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

March 1, 2024

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

Dear Mr. Haase:

Subject: EERC Proposal No. 2024-0126 Entitled "Regional Electric Vehicle Infrastructure Resiliency (REVIR) Plan"

The Energy & Environmental Research Center (EERC) of the University of North Dakota (UND) is pleased to submit this cost-share funding request to the Renewable Energy Program (REP) for the support of the REVIR plan project. The 2-year project has been selected for award by the U.S Department of Energy with a start date of May 1, 2024. The EERC is committed to completing the project on schedule and within budget should the Commission make the requested grant.

The EERC, a research organization within UND, an institution of higher education within the state of North Dakota, is not a taxable entity; therefore, it has no tax liability.

The $100 application fee (Check No. 2765) for this proposal was sent UPS overnight and was delivered Thursday, February 29, 2024, UPS tracking number 1ZX571891399267934. If you have any questions, please contact me by telephone at (701) 777-5105 or by email at dselvaraj@undeerc.org.

Sincerely,

DocuSigned by:
Daisy Selvaraj
7921E3286EF8479...

Dr. Daisy Selvaraj
Senior Research Engineer, EERC

Approved by:

DocuSigned by:
20499751F2B84D7...

Charles D. Gorecki, CEO
Energy & Environmental Research Center

DS/kl

c: Karen Tyler, North Dakota Industrial Commission

Renewable Energy Program

North Dakota Industrial Commission

Application

Project Title: Regional Electric Vehicle Infrastructure Resilience (REVIR) Plan

Applicant: Energy & Environmental Research Center, University of North Dakota

Principal Investigator: Dr. Daisy Selvaraj

Date of Application: March 1, 2024

Amount of Request: $375,000

Total Amount of Proposed Project: $1,875,000

Duration of Project: 24 Months

Point of Contact (POC): Dr. Daisy Selvaraj

POC Telephone: (701)-777-5105

POC Email: dselvaraj@undeerc.org

POC Address: 15 North 23rd Street, Stop 9018

Grand Forks, ND 58202-9018

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ABSTRACT

As electric vehicle (EV) charging infrastructure grows, resiliency planning will be critical to ensure that communities and energy systems are prepared for disruptive natural and manmade events that could compromise access to charging services. Such planning will foster EV sector growth, catalyze investment to diversify North Dakota's economy, expand use of renewable energy resources, and create renewable energy jobs, wealth, and tax revenues. **Objective:** The Energy & Environmental Research Center (EERC) will lead a consortium of regional stakeholders to develop a Regional Electric Vehicle Infrastructure Resilience (REVIR) plan that has broad support to serve as an actionable, adaptable, and evolving road map to strengthen and maintain secure, reliable, and resilient EV infrastructure in the four-state region (North Dakota, Montana, Minnesota, and South Dakota). **Expected Results:** The REVIR plan will support the North Dakota Industrial Commission (NDIC) Renewable Energy Program's (REP's) mission to promote the growth of North Dakota's vast renewable energy industries through research, development, marketing, and education. The resulting REVIR plan will map the developed networks and working

relationships among stakeholders, communities, and EV interest groups. The proposed work will provide guidance on resilience solutions to enhance the state's EV infrastructure plans as part of the National Electric Vehicle Infrastructure (NEVI) program [1] and other EV programs that can diversify North Dakota's economy, promote its renewable energy resources, and create jobs. **Duration:** 24 months, with an anticipated start date of May 1, 2024. **Total Project Cost:** $1,875,000, with $375,000 from NDIC REP, and $1.5 million from the Joint Office of Energy and Transportation (JOET) within the U.S. Department of Energy (DOE). **Participants:** ND Department of Transportation (DOT), MNDOT, MTDOT, ND Clean Cities, MN Clean Cities Coalition, ND Department of Commerce, ND Department of Emergency Services, MT Department of Environmental Quality, Fargo – Moorhead Metropolitan Council of Governments, Cass County Electric Cooperative, Mountrail–Williams Electric Cooperative, Xcel Energy, ZEF Energy, Connexus Capital LLC, SAGE Development Authority, and Native Sun Community Power Development.

PROJECT DESCRIPTION

The four-state region of Minnesota, Montana, North Dakota, and South Dakota encompasses a unique combination of EV infrastructure resilience challenges including harsh winter climate, extreme weather events, limited rural distribution grid infrastructure, lack of charging infrastructure, and low EV adoption. By leveraging U.S. Department of Energy (DOE) funds and coordinating with ongoing EV charging infrastructure build-out work and programs of the states' DOTs, charging network operators, utilities, planning departments, and community groups, the project team will build a consortium of stakeholders to identify, assess, and devise mitigation strategies to address risks specific to the regional EV charging infrastructure. With the goal of providing practical, achievable, and affordable mitigation strategies, project outcomes will translate to increased charging infrastructure resilience throughout the region. The proposed community benefits plan (CBP) will include sustained engagement with stakeholders, including representatives of tribal nations and disadvantaged communities, to invite participation in actively influencing REVIR plan development.

Objectives. The primary objective of this proposed effort is to provide technical assistance in developing the REVIR plan by 1) facilitating coordination between interstate, intrastate, and community-level working groups and stakeholders to plan for, respond to, and recover from anticipated and unanticipated disruptions to charging infrastructure availability and services; 2) identifying and addressing regional EV charging risks and providing mitigation strategies for ensuring maximum regionwide EV infrastructure reliability, resilience, and security; and 3) providing guidance to communities and stakeholders in preparing for and adapting to technological and socioeconomic developments in transportation electrification and implementing resilience solutions. Developing, nurturing, and strengthening these relationships will be essential to achieve project objectives and will enable effective response to longer-term opportunities and challenges in the energy industry.

Methodology. The project team will accomplish the proposed work by following a project structure that focuses on engagement and dialogue with all stakeholders involved. As depicted in Figure 1, the REVIR plan project is designed to feed and coordinate with other efforts in the region. The task structure is developed to provide consistency with the matching project awarded by the Joint Office of Energy and Transportation within the DOE.

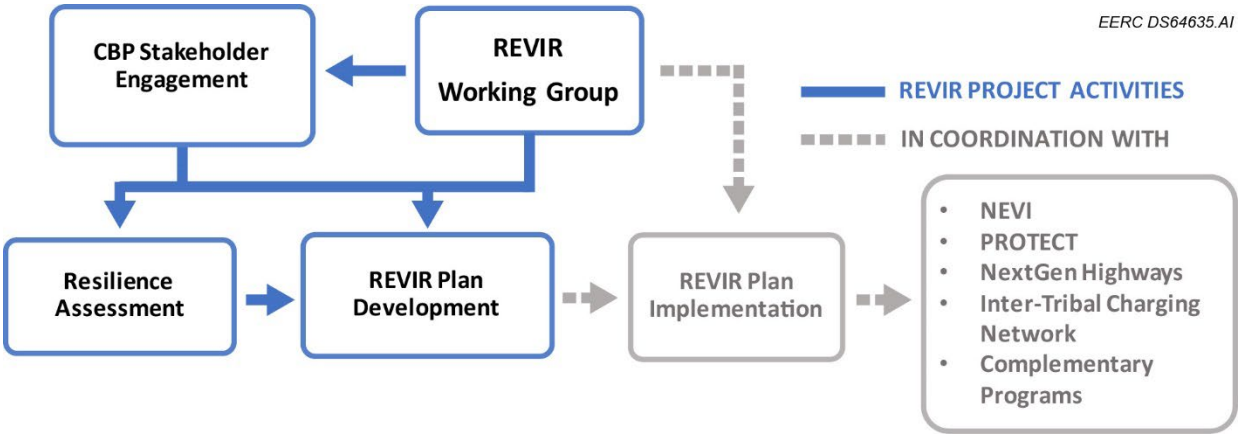

Figure 1. Proposed REVIR plan project approach.

