Address: jhswans@nppd.com

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Nebraska Public Power District (NPPD), is pleased to support the Energy & Environmental Research Center's (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of this proposal is to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR region of the United States and Canada. This is very much aligned with our interests in developing CCUS as NPPD has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

NPPD recognizes the significant value offered by membership of the PCOR Partnership and will support this new initiative through collaboration, knowledge transfer, and attendance at meetings, subject to an award from the DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

John Swanson
Generation Strategies Manager

cc: T. Kent J. Meacham B. Nitsch
A. Dostal R. Estrada

NEXTSTREAM™

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Nextstream CO2 LLC is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Nextstream CO2 LLC has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Nextstream CO2 LLC, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support or a cash contribution, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Phil DiPietro
CHIEF TECHNOLOGY OFFICER
NextStream CO2 LLC
300 N.E. 9th Street
Oklahoma City, Oklahoma 73104

NORTH AMERICAN COAL CORPORATION

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Re: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

The North American Coal Corporation is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. The North American Coal Corporation has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

The North American Coal Corporation, therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of either $50,000 up-front or $15,000 per year for 5 years, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

The North American Coal Corporation

David Straley
Director, Government and Public Affairs

Nuverra
Environmental Solutions™

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Nuverra Environmental Solutions is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Nuverra Environmental Solutions has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Nuverra Environmental Solutions, therefore, recognizes the significant value of the proposed initiative and support this new initiative through collaboration on specific activities as appropriate, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Robert Fox
President/COO
Nuverra Environmental Solutions

Dickinson District

11108 32nd Street SW
Dickinson, ND 58601

T: 701.483.5971
F: 701.483.5973

We put our energy behind sustainability.™

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your energy partner®

OPPD

Omaha Public Power District

May 24, 2019
19-EA-170

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Omaha Public Power District (OPPD), is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR region of the United States and Canada, is very much aligned with our interests in developing CCUS. OPPD has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

OPPD therefore recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, knowledge transfer and attendance at meetings, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Russ Baker
Director, Environmental & Regulatory Affairs Division
Omaha Public Power District

Cc:
Lisa Olson
Mary Fisher
Scott Eidem
Bob Holmes

215 South Cascade Street
PO Box 496
Fergus Falls, Minnesota 56538-0496
218 739-8200
www.otpco.com

May 24, 2019

OTTER TAIL POWER COMPANY

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

Otter Tail Power Company is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is aligned with our interests in developing CCUS. Otter Tail Power Company has benefitted from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Otter Tail Power Company, therefore, recognizes the significant value offered by membership of the PCOR Partnership. We look forward to this opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Mark Thoma
Manager, Environmental Services

May 26, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Outsource Petrophysics, Inc. is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Outsource Petrophysics, Inc. has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Outsource Petrophysics, Inc., therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Eric Pasternack
President and Chief Petrophysicist
Outsource Petrophysics, Inc.

Peabody

May 29, 2019

Mr. John Harju
Vice President for Strategic Partnerships
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Peabody Letter of Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Harju:

Peabody applauds the U.S. Department of Energy for continuing its world-class research programs on carbon capture, use and storage under DE-FOA-0002000. Therefore, we are writing in support of the application for the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with Peabody's support for advanced coal technologies, including carbon capture, use and storage.

As the leading global pure-play coal company, with considerable reserves and operations in the U.S. Peabody is particularly interested in the advancement of advanced coal technologies.

We look forward to the results of the program run by EERC, should it be funded.

Sincerely,

Holly Krutka

Holly Krutka, PhD
Vice President, Coal Generation and Emissions Technologies
Peabody

Prairie Public Broadcasting, Inc.
Television
Radio
Education Services
Enterprises

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Prairie Public Broadcasting is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Prairie Public has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Prairie Public, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative with provision of in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

John E. Harris III
President & CEO
Prairie Public Broadcasting, Inc.

Corporate Offices
207 North 5th Street
PO Box 3240
Fargo ND 58108-3240
701-241-6900 800-359-6900
701-239-7650 Fax

Bismarck Office
1814 North 15th Street
Bismarck ND 58501
701-224-1700
701-224-0555 Fax

Prairie Public, Manitoba
PO Box 2640
Winnipeg MB R3C 4B3

www.prairiepublic.org
info@prairiepublic.org

RED TRAIL ENERGY, LLC

"Our Farms, Our Fuel, Our Future"

PO Box 11 Richardton, ND 58652 (701)-974-3308 FAX (701)-974-3309

May 9, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Red Trail Energy, LLC is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Red Trail Energy, LLC has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Red Trail Energy, LLC, therefore, recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of either $50,000 up-front or $15,000 per year for 5 years, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Gerald Bachmeier
CEO
Red Trail Energy, LLC

SaskPower

2025 Victoria Avenue
Regina, SK., S4P 0S1
Phone: (306) 566-3183
dholderness@saskpower.com

May 24th, 2019

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

Delivered via Email

Attention: Charles D. Gorecki, Director of Subsurface R&D

Re: Support for EERC Proposal 2019-0147

Dear Mr. Gorecki:

Regarding Energy & Environmental Research Center (EERC) Proposal 2019-0147 in response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000, SaskPower is pleased to support the EERC proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. SaskPower has benefited greatly from knowledge gained and collaborative opportunities through the existing PCOR Partnership and related research programs at the EERC.

