



This project is being funded through the Solicited Research Program's Energy Focus Area, which enables WRF to solve broadly relevant subscriber issues and challenges with targeted, sustained research efforts.

To better manage water and wastewater processes as well as energy production, utilities need to leverage their data. While there is a growing quantity of data available at utilities, operators and managers do not always know the extent or meaning of this data in regard to energy use and optimization. Issues emerge when models are applied to practices. Research is needed to examine the available data and outline monitoring techniques and gradual changes that can be made to improve performance and efficiency. This first phase of the planned multi-year project is intended to examine how utilities have been using energy data, predictive models, etc. to better manage their energy costs.

Solicited Research RFP

Application of Big Data for Energy Management in Water Utilities (RFP 4978)

Project Objective

WRF is currently funding research to better understand how big data could be successfully utilized to manage and optimize current energy management schemes in utilities.

Budget

Proposals may request WRF funds for \$50,000. WRF funds requested and total project value will be criteria considered in the proposal selection process.

Background

Big data is the name for large data sets, varying in size from a few dozen terabytes to a great many petabytes. These data sets cannot be processed with traditional processing techniques easily. Creative, next-generation tools must be used for analysis, visualization, storage, and querying of underutilized data. Big data is already being leveraged in a variety of sectors, including health care¹, transportation², and urban planning³. Leveraging big data can improve business performance and profitability.

In the water sector, operators and managers face fiscal challenges that impact their operations. Treatment plants of all sizes must manage limited budgets while also satisfying all applicable regulations, including effluent water quality requirements and finished water requirements. Energy consumption is a primary factor that drives financial constraints. Power requirements are especially high for common unit operations like pumping, aeration, and solids handling. Energy requirements typically fluctuate throughout the operating cycle, which may force practitioners to adjust power and chemical inputs in non-optimal ways to operate electrical equipment outside of its optimal operating range. Ideally, water

¹ *Murphy et al., 2018.* Electronic Triggers to Identify Delays in Follow-Up of Mammography: Harnessing the Power of Big Data in Health Care. *Journal of the American College of Radiology*, Volume 15, Issue 2, Pages 287-295

² *Wang et al., 2016.* Soft computing in big data intelligent transportation systems. *Applied Soft Computing*, Volume 38, Pages 1099-1108

³ *Rathore et al., 2016.* Urban planning and building smart cities based on the Internet of Things using Big Data analytics. *Computer Networks*, Volume 101, Pages 63-80.

resource recovery facilities (WRRFs) and drinking water facilities should be optimized to permit energy inputs to match requirements⁴. Using techniques such as predictive analytics using big data may be able to enhance operating efficiency.

Research Approach

The study should focus on getting a better idea of the available data that could be used for a detailed analysis to optimize the performance of a plant, specifically process and energy management. Some utilities have a designated energy manager, whose role and responsibility is to come up with the best way to efficiently manage energy consumption of the plant. But often, their interests are not aligned with the operator, whose primary focus is staying within compliance without room for error. Analyzing the data would help the energy manager and/or the operator, incentivize, coordinate, and operate more efficiently. Ideally, the data should be understood, analyzed, and correlated and predictive analytics should be developed to help with efficient operations.

The research team should also scrutinize specific submetering data, especially for instances where specific equipment can be isolated and compared. A valuable output would also include a way to quickly identify which processes would be worthwhile to submeter. This could potentially allow in-depth comparison between WRRFs, effectively identifying methods to reduce and or optimize energy use. They should also identify what process measurements are required for this purpose.

Deliverables

- Report of the survey that lists all the current data collection and management strategies, available data and how much of this is being utilized for Energy.
- A detailed report containing data analytics (including predictive analytics) that could be ideally used, and optimized energy management scenarios for participating utilities.
- A plan for a pilot study at a selected utility to perform a test for data and then utilize said data to optimize energy management schemes.

Selection Process and Criteria

Selection of proposals is a very competitive process. Proposals will be reviewed by WRF and the Project Advisory Committee (PAC) for this specific project. This external review team may be complemented as needed by subject matter experts. As part of the evaluation process, WRF reserves the right to request interviews, either via conference call or in person, with qualified proposers if necessary.

Proposers are encouraged to develop and submit their intended research plan that meets the research goals of this RFP, provide sufficient details of their budget, as well as schedules and milestones that can successfully deliver on the stated research goals, objectives, and tasks that are proposed.