Task 1 – Creation and Coordination of the REVIR Working Group (RWG). Resilience planning requires active participation from local government and community representatives, officials, private industries,

and local businesses who have a diverse range of perspectives on EVs and EV infrastructure. An RWG will be created to provide a critical resource for data, technical analysis, and solutions. The RWG will offer strategic leadership, direction, stakeholder engagement, and assistance in REVIR plan development and recommendations for implementing resilience solutions for the regional EV infrastructure. Table 1 lists committed RWG members. Other members may be added over the course of the project.

Table 1. RWG Members

Transportation	Nongovernmental Energy and Consulting
• ND Department of Transportation • MN Department of Transportation • MT Department of Transportation • MN Clean Cities Coalition • ND Clean Cities	• Cass County Electric Cooperative • Mountrail–Williams Electric Cooperative • Xcel Energy • ZEF Energy • Connexus Capital LLC
Other State and Regional Agencies	**Tribal Relations**
• ND Industrial Commission • ND Department of Commerce • ND Department of Emergency Services • MT Department of Environmental Quality • Fargo–Moorhead Metropolitan Council of Governments	• SAGE Development Authority (Standing Rock Sioux Tribe) • Native Sun Community Power Development (Red Lake Nation)

Task 2 – CBP Implementation and Stakeholder Engagement. The effort will focus on gathering stakeholder input by identifying and engaging stakeholders, e.g., communities, government agencies, and other groups; industries such as charging station manufacturers/owners, network operators/providers, and EV manufacturers; local businesses, utilities, and policy makers. The CBP will lay the groundwork for a resilient EV charging infrastructure that supports broadly shared prosperity for communities, including workers and tribal nations, by doing the following:

- Soliciting input on goals, current and potential activities, and potential resources for executing the REVIR plan, such as knowledge sharing, lessons learned, and best practices.
- Leveraging outreach by partners to identify stakeholders to participate in plan development.
- Informing stakeholders about EV charging resilience, planning process, and benefits.

The stakeholder engagement activities will include meetings with communities, site hosts, and focus groups; listening sessions; surveys/questionnaires; and information sharing through websites.

Task 3 – Baseline and Risk Assessment of Regional EV Infrastructure. A robust resilience assessment framework is critical for assessing various threats and risks and developing and implementing solutions to address those risks and enhance resilience of the charging infrastructure. Illustrated in Figure 2, development of the framework begins with a *baseline assessment* to understand the current state of the regional EV infrastructure and energy systems and ends with identifying *risk mitigation* strategies. Examples of *threats* are provided in Table 2. *Vulnerabilities* are weaknesses within the charging infrastructure, processes, and supporting systems that may contribute to severe damage when a disruptive event occurs (e.g., lack of cyber defense leads to major economic loss or disruption of critical infrastructures).

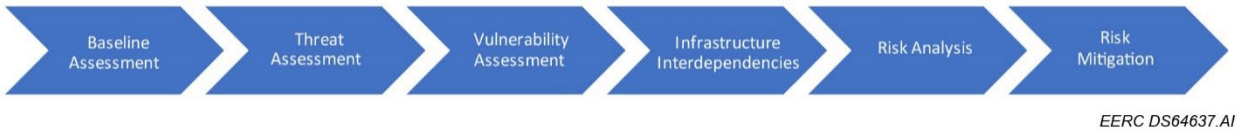

Figure 2. Steps to develop a resilience assessment framework.

Table 2. Threat Categories and Examples

Threats	Examples
Natural	Cold waves, snowstorms, high winds, floods, tornadoes
Technological	Electrical power outages, communication interruption, equipment breakdown
Manmade	Cyberattacks, accidents, vandalism, supply chain interruption

The RWG will consider stakeholder input in modeling additional threat scenarios as applicable to the regional charging infrastructure. For *risk analysis*, Idaho National Lab's (INL's) All Hazards Analysis (AHA) tool [2] will be used to simulate the regional threat scenarios and vulnerabilities and analyze the regional risks to the charging infrastructure. Potential mitigation options to reduce vulnerabilities and threats will be assessed for effectiveness along with viability, cost, and potential to reduce risk. The preliminary findings of the risk assessment will be compiled in a draft report to inform stakeholders about the regional EV infrastructure threats, vulnerabilities, and challenges and will be valuable for

involving stakeholders in the subsequent development of resilience solutions (i.e., mitigation strategies). The findings of the risk assessment will be used to 1) refine REVIR plan goals, strategies, and actions that facilitate building a resilient EV infrastructure; and 2) ensure that the REVIR plan is focused on addressing the threats and vulnerabilities and proposing practical solutions.

Task 4 – Development of REVIR Plan. The REVIR plan for the four-state region will comprise the process flow presented in Figure 3. Through stakeholder engagement, the RWG will develop meaningful short- and long-term goals and innovative strategies for translating the conceptual resilience vision to practical and achievable resilience solutions. Clear goals and proactive strategies to achieve these goals will be the foundation for the comprehensive design of the REVIR plan, help communicate efforts to stakeholders, and provide a basis for tracking and measuring success. The REVIR plan will also provide guidance on the implementation of mitigation strategies that include the following components: 1) responsible agency/community, 2) collaborators/partners, 3) preliminary steps for implementation, 4) resources required, 5) potential barriers, and 6) estimated timeline. Stakeholder feedback will inform the final REVIR plan.

Figure 3. Process flow of REVIR plan development.

Task 5 – Project Management and Reporting. This task will include all quarterly, interim, and final reporting to project sponsors, including deliverables. Results will be provided in interim and final project reports and at one or more technical conferences.

Anticipated Results. The project will support REP's mission to promote the growth of North Dakota's vast renewable energy industries through research, development, marketing, and education. The primary result will be a REVIR plan that showcases the networks and working relationships among stakeholders, communities, and EV interest groups. The proposed work will provide guidance on resilience solutions to enhance the state's EV infrastructure plans as part of the NEVI program and other

EV programs underway that can diversify North Dakota's economy, create **r**enewable energy jobs, and promote the use of North Dakota's renewable energy resources.

The primary long-term impact of the REVIR plan will be its use as an adaptable tool and framework for enhancing regional EV charging infrastructure reliability, resiliency, and accessibility as EV adoption increases and user patterns and markets evolve. In addition, the working relationships, organizational networks, and engendered trust established during the project will yield beneficial interdependencies and communication pathways that will facilitate preparing for and responding to disruptive events, technology improvements, evolving regulatory environments, social and demographic changes, and other as-yet unforeseen developments in transportation electrification.

Facilities and Resources. The EERC office and meeting rooms will be the main work location. The EERC's computers, communication networks, and clusters can support data storage, analysis, and simulation activities. The other project partners have the facilities and resources available to complete the scope of work. The project team will draw on research experience in infrastructure resilience assessments and electrical-grid-related impacts from EV adoption. In addition, the four states' DOTs have ongoing intrastate efforts to build the EV charging structure under federal programs including the NEVI program, the Promoting Resilient Operations for Transformative Efficient and Cost-saving Transportation (PROTECT) program, and the NextGen Highways program. The proposed work will leverage their collaboration with utilities, planning divisions, state agencies, charging network providers, charger manufacturers, fleet managers, local and tribal communities, and emergency services departments to help develop and implement the REVIR plan. The work will integrate the efforts of nongovernmental infrastructure development. SAGE Development Authority of the Standing Rock Sioux Tribe, Connexus Capital, ZEF Energy, and Native Sun Community Power Development have experience working on the charging network between the Standing Rock Sioux Tribe and Red Lake Nation in Minnesota. Xcel Energy, Cass County Electric Cooperative, and Mountrail–Williams Electric Cooperative will provide

utility perspectives on EV charging demand, load growth, and grid reliability issues. ND Department of Emergency Services manages the state's Critical Infrastructure Program and will inform emergency planning. ND Clean Cities, MN Clean Cities Coalition, Fargo–Moorhead Metropolitan Council of Governments, ND Department of Commerce, and MT Department of Environmental Quality will support REVIR plan development. No equipment will be purchased for this project.

Techniques To Be Used, Their Availability and Capability. The project will use INL's AHA tool for resilience assessment, which INL has agreed to provide with required data on regional infrastructures.

Environmental and Economic Impacts while Project is Underway. The project comprises data gathering and analysis, computer simulation modeling, surveys/questionnaires, and paper studies. Environmental and economic impacts of the project will be minimal.