SaskPower enthusiastically supports this initiative through collaboration, attendance at meetings and potential provision of data and in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Darcy Holderness
Manager, Technical Services
SaskPower

Wayne Rowe
Schlumberger Technology Corporation
1875 Lawrence St. Suite 810
Denver, CO 80202 USA

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Schlumberger is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. Schlumberger has benefitted greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

Schlumberger, therefore, recognizes the significant value offered by membership of the PCOR Partnership and will look to support this new initiative through collaboration, attendance at meetings, and consideration of in-kind support, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Wayne Rowe

Business Development Manager – Low Carbon Projects

Schlumberger 303-244-8234 (O) | 303.594.1219 (M)

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

SOG Resources (SOG) is pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

SOG is currently a proud partner with the EERC to develop and host a Williston Basin Associated CO_2 Storage Field Lab. SOG operates the South Central Cut Bank oil field in Montana and is planning a pilot-scale CO_2 injection test. Thus, the goal of the subject proposal to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage), is very much aligned with our interests. The EERC's portfolio of CCUS research provides important contributions to geologic characterization, reservoir surveillance, and management of EOR operations, and SOG would benefit greatly from knowledge sharing and collaboration opportunities through the proposed PCOR Initiative.

SOG recognizes the significant value offered by membership in the PCOR Partnership and will look to support this new initiative with provision of in-kind support (e.g., collaboration, field data, and access to field sites) and/or a paid membership, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Lee Hightower
President
SOG Resources

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
HEADQUARTERS: P.O. BOX 33695 DENVER, COLORADO 80233-0695 303-452-6111

Date: May 29th, 2019

To: Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

On behalf of Tri-State Generation & Transmission Association Inc., I am pleased to provide this letter of support for Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

Tri-State G&T Association, Inc. is a not-for-profit wholesale electric supplier owned by the 43 electric cooperatives that it serves in the states of Colorado, Nebraska, New Mexico and Wyoming. Tri-State's mission is to provide its member owners a reliable, cost-based supply of electricity while maintaining a sound financial position through effective use of human, capital and physical resources in accordance with cooperative principles. Tri-State serves over 1.5 million customers every day.

The PCOR Partnership efforts to identify and address onshore regional storage and transport challenges for commercial deployment of CCUS (carbon capture, utilization, and storage) in certain parts in continental United States and Canada is of interest to Tri-State.

Tri-State Generation and Transmission Association, Inc. will support this new PCOR initiative with provision of in-kind support, subject to an award from DOE.

We look forward to continue working closely with the EERC and other members of the PCOR Partnership and wish you success in your pursuit of funding from the U.S. Department of Energy.

Sincerely,

Ellen C. Connor
Senior Vice President Organizational Services and Chief Technology Officer
Tri-State Generation and Transmission Association, Inc.

WBI ENERGY
An MDU Resources Group company

WBI ENERGY, INC.
1250 West Century Avenue
Mailing Address:
PO Box 5601
Bismarck, ND 58506-5601
(701) 530-1500
www.wbienergy.com

May 3, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

WBI Energy, Inc. (WBI Energy) is pleased to support the Energy & Environmental Research Center's (EERC's) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

The goal of the proposal, to identify and address onshore regional storage and transportation challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is very much aligned with our interests in developing CCUS. WBI Energy has benefited greatly from knowledge gained and collaborative opportunities available through the existing PCOR Partnership and related research programs at the EERC.

WBI Energy recognizes the significant value offered by membership in the PCOR Partnership and is pleased to support this new initiative with cash cost share in the amount of either $50,000 up-front or $15,000 per year for five years, subject to an award from DOE.

We look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Partnership.

Sincerely,

Mark D. Anderson

Mark D. Anderson
Director of Marketing and Business Development
WBI Energy, Inc.

May 16, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment". Having served on the Technical Advisory Board (TAB) for the previous Phase III effort of the PCOR Partnership, I am also willing to be a member of the TAB for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Stefan Bachu
Distinguished Scientist
Innotech Alberta

Minnkota Power
COOPERATIVE
A Touchstone Energy® Cooperative

5301 32nd Ave S
Grand Forks, ND 58201-3312
Phone 701.795.4000
www.minnkota.com

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment." Having worked closely with the EERC on the previous Phase III effort of the PCOR Partnership, I am pleased to support their proposal to this FOA. I am also willing to be a member of the Technical Advisory Board for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to work closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Stacey Dahl

Stacey Dahl
Senior Manager of External Affairs
Minnkota Power Cooperative, Inc.

