

2010/11 Energy Research Grants – Cycle 5

NCESR. 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 in April 2006 to conduct 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.

Goal. The overall goal of the NCESR is to foster research and education in energy sciences by providing funding to support innovative research and collaboration among University of Nebraska-Lincoln faculty and other public- and private-sector organizations and businesses working in energy sciences.

Request for Proposals. The NCESR released the Request for Proposals (RFP) for its fifth competitive round of Energy Research Grants on July 7, 2010.

Selections. The External Advisory Committee (EAC) met on November 24, 2010 and selected 11 energy research projects to fund from among the forty-three proposals submitted by UNL faculty teams. The projects funded, by focus area, are as follows:

1. Produce or store commercially useable energy supplies from renewable energy sources, such as wind, biomass, solar or geothermal.

- *Novel Supercapacitors Based on Nano-Structured Materials* – Yongfeng Lu, Professor - Department of Electrical Engineering,
- *Generation of Biomass-Derived Feedstocks for Biofuel and Bioenergy Production* – Jiantao Guo, Assistant Professor - Department of Chemistry,
- *Portable Hydroelectricity in a Micro/Nano-World* – Li Tan, Associate Professor - Department of Engineering Mechanics
- *Self-X: An Intelligent Large-Scale Battery System for Renewable Energy Storage* – Song Ci, Associate Professor - Department of Computer and Electronics Engineering
- *A Two-Phase System for Solar Domestic Water Heating* – Siu-Kit Lau, Assistant Professor - Department of Architectural Engineering

2. Improve operating efficiency and use efficiencies in existing power plants, biofuel plants or wind energy facilities.

- *The Shadow Price of CO₂ Emissions for Nebraska Electricity Generating Plants* – Lilyan Fulginiti, Professor - Department of Agronomy and Horticulture
- *Micro/Nanomechanical Studies of Switchgrass Composition and Cellulose Breakdown Kinetics* – Joseph Turner, Professor - Department of Engineering Mechanics

3. Reduce or eliminate negative environmental impacts from energy production systems, including fossil fueled and nuclear power plants, Biofuel systems (crop production, ethanol conversion, co-product use), geothermal, and wind powered generation.

- *Optimizing Algae and Biogas Production in SUPER Loop Biorefineries* – Galen Erickson, Professor - Department of Animal Science
- *Integrated Systems for CO₂ Capture, Anaerobic Digestion, and Algae Production* – George Oyler, Associate Professor - Department of Biochemistry
- *Nanostructured Design of Catalysts for Converting Glycerol to Value Added Chemicals* – Xiao Cheng Zeng, Professor - Department of Chemistry

4. Improve energy efficiency and conservation in the residential, commercial or industrial sectors.

- *Residential Electricity Management and Control Mediated by Occupancy Sensor Networks* – Dale Tiller, Associate Professor - Department of Architectural Engineering