Ultimate Technological and Economic Impacts. The proposed project will support North Dakota's vision to promote the growth of North Dakota's renewable energy industries by improving the resiliency and thus increasing the reliability of electrified transportation. The proposed work will guide implementation of resilience solutions that can promote investment in EV infrastructure with the forethought to integrate resiliency, reliability, and security as well as partner with stakeholders who seek to develop resilient and independent energy systems into the future. The proposed project will foster sustainable growth of a resilient EV sector that can diversify North Dakota's energy economy, better leverage renewable energy resources, and create additional energy- and transportation-related jobs.

Why the Project Is Needed. North Dakota has a unique combination of EV infrastructure resilience challenges, including expansive sparsely populated geography, harsh winter climate, extreme weather events, personal-vehicle-dominated road transportation, and limited rural electric grid infrastructure. The region has relatively low EV adoption compared to national trends. Many of the plug-in-electric vehicles (PEVs) registered in the region are found in major urban areas, with few vehicles present in the more rural areas. The region also has limited EV charging infrastructure. Considering the number of

public charging ports per 10,000 people for each state, the average figure for North Dakota is 2.3, which is less than the national average of 2.9 ports/10,000 people and far less than leading states (e.g., about 7–21 in California) [3-4]. Most of the region has less than one charging station for every 50 miles along the designated alternative fuel corridors. Because of the lack of EV charging infrastructure, the study region is referred to as a charging desert, and this may cause concerns to EV-driving road trippers and tourists. Given the low EV adoption and minimal EV infrastructure deployment to date, resilience and reliability issues have yet to emerge. The REVIR plan will facilitate the proactive development of a built-from-scratch resilience system, saving time, money, and lives in the future.

By leveraging and coordinating with ongoing EV charging infrastructure build-out work and programs of the states' DOTs, charging network operators, utilities, planning departments, and community groups, the project team will lead a consortium of stakeholders to identify, assess, and devise mitigation strategies to address risks specific to the regional EV charging infrastructure. With the goal of providing practical, achievable, and affordable mitigation strategies, project outcomes will translate to increased charging infrastructure resilience throughout North Dakota and the four-state region and will offer significant applicability to resilience plans for other regions. The proposed work will provide guidance on the implementation of resilience solutions to enhance state DOT EV infrastructure plans as part of the NEVI program, PROTECT program, NextGen Highways program, and intertribal charging networks already underway in the region.

STANDARDS OF SUCCESS

Success first requires delivery of a REVIR plan that has sufficiently broad and deep stakeholder support to serve as an actionable, adaptable, and continually evolving road map for strengthening and maintaining a secure, functioning, and resilient EV infrastructure in North Dakota and the region. The success metric will be the extent to which REVIR plan stakeholders and EV users are committed to implementing and building on the plan, as demonstrated by willingness to fund and participate in

postproject working group(s) as needed to 1) keep the plan alive, 2) turn its directives and strategies into actions, and 3) achieve its objectives in the form of infrastructure, hardware, grid and resource management, operational strategies and policies, outreach and education, and increased EV adoption.

The resilience of EV charging stations will depend directly on the resilience of the electric utility serving the charging station. A substantial weather-induced power outage could shut down charging infrastructure and compromise consumer access with likely economic implications. In addition to weather and other uncontrollable threats, large-scale variations in demand profiles caused by unmanaged EV charging loads may lead to grid resource adequacy shortfalls and create needs for planned, rolling blackouts. A primary REVIR plan objective is to help build and maintain working groups (comprising EV industry, user, and community stakeholders) capable of 1) monitoring charging infrastructure use and performance, 2) regularly assessing risks to infrastructure availability, and 3) developing and implementing mitigation strategies to maximize infrastructure reliability and minimize downtime following an unavoidable shutdown.

VALUE TO NORTH DAKOTA

According to the Lignite Energy Council, over half of the electricity generated in North Dakota goes to out-of-state customers, most to Minnesota. Minnesota's new carbon-free energy standard (enacted by Minnesota lawmakers in 2023) requires Minnesota utility providers to transition to 100% carbon-free electricity sources by 2040. Twin Cities EV users will likely soon represent a major new and fast-growing power demand center. Therefore, demand for low-carbon power is growing in the immediate region. Cross-state industry–user–community alliances formed and guided by a working/living REVIR plan will help ensure continuing and expanded flow of North Dakota power to Minnesota, South Dakota, and Montana customers, benefiting North Dakota and its neighbors. Build-out of EV infrastructure will also yield greater connectivity within the region, allowing for EV travel corridors that enhance tourism

opportunities and ensuring economic stability, growth, and opportunity in the renewable energy industry.

BACKGROUND/QUALIFICIATIONS

The EERC will draw on extensive experience successfully managing multimillion-dollar contracts involving myriad regulatory, industry, and nongovernmental partners to lead the project and manage tasks with input and support from the project partners to accomplish task goals and objectives. The principal investigator (PI) is Dr. Daisy F. Selvaraj, Senior Research Engineer at the EERC. Dr. Selvaraj will manage the project planning and reporting activities. Her research focuses on energy infrastructure risk and resilience assessment, distribution system planning and analysis, load flow and hosting capacity analysis, studies on distributed energy resources (DER) impacts, and production cost and energy market simulations. Dr. Selvaraj will be assisted by Mr. Bradley G. Stevens, Principal Research Engineer, Civil Engineering at the EERC. Mr. Stevens' principal areas of interest and expertise include soil, groundwater, and industrial process water remediation; process instrumentation and control; wind power generation; hydrogen production; and oil and gas production. Dr. Selvaraj and Mr. Stevens worked on the development of a North Dakota grid resilience plan. The team's prior work also includes the Military Installation Resilience Study for the Grand Forks Air Force Base. Ms. Charlene R. Crocker, Senior Research Scientist and Outreach Team Lead at the EERC, will lead Task 2. Ms. Crocker's principal areas of interest and expertise span public outreach and scientific research activities over more than 30 years, including energy transformations and emissions control, CO_2 capture and storage, and water quality. Resumes of key personnel can be found in Appendix A.

MANAGEMENT

The EERC will oversee all tasks, schedule regular internal and external meetings with project participants, and ensure that the project is conducted using acceptable scientific methodologies and practices in accordance with the project plan (budget, schedule, and deliverables) and is meeting quality

objectives. The EERC will keep all partners informed of project progress, coordinate activities for successful project execution, and be responsible for timely submission of all project deliverables and products to the project team. Progress reports will be prepared and submitted to project sponsors for review. A broad team approach is key to successful execution of this project.

TIMETABLE

This project will be performed over 24 months. It is anticipated that DOE funds will be available by May 1, 2024, to initiate the project. Figure 4 depicts the proposed project schedule.

	Year 1				Year 2			
Tasks	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Task 1 – Creation and Coordination of REVIR Working Group (RWG)								
Task 2 – CBP Implementation and Stakeholder Engagement								
Task 3 – Baseline and Risk Assessment of Regional EV Infrastructure								
Task 4 – Development of REVIR Plan								
Task 5 – Project Management and Reporting								

Figure 4. Proposed project schedule.

BUDGET

The total estimated cost for the proposed work is $1,875,000, as presented in Table 3. The EERC requests $375,000 from REP to be matched with $1,500,000 from JOET within DOE. Letters of support are provided in Appendix B. Budget notes can be found in Appendix C.

TAX LIABILITY. The EERC is a business unit within UND, which is a state-controlled institution of higher education and is not a taxable entity; therefore, the EERC has no tax liability.

CONFIDENTIAL INFORMATION. No confidential information is included in this proposal.

PATENTS/RIGHTS TO TECHNICAL DATA. It is not anticipated that any patents will be generated during this project. The rights to technical data generated will be held jointly by the EERC and project sponsors.

STATE PROGRAMS AND INCENTIVES. A listing of EERC projects funded by NDIC in the last 5 years can be found in Appendix D.

REFERENCES. All references cited are in Appendix E.

