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U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

RECIPIENT: NREL **STATE:** NC

PROJECT TITLE: Waves To Water Prize Partnership with Coastal Studies Institute at East Carolina University; NREL Tracking No. 20-030

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
	DE-AC36-08GO28308	GFO-WavesPrize-003	GO28308

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:
Description:

A9 Information gathering, analysis, and dissemination	Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
A11 Technical advice and assistance to organizations	Technical advice and planning assistance to international, national, state, and local organizations.
B3.16 Research activities in aquatic environments	Small-scale, temporary surveying, site characterization, and research activities in aquatic environments, limited to: (a) Acquisition of rights-of-way, easements, and temporary use permits; (b) Installation, operation, and removal of passive scientific measurement devices, including, but not limited to, antennae, tide gauges, flow testing equipment for existing wells, weighted hydrophones, salinity measurement devices, and water quality measurement devices; (c) Natural resource inventories, data and sample collection, environmental monitoring, and basic and applied research, excluding (1) large-scale vibratory coring techniques and (2) seismic activities other than passive techniques; and (d) Surveying and mapping. These activities would be conducted in accordance with, where applicable, an approved spill prevention, control, and response plan and would incorporate appropriate control technologies and best management practices. None of the activities listed above would occur within the boundary of an established marine sanctuary or wildlife refuge, a governmentally proposed marine sanctuary or wildlife refuge, or a governmentally recognized area of high biological sensitivity, unless authorized by the agency responsible for such refuge, sanctuary, or area (or after consultation with the responsible agency, if no authorization is required). If the proposed activities would occur outside such refuge, sanctuary, or area and if the activities would have the potential to cause impacts within such refuge, sanctuary, or area, then the responsible agency shall be consulted in order to determine whether authorization is required and whether such activities would have the potential to cause significant impacts on such refuge, sanctuary, or area. Areas of high biological sensitivity include, but are not limited to, areas of known ecological importance, whale and marine mammal mating and calving/pupping areas, and fish and invertebrate spawning and nursery areas recognized as being limited or unique and vulnerable to perturbation; these areas can occur in bays, estuaries, near shore, and far offshore, and may vary seasonally. No permanent facilities or devices would be constructed or installed. Covered actions do not include drilling of resource exploration or extraction wells.
B3.2 Aviation activities	Aviation activities for survey, monitoring, or security purposes that comply with Federal Aviation Administration regulations.
B3.6 Small-scale research and development, laboratory operations, and pilot projects	Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) is proposing to subcontract with the Coastal Studies Institute (CSI) of East Carolina University to facilitate Stage 5: DRINK of DOE's Waves to Water Prize competition, which would deploy and test up to 7 small, modular, wave powered desalination systems at

Jennette's Pier in Nags Head, North Carolina.

Two NEPA reviews for the first four stages of the Prize (CONCEPT, DESIGN, ADAPT, and CREATE) have been completed previously. The first NEPA Determination was signed by the DOE NEPA Compliance Officer on June 6, 2019 (GFO-WavesPrize-001) and the second was signed on June 19, 2020 (GFO-WavesPrize-002). Stage 5: DRINK would involve the deployment, testing, and recovery of wave powered desalination devices in three phases: Phase 1 (Spring 2021), Phase 2 (Winter 2021-2022), and Phase 3 (Spring 2022). Each phase is an open water testing period which would occur at the Jennette's Pier Wave Test Site Facility in Nags Head, North Carolina, in 3.6m to 6m (12-20ft) water depth. The Jennette's Pier Wave Energy Test Center is an established site that is used to test temporary installations of small-scale wave energy devices and is located alongside and adjacent to Jennette's Pier.

A summary of each phase is provided below:

PHASE 1: SIMPLE TEST ARTICLE DEVICE DEPLOYMENT
CSI would install one primary anchor and would design, fabricate, and deploy one simple test article device. The purpose of this Phase is to allow personnel to practice installing a primary anchor and deploying and recovering a simple test article of representative size, and to allow divers to practice underwater anchoring and making water hose/power cable connections in preparation for Phase 2 and Phase 3 activities. The simple test article would not include any wave energy or reverse osmosis technology and would consist of a surface buoy with a strobe light, frame, a mooring system including an elastic bungee cord and polypropylene line, and a water hose extending from the surface frame to the primary anchor. The simple test article would be delivered to the project location via a pick-up truck.

