

water

FY23 WPTO SBIR/STTR Phase I Topics Webinar

December 1, 2022

Webinar Logistics

- This webinar is being recorded and will be publicly posted; the slides will be posted soon after the end of this webinar.
- Attendees' microphones are muted and attendees are not visible on video.
- Questions are encouraged during the presentation, and there will be additional time at the end for Q&A.
- To ask questions:
 - Submit question into the Q&A box
 - Questions will either be answered verbally or in the Q&A box
- If you have technical issues, try calling into the webinar via phone.

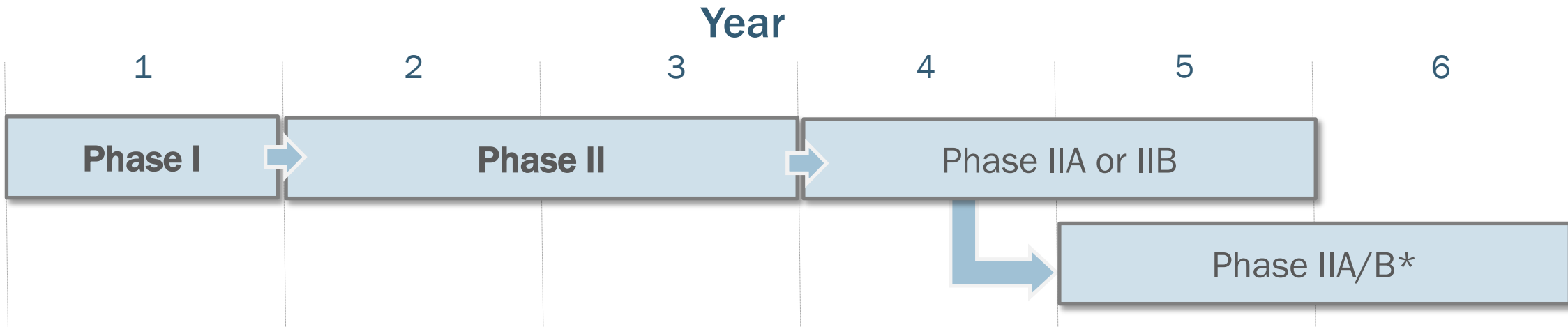
Agenda

- SBIR Background & Timeline
- Applying for SBIR/STTR Support
- FY23 WPTO Phase I SBIR/STTR topics overview
 - EERE Joint Topic: Decarbonization of Agriculture, Buildings, Transport, Industry, and their Communities (10a)
 - Innovations in Water Data (14a)
 - Advanced Coatings and Geomembrane Liners (14b)
 - Identification of Cybersecurity Threats and Research and Development of Mitigation Strategies for Hydropower and Dams' Operations (14c)
 - Co-Development of Marine Energy Technologies (CMET) (14d)
 - Marine Energy Supply Chain Development (14e)

What is SBIR?

- The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are highly competitive programs that encourage domestic small businesses to engage in Federal Research and Development (R/R&D) with the potential for commercialization.
- The program's goals are to:
 - *Stimulate technological innovation.*
 - *Meet Federal research and development needs.*
 - *Foster and encourage participation in innovation and entrepreneurship by women and socially or economically disadvantaged persons.*
 - *Increase private-sector commercialization of innovations derived from Federal research and development funding.*
- In addition, the STTR program aims to:
 - Foster technology transfer through cooperative R&D between small businesses and research institutions.

How DOE SBIR Funding Works



Phase I

- Exploratory R&D and to prepare for substantial Phase II project
- \$200,000/\$250,000
- 6 - 12 months duration

Phase II

- Phase I awardees apply for Phase II the following year
- Focus on prototype, demonstration and commercialization
- \$1,100,000/ \$1,600,000 (+\$50,000 for commercialization)
- 2 years duration

Phase IIA/IIB

- For projects that require additional R&D funding to transition to commercialization
- \$1,100,000 (+\$50,000)
- 2 years duration

*Second Phase IIA/B application possible in unsuccessful in first Phase IIA/B application

Key Dates

- **Topics Released:** Monday, November 7, 2022
- **WPTO Topics Webinar:** Thursday, December 1, 2022
- **SBIR FOA Released:** Monday, December 12, 2022
- **SBIR Office FOA Webinar:** Friday, December 16, 2022 (please check the SBIR website for a link)
- **Letter of Intent Due Date:** Monday, January 3, 2023
- **Application Due Date:** Monday, February 21, 2023
- **Award Notification Date:** Monday, May 15, 2023*
- **Start of Grant:** Monday, June 26, 2023*