Table 3. Budget Breakdown

Project Associated Expense	NDIC Share (Cash)	DOE Share (Cash)	Total Project
Direct Costs			
Labor	$239,514	$801,638	$1,041,152
Travel	$–	$26,072	$26,072
Supplies	$800	$6,970	$7,770
Subcontractor – Matthew Stolz	$–	$40,000	$40,000
Communications	$–	$6,566	$6,566
Printing and Duplicating	$–	$2,926	$2,926
Food	$–	$2,508	$2,508
Rents and Leases – Venue Rental	$–	$1,200	$1,200
Honorarium	$–	$2,000	$2,000
Document Production Services	$7,130	$98,318	$105,448
Technical Software Fee	$–	$8,996	$8,996
Engineering Services Fee	$900	$9,796	$10,696
Total Direct Costs	$248,344	$1,006,990	$1,255,334
Facilities and Administration	$126,656	$493,010	$619,666
Total Project Costs	**$375,000**	**$1,500,000**	**$1,875,000**

APPENDIX A

RESUMES OF KEY PERSONNEL

DR. DAISY F. SELVARAJ
Senior Research Engineer
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5105, dselvaraj@undeerc.org

Education and Training

Ph.D., Electrical Engineering, Visvesvaraya Technological University, Belagavi, India, 2018.
M.E., High-Voltage Engineering, College of Engineering Guindy, Anna University, Tamil Nadu, India, 2008.
B.E., Electrical and Electronics Engineering, Bharathidasan University, India, 1999.

Research and Professional Experience

2022–Present: Senior Research Engineer in the Energy Systems Group at the EERC, UND. Dr. Selvaraj's research focuses on distribution system planning and analysis, load flow and hosting capacity analysis, studies on distributed energy resources (DER) impacts, and production cost and energy market simulations. Her current research activities include a grid resilience study for the State of North Dakota and also energy storage modeling for a U.S. Department of Energy (DOE) project on ammonia storage. As a competent researcher and technical leader, Dr. Selvaraj has created strong collaborative engineering teams with national labs, government agencies, and utility partners. She has developed a number of new ideas and proposals over the years that led to successful research and business capabilities and subsequent funding from federal and state agencies. In addition, Dr. Selvaraj teaches Electrical Engineering graduate and undergraduate courses in the UND Department of Electrical Engineering as well as provides academic advising and mentoring to students.

2019–2022: Research Engineer, EERC, UND.

2018–2019: Postdoctoral Research Associate, School of Electrical Engineering & Computer Science, UND.

2017–2018: Assistant Professor, Department of Electrical and Electronics Engineering, Presidency University, Karnataka, India.

2013–2017: Senior Research Fellow, R&D Management Division, Central Power Research Institute, Karnataka, India.

2010–2013: Assistant Professor, Department of Electrical and Electronics Engineering, Rajiv Gandhi Institute of Technology, Karnataka, India.

2006–2008: Master's Degree Candidate, College of Engineering Guindy, Anna University, Tamil Nadu, India.

2003–2006: Lecturer, Department of Electrical and Electronics Engineering, J.J College of Engineering and Technology, Tamil Nadu, India.

2002: Production Engineer, Baby Industries, Tamil Nadu, India.

2000–2001: Programmer, Sierratronic India Pvt. Limited, Tamil Nadu, India.

Professional Activities

Member, Institute of Electrical and Electronics Engineers (IEEE)
Member, Indian Society for Technical Education
Reviewer, *IEEE Access*
Reviewer, DOE Artificial Intelligence and Decision Support for Complex System Review, July 2020.
Session Chair, Special Session on Electric Vehicles, Emerging Topics Track, 2019 North American Power Symposium (NAPS), Wichita, Kansas, USA, October 2019.
Reviewer, 2019 NAPS, Wichita, Kansas, USA, October 2019.
Reviewer, *IEEE Wireless Communications Magazine*
Reviewer, *IEEE Access*
Reviewer, *Elsevier Thermal Science and Engineering Progress*
Reviewer, *Elsevier Corrosion Science*
Reviewer, *MDPI Energies*

Publications

Mehrasa, M.; Salehfar, H.; Selvaraj, D.F.; Ahmed, S. I. Smart Bidirectional Charging for Frequency Support of a Low-Inertia Vehicle-To-Grid System in Presence of Energy Storage Systems Paper presented at 2023 IEEE Texas Power and Energy Conference (TPEC), College Station, TX, USA, 2023, pp. 1–6, doi: 10.1109/TPEC56611.2023.10078605.

Mehrasa, M.; Selvaraj, D. F.; Salehfar, H. Robust Control Strategy for a High-Power Off-Board EV Charger Connected to Grid-Tied Critical Loads. Paper presented at 2023 IEEE TPEC, College Station, TX, USA, 2023, pp. 1–6, doi: 10.1109/TPEC56611.2023.10078516.

Ibne Ahmed, S.; Salehfar, H.; Selveraj, D.F. Grid Integration of PV Based Electric Vehicle Charging Stations: A Brief Review. Paper presented at 2022 North American Power Symposium (NAPS), Salt Lake City, UT, USA, 2022, pp. 1–6, doi: 10.1109/NAPS56150.2022.10012159.

Mehrasa, M.; Hajar, K.; Razi, R.; Labonne, A. Fuzzy Logic-Based Charging Strategy for Frequency Control of an Electric Vehicles-Integrated Weak Grid. Paper presented at 2022 IEEE International Conference on Electrical Sciences and Technologies in Maghreb (CISTEM), Tunis, Tunisia, 2022, pp. 1–6, doi: 10.1109/CISTEM55808.2022.10044057.

Ahmed, S.I.; Salehfar, H.; Selvaraj, D.F. PV Hosting Capacity Assessment for Improved Planning of Low-Voltage Distribution Networks. Paper presented at 2021 NAPS, College Station, TX, Nov 14–16, 2021. DOI: 10.1109/NAPS52732.2021.9654614.

Ahmed, S.I.; Salehfar, H.; Selvaraj, D.F. Impact of Electric Vehicle Charging on the Performance of Distribution Grid. Paper presented at 2021 IEEE 12th International Symposium on Power Electronics for Distributed Generation Systems (PEDG), Chicago, IL, Jun 28 – Jul 1, 2021. DOI: 10.1109/PEDG51384.2021.9494268.

Bissing, D.; Klein, M.T.; Chinnathambi, R.A.; Selvaraj, D.F.; Ranganathan, P. A Hybrid Regression Model for Day-Ahead Energy Price Forecasting. *IEEE Access* **2019**, *7*, 26833–36842. DOI: 10.1109/ACCESS.2019.2904432.

El Mrabet, Z.; Selvaraj, D.F.; Ranganathan, P. Adaptive Hoeffding Tree with Transfer Learning for Streaming Synchrophasor Data Sets. *In* Proceedings of 2019 IEEE International Conference on Big Data (Big Data), p. 5697–5704.

El-Rewini, Z.; Sadatsharan, K.; Sugunaraj, N.; Selvaraj, D.F.; Plathottam, S.J.; Ranganathan, P. Cybersecurity Attacks in Vehicular Sensors. *IEEE Sensors Journal* **2020**, *20* (22), 13752–13767. DOI: 10.1109/JSEN.2020.3004275.

El-Rewini, Z.; Sadatsharan, K.; Selvaraj, D.F.; Plathottam, S.J.; Ranganathan, P. Cybersecurity Challenges in Vehicular Communications. *Vehicular Communications* **2020**, *23*, 100214

Synergistic Activities

1. Dr. Selvaraj is currently leading the EERC's diverse research portfolio that includes development of modeling schemes and control strategies for smart grid, grid integration of renewable energy systems and electric vehicles (EVs), hardware-in-the-loop testing, and data analytics for smart grid. Her work is supported by DOE and other leading federal and state funding agencies and private industry partners.
2. Dr. Selvaraj is coordinating current efforts for the development of a North Dakota energy resilience plan to address resilience risks associated with widespread and long-term electrical power outages in North Dakota.
3. Dr. Selvaraj was instrumental in the installation resilience study at Grand Forks Air Force Base.
4. Dr. Selvaraj has collaborated with North Dakota power distribution companies to support research on addressing broad grid integration issues with EVs. Through her collaborative approach, UND, along with regional partners, is establishing priorities, direct research, and development activities to address the technical challenges associated with increasing EV utilization across the state.
5. As a merit/panel reviewer, Dr. Selvaraj has reviewed DOE proposals for Artificial Intelligence and Decision Support for Complex Systems & Connected Communities.