The simple test article would be deployed for 5 days at Jennette's Pier in Spring 2021. Activities conducted in this phase include pre-test anchor installation and the assembly, deployment, and decommissioning of the simple test article. The anchor installed in this Phase would remain in place for use in Phase 2.

PHASE 2: MODULAR TEST ARTICLE DEVICE DEPLOYMENT
In Phase 2, NREL would design and fabricate one fully functioning wave energy conversion device with a modular drivetrain that would be shipped to CSI from Golden, Colorado. The purpose of this Phase is help Prize administrators determine how to evaluate both hydraulic and electric devices (either of which may be used in competitor designs) during the competition, and to further refine logistics and safe operations planning for Phase 3 activities.

Although the design of the modular test article is still being finalized, both configurations would use the same inflatable hexagonal ring made of PVC fabric and coated in polyurethane. The ring would have an outer diameter of approximately 2 m (6.6 ft) and would be equipped with a strobe light. The components for each configuration would fit inside of the ring and mount to the frame attached to the float.

Each of the two device configurations (hydraulic and electric) would be deployed for 1–2 days at Jennette's Pier in Winter 2021-2022. After the hydraulic configuration completes its testing, the device would be brought back to the Pier parking lot and the electric configuration of the device would be assembled and delivered to the water for testing. Activities associated with this phase include assembly and deployment of the modular test article, installation of a water hose and power connection, decommissioning of Phase 2 materials, Uncrewed Aircraft System (UAS) flight, and pier-mounted Swift X-band radar measurements of the wave surface.

PHASE 3: COMPETITORS' DEVICE DEPLOYMENT
In Phase 3, up to 7 devices would be deployed concurrently for 5 days at Jennette's Pier in Spring 2022. Specific details of each device are not known at this time, and competitors have been challenged to adapt their designs specifically for operation at Jennette's Pier. Further, competitors must provide monthly reports and updated device drawings indicating potential pinch points or entanglement risks, light and noise sources, brine production data (concentration, rate of production, and location of brine discharge), waste materials that would be generated by the device, and any hazardous materials that may be used, such as lubricants. Each device must be shipped in a 1.14 m x 1.22 m x 1.07 m (45 in x 48 in x 42 in) pallet-sized container to Jennette's Pier and weigh no more than 650 kg (1,433 lb).

Activities associated with Phase 3 include pre-test anchor installations, assembly and deployment of the competitors' systems, decommissioning of Phase 3 materials, UAS flight; and pier-mounted Swift X-band radar measurements of the wave surface (if needed).

The activities in each Phase would be similar. Specific details of each activity are provided below:

PRIMARY ANCHOR INSTALLATION
In Phase 1, CSI personnel would install one primary anchor (a chain bundle with a footprint of approximately 1.5 m2 (16.1 ft2) on the seafloor) using the CSI-owned research vessel R/V Miss Caroline, a 12.8-meter-long (42 ft) Duffy which is berthed at and would deploy from the CSI marina in Wanchese, North Carolina. After leaving the marina, the

R/V Miss Caroline would transit through the Roanoke and Pamlico Sounds, through Oregon Inlet, and out into the Atlantic Ocean, where it would travel nearly due north to the deployment site at Jennette's Pier. Once at the deployment site, the crew would verify that the water column is free of marine mammals before installing the anchor. Deployment of the anchor would take one day. At the conclusion of Phase 1 activities, the anchor would be left in place and used to support Phase 2 activities.

In Phase 3, up to 7 primary anchors would be installed over a 5-day period as described above. Each trip of the R/V Miss Caroline from CSI to Jennette's Pier would include a maximum of two primary anchor systems. Each primary anchor would be distanced at least 10 times the device diameter (or characteristic length) from neighboring devices to ensure no wave interactions occur between devices, which would also help mitigate any potential for marine mammal and sea turtle entanglement with the mooring lines.

DEVICE ASSEMBLY, DEPLOYMENT, AND INSTALLATION
In each Phase, a Spydercrane would lower a jet ski (2.4 m (8 ft) in length) and a Zodiac (a Grandraid that is 4 m (13 ft) in length) into the water. The Zodiac would be attached to the primary anchor and would serve as a dive platform. The 8.5-meter-long (28 ft) vessel, Blackbeard, would be on standby to assist each deployment effort if needed.