Dates and other resources at: <https://science.osti.gov/sbir/Funding-Opportunities>

DOE SBIR/STTR Phase 0 Assistance Program

- For first time DOE SBIR/STTR Phase I participants; this program assists applicants at no charge in developing SBIR applications
- Any first-time applicant is eligible to apply for Phase 0
- DOE encourages women-owned, as well as socially and economic disadvantaged small business to take advantage of this service alongside those located in “under-represented states”.
- More information on applying: <https://doephase0.dawnbreaker.com/apply/>

Contracted Support through American Made Network Power Connectors



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Power Connector Events

- November 18, 2022, 2:30 PM ET – **Understanding the SBIR/STTR Program and Resources Available to Applicants** – University of Arizona Center for Innovation
- November 22, 2022, 3:00 PM ET – **Justice40 and SBIR: Resources for Underrepresented Founders** – Clean Energy Business Network
- Various Dates: **Office Hours** – University of Arizona Center for Innovation
- November 29, 2022, 11:00 AM ET – **Finding the Right Topics** – University of Arizona Center for Innovation
- December 6, 2022, 11:00 AM ET – **Overview of the FOA and Preparing Your LOI** – University of Arizona Center for Innovation
- December 13, 2022, 11:00 AM ET – **Writing Your Proposal and Evaluation Criteria** – University of Arizona Center for Innovation
- January 3, 2023, 11:00 AM ET – **Legal Process and Data Rights** – University of Arizona Center for Innovation
- January 13, 2023, 11:00 AM ET – **Commercialization Workshop: Product Market Fit** – University of Arizona Center for Innovation
- January 20, 2023, 2:30 PM ET – **Commercialization Workshop: Business Basics** – University of Arizona Center for Innovation
- January 27, 2023, 2:30 PM ET – **Commercialization Workshop: Operational Experience** – University of Arizona Center for Innovation
- February 3, 2023, 2:30 PM ET – **Commercialization Workshop: Funding Strategy** – University of Arizona Center for Innovation

- WPTO is working with American Made Network Power Connectors to provide additional guidance and connections on SBIR
- Events related to teaming, commercialization etc. organized but Power Connectors
- https://www.cebn.org/media_resources/sbir-events/

Resources

- Office hours
- Webinars
- Workshops
- Application Education



Technical and Business Assistance Program & American Made Network

Technical and Business Assistance Program (TABA, formerly Commercial Assistance Program)

- EERE is dedicated to the successful commercialization of SBIR/STTR funded technologies and can fund discretionary commercialization assistance for DOE SBIR and STTR Phase I awardees.
- Award recipients have two options for receiving commercialization assistance: (1) services provided by a DOE Vendor (Phase I only) or (2) identify their own commercialization assistance provider.
 - Information on the services provided via the DOE Vendor can be found at: <https://larta.org/programs/doe-taba-phase-i/>
 - If you wish to utilize your own commercialization assistance provider, you are required to include this as a subcontract or consultant in your budget and to provide a detailed budget justification.
 - *You may include up to \$6,500 for assistance in Phase I and up to \$50,000 in Phase II.*

The American Made Network: A Resource for EERE-specific Commercialization Assistance

- The Network is comprised of National Labs, energy incubators, investors prototyping and testing facilities, and other industry partners from across the United States who engage, connect, mentor, and amplify the efforts of small businesses.
- Explore the Network to find potential partners and develop relationships at: <https://americanmadechallenges.org/network/>

Energy I-Corps for SBIR/STTR

- The Energy I-Corps for SBIR/STTR program is designed to educate awardees on entrepreneurial concepts and practices
- SBIR Phase I awardees are eligible to apply and receive an intense 2-month entrepreneurial training from experienced instructors at *no cost to participants*.
 - The training includes a series of interactive workshops and webinars focusing on performing customer discovery, identifying market segments, and crafting value propositions.
- FY20 Phase I Release 2 awardee cycle was the first cohort for the program and DOE will continue the program in FY23.
- Participants will be selected based on their commitment statement on why I-Corps training will improve their commercialization efforts (in 150 words or fewer)

** Please note that time spent by the participants for the Energy I-Corps training cannot be directly billed to an SBIR/STTR award because these are not research and development expenses.*

<https://science.osti.gov/sbir/Awardee-Resources/Energy-I-corps>



Other Important DOE SBIR/STTR Information

- DOE SBIR/STTR Phase I Proposal Prep Site
<https://science.osti.gov/SBIRLearning>
 - The DOE SBIR/STTR Phase I Proposal Prep site is available to help teach Small Businesses how to prepare a proposal in response to the DOE Funding Opportunity Announcement (FOA)
 - Includes text, audio, and video tutorials and other informational tools to help applicants learn about the program at no charge.

