U.S. Department of Energy

WATER RESOURCE RECOVERY PRIZE

Official Rules

March 2020
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The U.S. Department of Energy (DOE) Water Resource Recovery Prize will be governed by this official rules document, which establishes the rules and requirements for the prize. The Prize Administrator and DOE reserve the right to modify this Official Rules document if necessary and will publicly post any such notifications as well as notify prize participants.

Phase 1: Important Dates

- **Phase 1 Submission Open**: January 29, 2020
- **Phase 1 Submission Close**: May 28, 2020
- **Phase 1 Winner Notification**: June 29, 2020

Phase 2: Important Dates

Specific requirements and official rules for Phase 2 submissions will be released later, but important milestone dates are shown here.

- **Phase 2 Submission Open**: September 9, 2020
- **Phase 2 Submission Close**: September 9, 2021
- **Phase 2 Winner Notification**: October 2021

### MODIFICATIONS

<table>
<thead>
<tr>
<th>MODIFICATIONS</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Updated the number from five to 10 in the following sentence: “Up to five ten supporting images, figures, graphs, or another graphic may also be included.”</td>
<td>August 10, 2021</td>
</tr>
<tr>
<td>2. Changed 25,000 words to 15 pages.</td>
<td></td>
</tr>
<tr>
<td>3. All material modifications to the Prize are [HIGHLIGHTED] in the body of the Rules Document</td>
<td>April 6, 2020</td>
</tr>
<tr>
<td>4. All dates have been consolidated on Page 2.</td>
<td></td>
</tr>
</tbody>
</table>
Executive Summary

The DOE Advanced Manufacturing Office (AMO) is launching a two-phased prize competition with the goal of accelerating the transition from conventional wastewater treatment to a model of resource recovery from municipal wastewater. Water resource recovery facilities (WRRFs) recover valuable resources, such as energy, water, and nutrients, to help lower the ultimate cost of wastewater treatment.

The Water Resource Recovery Prize is part of a larger effort known as the Water Security Grand Challenge, which is a White House-initiated and DOE-led framework to advance transformational technology and innovation to meet the global need for safe, secure, and affordable water. More information about the Water Security Grand Challenge is available at [https://www.energy.gov/eere/water-security-grand-challenge](https://www.energy.gov/eere/water-security-grand-challenge). The prize also supports the U.S. Environmental Protection Agency’s Water Reuse Action Plan ([https://www.epa.gov/waterreuse/water-reuse-action-plan](https://www.epa.gov/waterreuse/water-reuse-action-plan)).


In Phase 1, teams will submit:

- Two high-level facility engineering schematics (i.e., diagrams for before and after implementation of the proposed resource recovery technology/strategy)
- A business case demonstrating improvement relative to the existing baseline conditions
- An accompanying technical description that demonstrates the potential for cost-effectiveness and viability of their resource recovery plan.

At the end of Phase 1, DOE anticipates selecting as many as 10 winning teams for cash prizes of $50,000 each.

Teams selected during Phase 1 are eligible to participate in the second phase of the competition. During Phase 2, competitors will be expected to provide a more detailed and validated technical and financial analysis that demonstrates the viability of the proposed technologies. DOE expects to provide teams 1 year from Phase 2 release date to submit final Phase 2 materials. At the conclusion of Phase 2, DOE expects to select no more than two teams that will receive $250,000 cash prizes. Specific rules governing Phase 2 submissions will be released at the conclusion of Phase 1—See Table of Important Dates on Page 2.

Introduction

Water is a critical resource for human health, economic growth, and agricultural productivity. The United States has historically benefitted from access to low-cost water supplies, but challenges for freshwater supplies could threaten U.S. economic competitiveness and water security.
Through this prize, DOE is seeking novel systems-based solutions from multidisciplinary teams to implement resource recovery at small- to medium-sized WRRFs. DOE expects at least one WRRF will be a part of any successful submission. The WRRF must provide a letter of commitment from an individual authorized to represent the facility. Such letters may be subject to verification by the prize administrator.

For purposes of this competition, terms are defined as follows:

- **Recovered wastewater resources** include, but are not limited to, energy that can be used on-site or sold; nutrients, such as phosphorous and nitrogen, that can be used as fertilizer; and clean water that can be reused for agricultural, industrial, and potable purposes.

- **Multidisciplinary teams** consist of a small- to medium-sized WRRF or a network of WRRFs, technology developers (e.g., engineering and design firms, product vendors, and inventors), resource customers (e.g., farmers, electric and gas utilities, and users of reclaimed water), and any other potentially relevant stakeholders (e.g., academic researchers, regulators, business/financial interests, local governments, and nonprofit organizations) to develop holistic community- or watershed-based resource recovery plans for their respective water resource recovery systems.

- **Small- to medium-sized WRRFs** are facilities that treat no more than 50 million gallons per day, on average.

**Background**

Resource recovery occurs at WRRFs across the country. Although many sizes of facilities can recover resources, recovery is often most cost-effective at the largest facilities. This prize competition seeks to stimulate further resource recovery among small- and medium-sized facilities. The competition is seeking creative system-wide solutions that link resource providers with customers. The competition seeks to identify coalitions of partners that may not have collaborated absent a financial incentive, considering the following key concerns:

- **WRRFs** purchase about $2 billion of electricity each year\(^1\) and face more than $200 billion in future capital investment needs to meet water quality objectives.\(^2\) These expenses can stress municipal budgets. For example, energy consumption at WRRFs can account for one-third or more of municipal energy

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bills.\textsuperscript{3} Energy costs are expected to increase over time\textsuperscript{4} and affect affordability of water for businesses and consumers.\textsuperscript{5}

- Disposal of residual biosolids from water treatment is another significant cost for municipalities. WRRFs can address these challenges by recovering resources and turning them into marketable products. And doing so can create new revenue streams for upgrading water treatment infrastructure, and particularly in rural communities, can reduce nutrient pollution and provide sources of alternative water supplies.

- Recoverable resources include energy that can be used on-site or sold, nutrients such as phosphorus and nitrogen that can be used as fertilizer, and clean water that can be reused for agricultural, industrial, and potable purposes. When the value of the recovered resources more than offsets the cost of recovery, the overall cost of wastewater treatment is reduced.

- Resource recovery contributes to system-level energy efficiency because recovering energy from wastewater reduces the amount of grid electricity required to operate a wastewater treatment plant. Moreover, recovered water (i.e., treated wastewater) can offer a substitute for water sources with a higher level of embedded energy (including desalinated water and water that is conveyed over a long distance) for industrial, agricultural, and municipal use. Recovered nutrients (e.g., nitrogen and phosphorus) can be less energy-intensive substitutes for fertilizer on agricultural land.

To make progress on the goal of doubling resource recovery from municipal WRRFs, the prize competition seeks to increase resource recovery from these plants across the United States. The prize is intended to target small- to medium-sized facilities (i.e., those with flows of up to 50 million gallons per day), as larger facilities are more likely to already be engaged in or developing resource recovery strategies.

\textsuperscript{4} Arzbaecher et al.
\textsuperscript{5} DOE, Water and Wastewater Annual Price Escalation Rates for Selected Cities across the United States (U.S. Department of Energy, September 2017), \url{https://doi.org/10.2172/1413878}.
Prize Phases
Important dates and a description of milestones for the Water Resource Recovery Prize are summarized in Figure 1.

