

## Energy Research Grants **Cycle 15 - REQUEST FOR PROPOSAL**

Issue Date . . . . . April 1, 2020  
 Preproposal Due . . . . . May 22, 2020 – 5:00 p.m. CDT  
 Full Proposal . . . . . By Invitation Only

**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](http://ncesr.unl.edu).

**C. RESEARCH – CYCLE 15 FOCUS AREAS.** NCESR seeks innovative research proposals that address science or technologies in the focus areas of: Bioenergy/Biomaterials; Utilization of co-product/bio-based renewables; Solar Energy; Hydrogen Technology; Energy Efficiency; Carbon Offset Technologies; Water Quality; Cyber Security and Secure Communications; and Energy Storage. Proposed research may include, but need not be limited to, the topics identified within each focus area below.

- **Bioenergy/Biomaterials:** Proposals are sought that utilize innovative, cutting-edge, approaches that use new technologies such as CRISPR/Cas9-mediated gene editing to create bioenergy crops (e.g., corn, soybeans, *Camelina*, switch grass, etc.) possessing new/enhanced traits that enhance value in the marketplace.  
Strategies for the efficient fractionation/purification of biomaterials and/or molecules from terrestrial-based feedstocks are sought. These can include but are not limited to throughput imaging technologies for non-destructive monitoring of co-product accumulation in feedstocks, to harvesting and purification of the biomaterials, and co-product fractionation. Technologies that can be scaled from a lab setting to rural processing facilities are of particular interest.
- **Utilization of Co-Product/Bio-Based Renewables:** Evaluation of new approaches to develop and utilize co-products from bio refineries including ethanol plants, energy generation operations or designed to harvest energy from renewable sources.
- **Solar Energy:** Solar forecasting (cloud and related weather models); technical, safety, and policy issues related to highly integrated solar PV materials and devices into the built environment; solar materials and systems and the integration of solar energy and storage; effect of large-scale distributed PV farms on the electric grid, and improved inverter technology for VAR output and control.
- **Hydrogen Technology:** Perform research on methods and technologies to purify hydrogen that is a resultant from a graphene or carbon black separation process from methane or other carbon carrying gases or other technologies such as improved PEMs.
- **Energy Efficiency:** Improved use of energy in agriculture to include reducing energy needs for irrigation, field operations, crop processing, and storage. Examples include studies that advance energy and water efficient irrigation practices that provide production cost input savings for

farmers. These improvements can be focused on using equipment and monitoring currently in place or by integrating these tools to provide more reliable information for improvements in the efficiency of field operation practices to reduce overall energy and water usage.

➤ **Carbon Offset Technologies**

- **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 to reduce soil pH, or for use in other commodities.
- **Methane Management:** Reduce methane emissions from livestock with ruminant digestive systems through management schemes that, working in concert with energy generation carbon management practices, have potential to reduce greenhouse gas emissions.
- **Crops that Impact Carbon Offsets:** Research and development of Nebraska climate specific crops that aid in the sequestration of carbon in agricultural soils. This may include plant root systems and the soil microbiome.

➤ **Water Quality:** Develop improved methods of removing harmful chemical contaminants from rural water supplies.

➤ **Cyber Security and Secure Communications:** Develop improved tools to help secure computer and communications technology from harmful, intrusive attacks from nefarious parties with malicious intent in grid transmission and energy delivery systems.

➤ **Energy Storage:** Develop improved energy storage technologies with improved electric grid supporting capabilities. Examples include thermal energy storage that utilizes concrete, liquid air, water, sand, and molten salt. This could include improvements in thermal energy management, and transport of thermal energy.

**D. 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 NCESR funding.

**E. 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.

**F. FUNDING.** Funding to support energy sciences research is provided by the NPPD ([www.nppd.com](http://www.nppd.com)) to UNL and administered by the NCSR ([ncesr.unl.edu](http://ncesr.unl.edu)).

**G. PROJECT PERIOD.**

1. The intent is for the effective start date to be January 1, 2021.
2. The project period for Year 1 is intended to be January 1, 2021 – December 31, 2021.
3. The end date for awards with authorized Year 2 funding is intended to be December 31, 2022; which makes the two-year project period January 1, 2021 – December 31, 2022. 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.

**H. BUDGET.** The maximum budget request for the preproposal is as follows:

1. Bioenergy/Biomaterials; Utilization of co-product/bio-based renewables; Solar Energy; Hydrogen Technology; Energy Efficiency; Carbon Offset Technologies; Water Quality; Cyber Security and Secure Communications; and Energy Storage:
  - 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 a PI are allowed a maximum of one-month of salary and benefits (summer or academic).

**I. 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.

**J. *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.

**K. 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 NCSR.
2. The decisions of the EAC are final.

**L. PROCESS.**

The process will involve two competitive stages: the preproposal and the full proposal, which is by invitation only.

**M. 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://ncesr.unl.edu/event.php?eventID=4592>  
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.

#### **N. 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.

**O. 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."

**P. NCSER CONTACT.**

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

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