WRF will evaluate proposals on the following components:

- **Understanding the Problem and Responsiveness to RFP (20%)**

⁴ Reported from a previous research project by The Water Research Foundation titled “WaterWatts: A Modern Look at Wastewater Power Metering Data”.

Does the proposal adequately explain the problem? Does it reflect knowledge of the issue and how solving the problem will benefit the water industry? Have the RFP objectives been adequately addressed? If proposed objectives differ from the RFP, do stated objectives address current or future needs of the water industry? Are data quality objectives specified?

- **Technical Approach and Scientific Merit (40%)**

Is the proposal prepared with supportive information and is it self-explanatory and clearly understandable? Is the proposed effort technically defensible? Is the approach practical? Can the project objectives be achieved in the stated time period with the allotted personnel and budget?

- **Management and Communication Plans (10%)**

Are the roles, responsibilities, and assignments clear? Do the supporting organizations on the team have complementary skills? Does the lead organization have adequate resources to provide the appropriate level of management, oversight, and project implementation? Is the Quality Assurance/Quality Plan acceptable? Are schedules and deliverables clearly defined?

- **Budget and Schedule (10%)**

Is the budget within the advertised budget for the project? Has the applicant provided appropriate (at least 25%) and significant in-kind contributions to the project? Is the level of effort allocated to each task logical? Is the Indirect Cost Rate reasonable (35% or less is competitive) and has it been detailed in the proposal? Is the schedule realistic? Do the proposed budget and schedule match funding needs to milestones and demonstrate the value of the research relative to the proposed cost?

- **Qualifications of Organization and Key Personnel (10%)**

Does the lead organization have demonstrated experience and expertise in the issues and objectives discussed in the RFP? Do the key project personnel have experience in the proposed area of research? Have key personnel committed an appropriate amount of time to the project? Are water and wastewater agencies involved?

- **Staff Evaluation and Input Based on Past Performance (10%)**

Proposal Preparation Instructions

Proposals submitted in response to this RFP must be prepared in accordance with The Water Research Foundation's document *Guidelines for Focus Area Program Proposals*. These Guidelines are applied to the Solicited program as well. The most current version of these guidelines is available at:

<http://www.waterrf.org/funding/ProposalDocuments/GuidelinesForFocusAreaProgramProposals.pdf>.

The guidelines contain instructions for the technical aspects, financial statements, and administrative requirements that the applicant must follow when preparing a proposal.

Please note that the selection criteria listed here are different from those listed in the Guidelines for Focus Area Program Proposals document. The selection criteria in this RFP will be used to evaluate the proposal.

Eligibility to Submit Proposals

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

WRF's Board of Directors has established a Timeliness Policy that addresses researcher adherence to the 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 staff listed at the bottom of this RFP.

Administrative, Cost, and Audit Standards

WRF's Solicited Research Program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget Uniform Grants Guidance, 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. 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*.

Budget and Funding Information

The funding available from WRF for this project is \$50,000. A minimum of 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 comply with 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 \$50,000. **Proposals that do not meet the minimum match of 25 percent of the total project value will not be accepted.**

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 sub-recipients have a contractual obligation 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 and Organization Participation

WRF is especially interested in receiving proposals that include both participation and contribution of resources from water utilities and organizations in the research effort. Information on utilities and/or organizations that have indicated an interest in participating in this research project are listed on the last page of this RFP. While WRF makes utility and organization participation volunteers known to applicants, it is the applicant's responsibility to negotiate utility and organization participation in their particular proposal, and the utilities and/or organizations are under no obligation to participate.

Application Procedure and Deadline

Proposals are now being accepted exclusively online in PDF format. Proposals must be submitted before 2:00 PM Mountain Time, Tuesday, November 27, 2018. 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. *If you have never logged in to WRF’s proposal submission system, it is imperative you request a login as soon as possible. It may take up to 48-hours to provide credentials to new users.* 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 and WRF’s administrative, cost, and financial requirements may be addressed to the Research Manager, Ashwin Dhanasekar, at (303) 734-3423 or by e-mail at adhanasekar@waterrf.org.

UTILITY AND ORGANIZATION PARTICIPANTS

To date, no utilities have indicated an interest in participating in this research. As utilities express interest, their information will be added below within 24 business hours of receipt of 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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