



SYRACUSE CENTER OF EXCELLENCE

in ENVIRONMENTAL and ENERGY SYSTEMS

Request for Applications Collaborative Activities for Research and Technology Innovation December 16, 2005

SUMMARY OF PROGRAM REQUIREMENTS

Synopsis of Program:

The Syracuse Center of Excellence in Environmental and Energy Systems (Syracuse CoE) seeks applications for competitively awarded “Collaborative Activities for Research and Technology Innovation (CARTI)” projects. CARTI projects will address research questions associated with either air quality or water resource management, in support of the development of technology innovations for improving environmental quality in built and urban environments.

Award Information:

Type of award: Contract from Syracuse University

Estimated number of awards: 14 awards

Anticipated funding amount: Up to \$2.4 million total for all awards

Funding per award: Two award levels are available: (i) total of up to \$100,000 for exploratory projects or planning activities with a duration of up to 12 months; (ii) total of up to \$300,000 for projects with a duration of up to 24 months.

Eligibility Information:

Institutions of higher education and not-for-profit research institutions that are members of the Syracuse CoE are eligible to apply. Non-member institutions may apply in collaboration with a member institution as lead applicant. (Syracuse CoE member institutions are listed in Section III, *Eligibility Information*.)

Application Materials:

Applications must be made electronically using the application package available at <http://www.syracusecoe.org>

Contact persons:

Technical contact: Suresh Santanam; Phone: 315-443-4445; Email: ssantana@syr.edu

Eligibility contact: Gina Lee-Glauser; Phone: 315-443-1824; Email: leeglaug@syr.edu

Electronic submissions: Cynthia Nieman; Phone: 315-443-4445; Email: cynieman@syr.edu

I. FUNDING OPPORTUNITY DESCRIPTION

Introduction

The mission of the Syracuse Center of Excellence in Environmental and Energy Systems (Syracuse CoE) is to create innovations that improve health, productivity, security, and sustainability in built and urban environments. The Syracuse CoE conducts projects across the full spectrum of innovation—from basic and applied research to technology application and demonstration—in multiple areas, including indoor environmental quality, air quality, water resource management, and energy systems.¹ This solicitation for “Collaborative Activities for Research and Technology Innovation (CARTI)” projects is targeted for basic and applied research in two focused areas: air quality and water resource management. This program is funded by the U.S. Environmental Protection Agency under award X-83232501-0.

The long-term vision for CARTI activities supported through this solicitation is to advance the development of technology innovations required to create envisioned new “Intelligent Environmental Quality Systems” (*i*-EQS). The *i*-EQS vision includes three primary components:

- 1) real-time monitoring of conditions at multiple locations across a broad range of scales, from “global” to “local”;
- 2) analysis of sensor data, including linkages with simultaneous computational modeling;
- 3) responses that improve an environment, including the services it provides (*e.g.*, occupant comfort in built environments, drinking water and/or recreation from surface waters) and its impact on humans (*e.g.*, health and performance effects) and natural resources (*e.g.*, materials, energy, ecosystems).

Potential applications of envisioned *i*-EQS include a variety of situations in which assurance and/or optimization of environmental conditions is highly valued. Two applications of current interest to the Syracuse CoE are: (a) control of building systems to create comfortable, more healthy indoor environments, while reducing contaminant emissions from buildings into the surrounding airshed, and (b) monitoring of surface waters that are sources of drinking water and ecological and recreational benefits. Motivations for these applications include improving human health, productivity, and security, as well as promoting sustainability of urban ecosystems.

Achieving the *i*-EQS vision will require advances in fundamental knowledge, technology innovation, technology application and demonstration, and system integration. Supported by grants and contracts from multiple sources, the Syracuse CoE is pursuing a broad portfolio of activities to realize the envisioned revolutionary *i*-EQS, including extensive research efforts to improve indoor environmental quality and a multi-year collaborative

¹ The Syracuse CoE includes activities of the Environmental Quality Systems (EQS) Strategically Targeted Academic Research (STAR) Center and the New York Indoor Environmental Quality (NYIEQ) Center, Inc.

effort to establish a network of water quality monitors in the Seneca River watershed. The Syracuse CoE seeks to extend the breadth of its *i*-EQS research efforts via CARTI projects in the specific research areas of interest described below.

Specific Research Areas of Interest

A. Air Quality. The Syracuse CoE seeks to address selected issues of national and international significance concerning harmful indoor and outdoor air pollution. Specifically, the Syracuse CoE seeks to extend the breadth of its research efforts to include studies that address the source, fate and transport of airborne pollutants throughout indoor environments; the linkages between outdoor and indoor air quality; and the monitoring and modeling of urban airsheds.

