This project is being funded through the Focus Area Program, which enables WRF to solve broadly relevant subscriber issues and challenges with a targeted, sustained research effort. The program is developed around research Focus Areas: a topic area that is of high interest and priority to WRF subscribers because of a challenge or opportunity that is present, emerging, or anticipated, and for which research will help subscribers manage and address the challenge or optimize the opportunity. A focus area includes a discrete challenge or opportunity statement, measurable objectives, and one or more projects that will lead to applied solutions and benefits for WRF subscribers within a specified, relevant time frame.

This project is funded under the Focus Area titled, ***Developing Tools and Strategies for Improved Energy Efficiency and Integrated Water-Energy Planning*** *and is intended to support the Focus Area objectives:*

- *Provide data, tools and knowledge for water utilities to reduce energy demand and energy costs*
- *Identify and demonstrate opportunities for water utilities to optimize use of renewable energy*
- *Identify opportunities to integrate water-energy planning*

FOCUS AREA RFP

Managing Water and Wastewater Utility Data to Reduce Energy Consumption and Cost (RFP #4668)

Project Objective

The project will provide guidance to water and wastewater utilities on leading practices for automated data collection and management to reduce energy consumption and cost of pumping operations and treatment processes. The project will:

- Identify data sets of value for water and wastewater utilities to reduce energy consumption and cost of pumping operations and treatment processes
- Identify data acquisition, communication, and storage requirements from various Information Technology (IT) and Operational Technology (OT) components, including remote data monitoring systems, with a focus on Supervisory Control and Data Acquisition (SCADA) and Energy Management Systems
- Assess methods of data transmission, collection, and storage options, and discuss pros and cons of each
- Identify data analytics, platforms, and display methods that will support reduction in energy consumption and cost of water and wastewater pumping operations and treatment processes.

Budget

Proposals may request WRF funds in the range of $230,000 - $260,000. WRF funds requested and total project value will be a criteria considered in the proposal selection process.

Background

The Industrial Control System (ICS) for water and wastewater utilities is the system used for real time monitoring and control of wells, pump stations, tanks, treatment plants and other operational facilities. These system types include:

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- Supervisory Control and Data Acquisition (SCADA) in which the monitoring and control takes place on a relatively small number of general purpose computers,
- Distributed Control System (DCS) in which the control function resides in special purpose communications and control computers located close to the associated processes,
- Hybrid Systems in which distributed and centralized approaches are mixed depending on the types of water facilities; for example, using a SCADA approach for the water network, and a DCS approach for treatment plants.

The components that make up the ICS include dedicated devices such as measuring instruments, input/output communications controllers, programmable logic controllers (PLC), data telemetry devices such as radio telemetry units (RTUs) and modems, and computers at several different levels of the system.

Energy management is optimized by OT systems at water and wastewater utilities using:

- Energy information management that uses monitoring and control systems to determine where, when, and how much energy is used in real time. Reporting and analytical tools process this data to characterize the utility's energy use profile, operating modes, energy tariff implications, and cost of service.
- Energy use optimization systems that execute automated strategies for energy optimization, along with monitoring and reporting key performance measures to determine if the strategies are effective.

There are a variety of commercial and custom automated programs used by water and wastewater utilities to collect, aggregate, and analyze data to improve energy efficiency and reduce costs in water and wastewater pumping operations and treatment processes. Research that investigates and discusses energy information management and energy use optimization systems and the outcomes of their use, success factors and barriers associated with using the systems, and leading practices for managing the energy data to result in reduced energy consumption in pumping operations and treatment processes, will help water and wastewater utilities improve energy efficiency.

Research Approach

The project approach will support interaction with water and wastewater utilities, and by employing a combination of literature review, surveys, interviews, workshops, and/or case studies, the research will identify current leading practices of water and wastewater utilities in identifying appropriate data to capture and methods to capture it, performing the appropriate data analysis to support the utility objectives, and implementing appropriate technology and data management practices to improve energy efficient operations and treatment processes, while avoiding negative impacts on water quality and the usable life of the infrastructure. The research project will at minimum identify:

- What automated energy management systems are used to reduce energy consumption in pumping and treatment operations?
- What data is collected by different utility functions' OT and IT systems (i.e., industrial control system such as SCADA, computerized maintenance management systems, automated meter reading, etc.) for the purpose of improving energy efficiency? How is the data analyzed and

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used to optimize energy efficiency and reduce costs of pumping and treatment? Is the data analysis used in real time or used to manually modify control algorithms and procedures?
- What instruments provide the data that is leveraged for energy optimization for water and wastewater treatment, distribution, and collection operations and how can the data be leveraged?
- Can wireless control solutions be used, and if so, how and why can they be used? What are the concerns and risks associated with wireless solutions?
- What parameters are monitored, and at what frequency, to optimize energy use for each of the treatment processes commonly used by water and wastewater utilities (e.g., coagulation, flocculation, activated sludge, clarification, filtration, dewatering, digestion, and advanced processes such as membrane filtration, pyrolysis, and reverse osmosis)?
- What parameters are monitored, and at what frequency, to optimize energy use in pumping systems?
- How is accuracy and completeness of data evaluated?
- What software and databases are available to enable utility energy performance management, analytics, and reporting of data (i.e., business intelligence and reporting systems) to optimize energy efficiency of pumping and treatment processes? What are the pros and cons?
- How is data used and analyzed to support decisions? What evaluations are performed to optimize performance?
- What is required of data to enable predictive actions?
- What are the best ways to present the data effectively to communicate different messages to different internal and external stakeholders?