- FY2023 SBIR/STTR Phase I FOA Webinar: Friday, December 16, 2022
 - Hosted by the DOE SBIR Office, topics to be covered include general SBIR/STTR application/award process and policies and general proposal preparation
 - Registration Information will be posted at a week before the webinar:
<https://science.osti.gov/sbir/Funding-Opportunities>

EERE Joint Topic: Decarbonization of Agriculture, Buildings, Transport, Industry, and their Communities

Topic 10a

Decarbonization of Agriculture, Buildings, Transport, Industry, and Communities

- The objectives of this topic on decarbonization of Agriculture, Buildings, Transport, and Industry are to enable major reductions in carbon emissions in these sectors to help meet greenhouse gas reduction objectives of 50 percent reduction by 2030 and net-zero carbon economy by 2050.
- *Crosscutting Community-Driven Decarbonization Areas of Interest:* EERE offices are, under each of the subtopics, soliciting in a specific area of interest for applications from small businesses that are focused on community partnerships.
- WPTO is interested in Agricultural Power Decarbonization:
 - This area of interest aims to support small businesses that advance technologies in agricultural opportunities related to irrigation modernization and other alternative opportunities in hydropower in agricultural communities.
 - By harvesting power from the flow of water through irrigation canals and pipes, irrigation water suppliers and users can self-supply clean energy while reducing or eliminating the need for diesel pumps.
 - Modernization also allows for the adoption of precision agriculture and other practices that support decarbonization, such as crop changes and reduced use of fertilizer.
 - Areas of interest include hardware and/or software tools to enable harvesting water power from irrigation canals and pipes and/or otherwise modernize agricultural systems through water power technologies

Innovations in Water Data

Topic 14a

Innovations in Water Data

- Background
 - The collection, preparation, storage, processing, and interpretation data as it relates to water is foundational to 1) understanding the resilience of hydropower to changing basin-scale and climate conditions and 2) strategizing new marine renewable energy projects. This subtopic seeks novel and/or opportunistic approaches in water-related data that could open new areas of opportunity or bring greater efficiency or capabilities to hydropower and/or marine energy applications.
- Scope
 1. Data Gaps and Collection: Products and services integrating multiple data streams or databases
 2. Data Processing and Analysis: Technologies, data, information, or tools that support the integration and/or usability of information in assessing hazard risk, vulnerability, and resilience

Innovations in Water Data

	Data Collection	Processing or Analytics
Phase I	<ul style="list-style-type: none"> • Conduct a landscape analysis • Establish data type, storage, and/or transmission, as applicable • Document concerns and limitations • Research commercial potential • Prepare a preliminary design • Define the accuracy, uncertainty, and adaptability 	<ul style="list-style-type: none"> • Clearly define the landscape of the system including but not limited to: <ul style="list-style-type: none"> • Applicability to the program • Applicability more generally • Distinction from existing solutions • Value proposition
Phase II	<ul style="list-style-type: none"> • Develop and finalize sensor as outlined in Phase I • Perform tests on the sensor over a range of operational conditions; • Complete research on commercial potential • Develop a report detailing: <ul style="list-style-type: none"> • Data collection needs • Commercial potential • Process for commercialization and industry uptake 	<ul style="list-style-type: none"> • Finalize design, processing and/or user information • Perform sensitivity tests to ensure accuracy and precision and quantify uncertainty. • Develop a report detailing: <ul style="list-style-type: none"> • Recommendations on data processing • Commercial potential • Process for commercialization and industry uptake

Advanced Coatings and Geomembrane Liners

Topic 14b

Advanced Coatings and Geomembrane Liners

Opportunity Area 1: Coatings for Hydropower

- Due to the harsh conditions typical for hydropower facilities, coatings are frequently leveraged for a variety of applications
- Some traditional coatings may no longer be acceptable for use because of increased efforts to ensure minimal environmental impacts
- Alternatives often have higher costs and/or shorter lifespans which is impacting the industry
- Common issues for concrete and metal components tend to include, but are not limited to friction loss, corrosion, cracking, insulation, seepage loss, and biofouling

