

2009 Northeast Sun Grant Competitive Grants Program

Release of the RFA. The 2009 grant competition opened with the August 27, 2008 release of the Request for Applications (RFA) at the Northeast Sun Grant 2008 Regional Conference at New funding levels. The 2009 RFA invited proposals for two new funding levels: Research Proposals: Grants that address the Northeast Sun Grant priorities will be provided to single investigators or small teams for up to \$150,000 (total Sun Grant dollars) (1-3 years in duration). Single or multi-component (research and/or education and/or outreach) proposals are appropriate. (15 page proposal narrative limit.) Cooperative Extension and Education Mini-Grant Proposals: Education and/or outreach proposals may seek up to \$30,000 (total Sun Grant dollars over the duration of the project) (1-3 years in duration possible) in support of graduate students, cooperative extension educator training or outreach programs. (10 page proposal narrative limit).

Letters of intent. The application process required submission of a letter of intent to apply, due by October 31, 2008. The Northeast Sun Grant Institute of Excellence received 91 letters of intent to apply to the 2009 competition. Full applications. This year, we changed the method of uploading proposals to simplify the preparations for the review process. Applicants were required to upload a single document that contained all parts of the proposal including budget pages.

Full applications were due on February 2, 2009. There were 65 full proposals submitted.

Technical panel review. A ten-person technical review panel was formed containing seven past members and three new members. Each proposal was assigned a primary and secondary reviewer. Each reviewer was assigned approximately 10-12 proposals to review. All panel members were expected to review the abstracts of all proposals. Five weeks prior to convening the panel, hardcopies and electronic CD copies were distributed to all panel members. Within two weeks of receipt the panel members indicated whether they had any conflicts of interest., Ad Hoc reviews were sought for all proposals in the competition. One proposal was re-assigned reviewers to avoid a potential conflict of interest and 65 Ad hoc reviews were requested from qualified scientists and provided in writing to the Chair. The panel convened in Ithaca, NY from noon Tuesday March 24 through noon Thursday March 26, 2009 to review and rank the proposals.

SUBJECT CATEGORIES SUBMITTED

The 2009 proposals were separated into the following subject categories:

RESEARCH GRANTS (\$150K limit) Conversion processes (21 proposals) Feedstock development (13 proposals) Logistics (6 proposals) Life cycle analysis (9 proposals) Scaleable technologies (7 proposals) Systems integration (3 proposals)

COOPERATIVE EXTENSION & EDUCATION GRANTS (\$30k limit) All categories were represented through 6 proposals (with regard to the distribution of proposals submitted to the 2009 competition),

ORIGIN OF SUBMISSIONS BY STATE

15 were submitted from New York, 11 from Pennsylvania, 9 from Michigan, 5 from New Jersey and Maryland, 6 from Maine, 4 from Massachusetts, 3 from Ohio and Vermont, 2 from West Virginia, and one each from Delaware and Connecticut. No proposals were submitted from Rhode Island, New Hampshire or the District of Columbia.

REVIEW PROCESS

The combined 65 full proposals represented over \$9 million in requested funding. The review panel spent the first two days reviewing each proposal by describing the proposal goals, methods, expected outcomes, relevance to the program, strengths and weaknesses. During the first group evaluation proposals were divided into three categories: Fund, Hold for further consideration, or Do Not Fund. Of the "Do Not Fund" category, the majority of these proposals were either poorly written, or did not sufficiently describe the proposed methods or experimental details. Proposals that were placed in the "Hold for further consideration" category were considered to be proposals with strong merit, but due to limited funds (\$1,050,000), a ranking of these was required to select the strongest proposals. There was general agreement within the group that projects that demonstrated high potential for immediate impact (lower risk) were generally preferred this year, though high quality fundamental research also was selected in at least one case.

The following is a list of the projects selected for funding:

Title: Economic Costs and Environmental Consequences of U.S. Biofuels Policies PI: Antonio Bento (Cornell University) Sun Grant funds: \$ 149,999 The purpose of this project is to develop a multi-market simulation model that simultaneously measures the economic costs, regional distributional impacts and GHG emissions of increased U.S. biofuels mandates. The merits of the proposed methodology are compared against standard lifecycle analysis

Title: Assessing the bioenergy production capability of native grasses using wet chemical techniques and bench-scale biochemical and thermo chemical conversion approaches PI: Suleiman Bughrara (Michigan State University, Crop and Soil Science) Sun Grant funds: \$112,000 The main objective of this proposed

research is to investigate the influence of biomass composition on the composition of bio-oil produced by fast pyrolysis. Plantations of the grass accessions and cultivars have been established at MSU since 2006, the research scope of this endeavor only includes chemical analysis and not stand establishment. The specific objectives of the proposed research are to: 1) characterize the chemical composition of native plant ascensions established at MSU using wet chemical techniques, including carbohydrate, protein, lipid, Klason lignin, and ash analysis, 2) perform a set of bench-scale pyrolysis experiments for bio-oil production using native warm-season grasses.

