

Energy Research Grants

Cycle 16 - REQUEST FOR PROPOSAL

Issue Date	April 1, 2021
Standard proposals	
Preproposal Due	May 15, 2021 – 1:00 p.m. CDT
Full Proposal	By Invitation Only
Special XPrize competition	
5-page proposal submission	May 15, 2021
Funding announced	June 1, 2021
Project Deliverable	December 31, 2021

- A. DESCRIPTION.** The Nebraska Center for Energy Sciences Research (NCESR), a collaboration between the Nebraska Public Power District (NPPD) and the University of Nebraska-Lincoln (UNL), was established to enhance UNL research on renewable energy sources, energy efficiency and energy conservation; and to expand economic opportunities and improve quality of life for Nebraska and the nation.
- B. GOAL.** The overall goal of NCESR is to foster research and education in energy sciences by providing funding to support innovative research and collaboration among UNL faculty and with other public- and private-sector organizations and businesses. More information about the Energy Center and previously funded energy research grants can be found at ncesr.unl.edu.
- C. RESEARCH – CYCLE 16 FOCUS AREAS.** NCESR seeks innovative research proposals that address science or technologies in the focus areas of: Cybersecurity; Energy Storage; Carbon Sequestration; Energy Management; Energy Infrastructure Resilience; Energy Literacy; Non-Carbon Combustion Fuel and Associated Turbines; and Sustainable Agriculture. Proposed research may include, but need not be limited to, the topics identified within each focus area below.
- **Cybersecurity:** Research and development of innovative tools and techniques to reduce risks to Nebraska’s energy infrastructure posed by cyber and other threats. This could be extended to infrastructure across the Regional Transmission Authority as well. Focus in strengthening energy sector cybersecurity *preparedness*, coordinating cyber *incident response and recovery*, and development of innovative *cyber-resilient energy delivery systems*.
 - **Energy Storage:** Develop or improve energy storage technologies to better support the electric grid. Approaches may include significant advancements in the energy density or operational lifetimes of existing technologies or through unique application of novel grid-enabled schemes.
 - **Carbon Sequestration:** Development of innovative technologies for CO₂ storage or transformation using mechanisms that are geologic, biologic, or chemical in character.
 - **Utilization of Biochar:** Perform research on utilization of biochar for carbon sequestration, for use as a soil amendment for improvements in plant growth and yield, soil nutrient retention, soil moisture retention, soil structure, habitat for soil microorganisms, utilization of agricultural and forestry waste and / or to reduce soil pH, or for use in other commodities.

- **Large Scale CO₂ sequestration:** Environmental impact of long-term (permanent) sequestration sourced by removal of massive amounts of CO₂ directly from the oceans or atmosphere.
- **Energy Management:** Research and development of technologies that include planning and operation of energy production and energy consumption units, as well as energy distribution and storage. Objectives are resource conservation, environmental and climate protection, reliable energy delivery, and cost savings.
- **Energy Infrastructure Resilience:** Research and development of innovative technologies for the infrastructure related to energy control and delivery, energy sources, and communication systems to withstand or recover quickly from severe weather, environmental, or human intervention (intentional or accidental).
- **Energy Literacy:** Development of pilot programs or material for enhancement of the broad knowledge about energy sources, the electric grid, and current technology limits of energy storage, generation, carbon sequestration, renewable energy, and other related topics. Programs should engage the public and/or students (university and/or K-12). Studies of the societal impact of energy technologies are also of interest.
- **Non-Carbon Combustion Fuels and Associated Turbines:** Research and development of new non-carbon fuels, synthesis or production of these fuels, and innovative gas turbine designs to use these fuels for electricity production.
 - Carbon free combustion fuels for gas turbines such as ammonia/hydrogen fuel blends for use in electrical energy production.
- **Sustainable Agriculture:** Two topics are of highest priority –
 - Producing “green” methane from animal waste in Nebraska. There are many unknowns associated with these processes including: digesting the manure, capturing the methane, securing the applicable credits, but also applying the digester solids on the fields and looking at getting carbon credits from that. Also consider the reduction of other inputs, including natural gas sourced ammonia.
 - Integrated studies of carbon management associated with low-till, cover-crop agriculture.