COMPUTER MODELLING GROUP INC.
Paragon Center One, 450 Gears Road, Suite 600 Houston, Texas, USA 77067
Tel: +1.281.872.8500
cmgl@cmgl.ca ▪ www.cmgl.ca

May 29, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment." Having served on the Technical Advisory Board (TAB) for the previous Phase III effort of the PCOR Partnership, I am also willing to be a member of the TAB for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

James C. Erdle

James Erdle
Vice President, USA and Latin America
Computer Modelling Group, Inc.

Department of Mineral Resources

Lynn D. Helms – Director

North Dakota Industrial Commission
www.dmr.nd.gov

May 30, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment."

Having served on the Technical Advisory Board (TAB) for the previous Phase III effort of the PCOR Partnership, I am also willing to be a member of the TAB for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Lynn D Helms

Lynn Helms
Director
701.328.8020 • lhelms@nd.gov • www.dmr.nd.gov

NORTH Dakota | Mineral Resources
Be Legendary.

701.328-8020 • oilandgasinfo@nd.gov • www.dmr.nd.gov • 600 E Boulevard Ave, Dept. 405 • Bismarck, ND 58505

Lignite Energy Council
LEADING THROUGH ADVOCACY AND INNOVATION

May 31, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Initiative to Accelerate CCUS Deployment." Having served on the Technical Advisory Board (TAB) during the previous Phase III effort of the PCOR Partnership, I am also willing to be a member of the TAB for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Michael Holmes
Vice President – Research & Development

1016 E. Owens Ave. | PO Box 2277 | Bismarck, ND 58502

701.258.7117 www.lignite.com LEC@lignite.com

Melzer Consulting

Phone: (432) 682-7664

P.O. Box 2083
Midland, Texas 79702-2083

Fax: (432) 682-9955
email: melzerls@aol.com

May 24, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

Dear Mr. Gorecki:

I am pleased to offer my support the Energy & Environmental Research Center (EERC) proposed project entitled “PCOR Partnership Initiative to Accelerate CCUS Deployment.” Having served on the Technical Advisory Board (TAB) for the previous Phase II and III efforts of the PCOR Partnership, I would also entertain an invitation to be a member of the TAB for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, is a vital one and can make a critical contribution to CCUS deployment in the region. I look forward to this exciting opportunity to assist the DOE with their initiatives and to continue working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

L. Stephen Melzer
Managing Principal
Melzer Consulting

SHELL CANADA LIMITED
400 - 4th Ave
P.O. Box 100, Station M
Calgary, Alberta
Canada T2P 2H5

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

May 2019

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment." I am also willing to be a member of the Technical Advisory Board for the proposed PCOR Initiative, subject to an award from DOE and formal approval from my employer, Shell Canada Energy.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to working closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Simon O'Brien
QUEST Storage Manager
Shell Canada Limited

Denbury

May 23, 2019

Mr. Charles D. Gorecki
Director of Subsurface R&D
Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Mr. Gorecki:

Subject: Support for EERC Proposal 2019-0147 in Response to U.S. Department of Energy (DOE) Funding Opportunity Announcement No. DE-FOA-0002000

I am pleased to support the Energy & Environmental Research Center (EERC) proposed project entitled "PCOR Partnership Initiative to Accelerate CCUS Deployment." Having worked closely with the EERC on the previous Phase III effort of the PCOR Partnership, specifically at the Bell Creek oil field in Montana, I am pleased to support their proposal to this FOA. I am also willing to be a member of the Technical Advisory Board for the proposed PCOR Initiative, subject to an award from DOE.

The goal of the proposal, to identify and address onshore regional storage and transport challenges facing commercial deployment of CCUS (carbon capture, utilization, and storage) in the newly defined PCOR Partnership region of the United States and Canada, can make a vital contribution to CCUS deployment in the region. I look forward to this exciting opportunity to work closely with the EERC and other members of the PCOR Initiative.

Sincerely,

Kate Ryan
Director of Reservoir Engineering
Denbury Resources Inc.

APPENDIX B

RESUMES OF KEY PERSONNEL

NEIL WILDGUST
Assistant Director for Geoscience and Engineering
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5193 (phone), 701.777.5181 (fax), nwildgust@undeerc.org

Principal Areas of Expertise
Mr. Wildgust's principal areas of interest and expertise include carbon capture, utilization, and storage (CCUS); enhanced oil recovery (EOR); and project management. In addition, he has 25 years of industrial experience in mining, land contamination, and hydrogeology.

Qualifications
MSc., Applied Geology, Cardiff University, Wales, United Kingdom.
BSc., Geology, University of Southampton, Southampton, United Kingdom.
Chartered Geologist (CGeol), United Kingdom.

Professional Experience
July 2018–Present: Assistant Director for Geoscience and Engineering, EERC, UND.

September 2016–July 2018: Principal CCS Scientist, EERC, UND. Mr. Wildgust leads CO_2 storage projects and risk assessment activities related to CO_2 storage and EOR projects, working with team members to prepare and lead proposals and develop and manage project scopes of work, objectives, personnel, and budgets.