### Prize Phases

<table>
<thead>
<tr>
<th>JANUARY 2020</th>
<th>MAY 2020</th>
<th>JUNE 2020</th>
<th>SEPTEMBER 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1: Engineering Schematics &amp; Business Case</strong></td>
<td><strong>Phase 1 Closes</strong></td>
<td><strong>Up to 10 winners of $50,000 each announced for Phase 1</strong></td>
<td><strong>Phase 2: Plans &amp; Detailed Analysis</strong></td>
</tr>
<tr>
<td>Prize Launch/Phase 1 Opens</td>
<td>Based on merit review process emphasizing:</td>
<td>Winning teams selected to enhance technical and financial analysis and build momentum for their proposed technologies.</td>
<td></td>
</tr>
<tr>
<td>Teams submit applications with:</td>
<td>• innovation</td>
<td>Winners selected for technologies with the greatest potential for widespread adoption.</td>
<td></td>
</tr>
<tr>
<td>• Detailed business case</td>
<td>• Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Engineering schematic(s)</td>
<td>• Replicability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Technical description</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**WATER RESOURCE RECOVERY PRIZE**

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*Figure 1. Updated Prize competition schedule*
Phase 1: Engineering Schematics and Business Case

In the first phase of the competition, teams will identify a problem or opportunity with respect to resource recovery. Teams are required to submit two high-level (i.e., one-page) facility engineering schematics that (1) characterize the existing operating conditions of the submitting WRRF or WRRFs and (2) define how the proposed new technology or process change would affect the facility configuration and operations. In addition, applicants are required to submit a business case that demonstrates improvement over the existing baseline conditions, as well as an accompanying technical description, which together demonstrate the potential for cost-effectiveness and viability of their resource recovery plan.

Successful plans should demonstrate how the approach (1) reaches the levels targeted by applicants as resource recovery metrics and (2) contributes to energy efficiency at the facility and/or system level, as discussed in the below sections. Plans will also be judged on their innovation and replicability.

DOE anticipates selecting up to 10 winning teams for cash prizes of $50,000 each at the end of Phase 1. DOE may also publish the selected teams’ plans (unless otherwise marked per Paragraph 10 of the appendix on a public-facing website to provide potential wastewater treatment recovery strategies that other wastewater treatment facilities might adopt.

Problem or Opportunity and Proposed Solution

Teams should clearly identify a problem or opportunity with respect to resource recovery and their innovative solution. The rationale for the solution should also be explained. Teams should describe the expected impact at their facility and the potential for transferability of the idea to other facilities.

Engineering Schematics

Teams should include two facility engineering schematics or process flow diagrams (e.g., Figure 1) to provide a technological context for the proposed water resource recovery effort. The teams should define the current state of operations of the WRRF—under both normal and peak/surge operating conditions—as well as its baseline performance with respect to a wide range of wastewater treatment parameters, including but not limited to those listed in Table 1.
<table>
<thead>
<tr>
<th>Operational Parameters</th>
<th>Wastewater Parameters</th>
<th>Resource Recovery Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate</td>
<td>Influent volume</td>
<td>Phosphorous generated</td>
</tr>
<tr>
<td>Type of reactor</td>
<td>Biochemical oxygen demand</td>
<td>Nitrogen generated</td>
</tr>
<tr>
<td>Reactor volume</td>
<td>pH levels</td>
<td>Biosolids volume</td>
</tr>
<tr>
<td>Solids retention time</td>
<td>Total suspended solids (influent/inert/effluent)</td>
<td>Biogas volume</td>
</tr>
<tr>
<td>Type of aerators</td>
<td>Temperature</td>
<td>Usable water</td>
</tr>
<tr>
<td>Speed of aerators</td>
<td>Ammonia concentration</td>
<td>Energy consumed/recovered</td>
</tr>
<tr>
<td>Elevation of facility</td>
<td></td>
<td>Other resources recovered</td>
</tr>
</tbody>
</table>

When combined with a technical description, the two facility engineering schematics—one for before and one for after implementation of the proposed resource recovery technology/strategy—will help reviewers assess the technical performance and viability of the proposed technologies. An effective “after” schematic must incorporate any pathways or processes intended to recover resources and how they relate to the existing WRRF infrastructure. In effect, the resource recovery technologies would be displayed as inserts or additions to the standard treatment process. In addition, the schematics must be accompanied by a table that summarizes the proposed resource recovery efforts (e.g., Table 2).

Table 2. Summary of Proposed Resource Recovery

<table>
<thead>
<tr>
<th>Resource</th>
<th>Current Recovery Level</th>
<th>Improvement Target</th>
<th>Unit of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy: Electricity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy: Thermal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Biosolids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usable Recovered Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 2. Sample engineering schematic/WRRF process flow diagram


**Business Case**

In general terms, a business case is a justification for a proposed project or undertaking on the basis of its expected commercial benefit relative to existing baseline operating conditions. A business case details the rationale to convince a decision maker to approve the investment recommendation or decision. The business case is particularly important to the Water Resource Recovery Prize, because simply recovering a resource is not enough for small- and medium-sized WRRFs—something of value needs to be created. Facilities need to consider the technological factors at the source as well as the midstream and downstream needs of their partners and ultimate “customers.” Applicants are encouraged to depict their business case based on Table 3, but an alternative format that contains the same key elements may be submitted.

**Team Composition**

Applicants should identify their team members and their affiliations, and they should summarize team members’ roles and responsibilities. Team member’s experience and qualifications should also be summarized. To increase their chance of success, applicants should also provide a strategy to further build relationships with customers, partners, and other stakeholders.
Table 3. Generic Business Case Structure

<table>
<thead>
<tr>
<th>Key Partners</th>
<th>Key Activities</th>
<th>Value Propositions</th>
<th>Customer Relationships</th>
<th>Customer Segments</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Who are our key partners and suppliers of goods and services?</td>
<td>• Which key activities are required for resource recovery?</td>
<td>• What products and services are offered?</td>
<td>• What type of relationships exist with customers?</td>
<td>• Who are our most important customers and potential customers?</td>
</tr>
<tr>
<td>• What are their roles in the resource recovery process?</td>
<td>Examples: Production, Design, Construction, Permitting/approval</td>
<td>• What customer needs are satisfied?</td>
<td>• Which ones are already established and need to be developed?</td>
<td>Examples: Commercial, Agricultural, Electric utilities</td>
</tr>
<tr>
<td>• What other stakeholders affect our costs?</td>
<td>Examples: Public authorities/utilities, Regulators, Engineering and design interests</td>
<td>• What scale of resource recovery should be pursued?</td>
<td>Examples: Personal relationships, Relationships with communities</td>
<td></td>
</tr>
</tbody>
</table>

| Key Resources & Risks | | Value Propositions | | Revenue Streams |
|-----------------------|------------------|------------------|------------------|
| • What key goods and services are required? | • What are our key risks and how are they mitigated? | • What are our customer relationships? | • Which resource products are of most interest to our potential customers? |
| • What are our customer relationships? | Examples: Physical resources, Intellectual property, Human capital, Financial resources | Examples: Primary supplier, Cost reduction, Risk reduction/resiliency | Examples: Which costs are associated with converting, processing, and delivering resource products? |

<table>
<thead>
<tr>
<th>Cost Structure</th>
<th></th>
<th>Revenue Streams</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What are the most important capital and operating costs?</td>
<td></td>
<td>• How much does each revenue stream contribute to overall revenues?</td>
</tr>
<tr>
<td>• Which costs are associated with converting, processing, and delivering resource products?</td>
<td></td>
<td>• What other value do we bring to other stakeholders?</td>
</tr>
</tbody>
</table>

Examples:
- Public authorities/utilities
- Regulators
- Engineering and design interests

Examples:
- Messaging
- Media
Phase 2: Plans and Detailed Analysis

Only teams selected during Phase 1 are eligible to compete in Phase 2. Phase 2 requires the submission of detailed and technically rigorous plans that demonstrate how teams would finance and construct their resource recovery solutions, with such plans being supported by quantitative analysis and/or modeling. Successful plans will be judged by modeled achievement of resource recovery metrics as well as by contributions to energy efficiency, financial viability, technical and engineering rigor, and the broad replicability of the plan. At the end of Phase 2, as many as two teams will be selected to receive $250,000 cash prizes.