D. GRANT TO BUILD A TEAM AND DEVELOP A PLAN FOR THE \$100M XPrize COMPETITION

(<https://www.xprize.org/prizes/elonmusk>)

This special grant from NCSR is to encourage team building and development of a plan for a competitive and credible submission for the XPrize competition by its submission date.

XPrize Information:

This four-year global competition invites innovators and teams from anywhere on the planet to create and demonstrate solutions that can pull carbon dioxide directly from the atmosphere or oceans ultimately scaling massively to gigaton levels, locking away CO₂ permanently in an environmentally benign way.

Team registration opens with the announcement of the full competition guidelines on Earth Day, April 22nd, 2021. The competition will last for 4 years through Earth Day 2025.

To win the competition, teams must demonstrate a rigorous, validated scale model of their carbon removal solution, and further must demonstrate to a team of judges the ability of their solution to economically scale to gigaton levels.

The first round of selections will occur approximately 18 months after the start of the competition (approx. April 22, 2021).

For NCSR support, a 5-page proposal describing the research team and the thrust of the technology planned for development, including the broad technology and science principles supporting the proposed solution. This is intended as a “rapid response” effort so that teams can move quickly to meet XPrize timelines. Up to 3 proposal teams will be supported at \$30,000 each. Funds are intended to be expended by December 31, 2021 at the latest. All requirements for personnel and allowed expenses are identical to the regular NCSR funded projects. The project deliverable is a report detailing the XPrize submission status.

5-page proposal submission – May 15, 2021

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E. RESEARCH TEAM.

1. The research team includes the Principal Investigator (PI), and at least one Co-Investigator, but may be up to two Co-Investigator(s) and other internal and/or external members as appropriate to successfully perform the proposed work.
2. The PI must be a current UNL faculty member holding a tenured, tenure-track (e.g., Assistant, Associate, or Professor) or nontenure-track faculty appointment (e.g., Research Assistant, Research Associate, or Research Professor).
3. The Co-Investigator(s) must be current UNL faculty. The Co-Investigator(s) must be willing and able to take on the role of the PI in the unforeseen event the PI no longer can perform that function. The Co-Investigators must hold a tenured, tenure-track or nontenure-track faculty appointment.
4. UNL faculty may serve as the PI for only one (1) preproposal; however, any individual may serve as a Co-Investigator on multiple preproposals.
5. UNL faculty not designated as the PI and Co-Investigator(s) are to be identified as participants on the research team.
6. Researchers from other universities and/or external partners from the private-sector may also be members of the research team but cannot receive any NCSR funding.

F. COLLABORATION AND INNOVATION. Preproposals from interdisciplinary teams will be given priority, especially those resulting in disruptive innovations and clean energy technology that impact Nebraska, the nation and the world.

G. FUNDING. Funding to support energy sciences research is provided by the NPPD (www.nppd.com) to UNL and administered by the NCSR (ncsr.unl.edu).

H. PROJECT PERIOD.

1. The intent is for the effective start date to be January 1, 2022.
2. The project period for Year 1 is intended to be January 1, 2022 – December 31, 2022.
3. The end date for awards with authorized Year 2 funding is intended to be December 31, 2023; which makes the two-year project period January 1, 2022 – December 31, 2023. Note: If selected, only the Year 1 project period will be initially authorized; the end date will be extended to include the second year if the provisional Year 2 funds are authorized.