2014–2016: Principal Manager – Storage, Global CCS Institute, Chevy Chase, Maryland. Mr. Wildgust served as the global lead for storage work and the country lead for Canada.

2011–2014: Chief Project Officer, Petroleum Technology Research Centre (PTRC), Regina, Saskatchewan, Canada. Mr. Wildgust managed the final stage of the Weyburn research program, successfully publishing a best practices manual and *International Journal of Greenhouse Gas Control* supplement with 24 peer-reviewed papers. He served as acting CEO in 2013 and successfully negotiated a multimillion-dollar deal with SaskPower for provision of services at the Aquistore project. In addition, Mr. Wildgust managed the heavy oil EOR research program at PTRC.

2008–2011: Manager – Geological Storage, IEA Greenhouse Gas R&D Programme, Cheltenham, United Kingdom. Mr. Wildgust managed the storage research program and networks.

Publications and Presentations
Has authored or coauthored numerous professional publications.

CHARLES D. GORECKI
CEO
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
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Principal Areas of Expertise
Mr. Gorecki's principal areas of interest and expertise include carbon capture, storage, and utilization; enhanced oil recovery (EOR); unconventional oil and gas research; oil and gas industry technologies; clean coal technologies; and energy and water sustainability.

Qualifications
B.S., Geological Engineering, University of North Dakota, 2007.

Professional Experience
August 2019–Present: CEO, EERC, UND. Mr. Gorecki leads a multidisciplinary science, engineering, and support team of 220 people who focus on research and development (R&D) leading to demonstration and commercialization of innovative energy and environmental technologies. The EERC, with its long tradition of fossil fuel-related R&D, has broadened its scope to include a wide array of strategic energy and environmental issues. Mr. Gorecki oversees efforts to address these issues through strategic initiatives focused on clean coal technologies; oil and gas industry technologies; carbon capture, utilization, and storage (CCUS); energy and water sustainability; air toxics and fine particulate control; water management strategies; global climate change; waste utilization, hydrogen technologies; and contaminant cleanup.

2015–July 2019: Director of Subsurface R&D, EERC, UND. Mr. Gorecki was responsible for developing and managing programs and projects focused on conventional, unconventional, and enhanced oil and gas production; geologic storage of CO_2; geothermal; and other energy and environmental research. In this role, he served as Program Manager for the Plains CO_2 Reduction (PCOR) Partnership and the Bakken Production Optimization Program, two major collaborative industry–government programs. Mr. Gorecki also managed or oversaw projects related to the entire CCUS value chain and conventional and unconventional oil and gas recovery.

2011–2015: Senior Research Manager, EERC, UND. Mr. Gorecki was manager of the PCOR Partnership and technical lead for the Bell Creek CO_2 EOR field demonstration. He led geologic modeling and simulation efforts for the EERC as well as national and international efforts associated with the nexus of water and CCS. Mr. Gorecki led efforts focused on developing storage capacity estimates and methodologies for deep saline formations (DSFs) and hydrocarbon reservoirs. In addition, he led and worked on detailed site characterization, modeling, risk assessment, and monitoring activities for both EOR projects and CO_2 storage operations in DSFs. Mr. Gorecki participated in several expert review committees and was involved in developing a methodology for estimating CO_2 storage capacity in DSFs, oil and gas reservoirs, and shale formations for the U.S. Department of Energy (DOE).

2010–2011: Research Manager, EERC, UND. Mr. Gorecki led modeling and monitoring and Water Working Group tasks for Phase III of the PCOR Partnership Program. He led the EERC's geologic modeling efforts, coordinating a multidisciplinary team to develop detailed geologic models and run

predictive simulations for CO_2 storage, CO_2 EOR, and unconventional oil and gas plays. Mr. Gorecki was also the facilitator of the RCSP Water Working Group, where he led discussion on the nexus of water and CCS.

2007–2010: Research Engineer, EERC, UND. Mr. Gorecki worked with the PCOR Partnership to develop models to describe the behavior of CO_2 prior to injection into saline formations and oil fields. He led a joint venture funded by the IEA Greenhouse Gas R&D Programme and DOE to develop storage capacity/resource coefficients to determine CO_2 storage capacity/resource estimates in saline formations. As a result of this work, he served on the expert review panel for the U.S. Geological Survey's CO_2 Capacity Methodology; advised and helped to develop methodologies for the North American Energy Working Group's CO_2 storage capacity efforts between the United States, Canada, and Mexico; and advised the DOE National Energy Technology Laboratory on the third edition of the Carbon Sequestration Atlas of the United States and Canada.

Professional Memberships
American Association of Petroleum Geologists, 2009–Present
Society of Petroleum Engineers, 2007–Present
Member of European Association of Geoscientists and Engineers, 2014–Present

Publications and Presentations
Mr. Gorecki has authored and coauthored numerous papers and given presentations on a variety of topics in the United States and throughout the world.