Review the Phase 2 rules and requirements.

Regarding financial viability, DOE anticipates aligning submission requirements with the application requirements of public financing programs (e.g., those from the U.S. Environmental Protection Agency’s Water Infrastructure Finance and Innovation Act program and its Clean Water State Revolving Fund, among others) so that participants are well-positioned to apply for these and other funding sources.

Quantitative metrics will play a critical role in the judging of both phases of the competition. Applicants will need to articulate an ambitious target of resource recovery for one or more resources (e.g., energy, clean water, or nutrients). The target could be expressed as a recovery rate (e.g., the percentage of resource recovered relative to the total amount of that resource present in influent) or as an improvement rate (e.g., an increase in recovery rate over some baseline). In Phase 2, financial metrics will also be used for judging, which may include levelized cost of avoided disposal, net present value of recovery streams, life cycle costs of recovery, or other metrics. To ensure diverse solutions that apply across a range of facility types, DOE may also introduce other factors to judging, such as geographic diversity of applicants, facility size, category of resources recovered, and treatment technologies used.
Participant Eligibility

Both Phase 1 and Phase 2 of the competition are open only to:

- Citizens or permanent residents of the United States
- Private or nonfederal public entities, such as townships, tribes, corporations, or other organizations that are incorporated in and maintain a primary place of business in the United States
- A group of individuals, acting as one competitor, provided the online account holder of the submission is a United States citizen or a permanent resident.

Only small- and medium-sized WRRFs are eligible to participate. For purposes of this prize competition, DOE defines small- and medium-sized WRRFs as facilities treating no more than 50 million gallons per day, based on a calendar year average. In addition, technology developers, resource customers (e.g., farmers and electric and gas utilities), academic researchers, regulators, business/financial interests, and nonprofit organizations are eligible to compete.

DOE employees, employees of sponsoring organizations, members of their immediate families (i.e., spouses, children, siblings, or parents), and persons living in the same household as such persons, whether or not they are related, are ineligible to compete. Federal entities and federal employees, acting within the scope of their employment, are also ineligible. DOE national laboratory employees cannot compete in any stage of the prize.

Only Phase 1 winners are eligible to compete in Phase 2. These winners are referred to as American-Made Water Resource Recovery Prize Finalists.

See Section 7 for additional Phase 2 eligibility considerations.
PHASE 1 RULES AND REQUIREMENTS

1. HOW TO ENTER PHASE 1


2. WHAT TO SUBMIT

The following items constitute the submissions package and must be submitted through the HeroX platform:

- Cover Page (to be made public, not scored)
- Submission Summary Slide (to be made public, not scored)
- Technical Narrative – up to 15 pages in length that includes the following components (all assumptions used in documentation, analysis, modeling and simulation must be explicitly stated):
  - Problem or Opportunity and Proposed Solution: Technical specifications of the WRRF and the interface with the proposed resource recovery technology, including details and a quantifiable projected value and/or impacts with credible supporting information.
  - Facility Engineering Schematics of the existing WRRF and the proposed WRRF after resource recovery technologies/strategies are implemented. Each schematic should not exceed one page and will not be counted towards the 15-page limit. A discussion of the technical specifications of the wastewater treatment system and the interface(s) with the proposed resource recovery technology must also be included. The schematics must be accompanied by a table that summarizes the proposed resource recovery efforts (see Table 1.1).
  - Business case explaining the proposed recovery rates, efficiency gains, prospective markets/customers, etc.
  - Team Composition: Individual member biographies (not resumes) and summary of team experience and qualifications.
- Letters of Commitment or Support

**Cover Page**

A cover page is to be made public but will not be scored. List basic information about your submission, including:

- Title
- Short description of the proposed solution
- Key project members (names, contacts, and links to professional online profiles)
- Your city and state
- Other partners (if any).
Submission Summary Slide

A one-page submission summary slide is to be made public but will not be scored. Convey the technical details of your proposal in a simplified format. The public-facing summary should contain technically specific details that can be understood by most people. There is no template, so feel free to present the information as you see fit. Please make any text readable in a standard printout and conference room projection.

Technical Narrative

You should address each of the following four elements. All assumptions used in documentation, analysis, modeling, and simulation must be explicitly stated. The suggested content bullets in Table 4 are provided to guide your responses: you decide where to focus your answers. The individual responses to the required elements do not have a word limit, but the aggregate response must not exceed 15 pages. You should also include two facility engineering schematic diagrams and up to four additional supporting images, figures, or graphs, as well as any letters of support or commitment from team members; these items are not included in the 15-page limit. The advisory judges will score the questions based on the content you have provided.
### Table 4. Technical Narrative

<table>
<thead>
<tr>
<th>Element 1: Problem or Opportunity and Proposed Solution</th>
<th>Judges Score Each Statement on 1-6 Scale:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested Content You Provide:</strong></td>
<td><strong>The proposed approach is innovative.</strong></td>
</tr>
<tr>
<td>• Detailed description of the identified problem or opportunity</td>
<td>• The proposed approach to address the identified problem or opportunity is clearly and thoroughly described.</td>
</tr>
<tr>
<td>• Proposed systems solution design and rationale</td>
<td>• Potential impact is multiplied through transferability to other small- to medium-sized WRRFs.</td>
</tr>
<tr>
<td>• Discussion of transferability to other facilities and potential impact</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Element 2: Facility Engineering Schematics and Performance Metrics</th>
<th>Judges Score Each Statement on 1-6 Scale:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested Content You Provide:</strong></td>
<td><strong>The competitor provides a complete representation of key processes and operating parameters of the wastewater treatment facility.</strong></td>
</tr>
<tr>
<td>• Schematic of current operations</td>
<td>• The proposed systems solution is technically sound.</td>
</tr>
<tr>
<td>• Schematic of proposed configuration including resource recovery technologies/process improvements</td>
<td>• Resource recovery targets are well-described and ambitious relative to a doubling of resource recovery goal.</td>
</tr>
<tr>
<td>• Summary matrix and technical discussion of recovered resources</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Element 3: Business Case</th>
<th>Judges Score Each Statement on 1-6 Scale:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested Content You Provide:</strong></td>
<td><strong>The competitor provides a credible and comprehensive discussion of 1) capital and operating costs for the proposed systems solution and 2) potential revenue for recovered resources.</strong></td>
</tr>
<tr>
<td>• Viable business case discussing financial viability and full market potential for recovered resources</td>
<td>• The competitor describes the approach to building relationships with customers for recovered resources.</td>
</tr>
<tr>
<td></td>
<td>• The competitor discusses technical and financial risks and provides an approach to mitigate these risks.</td>
</tr>
</tbody>
</table>
## Element 4: Team Composition

<table>
<thead>
<tr>
<th>Suggested Content You Provide:</th>
<th>Judges Score Each Statement on 1-6 Scale:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Identification of team members and a summary of roles and responsibilities</td>
<td>• The competitor has assembled a qualified team with credible and relevant experience.</td>
</tr>
<tr>
<td>• Summary of team experience and qualifications</td>
<td>• The competitor demonstrates involvement with a range of partners appropriate to the proposed project and business case from treatment to technology deployment to marketing and sales of recovered resources.</td>
</tr>
<tr>
<td></td>
<td>• The competitor articulates an approach to further build relationships with customers, partners, and other stakeholders to increase the chance of success.</td>
</tr>
</tbody>
</table>

### Letters of Commitment or Support

Attach one-page letters from relevant entities (e.g., potential users of the proposed innovation) to provide context. This could include letters from partners or others you believe are critical to the success of your proposal.
3. HOW WE DETERMINE PHASE 1 WINNERS

The prize administrator screens all completed submissions and, in consultation with DOE, assigns subject matter expert reviewers to independently score the content of each submission. The advisory judges will comprise federal and nonfederal subject matter experts with expertise in relevant areas. Advisory judges will review Phase 1 submissions according to the described evaluation criteria. Advisory judges and DOE reviewers may not (a) have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in the prize or (b) have a familial or financial relationship with an individual who is a registered participant.