BRADLEY G. STEVENS, P.E.
Principal Research Engineer, Civil Engineering
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5293, bstevens@undeerc.org

Education and Training

B.S., Civil Engineering, University of North Dakota, 1989.
Registered Professional Engineer – North Dakota No. PE-4340.

Research and Professional Experience

2022–Present: Principal Research Engineer, Civil Engineering, EERC, UND. Responsibilities include managing a variety of projects and tasks in the areas of oil and gas production and processing, hydrogen production and utilization, electrical grid resiliency, and risk mitigation. Expertise includes soil, groundwater, and industrial process water remediation; process instrumentation and control; wind power generation; hydrogen production; and oil and gas production.

2021–2022: Senior Research Engineer, Civil Engineering Team Lead, EERC, UND.

2011–2021: Senior Research Engineer, EERC, UND. Mr. Stevens' responsibilities included execution of wide-ranging projects under the EERC's Bakken Production Optimization Program, including the study of alternative natural gas use, saline and hydrocarbon soil remediation, and statistical analysis of various oil and gas industry segments.

2005–2011: Research Manager/Engineer, EERC, UND. Mr. Stevens' responsibilities included management of the EERC's Plains Organization for Wind Energy Resources® (POWER®) wind energy program. POWER management duties included strategic planning, fiscal management, program presentation, proposal preparation, and personnel management. In addition, technical duties included installation and setup of wind-monitoring equipment, assessment and analysis of wind resource data, wind turbine production estimates, and theoretical project economics. Other responsibilities included supervision of the design, installation, and operation of an electrolysis-derived hydrogen production and dispensing system.

1998–2005: Research Engineer, Remediation, EERC, UND. Mr. Stevens' responsibilities included the following: management, testing, data analysis, and report preparation for the commercial application of a centrifugal membrane filtration; project management, specification, construction, and demonstration of a freeze–thaw process for the utilization of marginal waters; participation in the Red River Water Management Consortium (RRWMC) as a technical staff member advising RRWMC members regarding pertinent water supply and water quality issues; management and operation of data analysis and report preparation for a sorption and regeneration process for mercury removal from primary and secondary liquid wastes assessment; and data analysis activities related to wind energy.

1992–1998: Project Manager/Engineer, Summit Envirosolutions, Inc., Minneapolis, Minnesota. Mr. Stevens' responsibilities included the following: specification and coordination of the installation of remote data acquisition equipment for municipalities in Minnesota for use as aquifer resource management tools; specification, installation, and maintenance of groundwater flow control and flow measurement equipment in association with a research and development cooperative agreement with NASA involving state-of-the-art methods of remote data acquisition, patented as RealFlow®; design,

installation, and maintenance of permanent and mobile remediation systems in Minnesota, Wisconsin, Nevada, and Arizona, including groundwater pump-and-treat systems, soil vapor extraction systems, and coupled air sparging–soil vapor extraction systems; and management of 20 projects in Minnesota, Wisconsin, and Illinois involving mechanical and electrical control and data retrieval for remedial systems including telemetry-based remedial systems. Other pertinent experience included work with programmable logic controllers and ladder logic programming and training in the use of Intellution FIX DMACS human–machine interface software.

1990–1992: Project Engineer, Delta Environmental Consultants, Inc., St. Paul, Minnesota. Mr. Stevens' responsibilities included the design, permitting, installation, and operation of treatment systems for remediation of contaminated groundwater and soils. Sites ranged from automotive service stations to railroad maintenance yards for projects located in a five-state region. Remediation technologies included subsurface air sparging and soil vapor extraction. Other project responsibilities included data interpretation and permit compliance for 14 remediation systems for a major oil company; supervising excavation of contaminated soils; and permitting and supervising in-place abandonment of a 12,000-gal underground storage tank.

1988–1990: Research/Engineering Technician, EERC, UND. Mr. Stevens' responsibilities included the design, construction, operation and maintenance, data collection and reduction, and formal report preparation for bench-scale treatability programs involving single-stage, two-stage, coupled nitrification–denitrification activated sludge systems, activated carbon adsorption, and ion exchange treatment of coal-processing waters. He maintained and operated the pure oxygen plug flow reactor for the biological treatment of synthetic wastewater. He also assisted in production of a pilot-scale wastewater treatment facility and design and analysis of bench-scale wastewater treatment models.

Patents

Barrett, D.P.; Davis, R.J.; Dustman, J.E.; Gibas, D.R.; Stevens, B.G.L.; Wilson, B.T. Measuring System for Measuring Real-Time Groundwater Data. U.S. Patent 5,553,492, Sept 10, 1996.

Publications

Mr. Stevens has authored or coauthored numerous publications.

CHARLENE R. CROCKER
Senior Research Scientist, Outreach Team Lead
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5018, ccrocker@undeerc.org

Education and Training

B.S., Chemistry, University of North Dakota, 1994; B.A., French, Colby College, Waterville, ME, 1986.

Research and Professional Experience

2002–Present: Senior Research Scientist, Outreach Team Lead, EERC, UND, Grand Forks, ND. Performs managerial and principal investigator duties for projects related to scientific research and public outreach. Outreach work has included development of programs for CO_2 sequestration, water, and fish advisories and development of CO_2 sequestration public outreach materials, water quality education, and water-based geoscience education program and outreach activities for middle and high school students. Research has included projects related to development of sorbents for emission control strategies in fossil fuel-fired energy systems; projects related to environmental management and air quality; collaborations in air and water monitoring, bioassessment tools, market research; proposal and report writing; data analysis; presentation of results; and budget tracking. Serves as the Energy Hawks Internship Program Coordinator and Supervisor, State Energy Research Center at the EERC; develops and implements energy literacy syllabus for multidisciplinary team of graduate and undergraduate students in 10-week internship program; guides development of white papers focused on value-added energy topics for North Dakota.
1994–2002: Research Chemist, EERC, UND. Managed projects relating to environmental management and air quality; collaborated with other scientists on fish consumption survey development, air sampling, coal ash, water purification, and surface decontamination research; wrote proposals and reports, analyzed data, presented results, and tracked budgets; developed air sampling protocols; participated in development of water-based geoscience education program and outreach activities for school children. Performed research on ultratrace elemental analyses on water and energy-related samples and followed quality control procedures.
1993–1994: Research Assistant, EERC, UND. Prepared and analyzed inorganic media for ultratrace elements, including mercury, and prepared reagents and solutions.
1990: Naturalist, Deep Portage Conservation Reserve, Hackensack, MN. Planned and conducted environmental education programs for children and adults; evaluated curriculum.
1988–1990: Sanctuary Manager, Wetlands, Pines & Prairie Audubon Sanctuary, Warren, MN. Planned and conducted environmental education programs, organized chapter meetings, published Sanctuary newsletter, and performed administrative tasks.
1988: Park Ranger/Interpreter, Boston Harbor Islands State Park, Boston, MA. Interpreted natural and human history, developed special programs, and conducted tours and school programs.

Relevant Publications

Crocker, C.R.; Krueger, N.M. Energy and CO_2 Management: Carbon Capture and Storage. Presented at 2023 Lignite Education Seminar, Bismarck, ND, June 13, 2023.

Crocker, C.R.; Leroux, K.M.; Massmann, N.M.; Crossland, J.L.; Manthei, M.M.; Glazewski, K.A.; Daly, D.J.; Hamling, J.A. Public Outreach Package for Carbon Capture and Storage in North Dakota; Task 5 Deliverable D3 for North Dakota Industrial Commission Contract No. R-038-047; EERC, Feb 2020.

Daly, D.J.; Crossland, J.L.; Crocker, C.R. Glazewski, K.A.; Massmann, N.M.; Peck, W.D. North Dakota CarbonSAFE Updated Outreach Plan Phase II, May 2019.