JOHN A. HARJU
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Principal Areas of Expertise

Mr. Harju's principal areas of interest and expertise include carbon sequestration, enhanced oil recovery, unconventional oil and gas development, waste management, geochemistry, technology development, hydrology, and analytical chemistry, especially as applied to the upstream oil and gas industry.

Qualifications

B.S., Geology, University of North Dakota, 1986. Postgraduate coursework in Management, Economics, Marketing, Education, Climatology, Weathering and Soils, Geochemistry, Geochemical Modeling, Hydrogeochemistry, Hydrogeology, Contaminant Hydrogeology, Advanced Physical Hydrogeology, and Geostatistics.

Professional Experience

2002–Present: EERC, UND.

July 2015–Present: Vice President for Strategic Partnerships. Mr. Harju leads efforts to build and grow dynamic working relationships with industry, government, and research entities globally in support of the EERC's mission to provide practical, pioneering solutions to the world's energy and environmental challenges. He represents the EERC regionally, nationally, and internationally in advancing its core research priorities: coal utilization and emissions, carbon management, oil and gas, alternative fuels and renewable energy, and energy–water.

2003–June 2015: Associate Director for Research. Mr. Harju led a team of scientists and engineers building industry–government–academic partnerships to carry out research, development, demonstration, and commercialization of energy and environmental technologies.

2002–2003: Senior Research Advisor. Mr. Harju developed, marketed, managed, and disseminated research programs focused on the environmental and health effects of power and natural resource production, contaminant cleanup, water management, and analytical techniques.

2017–Present: Adjunct Lecturer, Department of Petroleum Engineering, UND.

1999–2002: Vice President, Crystal Solutions, LLC, Laramie, WY. Mr. Harju's firm was involved in commercial E&P produced water management, regulatory permitting and compliance, and environmental impact monitoring and analysis.

1997–2002: Gas Research Institute (GRI) (now Gas Technology Institute [GTI]), Chicago, IL.

2000–2002: Principal Scientist, Produced Water Management. Mr. Harju developed and deployed produced water management technologies and methodologies for cost-effective and environmentally responsible management of oil and gas produced water.

1998–2000: Program Team Leader, Soil, Water, and Waste. Mr. Harju managed projects and programs related to the development of environmental technologies and informational products related to the North American oil and gas industry; formulated RFPs, reviewed proposals, and formulated contracts; performed technology transfer activities; and supervised staff and contractors. He served as Manager of the Environmentally Acceptable Endpoints project, a multiyear program focused on rigorous determination of appropriate cleanup levels for hydrocarbons and other energy-derived contaminants in soils. He led GRI/GTI involvement with industry environmental consortia and organizations, such as PERF, SPE, AGA, IPEC, and API.

1997–1998: Principal Technology Manager (1997–1998) and Associate Technology Manager (1997), Soil and Water Quality.

1988–1996: EERC, UND.
1994–1996: Senior Research Manager, Oil and Gas Group. Mr. Harju served as:
- Program Manager for assessment of the environmental transport and fate of oil- and gas-derived contaminants, focused on mercury and sweetening and dehydration processes.
- Project Manager for field demonstration of innovative produced water treatment technology using freeze crystallization and evaporation at oil and gas industry site.
- Program Manager for environmental transport and fate assessment of MEA and its degradation compounds at Canadian sour gas-processing site.
- Program Manager for demonstration of unique design for oil and gas surface impoundments.
- Director of the National Mine Land Reclamation Center for the Western Region.
- Co-PI on project exploring feasibility of underground coal gasification in southern Thailand.
- Consultant to an International Atomic Energy Agency program entitled "Solid Wastes and Disposal Methods Associated with Electricity Generation Fuel Chains."

1988–1994: Research Manager (1994), Hydrogeologist (1990–1994), Research Specialist (1989–1990), and Laboratory Technician (1988–1989).

Professional Memberships
National Coal Council (appointed 2018)
National Petroleum Council (appointed 2010)
Mainstream Investors, LLC, Board of Governors (2014–present)
DOE Unconventional Resources Technology Advisory Committee (2012–2014)
Interstate Oil and Gas Compact Commission (appointed 2010)
Rocky Mountain Association of Geologists

Publications and Presentations
Has authored or coauthored more than 100 professional publications and nearly 300 technical presentations.

EDWARD N. STEADMAN
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Principal Areas of Expertise
Mr. Steadman's principal areas of interest and expertise include carbon sequestration, enhanced oil recovery techniques, and chemical transformations during coal combustion.

Qualifications
M.A., Geology, Summa Cum Laude, University of North Dakota, 1985.
B.S., Geology, Cum Laude, State University of Pennsylvania-Edinboro, 1982.

Professional Experience
July 2015–Present: Vice President for Research, EERC, UND. Mr. Steadman oversees the activities of a team of scientists and engineers focused on research, development, demonstration, and commercialization of energy and environmental technologies. Strategic energy and environmental issues include unconventional hydrocarbon production; zero-emission coal utilization; CO_2 capture and sequestration; energy and water sustainability; hydrogen and fuel cells; advanced air emission control technologies, emphasizing SO_x, NO_x, air toxics, fine particulate, and mercury control; renewable energy; wind energy; water management; flood prevention; global climate change; waste utilization; energy efficiency; and contaminant cleanup.