Expert Advisory Judge Panel Scoring: The scoring of submissions will proceed as follows (see Table 5):

- Each judging criterion will receive a score from 1 to 6, defined as follows:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Slightly</td>
<td>Slightly</td>
<td>Agree</td>
<td>Strongly</td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td>Agree</td>
<td></td>
<td></td>
<td>Agree</td>
</tr>
</tbody>
</table>

- The final score from an individual judge for a submission package equals the total sum of the scores for all the bullets, multiplied by the weighting factor for that submission element (see Table 5).
- All judges’ scores will then be averaged for a final score for the submission package.

<table>
<thead>
<tr>
<th>Table 5. Scoring Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element</td>
</tr>
<tr>
<td>Proposed solution</td>
</tr>
<tr>
<td>Facility engineering schematics</td>
</tr>
<tr>
<td>Business case</td>
</tr>
<tr>
<td>Team composition</td>
</tr>
<tr>
<td>TOTAL</td>
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Interviews: AMO, at its sole discretion, may decide to hold a short interview with a subset of the Phase 1 competitors. The interviews would be held before the announcement of winners and would serve to help clarify questions the judges may have. Attending interviews is not required and interviews are not an indication of winning.
**Final Determination:** Final determination of winners by the director of AMO will take the advisory judges’ scores and the interview findings (if applicable) into account. The director of AMO is the ultimate judge of the competition and will make the final determination of winners.

**Announcement:** Approximately 30 days after the contest closes, the prize administrator notifies winners and requests the necessary information to distribute cash prizes. The prize administrator will then publicly announce winners.

**Program Goal Requirements**

Only submissions relevant to the technology development goals, as laid out in Section 1 of this document, may compete. The prize administrator must conclude that all of the following statements are true when applied to your submission:

- The proposed solution utilizes innovative solutions to recover resources from municipal wastewater.
- The proposed solution represents an innovation that could move the sector of small- and medium-sized WRRFs beyond their current technological status.
- The proposed solution does not involve the lobbying of any federal, state, or local government.
- The proposed solution is based on sound fundamental technical principles.
PHASE 2 RULES AND REQUIREMENTS

1. INTRODUCTION

The Water Resource Recovery Prize is a two-phase contest seeking to increase resource recovery from municipal wastewater treatment plants across the United States and, in so doing, lower the ultimate cost of treatment by extracting additional value from the wastewater. Through this prize, the U.S. Department of Energy (DOE) seeks novel, systems-based solutions from multidisciplinary teams to implement watershed-based resource recovery at small- to medium-sized wastewater treatment plants. Specifically, the intent is to encourage teams of wastewater treatment plants, engineering and design firms, technology developers, resource customers (e.g., farmers, electric and gas utilities), and others to develop innovative, holistic community- and/or watershed-based resource recovery plans for their respective wastewater treatment systems.

Phase 2 is the final contest phase in a two-part series, offering a $500,000 cash award split between up to two winners (maximum $250,000 each). Only Phase 1 winners are eligible to compete in Phase 2. These winners are referred to as American-Made Water Resource Recovery Prize Finalists. The following guidelines are for competitors interested in Phase 2. “You” and “your” reference competitors in the contest.

2. GOALS

Competitors will submit detailed and technically rigorous plans that demonstrate how they would finance and construct their resource recovery solutions, with such plans supported by pilot-scale demonstrations, modeling results, and other quantitative reporting/analyses at partner water resource recovery facilities.

3. HOW TO ENTER PHASE 2

Before the contest closes, complete a submission package online at https://www.herox.com/WaterResourceRecovery

4. PHASE 2 PROCESS

The process to compete for, and win, the Phase 2 contest consists of six important steps:

1. Progress – Competitors work with their partner resource recovery facility and multidisciplinary team to advance their proposed solution as far as possible and to assemble the required data/evidence to demonstrate both the technical performance
levels and the financial and institutional viability. Teams are expected to enhance and build upon the technical metrics and business case submitted as part of Phase 1 to illustrate the effectiveness of their proposed innovation.

2. HeroX Submission Package Review and Score – All completed submission packages will be assigned to three (3) subject matter expert reviewers. Expert reviewers will independently review and score each submission based on the judging criteria in Section 5.

3. Interview – Following the finalization of HeroX submission package scores, competitors will participate in a private and virtual one-on-one interview with the panel of expert reviewers and members of the prize administration team. It is anticipated that the interview will include a presentation by the competitor, followed by a question-and-answer session on the competitor’s Phase 2 progress and innovation. The prize administration team reserves the right not to interview teams who fail to meet the requirements discussed in Section 5.

For the interview, the expert review panel will focus on evaluating:

- Proof of Concept. The completion of a technically rigorous modeling and prototype/field demonstration that includes an examination of technical risk and mitigation strategies and incorporates lessons learned from initial trials and operational tests, as well as any feedback received from potential users and partners.

- Business and Marketing Plan with Committed Partners. The development of committed partners, as evidenced by legally binding agreements to provide markets for or essential services to the proposed technology solution (e.g., members of the American-Made Network, funders, and private partners).

- Post-Contest Planning. The development of a long-term plan for the ongoing success of the effort. Specifically, a compelling case that there is, or will soon be, sufficient funding in place to keep the effort going beyond this prize contest.

4. Assessment – Following the interview, the expert reviewers will finalize scores considering the judging criteria not only to the submitted materials, but also to the performance during the interview.

5. Selection – After all designated contestants have completed their interviews, the scores will be tabulated and up to two winning submissions will be selected. Successful plans will be judged by achievement of resource recovery metrics as well as by
contributions to energy efficiency, financial viability, technical and engineering rigor, and the broad replicability of the plan.

6. Announcement – Approximately 30 days following the interviews, the Prize Administrator will announce winners.

To ensure diverse solutions applicable across a range of facility types, DOE may also introduce other factors to judging, such as geographic diversity of applicants, facility size, category of resources recovered, and treatment technologies used.

5. WHAT TO SUBMIT FOR PHASE 2

The following items constitute the Phase 2 submission package and must be submitted through the HeroX platform:

- Video: No more than 240 seconds in length (to be made public, scored)
- Cover page (not scored)
- Submission summary slides: 3 to 5 slides aimed at promoting the proposed technical solution to other water resource recovery facilities or prospective resource end users. The slides should include quantitative results of either a functioning prototype or a demonstration project supported by rigorous modeling (to be made public, scored).
- Technical Narrative: Up to 15 pages total with up to 10 supporting images, figures, or graphs. All assumptions used in documentation, analysis, modeling, and simulation must be explicitly stated. Includes a discussion of technical performance, an elaboration on the originally submitted business case—including a discussion of effective partnerships and long-term planning for a viable path forward (scored).
- Letter of ongoing partnership and evaluation from the wastewater treatment facility (WWTF) or wastewater resource recovery facility (WRRF) from applicant’s Phase 1 submission (scored)

Note: It is expected that competitors continue to work with the WWTF or WRRF they identified in Phase 1. If working with a different facility than in Phase 1, a detailed account of why the Phase 1 WWTF is not being used must be explicitly discussed in the Technical Narrative. Moreover, the new choice of a facility must be explained and be substantially similar in specs. Failure to comply with these requirements may result in an application being considered ineligible.

- Additional letters of commitment or contracts from potential and/or actual customers of the applicant’s recovered resource(s) from their technology (not scored).