The overarching motivation for this research is developing and implementing *i*-EQS for buildings in urban settings that will reduce potential health impacts and improve productivity of building occupants. Envisioned *i*-EQS will include capabilities for monitoring the local airshed and the transport of outdoor contaminants through the building envelope; dynamically regulating the building control system in response to, or in anticipation of, changing outdoor conditions; and optimizing the delivery of conditioned outdoor and/or treated recirculated indoor air to individual occupants. In support of this vision, the new headquarters facility for the Syracuse CoE is being designed to serve as a testbed for prototype *i*-EQS technologies, including systems that monitor environmental conditions across a cascade of scales, from individuals' desktops to rooms, floors, and the surrounding urban airshed. In addition, the Syracuse CoE headquarters will include a variety of specialized laboratories designed for studies of the impact on human performance of multiple environmental factors, including air quality, thermal conditions, lighting, and sound. Construction of the Syracuse CoE headquarters facility is scheduled to be completed in Fall 2007.

Specific air quality research areas of interest to the Syracuse CoE include:

- What computational models and real-time monitoring of urban airsheds are required to enable development and implementation of *i*-EQS applications for buildings in urban settings?
- How can building envelopes and HVAC systems be integrated into an *i*-EQS application that achieves reductions in the exposure of occupants to harmful contaminants in indoor air?
- What are the sources and/or mechanisms that contribute to elevated levels of pollutants in indoor environments?
- What are the dominant sources and/or processes within a building that contribute to exposing occupants to harmful contaminants in indoor air?
- How can methods that link sources and receptors be applied to better understand the contribution of source types, components, and attributes to indoor air quality in the vicinity of building occupants and to the health effects they experience?

- How can personal environments be controlled to suit the need of each individual, while providing global optimization of the building as a whole?
- Do individuals have a persistent characteristic set of preferences for environmental conditions?

B. Water Resource Management. The Syracuse CoE seeks to address selected issues of national and international significance concerning water resource management, focusing on the development of integrated *i*-EQS that improve significantly the tools available to monitor and protect critical surface waters, including sources of drinking water and/or for recreation. We are especially interested in projects focused on watersheds in Upstate New York, including watersheds of Onondaga Lake, the Seneca River, Lake Ontario, and the St. Lawrence River. Specifically, the Syracuse CoE seeks to extend the breadth of its research efforts to include studies of broader geographical regions in Upstate New York (beyond the Seneca River watershed) and the application of robotic monitoring to manage and protect water resources.

Specific water quality research areas of interest to the Syracuse CoE include:

- What are the stressors to water quality in New York watersheds to Lake Ontario? Are there techniques to quantify the impacts of these stressors? Are there diagnostic indicators that can be monitored?
- How do aquatic ecosystems in the Lake Ontario watershed respond to environmental management actions and what is the time-scale of recovery?
- How can we advance monitoring techniques, such as robotic devices or remote imagery, to better manage and protect water resources, and assess mitigation activities?
- Can we link models to advanced monitoring activities to better manage and protect water resources? How can these models be tested and validated? How will the availability of advanced monitoring data alter understanding of uncertainty in model calculations?

II. AWARD INFORMATION

Up to \$2.4 million is available for award under this announcement. The Syracuse CoE anticipates making up to 14 awards (depending on the number and merit of applications submitted), at two different funding levels:

1. Up to \$100,000 in total costs for exploratory projects and/or planning activities, with a duration up to 12 months; and
2. Up to \$300,000 in total costs for projects with a duration of up to 24 months.

The distribution of available funds between 12- and 24-month projects, and between air quality and water resource management topics, will be determined based on evaluations of submitted proposals and programmatic priorities of the Syracuse CoE. Overall, the objective is to support a balanced portfolio of projects, with one-year projects typically being exploratory in nature and two-year projects typically involving fieldwork and/or experimental studies that require longer durations.

The total project period for an application submitted in response to this RFA may not exceed 24 months. Proposed start dates may be as early as June 1, 2006 and as late as September 1, 2006.

Requests for amounts in excess of a total of \$100,000 for 12-month projects or \$300,000 for 24-month projects will not be considered. The Syracuse CoE reserves the right to reject all applications and make no awards under this RFA.

III. ELIGIBILITY INFORMATION

Eligible Institutions

A faculty or staff member from an academic or not-for-profit research institutional partner of the Syracuse CoE must lead each CARTI project; these institutions are:

- Alfred University
- Clarkson University
- Cornell University
- Institute of Ecosystem Studies
- Rensselaer Polytechnic Institute
- State University of New York (SUNY) College of Environmental Science and Forestry
- SUNY Upstate Medical University
- Syracuse University
- University at Albany—SUNY
- University at Buffalo—SUNY
- University of Rochester
- Upstate Freshwater Institute

Applicants are strongly encouraged to create teams involving investigators from more than one partner academic and/or research institution, and to include collaborators from industry. Applicants also are strongly encouraged to form teams of investigators, students, and staff that promote increased involvement of individuals from groups that have been traditionally under-represented in scientific research. The project team may include co-investigators and other collaborators who hold positions at institutions that are not currently partners in Syracuse CoE.

IV. APPLICATION AND SUBMISSION INFORMATION

All applications in response to this announcement must be submitted electronically.

The application must contain the components listed below, paginated consecutively at the bottom of the page. Applications that are either incomplete or exceed stipulated limits will be returned without review.