Scope

- Applicants should consider novel coatings that can address one or more of the above concerns; this can include completely novel coatings or those adopted from other industries

Opportunity Area 2: Reservoir Liners

- As of December 2021, developers were designing over 93 PSH projects representing over 70 GW
- Reservoirs of PSH plants must consider the slope stability during rapid draw-down and filling cycles
- Efforts to minimize water loss due to seepage are important for conservation of water used for the energy production and protection of groundwater resources
- Because of the growing need for energy storage, PSH reservoir liners present an opportunity for innovation related to geomembrane reservoir liners as well as adoption from other industries

Scope

- Applicants are challenged to develop polymeric geomembrane liners that have properties that are relevant to PSH reservoirs
- Factors to consider include seepage rates, soil retention, greenhouse gas emission reductions, installation, cost, and durability

Advanced Coatings and Geomembrane Liners

Phase I

- A conceptual design of the proposed system with estimated physical dimensions and a clear description on how the system would operate – this may include a drawing or schematic of the proposed system
- The selection of a suitable location for demonstration of the technology and obtain necessary permits if needed
- Illustrate the integration of the innovative system and/or improvement within a hydropower project
- Customer discovery and analysis

Phase II

- Refine system designs based on the findings from Phase I towards building a functional prototype
- Build, test, and demonstrate the technology developed during Phase I at the location identified in Phase I
- Create a detailed commercialization plan

Competitive applications will demonstrate knowledge, experience, and/or capabilities in developing coatings, membranes, and/or hydropower technologies and include:

- The state-of-the-art for incumbent technologies and/or typical industry practice for the current coating or liner and how the proposed design is an improvement in performance or reduction in cost;
- How the innovative technologies will improve operational performance relative to current components or structures given that reductions of cost, time, materials, etc. are the desired outcomes
- How the innovation relates to various types of dams or PSH projects (i.e. concrete arch, concrete gravity, earth fill, or combinations)
- How the applicant will research, design, and develop innovative coating or geomembrane lining systems for the targeted location and demonstrate understanding of the specific requirements for deployment at that site

Identification of Cybersecurity Threats and Research and Development of Mitigation Strategies for Hydropower and Dams' Operations

Topic 14c

Identification of Cybersecurity Threats and Research and Development of Mitigation Strategies for Hydropower and Dams' Operations

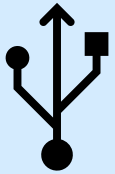
Background



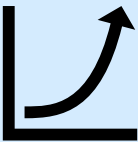
Hydropower plants play a critical role in human, grid, and environmental health and safety



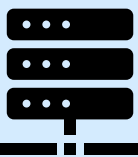
The approximately **2300** hydropower plants in the U.S have an average age of **61** years



The value of hydropower is changing, highlighting the needed for flexibility, smarter control systems, and secure communications



Cyberattacks are on the rise with over **40** major attacks on hydropower plants and water infrastructure in the last 20 years



Threats are increasing in both the information technology (IT) and operational technology (OT) systems

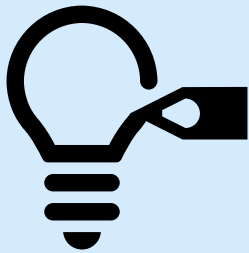
Scope

- Cybersecurity solutions for hydropower-specific challenges (including, but not limited to)
 - Mixes of modern and legacy systems
 - Remote operation of complex facilities
 - Operation in ancillary service markets
 - Diverse plant configurations
 - Multi-purpose operations
- Examples (including, but not limited to)
 - Communication monitoring devices
 - Threat detection and mitigation software (including OT asset management systems)
 - Defense in depth approaches
 - Supervisory control and data acquisition (SCADA) system protections
 - Remote operation platforms

Identification of Cybersecurity Threats and Research and Development of Mitigation Strategies for Hydropower and Dams' Operations

Phase I

- Conceptual design
- Threat analysis
- Customer discovery and market assessment
- Select a test site and prepare for site deployment
- Define the value proposition and cost estimates



Phase II

- Pilot deployment
 - At a hydropower facility
 - Or in a cyber test range
- Demonstrate and test the solution (e.g., red team test)
- Create detailed commercialization plan