Phase 2 competitors should also be prepared to participate in a live invite-only interview event to take place following the HeroX submission, which will include a sales pitch/presentation, expert reviewer Q&A, and potential development of additional supporting materials/media, discussing any relevant prototype, test, or modeling efforts.
Submission Formatting

The documents submitted should conform to the following requirements:

- Each must be submitted in Adobe PDF format unless stated otherwise.
- Each must be written in English.
- All pages must be formatted to fit on 8.5-by-11-inch paper, with margins not less than 1 inch on every side. Use Times New Roman typeface, a black font color, and a font size of 12 point or larger (except in figures or tables, which may be 10-point font). A symbol font may be used to insert Greek letters or special characters, but the font size requirement still applies. References must be included as footnotes or endnotes in a font size of 10 point or larger. Footnotes and endnotes are not counted toward the maximum word count requirement.
- All figures and tables should be legible and must include a figure/table number, title, and legend and axis labels (as appropriate).
- Page numbers must be included in the bottom right-hand footer of every page, except for the title page.
- Each submission must not exceed the specified maximum word count—not including cover page, charts, graphs, maps, figures, and photographs—when printed using the formatting requirements set forth (previously mentioned) and single-spaced. If applicants exceed the maximum word count or other size limits as indicated, the expert review panel will review only the authorized number of words/slides/video length and disregard any additional information beyond the specified maximum.

The following details provide more guidance on what information to provide and how expert reviewers evaluate and score submissions. Expert reviewers will evaluate submissions on a scale of 1–6, as shown.

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<tr>
<td></td>
<td>strongly disagree</td>
<td>disagree</td>
<td>slightly disagree</td>
<td>slightly agree</td>
<td>agree</td>
<td>strongly agree</td>
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Video

Each submission must include a video that succinctly conveys the technical appeal, business case, and potential replicability of the proposed technical solution to a wider public audience. Videos must be posted publicly (e.g., YouTube, Vimeo). An effective video will convey the required information in an interesting way. Focus on the technical content and delivery of the information in the video rather than the artistic elements (i.e., the expert reviewers will not be grading on aesthetics).
### Technology Solution Prototype in Less Than 4 Minutes

<table>
<thead>
<tr>
<th>Suggested content:</th>
<th>Judging Criteria – This statement is scored on a 1–6 scale:</th>
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<tbody>
<tr>
<td>• The partnering WWTF or WRRF and its source(s) of wastewater</td>
<td>The video adequately explains the technical innovation and overall approach in a compelling way considering the following elements:</td>
</tr>
<tr>
<td>• The real-world problem being solved</td>
<td>• The video explains a compelling real-world problem and solution</td>
</tr>
<tr>
<td>• The specific resource(s) being recovered from the wastewater and the relative percent recovered</td>
<td>• The video explains the resources being recovered through the innovation and provides quantitative and/or qualitative metrics of the present capabilities of the WWTF or WRRF</td>
</tr>
<tr>
<td>• Demonstration of the technical solution’s features</td>
<td>• The video identifies how the recovered resources can be used and/or identifies potential customers and/or improvements to cost or energy efficiency</td>
</tr>
<tr>
<td>• The team’s qualifications and unique capabilities</td>
<td>• The video features a prototype for an exciting and viable innovation</td>
</tr>
<tr>
<td>• Footage or pictures of partner facility.</td>
<td>• The video shows a knowledgeable and skillful team.</td>
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### Cover Page

The goal of the cover page is to present the most basic information regarding the proposal (project name, tagline, video link, and key project members and the major items on which they worked). In addition, the cover page should include the name and location (city, state, and nine-digit zip code) of the partnering wastewater resource recovery facility or wastewater treatment plant, as well as any keywords that best describe the proposed technical solution.

### Submission Summary Slides

The goal of the summary slides is to succinctly convey the technical appeal, business case, and potential replicability of the proposed technical solution to a nontechnical general audience. Effective slides will be concise, avoid technical jargon, and convey the required information in an interesting way. The slides should be able to convey key aspects of the technology with sufficient context, clarity, and simplicity to function independently of other media or presentation. An example format includes the following:
**Introductory slide:**
- Project name
- Key project members
- Name of the partnering WRRF/WWTP
- Wastewater Resource Recovery Prize and Water Security Grand Challenge logos

**Problem-solution slide:**
- Identify one or more real-world problems that the technology addresses
- Identify the solution with a brief description

**Recovered resources slide:**
- Identify which resource(s) are recovered
- Provide quantitative and/or qualitative metrics for resource(s) recovered
- Describe how the recovered resources can be used

**Business case slide:**
- Briefly provide information on any cost or energy-efficiency improvements
- Identify what characteristics or general type of WRRF/WWTP could benefit from use
- Estimate cost of system to end users

**Conclusions slide:**
- Identify any other relevant factors to consider in favor of the proposal
- Summarize the key takeaway elements of the proposal (i.e., the “deal closers”).

**Table 6. Submission Summary Slides**

<table>
<thead>
<tr>
<th>Submission Summary Slides (3–5 pages; will be publicly available)</th>
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<tbody>
<tr>
<td><strong>Suggested content:</strong></td>
</tr>
<tr>
<td>- Introductory slide</td>
</tr>
<tr>
<td>- Problem-solution slide</td>
</tr>
<tr>
<td>- Recovered resources slide</td>
</tr>
<tr>
<td>- Business case slide</td>
</tr>
<tr>
<td>- Conclusions slide</td>
</tr>
<tr>
<td>- Metrics/results of pilot, modeling, or demonstration project.</td>
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<tr>
<td><strong>Judging Criteria – This statement is scored on a 1–6 scale:</strong></td>
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<tr>
<td>- The summary slides provide a concise and compelling summary of the innovation and project.</td>
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</table>

**Technical Narrative**

The Technical Narrative should include a description of the modeling and/or experimental measurement approach used to demonstrate proof of concept for the solution on its own and as part of the water resource recovery facility. Variations in performance across the range of operating conditions for the facility (e.g., average daily composition, daily and seasonal variations, and source(s) of wastewater entering the
WWTF/WRRF) should be presented, along with any anticipated changes in the quantity or quality of wastewater inflow. Performance of the facility including the innovative solution should be compared to the resource recovery metrics given in Phase 1, including a discussion of the quality of the resources recovered. A discussion of the potential for transferability of the solution to other facilities should also be discussed. A technical risk assessment should be presented that considers the potential technical failure modes for the solution on its own and within the facility. A marketing and business plan should be included that identifies customers and addresses the current market conditions, future market considerations, logistical costs, other overhead costs, and local policy considerations. The marketing and business plan should also discuss seasonal and other variabilities, where appropriate. A financing and engineering plan should be presented that presents a financial analysis and engineering and construction steps to build the solution at scale as part of the facility. This aligns with the application requirements of public financing programs (e.g., from the U.S. Environmental Protection Agency’s Water Infrastructure Finance and Innovation Act program and Clean Water State Revolving Fund, among others), enabling participants to be well-positioned to apply for these and other funding sources.

Submissions should answer each of the questions in the following section. The content bullets are only suggestions to guide the competitor’s responses. Beyond the guidance mentioned earlier, competitors should exercise their own judgment on where to focus their answers. The individual answers to the questions do not have a word limit; however, the aggregate response must not exceed 15 pages. Up to ten supporting images, figures, graphs, or another graphic may also be included. Footnotes, endnotes, cover page, and captions on graphics do not count toward the word limit.