A. Cover Sheet with Official Certification. The Cover Sheet should include: Project title, Principal Investigator (PI) (name and contact information, including phone number and email address), Co-PIs, Proposed total funding, Proposed project period (start date, duration), and signed official certification by an authorized institutional representative (name and contact information, including phone number and email address). A template cover sheet is available at <http://www.syracusecoe.org/carti/forms/>.

B. Project Summary. A summary of not more than 200 words suitable for public dissemination should include: (a) the objectives of the study (including any hypotheses that will be tested, (b) the approach to be used, and (c) the expected results of the project.

C. Table of Contents.

D. Project Narrative. The project narrative should include:

- Statement of Problem, Need or Hypothesis
- Rationale, justification for work (including, if appropriate, differentiation from previous or ongoing work performed under funding through the Syracuse CoE)
- Specific aims/objectives to address problem, need or test hypothesis
- Experimental design and/or computational approach and methodologies
- Workplan (timeline) and management plan (if appropriate)
- Expected results and practical outcomes
 - Assessment/evaluation
 - Potential benefits
 - Collaboration benefits

For proposals requesting up to \$100,000, the narrative must be no more than 5 pages. For proposals requesting up to \$300,000, the narrative must be not more than 10 pages. (In each case, the narrative should be presented in 12-point type, single-spaced, with 1-inch margins.)

E. Quality Assurance Statement (up to 2 pages in addition to the 5-page project narrative). For any project involving data collection or processing, conducting surveys, environmental measurements, modeling, or the development of technology (whether hardware-based or via new technologies) for pollution control, provide a statement on processes that will be used to assure that the results of the research satisfy the intended project objectives. The Syracuse CoE is particularly interested in the quality controls for data generation and acquisition, and how data validation and usability will be verified.

E. Budget. The proposed budget should be presented using the template available at <http://www.syracusecoe.org>. A budget narrative of up to 2 pages should include rationale and need for requested expenses (i.e., personnel, fringe benefits, travel, equipment, supplies, and other costs associated with the project). The budget must include an allowance for participating in, and presenting the project results at the Syracuse CoE annual Symposium, which is held in Syracuse each Fall.

F. Resumes. Provide resumes for all principal investigators, co-PIs, and senior personnel. Each resume must not exceed two pages (single spaced, 12-point type, 1-inch margins). The NSF biosketch format should be used.

Submission Instructions

All application materials should be assembled into a single Adobe Acrobat PDF file, which must be submitted via email to Cynthia Nieman at cynieman@syr.edu. The deadline for submissions is 5:00pm Eastern Time on January 31, 2006. An email will be sent to the PI and the Administrative Contact to acknowledge receipt of the application.

V. APPLICATION REVIEW INFORMATION

Criteria

Proposals for CARTI projects will be reviewed for the following scientific and technical merit criteria:

- *Innovation* - Does the project employ novel concepts, approaches or methods? Are the aims original and innovative? Does the project challenge existing principles/dogma, develop new methodologies or technologies, or address under-explored or unexplored areas?
- *Approach* - Are the research design and methods appropriate to achieve the proposal's aims? Are the conceptual framework, hypotheses, design methods and analyses adequately developed, and well integrated with the project's aims? Does the applicant acknowledge potential problem areas and consider alternative methods/approaches? While preliminary data are not required, if provided, do they support the scientific rationale for the study? If the project develops useful results, how might subsequent work be funded?
- *Applicant's Qualifications* - Does the principal investigator (and any collaborators) have the appropriate background to carry out this work? Are all areas of expertise needed to conduct the study adequately represented? If the investigator is not yet established or is new to environmental systems research, what is the investigator's potential to contribute significantly to the field?
- *Resources* - Are research requirements adequately supported by the necessary resources, and are any collaborative arrangements proposed? Is there evidence of appropriate institutional resources?
- *Interdisciplinary Involvement in the Proposed Research* - If applicable, is the combination of disciplines proposed likely to advance the frontiers of environmental systems research and generate meaningful results? Are the plans for collaboration well developed and realistic?
- *Budget Justification* - Is the budget reasonable and well justified for the proposed research? Is the project period reasonable and realistic for the proposed scope of work?

In addition, review criteria will include an evaluation of overall significance of the project:

- To what extent will the project, if successful, make an original and important contribution to the mission of the Syracuse Center of Excellence in Environmental and Energy Systems?

Review and Selection Process

An external technical peer review panel will review all applications. Each proposal will be assigned to at least two referees—one primary reviewer and one or more secondary reviewers, whose expertise is closely aligned with the proposal’s topic or methodologies. In making reviewer assignments, consideration also will be given to the avoidance of conflicts of interest. Reviewers will prepare written evaluations and score proposals for scientific and technical merit in advance of the review meeting.

The Review Panel will make recommendations of meritorious projects to the Syracuse CoE Executive Director. From the pool of meritorious proposals recommended by the Review Panel, the Executive Director will select the projects that will receive funding. The Executive Director may invite additional comments from the Review Panel, as necessary, to aid in the final selection. Every applicant will receive copies of the reviews of their proposal.