2011–June 2015: Deputy Associate Director for Research, EERC, UND. Mr. Steadman was responsible for developing, managing, and marketing programs and projects focused oil and gas and CO_2 storage, especially as related to EOR. Program areas included the Plains CO_2 Reduction (PCOR) Partnership, one of seven regional partnerships funded by the U.S. Department of Energy's National Energy Technology Laboratory Regional Carbon Sequestration Partnership Program to assess the technical and economic feasibility of capturing and storing (sequestering) CO_2 emissions from stationary sources in the northern Great Plains and adjacent area. His group's work also included projects related to EOR in unconventional reservoirs, especially focused on the Bakken petroleum system. Under these programs, Mr. Steadman managed a multidisciplinary team of researchers.

2003–2011: Senior Research Advisor, EERC, UND. Mr. Steadman's responsibilities included directing a multidisciplinary team of researchers on a carbon sequestration project in which detailed inventories of CO_2 sources, geologic and terrestrial sinks, and sequestration infrastructure were made; CO_2 capture and separation technologies were identified; monitoring, verification, and accounting technologies and permitting requirements were investigated; and the most promising opportunities for carbon sequestration in nine states and four Canadian provinces were defined. Successfully increased sponsor participation in the program. Other responsibilities as Senior Research Advisor included development, marketing, management, and dissemination of market-oriented research; development of programs focused on enhanced oil recovery, the environmental and health effects of power and natural resource production, contaminant cleanup, water management, and analytical techniques; publication and presentation of results; client interactions; and advising EERC staff.

1994–2002: Associate Director for Research, EERC, UND. Mr. Steadman's responsibilities included developing and administering environmental programs involving water management and contamination cleanup and building industry–government–academic teams to carry out research, development, demonstration, and commercialization of environmental products and technologies.

1988–1994: Research Manager, EERC, UND. Mr. Steadman's responsibilities included research project management, coordination of research activities, inorganic analytical methods development, and preparation and presentation of research publications, reports, and proposals.

1987–1988: Instructor, Valley City State University. Mr. Steadman's responsibilities included teaching earth science, physical and historical geology, geomorphology, astronomy, and geography and supervising work-study students.

1986–1987: Research Associate, Energy and Mineral Research Center, UND. Mr. Steadman's responsibilities included conducting research into the chemical and physical mechanisms of coal combustion and the characterization of coal and coal ash, experimental design, and preparation of research publications, reports, and proposals.

1985–1986: Associated Western Universities Postgraduate Fellow. Mr. Steadman's responsibilities included writing research proposals and reports, mine sampling, and chemical analysis of coals and related strata throughout the western United States.

Publications and Presentations
Has authored or coauthored over 160 publications and professional presentations.

ERIN H. PHILLIPS
Research Scientist
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Qualifications
Ph.D., Geology, University of Wyoming, 2017.
M.S., Geology, New Mexico Institute of Mining and Technology, 2004.
B.A., Geology and Geography, Macalester College, 2000.

Professional Experience
2017–Present: Research Scientist, Center for Economic Geology Research, University of Wyoming, Laramie, Wyoming.

2017–2018: Instructor (Introduction to Petrology), University of Wyoming Department of Geology and Geophysics, Laramie, Wyoming.

2006–2011: Research Associate and Instructor, Black Hills State University, Spearfish, South Dakota.

2004–2006: Senior Geologic Laboratory Associate, New Mexico Bureau of Geology and Mineral Resources, Socorro, New Mexico.

Publications and Presentations
Has authored or coauthored numerous publications and presentations.

BRENT J. SHEETS
Director, Petroleum Development Laboratory (PDL)
Institute of Northern Engineering, University of Alaska Fairbanks (UAF)
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Qualifications
B.S., Public Administration (Energy Economics minor), University of North Dakota, 1986.

Professional Experience
2016–Present: Director, PDL, Institute of Northern Engineering, UAF. Recruited to position by Director of Institute of Northern Engineering to assume leadership of PDL in order to facilitate a closer working relationship with Alaska's oil and natural gas industry. Work with several oil companies and federal research labs to make the University's resources and expertise available to industry for purpose of advancing development of conventional and unconventional energy resources in the state.

2011–2016: Deputy Director, Alaska Center for Energy and Power (ACEP), Institute of Northern Engineering, UAF. Represented program at highest levels of University of Alaska system as well as met with research sponsors, industry stakeholders, and members of legislature. Represented Director in her absence and managed day-to-day activities.