Table 7. Four Submission Questions

<table>
<thead>
<tr>
<th>Question 1: Technical Performance and Impact – How Technically Sound and Impactful Is the Proposed Solution?</th>
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<tr>
<td><strong>Suggested content:</strong></td>
</tr>
<tr>
<td>• Briefly describe the metrics being used to evaluate the resource recovery of your technology as envisioned in Phase 1 and any modifications for Phase 2</td>
</tr>
<tr>
<td>• Describe the modeling and/or measurement approach to validate the concept</td>
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<tr>
<td>• Using convincing data, demonstrate the solution’s effectiveness in achieving key performance metrics</td>
</tr>
<tr>
<td>• Describe any revisions/enhancements made to</td>
</tr>
<tr>
<td><strong>Judging Criteria – Each statement is scored on a 1–6 scale:</strong></td>
</tr>
<tr>
<td>• Metrics given represent significant, impactful resource recovery for the innovation</td>
</tr>
<tr>
<td>• The initial solution achieved or exceeded the as-designed specifications (from Phase 1)</td>
</tr>
<tr>
<td>• The modeling and/or experimental approach is technically sound</td>
</tr>
<tr>
<td>• Modeling and/or measurement data are of sufficient quality and duration to indicate long-term performance and overall viability</td>
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</table>
the solution based on initial testing, modeling, or simulation
• Describe how partners, potential customers, or stakeholders were engaged in performance verification
• Identify other potential WWTFs/WRRFs where the technology might be viable, considering all other factors (e.g., geographic location, size of plant, wastewater composition).

• The project team successfully adapted the design based on preliminary modeling or measurement results
• Partners, potential customers, or stakeholders were engaged in verifying and improving performance
• The applicant identifies, and supports with evidence, one or more potential additional WWTFs/WRRFs beyond the project team members that can benefit from the solution.

Question 2: Technical Risk Assessment and Mitigation – How Robust Is the System to Changes Over Time to Wastewater and Resource Recovery?

Suggested content:
• Describe technical risk assessment and mitigation strategies for component or process failure
• Describe technical risk assessment and mitigation strategies related to variability in input streams
• Describe any opportunities for improving resource recovery yield and quality. Include discussion of the barrier(s) and possible mitigation strategies.

Judging Criteria – Each statement is scored on a 1–6 scale:
• Component failure risk assessment and mitigation strategies are technically sound and clearly explained
• Technical risk assessment and mitigation strategies associated with variability in input streams are technically sound and clearly explained
• Described opportunities for improving resource recovery yield and quality are technically sound and clearly explained.

Question 3: Business and Marketing Plan – Do the Recovered Resources Have Meaningful Economic Impacts?

Judging Criteria – Each statement is scored on a 1–6 scale:
### Suggested content:

- Discuss the marketing of the recovered resource(s) that will be captured
- Provide evidence that customers are genuinely interested in obtaining/using **and buying** the recovered resources
- Logistics plan for bringing the recovered resource(s) to market at scale.
- Examples or data are provided that demonstrate customers/users are willing to pay for or use the recovered resources
- Verifiable commitments exist to ensure sale or delivery of resources
- The applicant provides a reasonable/feasible implementation plan to physically deliver recovered resource(s) to customers.

### Question 4: Finance and Engineering – Can the Proposed Solution Be Financed and Scaled Beyond a Prototype/Demonstration Stage?

#### Suggested content:

- A financial “pro forma,” including actual/modeled data, as well as projected data on revenues, operating expenses, operating income, cash flow, debt service, debt balance (see [https://www.epa.gov/sites/production/files/2020-07/documents/sample_financial_pro_forma.pdf](https://www.epa.gov/sites/production/files/2020-07/documents/sample_financial_pro_forma.pdf) for an example)
- Description of the necessary steps to prepare an engineering design to bring the prototype/demonstration to scale.

#### Judging Criteria – Each statement is scored on a 1–6 scale:

- Detailed and sufficient evidence of actual costs and revenues are given
- The availability of financing and engineering to design and build a full-scale solution are demonstrated.

### Letter of Support and Commitment

Support and commitment from a WWTF or WRRF are required to verify that the technological solutions’ claims and functions work as described (e.g., as designed, deployed, modeled). In addition, through these letter(s), the facilities will provide insight into their collaborations/partnership with the applicant (i.e., team) and provide valuable information as to the ability of the technology and team to be financially and otherwise viable. These letter(s) are not the same as those submitted for Phase 1, though some information may be complementary. Consider the following elements when drafting the letter:
• Description of any financial or in-kind resources the facility has contributed or will contribute (e.g., technical advice, tools, parts, funds)
• Timeline (with the assistance of figures or tables)—as agreed upon between the WWTF/WRRF and the submission team—for project completion, detailing appropriate and mutually agreed-upon goals/deliverables/objectives that are bound by the timeline of Phase 2 of the prize
• Description of the team’s ability to meet goals/deliverables/objectives
• Assessment of the technology’s current and future success in general and with respect to the facility. Support and explain which criteria and/or metrics are being considered in assessments.
• Assessment of the team’s likelihood of commercial success.

Additional question to consider addressing in the letter:
• Is the technology solution currently in use at your facility? If not, please comment.
• Will you use the technology in its current form moving forward? If not, please comment.
• Is the technology/innovation mature enough for use and deployment at other facilities? Explain (based on what criteria/metrics).
• Is the technology financially viable? Would you be able to use/sell/produce the recovered resources in a sustainable business manner (i.e., at least break even or earn some amount of profit)? Explain.
• What are the goals/deliverables/objectives/agreements made in partnership with you by the applicant(s)?
  o Has the team met each of their goals/deliverables/objectives/agreements made in partnership with you? Explain for each (include, in terms of percentage, the completeness in achieving each item).
• Would you or will you consider partnering with the team beyond the prize competition? Explain.

### Letter(s) of Support and Commitment From a Wastewater Treatment Facility or Wastewater Resource Recovery Facility

#### Suggested content:
• Confirmation and detailed information pertaining to the nature of the partnership, the effective period of commitment or collaboration, and the frequency of (e.g., weekly, monthly) and type of contact (e.g., video conference, on-site visits)

#### Judging Criteria – This statement is scored on a 1–6 scale:
• The letter supports a strong partnership between applicant (or team) and facility considering the following elements:
  o The technology is innovative
  o The technology is in use or will be in use at the facility by the end of quarter 2 of 2022
  o The technology is financially viable with sales or use of recovered resources for the facility in its present form
between applicant and WWTF/WRRF.

- The technology is scalable to larger or smaller facilities
- The technology is generally viable at other facilities
- The facility is confident in the applicant’s ability to commercialize the product.

Support Letter Requirements

Support letter(s) from the WWTF/WRRF should be on business letterhead and signed by the manager or its designated point of contact of said collaborating/partnering facility.

Additional Letters of Commitment or Support (Optional)

Additional Letters of Commitment or Support

Competitors may attach additional letters of commitment or support from relevant entities (e.g., end users of the proposed solution or [potential] customers of recovered resource(s)). All letters should be on business letterhead and signed by the appropriate entity or point of contact.

6. HOW WE SCORE AND DETERMINE PHASE 2 WINNERS

The prize administrator screens all completed submissions and, in consultation with DOE, assigns subject matter expert reviewers to independently score the content of each submission. The subject matter experts selected by the Prize Administrator, will score submissions according to the judging criteria defined in Section 5, “What to Submit.” To select winning teams, expert reviewers may not have personal or financial interests in, or be an employee, officer, director, or agent of any entity that is a registered participant in this contest; or have a familial or financial relationship with an individual who is a registered competitor. The scoring of submissions will proceed as follows:

Expert reviewers will consider the submission package and the interview of invited competitors. The expert reviewer will then score each bullet listed in the judging criteria for each of the scored submission elements. Each judging criterion has equal weight. All expert reviewers’ scores will then be averaged for a final score for the submission package. Final determination of winners will take expert reviewers’ scores and program policy factors.

Expert Advisory Judge Panel Scoring: The scoring of submissions will proceed as follows:
Each judging criterion will receive a score from 1 to 6, defined as follows:

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<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Slightly Disagree</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
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</table>

The final score from an individual judge for a submission package equals the total sum of the scores for all the bullets listed in the judging criteria in Table 7. All judges’ scores will then be averaged for a final score for the submission package.