The final deliverable will provide guidance for water and wastewater utilities to improve energy efficiency and reduce cost of water and wastewater pumping operations and treatment processes by:

- Identifying and discussing opportunities and requirements (i.e., technology and staffing) for using automated energy management systems without jeopardizing water quality or the usable life of associated water infrastructure
- Identifying leading practices for managing energy data, including data collection, aggregation, and analysis
- Identifying energy and cost outcomes of using automated energy management systems and effectively managing the data
- Presenting at least six case studies to illustrate some of the leading practices identified.

Proposal Preparation Instructions

Proposals submitted in response to this RFP must be prepared in accordance with the Water Research Foundation document "Guidelines for Focus Area Program Proposals." The most current version of these guidelines is available at http://www.waterrf.org/funding/Pages/proposal-guidelines.aspx . The guidelines contain instructions for the technical aspects, financial statements and administrative requirements that the applicant must follow when preparing a proposal.

Eligibility to Submit Proposals

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This RFP solicits proposals from all technically qualified U.S. based or non-U.S. based applicants, including educational institutions, research organizations, federal or state agencies, local municipalities, and consultants or other for-profit entities.

WRF's Board of Trustees has established a Timeliness Policy that addresses researcher adherence to project schedule. The policy can be reviewed at http://www.waterrf.org/funding/Pages/policies.aspx. Researchers who are late on any ongoing WRF-sponsored studies without an approved no-cost extension are not eligible to be a named participant in any proposal. If you have any questions about your eligibility for WRF projects, please contact the WRF Research Manager listed at the bottom of the RFP.

Budget and Funding Information

The funding available from WRF for this project is in the range of $230,000 - $260,000. A minimum 25 percent of the total project value must be contributed by the applicant (i.e. the applicant's minimum contribution must equal one-third of WRF funds requested). Acceptable forms of applicant contribution include cost-share, applicant in-kind or third-party in-kind that meet Code of Federal Regulation (CFR) requirements in 2 CFR Part 200.306 Cost sharing or matching. The applicant may elect to contribute more than 25 percent to the project but the maximum WRF funding available remains fixed at $260,000. **Proposals that do not meet the minimum 25 percent of the total project value will not be accepted.**

Administrative, Cost and Audit Standards

WRF's standards for administrative, cost and audit compliance are based upon and comply with OMB Uniform Grants Guidance, 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. These standards are referenced in the WRF's "Guidelines for Focus Area Program Proposals" and include specific guidelines outlining the requirements for Indirect Cost Negotiation Agreements, Financial Statements and the Statement of Direct Labor, Fringe Benefits and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits and General Overhead. Well in advance of preparing the proposal, your financial staff should review the detailed instructions included in WRF's annually released "Guidelines for Focus Area Program Proposals."

Period of Performance

The proposed project schedule should be realistic, allowing ample time for the preparation of final reports and for review of project results. It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its contractors have a responsibility to adhere to the agreed-upon schedule. Under WRF's No-Cost Extension Policy, a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted. The policy can be reviewed at http://www.waterrf.org/funding/Pages/policies.aspx.

Utility Participation

WRF is especially interested in receiving proposals which include both participation and contribution of resources from water utilities in the research effort. Information on utilities that have indicated an interest in participating in this research project is attached. While WRF makes utility participation

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volunteers known to applicants, it is the applicant's responsibility to negotiate utility participation in their particular proposal, and the utilities are under no obligation to participate.

Application Procedure and Deadline

Proposals are now being accepted exclusively online in PDF only format and must be fully submitted before June 15, 2016, 5pm Mountain Time. All the forms and components of the proposal are available online in the "Proposal Component Packet" zip file. A login is required to download this packet and use the proposal website. This information is available at https://proposals.waterrf.org/Pages/RFPs.aspx

The online proposal system allows submission of your documents until the date and time stated in the RFP. To avoid the risk of the system closing before you press the submit button, do not wait until the last minute to complete your submission.

Questions to clarify the intent of this Request for Proposals may be addressed to the Research Manager, Linda Reekie, at (303) 734-3423 or by e-mail at lreekie@waterrf.org.

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4668 UTILITY VOLUNTEERS

The following utilities have indicated an interest in possible participation in this research. This information is updated within 24 business hours when a utility submits a volunteer form and this RFP will be re-posted with the new information. **(Depending upon your settings, you may need to click refresh on your browser to load the latest file.)**

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