Energy Research Grants

Cycle 12 - REQUEST FOR PROPOSAL

Issue Date	April 3, 2017
Pre-Proposal Due	May 19, 2017 – 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.

C. RESEARCH – CYCLE 12 FOCUS AREAS. NCESR seeks innovative research proposals that address science or technologies in the focus areas of: biofuels and bioproducts; carbon management and energy use efficiency in agroecosystems; electrification of heavy equipment; energy and society; energy storage; materials; new approaches to generate value from established ethanol production technology; and water, energy and agriculture. Proposed research may include, but need not be limited to, the topics identified within each focus area below.

- **Biofuels and Bioproducts**— New chemicals, biofuels or other valuable chemical intermediates produced through microbial activity; advances in lignin processing and utilization; utilization of combustion-derived carbon dioxide for processing or synthesis of materials or foods or other bioproducts; and utilization of combustion-derived carbon dioxide for processing or synthesis of materials, or foods or other bioproducts.
- **Carbon Management and Energy use Efficiency in Agroecosystems** — Improved use and recycling of carbon in agroecosystems that focus on carbon losses and sinks in integrated livestock and cropping systems. Mitigation of greenhouse gas emissions from agroecosystems with specific focus on new and emerging methods that lead to great promise and external funding. Quantification of carbon cycling within agroecosystems or within different subsystems that contribute to a better understanding of food production impact on global carbon cycles.
- **Electrification of Heavy Equipment** – Breakthroughs and improvements in energy storage, efficient energy conversion, test and measurement designs, advanced electric or electro-mechanical machines, and novel applications of electric drive systems, control of electric systems, and electric power for trailers and implements. The platforms of interest include applications in agricultural, construction, forestry, mining, and other off-road heavy equipment. Industry collaboration and/or partnerships will be favorably considered as part of the review process.

- **Energy and Society** — Understand the impacts and consequences of transforming historic land use practice to enhance energy efficiency; establish sociological perspectives that guide sustainable energy consumption; and identify and analyze psychological and sociological stress arising from energy inefficiency, energy dependency, and needs, if any, to manage energy expectations.
- **Energy Storage** — Develop a modeling tool or a consistent methodology and approach capable of comparing, on an equal basis, the net cost of energy related services provided by energy storage and other distributed energy resources as compared to incumbent technologies such as combustion turbines and traditional infrastructure upgrades.
- **Materials** —Low cost energy storage methods and materials to directly store electric charge or for improved energy density and rapidity of chemical to electrical energy conversion; materials for energy efficient devices; materials synthesis from CO_2 and hydrogen utilization; utilization of agricultural biomass residues for production of materials; and materials for high temperature extreme applications.
- **New Approaches to Generate Value from Established Ethanol Production Technology** — Improved uses and endproducts from bioproduct streams that upgrade end uses or improve efficiency or viability within existing biorefinery starch ethanol operations, and developing methods to improve bioprocess efficiency to enhance viability of new renewable processes that may include algal approaches, grain ethanol, or cellulosic ethanol processes.
- **Water, Energy and Agriculture** — The research objectives are to: (1) increase agricultural income and yield per unit of irrigation water used in Nebraska, (2) decrease peak-load irrigation-associated energy demand, and (3) improve crop water use efficiency during periods of high water demand and drought. Research can also address temporal and spatial energy (all energy types) use in irrigated and non-irrigated agriculture. Specific areas include: comprehensive analyses on energy input and implications to farm net benefit under various crop management practices and embodied energy analyses and their implications to farm net income. Evaluate energy use for different crop management practices, including tillage practices: economic net return vs. environmental implications of no-till, disk-till, strip-till, ridge-till, and other tillage practices.

D. RESEARCH TEAM.

1. The research team includes the Principal Investigator (PI), 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* non-tenure-track faculty appointment (e.g., Research Assistant, Research Associate, or Research Professor).
3. The Co-Investigator(s) must be current UNL faculty. One Co-Investigator is required, however, one additional Co-Investigator is allowed. 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* non-tenure-track faculty appointment.

4. UNL faculty may serve as the PI for only one (1) pre-proposal; however, any individual may serve as a Co- Investigator on multiple pre-proposals.
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.

E. COLLABORATION AND INNOVATION. Pre-proposals 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) to UNL and administered by the NCESR (ncesr.unl.edu).

G. PROJECT PERIOD.

1. The intent is for the effective start date to be January 1, 2018.
2. The project period for Year 1 is intended to be January 1, 2018 – December 31, 2018.
3. The end date for awards with authorized Year 2 funding is intended to be December 31, 2019; which makes the two-year project period January 1, 2018 – December 31, 2019. 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 pre-proposal is as follows:

1. Biofuels and bioproducts; carbon management and energy use efficiency in agroecosystems; electrification of heavy equipment; energy and society; energy storage; materials; new approaches to generate value from established ethanol production technology; and water, energy and agriculture:
    a. For a one-year (12 month) research project, the maximum budget is $75,000.
    b. For a two-year (24 month) research project, the maximum total budget is $150,000: $75,000 maximum for Year 1 and $75,000 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 pre-proposal, 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).

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 NCESR.
2. The decisions of the EAC are final.

L. PROCESS.

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

M. PRE-PROPOSAL.

1. Pre-proposals 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 pre-proposal 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.
   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.
      - The narrative must include:
        - a short, non-proprietary description of the project that can be understood by a non-scientific audience
        - the research goal and scientific objective(s) of the project including methods to be employed
        - the energy science merit and potential impact of the project (i.e., innovation, benefits, outcomes)
        - sources where the principal investigator will apply for future funding
        - the proposed project length (one year/12 months or two years/ 24 months)
        - 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 2012-present.

3. To submit a pre-proposal, go to: **http://ncesr.unl.edu/event.php?eventID=2513**
Enter the information requested, attach the pre-proposal Word document and click on the "Submit" button.
4. A pre-proposal 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. NCESR CONTACT.

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

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