Crocker, C.R.; Daly, D.J. Low-Carbon Energy for North Dakota [documentary short]; Dambach, B.; Olien, M., Site Producers; Prairie Public Broadcasting (PPB): Fargo, ND, and EERC, 2019.

Crocker, C.R.; Daly, D.J. Coal: Engine of Change [DVD]; Dambach, B.; Steadman, E.N., Executive Producers; PPB and EERC, 2018.

Daly, D.J.; Crocker, C.R.; Crossland, J.L.; Massmann, N.M.; Peck, W.D. North Dakota Integrated Carbon Storage Complex Feasibility Study; Deliverable D3 (Outreach Toolkit) for U.S. Department of Energy (DOE) Cooperative Agreement (CA) DE-FE0029488; EERC: Grand Forks, ND, Feb 2018.

Daly, D.J.; Crossland, J.L.; Crocker, C.R.; Gorecki, C.D. Outreach Action Plan; Plains CO_2 Reduction (PCOR) Partnership Phase III Task 2 Deliverable D11 (Update 2) for DOE National Energy Technology Laboratory CA DE-FC26-05NT42592; EERC Publication 2016-EERC-09-02; March.

Daly, D.J.; Crocker, C.R.; Gorecki, C.D. Regionwide Outreach in a Project-Level World – Lessons from the PCOR Partnership. *Energy Procedia* **2017**, *114*, 7224–7236.

Crocker, C.R.; Daly, D.J.; Dambach, B.; Pearson, B.; Anderson, D. A Collaboration among PPB, Classroom Teachers, and the PCOR Partnership to Produce Classroom-Ready CCS Lessons. Presented at the International Workshop on Public Education, Training, and Community Outreach for Carbon Capture, Utilization, and Storage, Decatur, IL, July 30, 2014.

Synergistic Activities

- Outreach Team Lead (Oct 2018–present)/member of ND CarbonSAFE team (Phases II and III) since inception in June 2017, developing and implementing project outreach plan, facilitating Outreach Advisory Board, developing outreach materials, engaging educators and K–12 to postsecondary students on carbon capture and storage (CCS), and providing input and guidance to project timelines, budgets, and objectives.
- Outreach Team Lead (Jan 2019–Nov 2021)/member of RTE Ethanol CCS project since 2017, developing and implementing project outreach plan; developing outreach materials; handling media, talking points, and logistics for county commission appearances; preparing landowner packets and public notices for seismic surveys, environmental sampling events, and research results; overseeing logistics, preparing advertising, and developing materials for community open houses; and providing input and guidance to project timelines, budgets, and objectives.
- Outreach Team member for Regional Carbon Sequestration Partnerships (RCSP) Initiative's PCOR Partnership Program since inception in 2003.
- Associate Producer and Cowriter for seven CCS-related public television documentaries—*Coal: Engine of Change, The Bell Creek Story: CO_2 in Action, Global Energy and Carbon: Tracking Our Footprint, Managing Carbon Dioxide: The Geologic Solution, Out of the Air – Into the Soil: Land Practices That Reduce Atmospheric Carbon Levels, Reducing Our Carbon Footprint: The Role of Markets, Nature in the Balance: CO_2 Sequestration.*
- Codeveloped six outreach plans, 23 outreach posters, numerous fact sheets, general public and educational presentations, and a website focused on aspects of CCS and CCS projects.

APPENDIX B

LETTERS OF SUPPORT

NORTH Dakota | Transportation
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July 19, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

Dear Ms. Selvaraj

This letter is to express North Dakota Department of Transportation's support of the Energy & Environmental Research Center's (EERC) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional Electric Vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

We look forward to working with the EERC team and other project partners. Your point of contact for this project if awarded is Russ Buchholz, who can be reach at (701) 328-2561.

Sincerely,

Ronald J. Henke, PE
Director

DEPARTMENT OF TRANSPORTATION

Minnesota Department of Transportation
Office of Sustainability and Public Health
395 John Ireland Blvd
Mail Stop 245
St. Paul, MN 55055

August 2, 2023

Ms. Daisy Selvaraj, Senior Research Engineer
University of North Dakota -Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj

This letter is to express Minnesota Department of Transportation's (MnDOT) support of the Energy & Environmental Research Center's (EERC) proposal being submitted to the U.S. Department of Energy (DOE).

In 2007, Minnesota passed the bi-partisan Next Generation Energy Act (NGEA), which established goals for the state to reduce greenhouse gas emissions by 15% below 2005 levels by 2015, 30% by 2025, and 80% by 2050. However, the state did not meet the 2015 goal and is not on track to meet our future goals. Transportation became the largest emitter of carbon pollution in the state in 2016. Electrification of transportation is a key strategy to reduce green house gas emissions from transportation. The EERC project will also support the MnDOT Office of Sustainability and Public Health's five focus areas that connect back to agency and statutory transportation and climate goals.

Participation in this project will provide resilience solutions to enhance the implementation of Minnesota's Electric Vehicle Infrastructure Plan as part of the National Electric Vehicle Infrastructure Program. MnDOT can offer learnings from our use of rights of way to support decarbonization of transportation and energy – an effort called NextGen Highways.

MnDOT can provide an in-kind match in the form of staff time to participate in working group meetings, contribute information and data as available, assist in implementation of resilience solutions as fits with our EV Infrastructure plan. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Amber Dallman

Digitally signed by Amber Dallman
Date: 2023.08.02 10:48:58 -05'00'

Amber Dallman
Office of Sustainability and Public Health Director

CC: Beth Kallestad, Principal Sustainability Planner
Jessica Oh, Strategic Partnerships Director
Siri Simons, Sustainability Program Supervisor
Anna Pierce, Interim Sustainability Program Supervisor

Equal Opportunity Employer

MONTANA
Department of Transportation

Malcolm D. Long, Director

2701 Prospect ▪ PO Box 201001
Helena MT 59620-1001

July 19, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

Dear Ms. Selvaraj,

This letter is to express the Montana Department of Transportation's (MDT) support of the Energy & Environmental Research Center's (EERC) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional Electric Vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota. MDT appreciates the collaborative nature of this study, which plans to a working group with key stakeholders from the region that will come together to create recommendations to produce a flexible implementation plan that meets each state's unique needs.

As the agency responsible for managing and improving Montana's transportation system, we recognize the growing importance of EVs. With the rising adoption of EVs, it is crucial to assess and enhance the resiliency of our infrastructure to support transportation across the state. This research aligns closely with our own mission to innovate at all levels and invest in infrastructure that can accommodate the evolving needs of Montana's residents and visitors. Based on our mutual interests, we support the proposed project in the form of providing staff time, roadway data and statewide EV information. We look forward to working with the EERC team and the outcomes and insights that will emerge from this research, which will undoubtedly inform our future transportation planning and resiliency efforts.

Sincerely,

Malcolm D. Long, Director
Montana Department of Transportation

Rail, Transit and Planning Division
Phone: (406) 444–3423
Fax: (406) 444–7671

An Equal Opportunity Employer

Toll–free: (800) 714–7296
TTY: (800) 335–7592
Web Page: www.mdt.mt.gov

July 19, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express the commitment of Minnesota Clean Cities Coalition and North Dakota Clean Cities to the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Our Clean Cities coalitions have been active in developing the region's current EV charging ecosystem and strive to accelerate its growth. We currently lead or support several DOE-funded electric vehicle projects that are active in the region and work with a wide variety of relevant stakeholders in our states. Based on our mutual interests, we are proud to support the proposed project and partner with EERC to develop and implement the resilience plan. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Jon Hunter
Interim Director
North Dakota Clean Cities

Lisa Thurstin
Director
Minnesota Clean Cities Coalition

NORTH Dakota | Commerce
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July 12, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express North Dakota Department of Commerce's support of the Energy & Environmental Research Center's (EERC) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional Electric Vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Commerce houses the North Dakota State Energy Office and the state energy resiliency plan. Our team is willing to provide resources such as staffing, research, collaboration on community involvement and other time and talent that will help EERC provide this plan for our state. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Joshua Teigen
Commissioner, North Dakota Department of Commerce

1600 E Century Avenue, Suite 6 | P.O. Box 2057 | Bismarck, ND 58502
PHONE: 701-328-5300 | TOLL FREE: 1-866-4DAKOTA | ND RELAY TTY: 1-800-366-6888 | VOICE: 1-800-366-6889 |
NDCommerce.com

NORTH Dakota | Emergency Services
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Aug. 17, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express the N.D. Department of Emergency Services' support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

As the central coordinating agency for emergencies and disasters, planning for disruptions to regional EV charging infrastructure is critical for an effective and intentional emergency response. Weather event-wise, North Dakota is a land of extremes. We know we need to consider the impact on our communities should EV infrastructure be impacted during a disaster. If there is a disruption to energy sources for electric vehicles, we would have citizens unable to travel to safety in the event an evacuation is necessary, or they could become stranded during extreme winter weather events. These scenarios must be planned for so we can identify ways to mitigate these impacts.