Interviews: Following the finalization of HeroX submission package scores, competitors will participate in a private and virtual one-on-one interview with the panel of expert reviewers and members of the prize administration team. See Section 4 for more detail.

Final Determination: Final determination of winners by the director of AMO will take the advisory judges’ scores and the interview findings into account. The director of AMO is the ultimate judge of the competition and will make the final determination of winners.

Announcement: Approximately 30 days after the contest closes, the prize administrator notifies winners and requests the necessary information to distribute cash prizes. The prize administrator will then publicly announce winners.

7. WHO CAN WIN PHASE 2

To be eligible to win the Phase 2 competition, all competitors must comply with the following eligibility requirements:

(a) Citizens or permanent residents of the United States

(b) Private or nonfederal public entities, such as townships, tribes, corporations, or other organizations that are incorporated in and maintain a primary place of business in the United States

(c) A group of individuals acting as one competitor may win, provided that the online account holder of the submission is a United States citizen or a permanent resident. Individuals competing as part of a team may participate if they are legally authorized to work in the United States.
DOE employees, employees of sponsoring organizations, members of their immediate families (i.e., spouses, children, siblings, or parents), and persons living in the same household as such persons, whether related or unrelated, are not eligible to compete in this prize. Federal entities and federal employees, acting within the scope of their employment, are also not eligible. DOE National Laboratory employees cannot compete in any stage of the prize.

- Entities and individuals publicly banned from doing business with the U.S. government, such as entities and individuals debarred, suspended, or otherwise excluded from or ineligible for participating in federal programs are not eligible to compete.

- Entities identified on a Department of Homeland Security, Binding Operational Directives as an entity publicly banned from doing business with the United States government are not eligible to compete. See [https://cyber.dhs.gov/directives/](https://cyber.dhs.gov/directives/).

- Entities and individuals identified as a restricted party on one or more screening lists of Department of Commerce, State and the Treasury are not eligible to compete. See the Consolidated Screening List at [https://2016.export.gov/ecr/eg_main_023148.asp](https://2016.export.gov/ecr/eg_main_023148.asp).

- This prize is expected to positively impact U.S. economic competitiveness. Participation in a foreign government talent recruitment program could conflict with this objective by resulting in unauthorized transfer of scientific and technical information to foreign government entities. Therefore, individuals participating in foreign government talent recruitment programs of foreign countries of risk are not eligible to compete. Further, teams that include individuals participating in

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6 In general, foreign government talent recruitment programs include any foreign-state-sponsored attempt to acquire U.S. scientific-funded research or technology through foreign government-run or funded recruitment programs that target scientists, engineers, academics, researchers, and entrepreneurs of all nationalities working or educated in the United States. These recruitment programs are often part of broader whole-of-government strategies to reduce costs associated with basic research while focusing investment on military development or dominance in emerging technology sectors.

Distinguishing features of a foreign government talent recruitment program include:

a) Compensation provided by the foreign state to the targeted individual in exchange for the individual transferring their knowledge and expertise to the foreign country. The compensation can take several forms, such as cash, research funding, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration.

b) Recruitment in this context refers to the foreign-state-sponsor’s active engagement in attracting the targeted individual to join the foreign-sponsored program and transfer their knowledge and expertise to the foreign state. The targeted individual may be employed and located in the United States or in the foreign state. Recruitment would not necessarily include any invitation for engagement extended by the foreign state, for example, an invitation to attend or present work at an international conference.

c) Many, but not all, programs aim to incentivize the targeted individual to physically relocate to the foreign state. Of particular concern are those programs that allow for continued employment at U.S. research facilities or receipt of DOE research funds while concurrently receiving compensation from the foreign state.

7 Currently, the list of countries of risk includes Russia, Iran, North Korea, and China.
foreign government talent recruitment programs of foreign countries of risk are not eligible to compete.

- To be eligible, an individual authorized to represent the competitor must agree to and sign the following statement upon registration with HeroX:

  I, [NAME OF INDIVIDUAL RESPONSIBLE FOR THE REGISTRATION,] am submitting this submission package as part of my participation in this prize. I certify under penalty of perjury that the named competitor meets the eligibility requirements for this prize competition and complies with all other rules contained in the Official Rules document. I understand false statements or misrepresentations may result in civil and/or criminal penalties under 18 U.S.C. § 1001.
Appendix. Additional Terms and Conditions

1. REQUIREMENTS

Your submission for the Water Resource Recovery Prize is subject to the following terms and conditions:

- You must post the final content of your submission or complete the submission form at https://www.herox.com/WaterResourceRecovery before the current phase closes. Late submissions or any other form of submission may be rejected.
- All submissions that you wish to protect from public disclosure must be marked according to the instructions in paragraph 10 of this appendix. Unmarked or improperly marked submissions will be deemed to have been provided with unlimited rights and may be used in any manner and for any purpose whatsoever.
- Submissions are not intended to be made public, except the portions of the submissions designated as public; however, see Section 10 regarding the Freedom of Information Act.
- You must include all the required submission’s elements. The prize administrator may disqualify your submission after an initial screening if you fail to provide all required submission elements. Competitors may be given an opportunity to rectify submission errors that are a result of technical challenges.
- Your submission must be in English and in a format readable by Microsoft Word or Adobe Acrobat. Scanned hand-written submissions will be disqualified.
- Submissions will be disqualified if they contain any matter that, in the sole discretion of DOE or the prize administrator, is indecent, obscene, defamatory, libelous, lacking in professionalism, or demonstrates a lack of respect for people or life on this planet.
- If you click "Accept" on the HeroX platform and proceed to register for any of the phases described in this document, these rules will form a valid and binding agreement between you and DOE that is in addition to the existing HeroX terms of use for all purposes relating to this contest. You should print and keep a copy of these rules. These provisions only apply to the contest described here and no other contest on the HeroX platform or anywhere else.
- The prize administrator, when feasible, may give competitors an opportunity to fix insubstantial mistakes or errors in their submission packages.

2. VERIFICATION FOR WINNER PAYMENTS

The prize administrator will verify the identity of a participant selected to receive the prizes. Receiving a prize payment is contingent upon fulfilling all requirements contained herein. The prize administrator will notify winning participants using provided email contact information after the date that results are announced. Each participant will be required to sign and return all required payment forms to the prize administrator, within 30 days of the date the notice is sent, a completed National Renewable Energy
Laboratory (NREL) Request for Automated Clearing House (A)Banking Information form, and a completed W9 form (https://www.irs.gov/pub/irs-pdf/fw9.pdf). At the sole discretion of the prize administrator, a winning competitor will be disqualified from the competition and receive no prize funds if (1) the person/entity cannot be contacted, (2) the person/entity fails to sign and return the required documentation within the required time period, (3) the notification is returned as undeliverable, or (4) the submission or person/entity is disqualified for any other reason.

3. TEAMS AND SINGLE ENTITY AWARDS

The prize administrator will award a single dollar amount to the designated primary submitter whether consisting of a single or multiple entities. The primary submitter is solely responsible for allocating any prize funds among its member competitors as they deem appropriate.

4. SUBMISSION RIGHTS

By making a submission and consenting to the rules of the contest, a competitor is granting to DOE, the prize administrator, and any other third parties supporting DOE in the contest, permission to use the submission consistent with this Official Rules Document. Portions of submissions that are marked as protected from public disclosure according to Section 10 will be treated accordingly. Potential uses of submissions include posting or linking to the nonprotected portions of the submission on the prize administrator or HeroX platforms, including the contest website, DOE websites, and partner websites, and the inclusion of the submission in any other media, worldwide. The submission may be viewed by DOE, the prize administrator, and judges for purposes of the contest, including but not limited to screening and evaluation purposes. The prize administrator and any third parties acting on their behalf will also have the right to indefinitely publicize the competitor’s name and, as applicable, the names of the competitor’s team members and organization, and the abstract for their idea on the contest website indefinitely.