2001–2011: Regional Manager, Gs-15, Arctic Energy Office, National Energy Technology Laboratory (NETL), U.S. Department of Energy (DOE), Fairbanks, AK. Identified research needs, designed studies, and managed projects regarding extraction, utilization, conservation, and transportation of Alaska's oil, natural gas, and coal resources. Worked closely with congressional appropriators, DOE program officials, and federal Office of Management and Budget (OMB) to secure funding for our strategic plan. Cultivated relationships with Alaska's oil producers, Alyeska Pipeline, and constituents in environmental community to identify research needs to be addressed by DOE. Many of our research initiatives resulted in partnerships with industry for UAF researchers. Working with UAF to make it more relevant to energy industry was one of the strategic goals of Arctic Energy Office.

1999–2001: Deputy Director, Office of Budget and Financial Management, Office of Fossil Energy (FE), DOE, Washington, DC. Worked closely with Budget Director, FE program offices, and OMB to develop an integrated annual congressional budget request of approximately $875 million, controlled allotment of funds to programs and field sites, maintained all financial data, supervised headquarters procurements, tracked field procurement actions, and was responsible for ensuring sound financial management practices throughout FE. Commensurate with supervising activities of employees who were responsible for day-to-day duties of office, advised Director, Assistant Secretary, Deputy Assistant Secretaries, heads of field elements and other officials about budget and financial issues on an organization-wide basis. Also served as point of contact with DOE's Office of the Controller, OMB, and congressional appropriations staff, prepared internal decision-making materials, wrote testimony, and briefed congressional staff on the President's budget requests.

1998–1999: Director, Office of Business Management and Development, Naval Petroleum and Oil Shale Reserves, DOE, Washington, DC. Responsible for management and overall direction of budgetary planning and execution of $200+ million budget, generating revenues of approximately $400 million annually. Directed and coordinated crude oil, natural gas, and NGL sales contracts; supervised external audit and internal control activities; and maintained oversight of procurement actions for headquarters and two field offices.

1991–1998: Team Leader, SALES, Office of Business Management and Development, Naval Petroleum and Oil Shale Reserves, DOE, Washington, DC. Coordinated marketing and sale of government-owned oil and natural gas, typically over 65,000 barrels of oil per day equivalent, generating revenues of approximately $400 million annually.

Publications and Presentations
Has authored or coauthored numerous publications and presentations.

APPENDIX C

BUDGET NOTES

BUDGET NOTES

ENERGY & ENVIRONMENTAL RESEARCH CENTER (EERC)

BACKGROUND

The EERC is an independently organized multidisciplinary research center within the University of North Dakota (UND). The EERC is funded through federal and nonfederal grants, contracts, and other agreements. Although the EERC is not affiliated with any one academic department, university faculty may participate in a project, depending on the scope of work and expertise required to perform the project.

INTELLECTUAL PROPERTY

The applicable federal intellectual property (IP) regulations will govern any resulting research agreement(s). In the event that IP with the potential to generate revenue to which the EERC is entitled is developed under this project, such IP, including rights, title, interest, and obligations, may be transferred to the EERC Foundation, a separate legal entity.

BUDGET INFORMATION

The proposed work will be done on a cost-reimbursable basis. The distribution of costs between budget categories (labor, travel, supplies, equipment, etc.) and among funding sources of the same scope of work is for planning purposes only. The project manager may incur and allocate allowable project costs among the funding sources for this scope of work in accordance with Office of Management and Budget (OMB) Uniform Guidance 2 CFR 200.

Escalation of labor and EERC recharge center rates is incorporated into the budget when a project's duration extends beyond the university's current fiscal year (July 1 – June 30). Escalation is calculated by prorating an average annual increase over the anticipated life of the project.

The cost of this project is based on a specific start date indicated at the top of the EERC budget. Any delay in the start of this project may result in a budget increase. Budget category descriptions presented below are for informational purposes; some categories may not appear in the budget.

Salaries: Salary estimates are based on the scope of work and prior experience on projects of similar scope. The labor rate used for specifically identified personnel is the current hourly rate for that individual. The labor category rate is the average rate of a personnel group with similar job descriptions. Salary costs incurred are based on direct hourly effort on the project. Faculty who work on this project may be paid an amount over the normal base salary, creating an overload which is subject to limitation in accordance with university policy. As noted in the UND EERC Cost Accounting Standards Board Disclosure Statement, administrative salary and support costs which can be specifically identified to the project are direct-charged and not charged as facilities and administrative (F&A) costs. Costs for general support services such as contracts and IP, accounting, human resources, procurement, and clerical support of these functions are charged as F&A costs.

Fringe Benefits: Fringe benefits consist of two components which are budgeted as a percentage of direct labor. The first component is a fixed percentage approved annually by the UND cognizant audit agency, the Department of Health and Human Services. This portion of the rate covers vacation, holiday, and sick leave (VSL) and is applied to direct labor for permanent staff eligible for VSL benefits. Only the actual approved rate will be charged to the project. The second component is estimated on the basis of historical data and is charged as actual expenses for items such as health, life, and unemployment insurance; social security; worker's compensation; and UND retirement contributions.