Submission Recommendations

- Demonstrate expertise in both cyber and hydropower
 - Critical threats
 - Fleet/market characteristics
- Letter of support from a hydropower stakeholder
- Clear understanding of how the solution fits into existing WPTO work
- Initial understanding of the value proposition
- Defined path forward for testing and validation

Co-Development of Marine Energy Technologies

Topic 14d

Co-Development of Marine Energy Technologies

- Part of WPTO's **Powering the Blue Economy (PBE)** initiative
- Co-develop marine energy solutions tightly coupled to end-user needs in the blue economy.
- Applicants may be technology developers and/or end users.
- **Market-agnostic topic**; applicants must include an initial analysis of market value and broader impact of their solution
- Successful applicants will include at least one end-user partner.
- Areas of interest for FY23 include:
 - *Applications that incorporate aquaculture systems or marine carbon dioxide removal (mCDR)* with marine energy systems including those related to monitoring, precision farming, robotic and submerged cages, towing and transportation, feeding, health and disease prevention, and/or underwater drones and autonomous vehicles.
 - *Applications that seek to further develop innovations related to recent WPTO Powering the Blue Economy Prizes*, i.e., the Waves to Water Prize focusing on wave-powered desalination, and the Ocean Observing Prize focused on marine energy powered ocean observing systems, including autonomous underwater vehicles.



Co-Development of Marine Energy Technologies

Competitive applications for Phase I will demonstrate knowledge, experience, and/or capabilities in developing marine technologies and include:

- A **preliminary design** and a clear description of the system
- **Identification of the marine energy resource** that would be utilized;
- **The end-user or customers** that will be engaged during the project, and plan to incorporate customer needs based on interviews, workshops, expert panels, literature searches, and other methods;
- Plan for **preliminary proof-of-concept testing** or modeling of system components;
- Identification and description of the proposed performance metrics which will be used to assess the system in comparison to incumbent technologies
- A description of the intended deployment location(s) and the available energy in the chosen marine energy resource
- Relevance of this project to DOE's climate change goals including through advancing clean energy and decarbonization.

Phase II applications should state how awardees will:

- Refine system designs based on the findings from Phase I towards building a functional prototype;
- Build, test, and demonstrate a functioning prototype in a realistic environment;
- Iterate system design based on ongoing laboratory and in-water experiments;
- Present a detailed plan for technology commercialization including identification and engagement of end-users, near-term and long-term market opportunities, future demonstration and deployment plans, manufacturing and supply chain requirements

Marine Energy Supply Chain Development

Topic 14e

Marine Energy Supply Chain Development

Marine Energy Challenge

- Currently there is no clustered or established marine energy supply chain in the US.
- The **Objective** of this subtopic is therefore to spur the development of innovative systems or prototypes that will improve the logistics and supply chain capabilities (i.e., faster, cheaper more resilient, more secure, more adaptive) necessary for the deployment of marine energy technologies on a commercial scale.
- **Develop:**
 - ✓ Expertise
 - ✓ Fit for purpose ME services
 - ✓ Training
 - ✓ Facilities



Marine Energy Supply Chain Development

- Phase I
 - Identify ME developer/institution
 - Incorporate ME developer/institution **requirements** with stakeholder requirements.
 - Develop **partnerships** with existing supply chains
 - Demonstrate **knowledge and experience** with ME challenges
 - Demonstrate **impact** of supply chain participation on **ME cost reductions**
 - Describe **business models** for supply chains to pivot technologies or services to address ME requirements
 - Describe / Investigate opportunities for ME to access existing maritime infrastructure, services, and expertise to deploy marine energy systems at commercial scale.
- Phase II
 - Describe and develop the **How / What / Why solutions** for rapid supply chain development.

Questions?

Please use the chat box



U.S. DEPARTMENT OF
ENERGY | Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY
WATER POWER TECHNOLOGIES OFFICE

WPTO SBIR contact info

- **WPTO SBIR Lead:** Rukmani Vijayaraghavan, water.sbir@ee.doe.gov
- For information on the SBIR program, deadlines, and application portal, please visit: <https://science.osti.gov/sbir/Funding-Opportunities>
- For more information about WPTO projects and funding opportunities, please visit energy.gov/eere/water
- For more information on WPTO's SBIR program, visit <https://www.energy.gov/eere/water/small-business-innovation-research-sbir-and-small-business-technology-transfer-sttr>