- I. BUDGET.** The maximum budget request for the preproposal is as follows:
1. Cybersecurity; Energy Storage; Carbon Sequestration; Energy Management; Energy Infrastructure Resilience; Energy Literacy; Non-Carbon Combustion Fuel and Associated Turbines; and Sustainable Agriculture:
 - a. For a one-year (12 month) research project, the maximum budget is \$85,000.
 - b. For a two-year (24 month) research project, the maximum total budget is \$170,000: \$85,000 maximum for Year 1 and \$85,000 maximum for Year 2. However, Year 2 funding is provisional and contingent on the PI's demonstration of adequate project and financial performance as documented in the required progress reports.
 2. When estimating the total research budget requested for the preproposal, salary and benefits are not allowed for faculty holding tenured or tenure-track appointments. Non-tenure-track faculty who serve as PI are allowed a maximum of one-month of salary and benefits (summer or academic).
- J. EXPECTATION TO SEEK EXTERNAL FUNDING.** It is important and must be understood that those invited to submit full proposals and selected to receive funding are expected to actively submit proposals to secure external funding to supplement the energy research seed grant.
- K. NUgrant ROUTING IS NOT APPLICABLE.** This is an internal funding competition to UNL. Therefore, PIs do not enter this proposal in *NUgrant*, which is currently used only for proposals submitted for external funding.
- L. SELECTION.**
1. The final decision of which principal investigators will be invited to submit full proposals will be performed by the External Advisory Committee (EAC) to NCESR.
 2. The decisions of the EAC are final.
- M. PROCESS.** The process will involve two competitive stages: the preproposal and the full proposal, which is by invitation only.
- N. PREPROPOSAL. Requirements have been revised. Please read carefully.**
1. Preproposals are due by the date and time designated on page 1 of this RFP. Requests for extensions or exceptions will not be accepted.
 2. The preproposal document must:
 - a. Be submitted as a *Word 2003* or *Word 2010* file. Any other type of file, such as a PDF, will not be accepted; thus VOIDING the preproposal.
 - b. Not exceed five (5) pages when printed using standard 8.5" by 11" paper with a minimum of one (1) inch margins (top, bottom, left and right) and font no smaller than 11 point.
 - c. The order and requirements are as follows:
 - c1. Title/abstract – page 1.
 - The title/abstract page must not exceed one page.
 - The title/abstract page, must provide:
 - the project title (15 word maximum)
 - the PI name, position title (e.g., Professor, Associate Professor, Research Assistant, Research Associate etc.), department name and contact information
 - the Co-PI name, position title (e.g., Professor, Associate Professor, Research

Assistant, Research Associate etc.), department name and contact information for a minimum of one Co- PI or a maximum of two Co-PIs

- name, title, affiliation of other members of the research team
- a brief abstract (300 word maximum)

c2. Narrative – pages 2 and 3.

- The narrative must not exceed two pages. References are to be included.
- An omission of any of these sections voids the preproposal.
- The narrative **MUST** include the following sections.
 1. a short, nonproprietary description of the project that can be understood by a nonscientific audience
 2. the research goal and scientific objective(s) of the project including methods to be employed
 3. the energy science merit and potential impact of the project (i.e., energy science innovation, benefits, outcomes)
 4. sources where the principal investigator will apply for future funding
 5. the proposed project length (one year/12 months or two years/ 24 months)
 6. the total budget request

c3. Curriculum Vitae – pages 4 and 5.

- The Curriculum Vitae must not exceed two pages.
- The Curriculum Vitae must be for the Principal Investigator only and must include pending, current and past external funding from 2014-present.

3. To submit a preproposal, go to:

<https://go.unl.edu/i78w> Enter the information requested, attach the preproposal Word document and click on the “Submit” button.

4. A preproposal that does not follow all of the requirements will not be reviewed.

O. FULL PROPOSAL – By Invitation Only

Only the Principal Investigators who are invited to submit a full proposal in the second stage of the competitive process will be provided more specific information regarding the due date, requirements and instructions to electronically submit the full proposal.

P. PUBLICATION ACKNOWLEDGEMENT.

Please use the following acknowledgement format when referencing the Energy Center on your publications. “This work was supported by the Nebraska Public Power District through the Nebraska Center for Energy Sciences Research at the University of Nebraska-Lincoln.”

Q. NCSR CONTACT.

For questions or more information, contact the Nebraska Center for Energy Sciences Research:

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