Travel: Travel may include site visits, fieldwork, meetings, and conferences. Travel costs are estimated and paid in accordance with OMB Uniform Guidance 2 CFR 200, Section 474, and UND travel policies, which can be found at http://und.edu/finance-operations (Policies & Procedures, A–Z Policy Index, Travel). Daily meal rates are based on U.S. General Services Administration (GSA) rates unless further limited by UND travel policies; other estimates such as airfare, lodging, ground transportation, and miscellaneous costs are based on a

combination of historical costs and current market prices. Miscellaneous travel costs may include parking fees, Internet charges, long-distance phone, copies, faxes, shipping, and postage.

Equipment: If equipment (value of $5000 or more) is budgeted, it is discussed in the text of the proposal and/or identified more specifically in the accompanying budget detail.

Supplies: Supplies include items and materials that are necessary for the research project and can be directly identified to the project. Supply and material estimates are based on prior experience with similar projects. Examples of supply items are chemicals, gases, glassware, nuts, bolts, piping, data storage, paper, memory, software, toner cartridges, maps, sample containers, minor equipment (value less than $5000), signage, safety items, subscriptions, books, and reference materials. General purpose office supplies (pencils, pens, paper clips, staples, Post-it notes, etc.) are included in the F&A cost.

Subrecipient: A contract will be executed with the University of Wyoming to provide specific analysis of carbon capture, utilization, and storage (CCUS) in Wyoming and other states. The cost for this is $502,845.

Subrecipient: A contract will be executed with the University of Alaska to provide specific analysis of CCUS in Alaska. The cost for this is $500,047.

Subcontractor: A contract will be executed with a yet-to-be-determined company to assess the socioeconomic benefits of CCUS projects. The cost for this service is estimated at $60,000 based on previous experience.

Professional Fees: Not applicable.

Communications: Telephone, cell phone, and fax line charges are included in the F&A cost; however, direct project costs may include line charges at remote locations, long-distance telephone charges, postage, and other data or document transportation costs that can be directly identified to a project. Estimated costs are based on prior experience with similar projects.

Printing and Duplicating: Page rates are established annually by the university's duplicating center. Printing and duplicating costs are allocated to the appropriate funding source. Estimated costs are based on prior experience with similar projects.

Food: Expenditures for project partner meetings where the primary purpose is dissemination of technical information may include the cost of food. The project will not be charged for any costs exceeding the applicable GSA meal rate. EERC employees in attendance will not receive per diem reimbursement for meals that are paid by project funds. The estimated cost is based on the number and location of project partner meetings.

Professional Development: Fees are for memberships in technical areas directly related to work on this project. Technical journals and newsletters received as a result of a membership are used throughout the development and execution of the project by the research team.

Operating Fees: Operating fees generally include EERC recharge centers, outside laboratories, and freight.

EERC recharge center rates are established annually and approved by the university.

Laboratory and analytical recharge fees are charged on a per-sample, hourly, or daily rate. Additionally, laboratory analyses may be performed outside the university when necessary. The estimated cost is based on the test protocol required for the scope of work.

Graphics recharge fees are based on an hourly rate for production of such items as report figures, posters, and/or images for presentations, maps, schematics, Web site design, brochures, and photographs. The estimated cost is based on prior experience with similar projects.

Shop and operations recharge fees cover specific expenses related to the pilot plant and the required expertise of individuals who perform related activities. Fees may be incurred in the pilot plant, at remote locations, or in EERC laboratories whenever these particular skills are required. The rate includes such items as specialized

safety training, personal safety items, fall protection harnesses and respirators, CPR certification, annual physicals, protective clothing/eyewear, research by-product disposal, equipment repairs, equipment safety inspections, and labor to direct these activities. The estimated cost is based on the number of hours budgeted for this group of individuals.

Engineering services recharge fees cover specific expenses related to retaining qualified and certified design and engineering personnel. The rate includes training to enhance skill sets and maintain certifications using Webinars and workshops. The rate also includes specialized safety training and related physicals. The estimated cost is based on the number of hours budgeted for this group of individuals.

Software solutions services recharge fees are for development of customized Web sites and interfaces, software applications development, data and financial management systems for comprehensive reporting and predictive analysis tools, and custom integration with existing systems. The estimated cost is based on prior experience with similar projects.

Freight expenditures generally occur for outgoing items and field sample shipments.

Facilities and Administrative Cost: The F&A rate proposed herein is approved by the U.S. Department of Health and Human Services and is applied to modified total direct costs (MTDC). MTDC is defined as total direct costs less individual capital expenditures, such as equipment or software costing $5000 or more with a useful life of greater than 1 year, as well as subawards in excess of the first $25,000 for each award.

Cost Share: DOE will provide $5,000,000 of cash for the current scope. The North Dakota Industrial Commission (NDIC) Lignite Research Program will also provide $500,000, with an additional $1,500,000 for future additional scope. In-kind cost share will be provided in the form of labor for specific analysis of CCUS, with $128,823 provided by the University of Wyoming and another $125,794 by the University of Alaska.