By entering, the competitor represents and warrants that:

1. Competitor has not included third-party content (e.g., writing, text, graphics, artwork, logos, photographs, dialogue from plays, likeness of any third party, musical recordings, clips of videos, television programs, or motion pictures) in or in connection with the submission, unless (1) otherwise requested by the prize administrator and/or disclosed by competitor in the submission and (2) competitor has either obtained the rights to use such third-party content or the content of the submission is in the public domain without any limitations on use.

2. Unless otherwise disclosed in the submission, the use thereof by the prize administrator, or the exercise by the prize administrator or others acting on its behalf of any of the rights granted by competitor under these rules, does not and will not infringe or violate any rights of any third party or entity, including, without limitation, patent, copyright, trademark, trade secret, defamation, privacy,
publicity, false light, misappropriation, intentional or negligent infliction of emotional distress, confidentiality, or any contractual or other rights.

3. Competitor is not and will not conduct any activity pertaining to this prize competition that would infringe on any intellectual property right of any third party, such as any patent, copyright, trade secret, or other intellectual property right, and that it has exercised reasonable efforts and diligence in making this representation and warranty. The foregoing representation and warranty shall be ongoing during the course of this competition and will be considered to have been made again and as of the date of each subsequent phase of the competition in which the competitor participates.

4. All persons who were engaged by the competitor to work on the submission or who appear in the submission in any manner have:
   a. Given competitor their express written consent to submit the submission for exhibition and other use in any manner and in any and all media, whether now existing or hereafter discovered, throughout the world
   b. Provided written permission to include their name, image or pictures in or with the submission (or if a minor who is not the competitor’s child, competitor must have the permission of their parent or legal guardian) and competitor may be asked by the prize administrator to provide permission in writing.

5. COPYRIGHT

Each competitor represents and warrants that the competitor is the sole author and copyright owner of the submission; that the submission is an original work of the participant or that the participant has acquired sufficient rights to use and to authorize others, including DOE, to use the submission, as specified throughout the rules, that the submission does not infringe on any copyright or on any other third-party rights of which the participant is aware; and that the submission is free of malware.

6. CONTEST SUBJECT TO APPLICABLE LAW

Contest is subject to all applicable federal laws and regulations. Participation constitutes each participant's full and unconditional agreement with the Official Rules Document and administrative decisions, which are final and binding in all matters related to the prize. This notice is not an obligation of funds; the final awards are contingent upon the availability of appropriations.

7. RESOLUTION OF DISPUTES

DOE is solely responsible for administrative decisions, which are final and binding in all matters related to the contest.

Neither DOE nor the prize administrator will arbitrate, intervene, advise on, or resolve any matters between team members or among competitors.
In the event of a dispute as to any registration, the authorized account holder of the email address used to register will be deemed to be the participant. The "authorized account holder" is the natural person or legal entity assigned an email address by an internet access provider, online service provider, or other organization responsible for assigning email addresses for the domain associated with the submitted address. Competitors and potential winners may be required to show proof of being the authorized account holder.

8. PUBLICITY

The winners of these prizes (collectively, "winners") will be featured on the DOE and NREL websites.

Participation in the contest constitutes each winner's consent to DOE's and its agents' use of each winner's name, likeness, photograph, voice, opinions, and/or hometown and state information for promotional purposes through any form of media, worldwide, without further permission, payment, or consideration.

9. LIABILITY

Upon registration, all participants agree to assume and, thereby, have assumed any and all risks of injury or loss in connection with or in any way arising from participation in this contest or development of any submission. Upon registration, except in the case of willful misconduct, all participants agree to and, thereby, do waive and release any and all claims or causes of action against the federal government and its officers, employees, and related entities for any and all injury and damage of any nature whatsoever (whether existing or thereafter arising, whether direct, indirect, or consequential and whether foreseeable or not), arising from their participation in the contest, whether the claim or cause of action arises under contract or not.

In accordance with the delegation of authority to run this contest delegated to the director of AMO, the director has determined that no liability insurance will be required of participants to compete in this competition per 15 USC 3719(i)(2) in Phases 1 and 2. The director will evaluate possible activities in the rest of the Phases and make additional determinations. Participants may be required to obtain liability insurance in future phases.

10. SUBMISSION MARKING AND FREEDOM OF INFORMATION ACT

All materials submitted to DOE as part of a submission become DOE records. Any confidential commercial information contained in a submission should be designated in writing at the time of submission.

Participants are required to employ protective markings in the following manner:
The cover sheet of the submission must be marked as follows and identify the specific pages containing trade secrets or commercial or financial information that is privileged or confidential:

**Notice of Restriction on Disclosure and Use of Data**

Pages [list applicable pages] of this document may contain trade secrets or commercial or financial information that is privileged or confidential and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes. The government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source. [End of Notice]

The header and footer of every page that contains trade secrets or commercial or financial information that is privileged must be marked as follows: “May contain trade secrets or commercial or financial information that is privileged or confidential and exempt from public disclosure.”

In addition, each line or paragraph containing trade secrets or commercial or financial information that is privileged or confidential must be enclosed in brackets.

Competitors will be notified of any Freedom of Information Act requests for their submissions in accordance with 29 C.F.R. § 70.26. Competitors may then have the opportunity to review materials and work with a Freedom of Information Act representative before the release of materials.

11. PRIVACY

If you choose to provide HeroX with personal information by registering or completing the submission package through the contest website, you understand that such information will be transmitted to DOE and may be kept in a system of records. Such information will be used only to respond to you in matters regarding your submission and/or the contest unless you choose to receive updates or notifications about other contests or programs from DOE on an opt-in basis. DOE and NREL are not collecting any information for commercial marketing.

Federal employees are subject to the nondisclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The government may seek the advice of qualified nonfederal personnel. The government may also use nonfederal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to DOE providing their response to nonfederal parties. Nonfederal parties given access to responses must be subject to an appropriate obligation of confidentiality before being given the access. Submissions may be reviewed by support contractors and private consultants.
12. GENERAL CONDITIONS

DOE reserves the right to cancel, suspend, and/or modify the contest, or any part of it, at any time. If any fraud, technical failures, or any other factor beyond DOE’s reasonable control impairs the integrity or proper functioning of the contest, as determined by DOE in its sole discretion, DOE may cancel the contest.

Although DOE indicates in the Water Resource Recovery Prize phases that it may select multiple winners for each phase, DOE reserves the right to only select competitors that are likely to achieve the goals of the program. If, in DOE’s determination, no competitors are likely to achieve the goals of the program, DOE will select no competitors to be winners and will award no prize money.

DOE reserves the right to request additional and/or required documentation from the competitors within a reasonable time after the close of the competition.

13. PRIZE ADMINISTRATOR

The prize administrator is the Alliance for Sustainable Energy, LLC operating in its capacity as the managing and operating contractor for NREL. AMO is the federal agency sponsor of the prize.

14. NATIONAL ENVIRONMENTAL POLICY ACT COMPLIANCE

DOE’s administration of the Water Resource Recovery Prize contest is subject to the National Environmental Policy Act (NEPA) (42 USC 4321, et seq.). NEPA requires federal agencies to integrate environmental values into their decision-making processes by considering the potential environmental impacts of their proposed actions. For additional background on NEPA, see DOE’s NEPA website at http://nepa.energy.gov/. Though NEPA compliance is a federal-agency responsibility, the ultimate decisions remain with the federal agency. Participants may be asked to provide DOE with information such that DOE can conduct a meaningful evaluation of the potential environmental impacts.

ALL DECISIONS BY DOE ARE FINAL AND BINDING IN ALL MATTERS RELATED TO THE CONTEST.