Title: Online Demonstration and Measurement of Renewable Energy Technologies PI: Daniel Ciolkosz (Pennsylvania State University) Sun Grant funds: \$30,000 This project seeks to create and utilize an online monitoring system for renewable energy technologies that measures and communicates actual performance of renewable energy systems in the region.

Title: Optimal Harvest Time of Switchgrass: Yield, Nutrient Cycling, Air Emissions PI: Stephen Herbert (University of Massachusetts) Sun Grant funds: \$30,000 This research will examine harvest times with regard to mineral and moisture content, and the vigor/health of the overall switchgrass crops monitored. Varying different fall harvest times can potentially affect plants vigor and ability to store total non-structural carbohydrates to survive the winter season with an ultimate goal of farmer adoption and of a production guide with Best Management Practices (BMPs) for fertility and harvest management.

Title: Fractionation of Alkaline Pulping Liquors for Fuel and Chemical Production PI: David Hodge (Michigan State University) Sun Grant funds: \$150,000 The purpose of this work is to develop a better understanding of the solubility behavior of the biopolymers hemicellulose and lignin solubilized during chemical pulping, with the goal of developing solubility-based separations for recovering a portion of these chemicals to be used as feedstocks for higher value applications from chemical pulping waste streams.

Title: Development of Square Bale Handling Systems PI: Jude Liu (Pennsylvania State University) Sun Grant funds: \$138,807 This project will be focused on solving some constraints that may impact entire systems of square bale logistics. . Anticipated outcomes include mechanical devices for fast-loading and unloading operations, and a spreadsheet model of square bale logistics systems.

Title: New Proposal: High-throughput Engineering of Cellulase Consortia Using a Gel that Can Produce Proteins without Any Living Cells PI: Dan Luo (Cornell University) Sun Grant funds: \$150,000 The project goal is to establish a robust, P-gel-based, high-throughput protein engineering platform that is able to molecularly evolve not just single proteins, but also protein consortia. We also expect to achieve a five- to ten-fold reduction in the cost of cellulase enzymes by dramatically improving the efficiency of these enzymes. There are three goals for this project: 1) Using P-gel to establish cellulase mutant selection methods based on insoluble substrates; 2) Using microfluidics to generate P-gel microdroplets in order to

establish a high-throughput method for screening the high activity cellulase mutants; and 3) High-throughput molecular engineering of cellulase consortia.

Title: Advanced biofuels using ozone mediated technologyPI: Ramani Narayan (Michigan State University) Sun Grant funds: \$147,995 We propose to improve the thermal and oxidative stability of Biofuels derived from vegetable oils to resolve issues related to filter plugging, injector failure and overall problems with fuel economy, emission and power loss associated with Biodiesel. The proposed process should further yield oxygen enriched value-added products suitable as fuel oxygenators and bio-based lubricants.

Title: Hydrogen, Natural Gas, Electricity, and Heat from Landfill Gas: Integration of Emerging Technologies for a Quad-Generation Demonstration ProjectPI: David Specca (Rutgers, The State University of New Jersey) Sun Grant funds: \$150,000 This project will integrate innovative emerging technologies into a system that will produce clean transportation fuel, electricity and heat from landfill gas. A preliminary engineering and feasibility study will be conducted as part of this proposal in addition to education and outreach activities related to the outcome of the research.

Title: Fuel-Smart II: A Biofuel Education Outreach ToolPI: Mary Wrege (Cornell Cooperative Extension – Oneida County) Sun Grant funds: \$30,000 The proposed work is to (1) prepare Extension educators with a research-based, critically reviewed package of information that is ready for electronic presentation and distribution to meet the growing need for sustainable biofuels knowledge in their communities and to (2) provide a new cellulosic ethanol biofuels electronic knowledge base package targeting grades 7-12 that is aligned with state learning standards, and delivered using interactive whiteboard (IWB) technology.

Letters of award were sent to the above noted PI's following approval by the Department of Transportation. Additionally, rejection letters were forwarded along with reviewer's comments and critiques to those submitting unsuccessful proposals. Where appropriate resubmission in the 2010 NESGI competition was encouraged.