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REQUEST FOR PROPOSALS (RFP)

Quantifying the Impact of Artificial Intelligence/Machine Learning-Based Approaches on Utility Performance (RFP 5189)

Due Date: Proposals must be received by **3:00 pm Mountain Time on Tuesday, December 13, 2022**

WRF Project Contact: Ashwin Dhanasekar, adhanasekar@waterrf.org

Project Sponsors

This project is funded by The Water Research Foundation (WRF) as part of WRF's Research Priority Program.

Project Objectives

- Provide quantifiable results, real case studies, and an implementation demonstration study to gain insight into the capabilities of vendor-driven, academic-driven, or home-grown solutions for process performance evaluation.
- Evaluate artificial intelligence/machine learning (AI/ML) techniques and compare them with conventional alternatives such as heavily instrumented processes where the instruments can be expensive and hard to maintain.
- Demystify AI/ML to enable all utility staff to understand, trust, and embrace AI/ML via provable outcomes and value-driven key performance indicators (KPIs). Provide guidance on how to assess which AI/ML solutions are best for specific use cases.
- Identify impact types (e.g., efficiency, effectiveness, cost-saving, etc.) and how the benefits from the initial AI/ML implementation could endure with only minimal upkeep (i.e., how sustained are the initial impacts over the long run; what financial and effort investments may be required in the future to at least sustain the initial benefits).
- Identify and discuss risks and mitigation requirements that may apply when an AI/ML approach is used.

Budget

Applicants may request up to \$350,000 in WRF funds for this project.

Background and Project Rationale

AI/ML is a key technology in digitalization that can support areas such as real-time monitoring, predictive maintenance, process control, and forecasting. Utilities face a barrage of requests from vendors, consultants, new hires with data science experience, and academics to deploy AI/ML-based solutions to improve process performance and efficiency.

However, the use of AI/ML within the water sector is not well understood. Utilities lack guidance on determining where AI/ML-based techniques can provide the greatest benefit and estimating the financial, staffing, or workflow benefits achieved from deploying AI/ML-based solutions. The utilities need to understand the data required to deliver a successful outcome to overcome preconceived ideas and clarify requirements. Case studies and a specific demonstration study with measurable benefits from AI/ML solutions are needed to calculate the return on investment to support a business case for deployment of advanced analytics solutions.

Research Approach

This RFP is intentionally flexible in the research approach to encourage creativity and originality from proposers. Proposers should describe how they will conduct the research to meet the objectives listed above. The following approach is intended as a starting point:

- Evaluate KPI baselines using historical data and then test AI/ML-based solutions ranging from general (such as “AI Solution in a Box” vendors) to specific (such as specific performance-based coagulation models) at one or more utilities.
- Determine data requirements and availability to ensure a positive outcome.
- Investigate long-term benefits of AI/ML-based solutions.
- Compare benefits with respect to cost and effort of implementation across multiple areas of operation and interest.
- Incorporate an AI/ML demonstration study to support evaluation protocols and utility benefits (required).

Expected Deliverables

Example deliverables from this project may include, but are not limited to, the following.

- A framework on the extent to which AI/ML can be used to support process optimization
- Protocol for effectively measuring and reporting the change in KPI when implementing AI/ML
- Demonstration/case studies with successes and pitfalls described, and technical discussion of the merits of general AI/ML approaches versus specific AI/ML approaches
- Recommendations for where AI/ML-based approaches could have positive impacts across water and wastewater utilities based on the results of the evaluation, including a ranking of utility areas that would benefit the most from AI/ML applications with the least level of implementation effort (e.g., predictive maintenance, operational response to disasters, overall utility health [staffing, financial, assets, knowledge], prioritization of competing strategic initiatives, etc.)
- Recommendations on how to consider risk and responsibility where AI/ML is either guiding or controlling processes that have regulatory requirements

Communication Plan

Please review WRF’s *Project Deliverable Guidelines* for information on preparing a communication plan. The guidelines are available at <https://www.waterrf.org/project-report-guidelines>. Conference presentations, webcasts, peer review publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 24 months from the contract start date.

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the Problem and Responsiveness to RFP (maximum 20 points)
- Technical and Scientific Merit (maximum 30 points)
- Qualifications, Capabilities, and Management (maximum 15 points)
- Communication Plan, Deliverables, and Applicability (maximum 20 points)
- Budget and Schedule (maximum 15 points)

Proposal Preparation Instructions

Proposals submitted in response to this RFP must be prepared in accordance with the WRF document *Guidelines for Research Priority Program Proposals*. The current version of these guidelines is available at <https://www.waterrf.org/proposal-guidelines>, along with *Instructions for Budget Preparation*. The guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the *Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables* at <https://www.waterrf.org/project-report-guidelines#deliverables>.

Eligibility to Submit Proposals

Proposals will be accepted from domestic or international entities, including educational institutions, research organizations, governmental agencies, 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 <https://www.waterrf.org/policies>. Researchers who are late on any ongoing WRF-sponsored studies without approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards

WRF's research program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 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 WRF's *Guidelines for Research Priority 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 research and financial staff should review the detailed instructions included in WRF's *Guidelines for Research Priority Program Proposals* and consult the *Instructions for Budget Preparation*, both available at <https://www.waterrf.org/proposal-guidelines>.

Budget and Funding Information

The maximum funding available from WRF for this project is \$350,000. The applicant must contribute additional resources equivalent to at least 33 percent of the project award. For example, if an applicant requests \$100,000 from WRF, an additional \$33,000 or more must be contributed by the applicant. 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 33 percent to the project, but the maximum WRF funding available remains fixed at \$350,000. **Proposals that do not meet the minimum 33 percent of the project award will not be accepted.** Consult the *Instructions for Budget Preparation* available at <https://www.waterrf.org/proposal-guidelines> for more information and definitions of terms.

Period of Performance

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 <https://www.waterrf.org/policies>.

Utility and Organization Participation

WRF encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 3:00 pm Mountain Time on Tuesday, December 13, 2022.

The online proposal system allows submission of your documents until the date and time stated in this 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. Submit your proposal to:

<https://forms.waterrf.org/222556584776874>.

Questions to clarify the intent of this RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Ashwin Dhanasekar at (303) 734-3423 or adhanasekar@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at (303) 347-6118 or cbruck@waterrf.org.

5189 Utility and Organization Participants

The following utilities have indicated an interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization 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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