The N.D. Department of Emergency Services also manages our state's Critical Infrastructure Program, so we understand the importance of strengthening and maintaining a secure, functioning and resilient energy sector. Based on our mutual interests, we are proud to support the proposed project in the form of regular collaboration. The N.D. Department of Emergency Services will participate in the EERC's working group in which we will attend meetings and provide input for resilience and emergency planning. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Darin Hanson
N.D. Department of Homeland Security Director

NDDES Homeland Security State Radio

Doug Burgum
GOVERNOR

Major General Alan S. Dohrmann
DIRECTOR - DEPARTMENT OF EMERGENCY SERVICES

Darin Hanson
DIRECTOR - DIVISION OF HOMELAND SECURITY

Darin Anderson
DIRECTOR - DIVISION OF STATE RADIO

Ensuring a safe and secure homeland for all North Dakotans

PO Box 5511 | Bismarck, ND 58506-5511 | 701.328.8100 | Fax: 701.328.8181 | Email: nddes@nd.gov | nd.gov/des

August 2, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express the Montana Energy Office at the Montana Department of Environmental Quality's support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

The Montana Energy Office is committed to initiatives and research that help support resilient and reliable transportation electrification. Based on our mutual interests, we are proud to support the proposed project in the form of in-kind cost share. The Montana Energy Office will provide in-kind contribution in the form of staff time over the period of the project. Our staff contributions will include providing data and information related to electric vehicle charging development and installation and participation in the region-wide resilience working group meetings. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

METROCOG Fargo-Moorhead Metropolitan Council of Governments

Case Plaza Suite 232 | One 2nd Street N
Fargo, North Dakota 58102-4807
p: 701.532.5100| f: 701.232.5043
e: metrocog@fmmetrocog.org
www.fmmetrocog.org

July 18, 2023

Dr. Daisy Selvaraj, Senior Research Engineer
Energy & Environmental Research Center
University of North Dakota
15 N 23 Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

Dear Dr. Selvaraj,

This letter from the Fargo-Moorhead Metropolitan Council of Governments (Metro COG) is to express our support of the Energy & Environmental Research Center's (EERC) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional Electric Vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Metro COG and area jurisdictions of the Fargo, ND-MN MSA understand the importance of understanding EV feasibility and its benefits within our transportation network, identifying current and potential barriers to EV adoption, and developing infrastructure-related best practices to meet current and future EV needs in our region. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Ben Griffith, AICP
Executive Director
Fargo-Moorhead Metropolitan Council of Governments

Cass County Electric Cooperative
A Touchstone Energy® Cooperative

August 2, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter expresses Cass County Electric Cooperatives' support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Cass County Electric Cooperative is an electric cooperative serving over 56,000 members in eastern North Dakota. We will support the proposed project through data sharing where applicable. If awarded, we look forward to working with the EERC team and other project partners.

Sincerely,

Jodi Bullinger

Jodi Bullinger
VP Engineering & Operations

Mountrail - Williams Electric Cooperative

Internet: www.mwec.com
Service Area
Toll Free: 1-800-279-2667

PO Box 1346
Williston, ND 58802-1346
(701) 577-3765

PO Box 129
Stanley, ND 58784-0129
(701) 628-2242

PO Box 59
New Town, ND 58763-0059
(701) 627-3550

August 21, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express Mountrail Williams Electric Cooperative's (MWEC) support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

MWEC's service area covers the north half of the Bakken oil field in Mountrail and Williams counties. MWEC is rapidly growing and just reached 750MW peak load. US Hwy 2 goes through MWEC's service area as well. Based on our mutual interests, we are proud to support the proposed project in the form of assistance with engineering support. MWEC will provide system models, analysis, and engineering input. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Scott Iverson
Senior Electrical Engineer
Mountrail-Williams Electric Cooperative

P.O. Box 2747
Fargo, ND 58108

July 28, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota-Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express Xcel Energy's support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Xcel Energy, North Dakota's largest utility began operations in 1908 and is focused on the future of electrification of the transportation industry. Xcel Energy was the first utility to add an electric bucket truck to its fleet. Based on our mutual interests, we are proud to support the proposed project in the form of cost share. Xcel Energy will provide in-kind industry expertise to project working group to develop an EV resilience plan.

We look forward to working with the EERC team and other project partners if awarded

Sincerely,

Tony Grindberg

Tony Grindberg
Xcel Energy
North Dakota Principal Manager
2302 Great Northern Drive
Fargo, ND 58102

ZEF ENERGY

August 14, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express ZEF Energy's support of the Energy & Environmental Research Center's (EERC's) EV Infrastructure Resiliency Plan proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota. There are considerable grid resources needed to build out all of the EV charging infrastructure needed to support EV driers traveling in this legion. Further, resiliency planning will be key when planning for this infrastructure.

As an EV charging solutions provider (an EVSE manufacturer and network operator), ZEF sees the importance of this work. We specialize in working in rural areas and with mid and small sized utilities and communities. We see the importance of good planning so that investment decisions are well informed, especially with significant funding opportunities coming up over the next 5-7 years. Based on our mutual interests, we are proud to support the proposed project in the form of cost share. ZEF Energy will provide technical input along the way. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Megan D. Hoye

Megan Hoye
Chief Development Officer

CONNEXUS
CONNEXUS CAPITAL, LLC

August 2, 2023

Ms. Daisy Selvaraj
Senior Research Engineer, University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

Dear Ms. Selvaraj,

On behalf of Connexus Capital LLC, I submit this letter to express our support of the Energy & Environmental Research Center's ("EERC") subject proposal being submitted to the U.S. Department of Energy ("DOE").

The proposed EERC project will develop and implement a regional Electric Vehicle ("EV") infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

CONNEXUS is a black-owned and operated strategic advisory services firm that specializes in operations and project administration — with a particular focus on infrastructure-level physical & technological initiatives. The company has served clients in renewable energy, law, education, not-for-profit, and financial services. Partners have designed renewable-energy related solutions for nation-state actors, including transportation and energy grid planning programs for the State of California South Coast Air Quality Management District.

Based on our mutual interests, we are proud to support the proposed project in the form of cost-share. CONNEXUS will provide (i) its network, and (ii) the time and expertise of relevant members of its team as needed or otherwise requested to help fulfill project objectives.

We look forward to working with the EERC team and other project partners if awarded. Please feel free to contact me directly at william@connexus.io if I may be of further service.

Most sincerely,

William T. Whitaker
Founder & CEO

August 21, 2023

Ms. Daisy Selvaraj
Senior Research Engineer, University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

Dear Ms. Selvaraj,

On behalf of SAGE Development Authority ("SAGE"), I submit this letter to express our support of the Energy & Environmental Research Center's ("EERC") subject proposal being submitted to the U.S. Department of Energy ("DOE"). The proposed EERC project will develop and implement a regional Electric Vehicle ("EV") infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure and provide solutions to ensure the continuity of operations and services of EV infrastructure and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

SAGE is a 100% Native-led organization, is dedicated to community development, institution-building, and self-determination for the Standing Rock Sioux Tribe. SAGE Development Authority exists to ensure energy independence, protect the environment, and promote economic growth in the region, for the Tribe. A federally chartered Section 17 Corporation created by the Standing Rock Sioux Tribe, SAGE acts as a Public Power Authority (PPA) that will control and operate all the energy production assets within the reservation. As an organization, SAGE institutionalizes Standing Rock's involvement in renewable energy projects, facilitates agreements with third-party entities, and holds the Standing Rock Sioux Tribe's equity interest.

Based on our mutual interests, we are proud to support the proposed project in the form of cost-share derived from the time and expertise of its team as needed to fulfill project objectives. SAGE will also engage its network as needed in service of the project's fact-finding, research, and solutions development efforts.

We are a committed partner to expanding the use of electric vehicles and charging infrastructure in the region. We look forward to working with the EERC team and other project partners if awarded. Thank you for leading this important project. Please contact me via email at joseph@sagesrst.com, at the office (701-854-4766), or on my cell (701-425-3776) if I may be further of service.

Sincerely,

Tatanka Wanjila – Joseph McNeil Jr. | General Manager

SAGE Development Authority

NATIVE SUN COMMUNITY POWER DEVELOPMENT

July 31, 2023

Ms. Daisy Selvaraj
Senior Research Engineer
University of North Dakota
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Dear Ms. Selvaraj:

Subject: Energy & Environmental Research Center Proposal in Response to DOE-NETL-EERE-DOT-JOINT-OFFICE-DE-FOA-0002881

This letter is to express Native Sun's support of the Energy & Environmental Research Center's (EERC's) subject proposal being submitted to the U.S. Department of Energy (DOE).

The proposed EERC project will develop and implement a regional electric vehicle (EV) infrastructure resilience plan that can assess the current and future threats and risks to regional EV charging infrastructure, provide solutions to ensure the continuity of operations and services of EV infrastructure, and maximize benefits to all EV users in North Dakota, South Dakota, Montana, and Minnesota.

Native Sun is a native-led nonprofit that promotes energy efficiency, renewable energy and an equitable energy transition through education, workforce training and demonstration. We are building a dynamic clean energy future that works for all. Based on our mutual interests, we are proud to support the proposed project in the form of cost share. Native Sun will provide expertise in working with Tribal communities in planning for EV infrastructure. We look forward to working with the EERC team and other project partners if awarded.

Sincerely,

Robert Blake
Executive Director

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 https://campus.und.edu/finance/procurement-and-payment-services/travel/travel.html (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.

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.

Subcontractor – Matthew Stolz: Subcontractors are budgeted based on project needs. Mr. Stolz will handle the technical consulting related to electric utility operation and regulation as it relates to electric vehicle (EV) infrastructure. Cost is based on conversations with vendor for Tasks 1.3/1.4 and 2.3/2.4. Please see the scope of work and background/qualifications for additional details.

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 hosting listening sessions, focus groups, and engagement trips with community stakeholders where the primary purpose is dissemination of technical information may include the cost of food. 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.

Rents and Leases – Venue Rental: Venue rental for listening sessions, focus groups, and engagement trips with community stakeholders. Two rentals at $600.

Honorarium: Nominal compensation for stakeholders to participate in listening sessions and focus groups. Based on 10 sessions with four people at $50 per.

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.

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

Technical software fees are for Smartsheet software, which is to be used for tracking and reporting on project specific deliverables and milestones.

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.

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.

APPENDIX D

EERC PROJECTS FUNDED BY NDIC IN THE LAST 5 YEARS

EERC PROJECTS FUNDED BY NDIC IN THE LAST 5 YEARS

Project Name	Start Date	End Date	Total Contracted
Bakken Production Optimization Program 2.0	11/01/16	05/31/20	$6,000,000
Initial Engineering, Testing, and Design of a Commercial-Scale CO_2 Capture System	09/01/17	12/31/19	$3,200,000
FERR 1.3 – Integrated Carbon Capture and Storage for North Dakota Ethanol Production	11/01/17	07/31/18	$345,000
iPIPE: The intelligent Pipeline Integrity Program	04/01/18	12/31/23	$2,600,000
Economic Extraction and Recovery of REES and Production of Clean Value-Added Products from Low-Rank Coal Fly Ash	06/16/18	02/15/20	$30,000
Low-Pressure Electrolytic Ammonia Production	06/16/18	06/30/22	$437,000
FERR 1.3 – Integrated Carbon Capture and Storage for North Dakota Ethanol Production	12/01/18	05/31/20	$500,000
State Energy Research Center	07/01/19	06/30/27	$17,500,000
Underground Storage of Produced Natural Gas – Conceptual Evaluation and Pilot Project(s)	06/01/19	06/30/23	$3,500,000
Assessment of Bakken and Three Forks Natural Gas Compositions	11/01/19	06/19/20	$300,650
Improving EOR Performance Through Data Analytics and Next-Generation Controllable Completions	01/27/20	09/30/24	$500,000
Wastewater Recycling Using a Hygroscopic Cooling System	01/31/20	09/30/22	$100,000
PCOR Partnership Initiative to Accelerate CCUS Deployment	02/01/20	09/30/24	$2,000,000
PCOR Partnership Initiative to Accelerate CCUS Deployment	02/01/20	09/30/24	$2,000,000
FERR 3.2 – Produced Water Management Through Geologic Homogenization, Conditioning, and Reuse	02/01/20	01/31/22	$300,000
Bakken Production Optimization Program 3.0	05/01/20	04/30/23	$6,000,000
EERC Technical Support for RTE CCS Activities – November 1, 2019	06/01/20	11/30/21	$500,000
Flue Gas Characterization and Testing	07/01/20	11/30/21	$3,741,450
Laboratory-Scale Coal-Derived Graphene Process	09/01/20	04/30/23	$162,500
Hydrogen Energy Development for North Dakota	07/01/21	06/30/23	$500,000
Ammonia-Based Energy Storage Technology	04/01/21	03/31/23	$101,390
Field Study to Determine the Feasibility of Developing Salt Caverns for Hydrocarbon Storage in Western North Dakota	07/01/21	06/30/23	$11,900,000
Williston Basin CORE-CM Initiative	02/01/22	05/31/23	$750,000
Front-End Engineering and Design for CO_2 Capture at Coal Creek Station	02/01/22	08/31/23	$7,000,000
Unitized Legacy Oil Fields: Prototypes for Revitalizing Conventional Oil Fields in North Dakota	07/01/21	06/30/24	$3,000,000
iPIPE 2.0: The intelligent Pipeline Integrity Program	01/01/22	12/31/23	$400,000
Advanced Processing of Coal and Waste Coal to Produce Graphite for Fast-Charging Lithium-Ion Battery	02/01/22	01/31/25	$500,000
Liberty H_2 Hub Front-End Engineering and Design	11/01/22	10/31/24	$10,000,000

Continued . . .

EERC PROJECTS FUNDED BY NDIC IN THE LAST 5 YEARS (continued)

Redundancy Study for CO_2 Capture at Coal Creek Station	5/26/2023	3/31/2024	$837,313
Coal Creek Carbon Capture: Geologic CO_2 Storage Complex Development	7/1/2023	5/31/2024	$6,119,690
BPOP 4.0 – Bakken Production Optimization Program 4.0	7/28/2023	10/31/2025	$6,000,000
Prairie Horizon Carbon Management Hub	11/1/2023	10/31/2025	$100,000
Rare-Earth Minerals Study	2/1/2024	4/30/2025	$1,500,000

APPENDIX E

REFERENCES

REFERENCES

1. North Dakota Electric Vehicle (EV) Infrastructure Plan: https://www.dot.nd.gov/construction-and-planning/transportation-plans-programs/north-dakota-electric-vehicle-ev#:~:text=North%20Dakota%20will%20receive%20approximately,charging%20experience%20for%20all%20users (accessed February 2024).
2. All Hazards Analysis (AHA), A Dynamic Approach to Critical Infrastructure Threats: https://inl.gov/ics-aha/ (accessed February 2024).
3. Electric Vehicle Charging Station Locations: https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC (accessed February 2024).
4. U.S. State Population by Rank: https://www.infoplease.com/us/states/state-population-by-rank (accessed February 2024).