All devices would be assembled in the Jennette's Pier parking lot and transported from the parking lot and onto the Pier using either a pallet jack, a Bobcat with forks, or a manual pallet jack. The Spydercrane would lower the device(s) to the water surface, the jet ski would tow them to the selected deployment location, and CSI divers would secure them to the primary anchor. Smaller, secondary anchors (with a footprint of approximately 1 m2 (10.8 ft2) on the seafloor) may also be installed if needed to prevent the device(s) from spinning. Once anchored, divers would connect water delivery hoses and power cables as needed from the device to the chain pile marker buoy and along the seabed to the pier; the hoses and cables would be secured to the seabed using 12-inch-long U-shaped rebar staples. In Phase 1, a dummy water hose and power cable would be used to train divers for installation of active lines that would occur in Phase 2 and Phase 3.

In Phase 2 and Phase 3, the desalination system and/or water collection system would be set up on the Pier after the devices are installed. The water would be collected in containers and emptied every 12 hours (or as needed). The brine and fresh water produced would be disposed of in the ocean as authorized.

In each Phase, CSI and NREL personnel would maintain 24/7 monitoring of the devices and would respond to any system failure or environmental concern in a timely manner during daylight hours.

PIER-MOUNTED X-BAND RADAR
In Phase 2, DOE would subcontract with the United States Army Corps of Engineers' (USACE) Field Research Facility in Duck, North Carolina, to install and operate one Swift X-Band Radar system from the roof of the work building at the seaward end of Jennette's Pier. The X-Band radar system would measure hourly radar intensity data over a one-week period, after which it would be removed and returned to USACE for future use. The system is a commercially available unit utilized by many recreational and commercial vessels.

Depending on the outcome of the Swift X-band Radar results in Phase 2, Prize organizers may decide to use this equipment again in Phase 3. If so, the installation and operation of the system would be the same as described previously.

UNCREWED AIRCRAFT SYSTEM FLIGHTS
During Phase 2, NREL personnel would operate UAS to collect photographs and video footage and to test the live-streaming system that would be used in Phase 3. The UAS that would be used is a Parrot ANAFI, and flights would be conducted over the parking lots, pier, and test areas. There are no airspace restrictions in the area; as such, UAS can operate at heights up to 122 m (400 ft) above the ground/sea. An operational height range of 9.1–30.5 m (30–100 ft) above the ground/pier/sea is anticipated for the Project. The UAS would maintain at least 9.1 m (30 ft) distance from any structure. UAS operations during Phase 2 would be limited to 2-4 days.

During Phase 3, NREL personnel would operate UAS to collect photographs, video footage, and support a live stream of the competition as described above. UAS operations during Phase 3 would be limited to 5-6 days.

DECOMMISSIONING
At the conclusion of each Phase, the devices and their connections would be removed. In Phase 2 and Phase 3, all water and power systems would be shut down and disconnected prior to separating the device(s) from the anchor. In all Phases, the devices would be towed to the base of the pier, raised to the pier deck, and transported to the parking lot where they would be disassembled and returned to their respective facilities.

In Phase 2 and Phase 3, the primary and secondary anchors would be removed by the Tiki XIV, a 24.4 m (80 ft) steel trawler. The Tiki XIV would travel approximately 278 km (150 nautical miles) to Jennette's Pier on a nearly straight, established route along the Continental shelf of the North Atlantic Ocean; the transit time between dock and

Jennette's Pier would take one day in each direction. Once at the project location, the anchor would be hauled aboard using the A-frame and winch and secured on deck. The vessel would return the anchors to CSI for future use.

Permitting
The North Carolina Ocean Renewable Energy Program (hereafter "the Program"), operated out of CSI, has a Coastal Area Management Act (CAMA) major permit for the Program's Wave Energy Test Center at Jennette's Pier, which is a joint permit between North Carolina Division of Coastal Management and the U.S. Army Corps of Engineers (USACE). Additionally, the USACE issued the Program Nationwide Permit #5, Scientific Measurement Devices, for the Wave Energy Test Center at Jennette's Pier. Additional permits that could be required include: U.S. Coast Guard Private Aids to Navigation or Notice to Mariners; and/or a Land Use permit. Project activities shall not commence until all required permits have been obtained.

FWS Consultation
There are 16 federally listed threatened or endangered species under FWS's jurisdiction that could occur in the Project area. DOE determined that the proposed project would have no effect on 15 species and may affect, not likely to adversely affect, one species, the West Indian manatee. The Prize team would implement WIM Guidelines: Precautionary Measures for Construction Activities in North Carolina Waters. Manatees are not likely to encounter the Project given the time of year, but if a manatee is seen within 100 yards of the project, all appropriate precautions shall be implemented to ensure their protection. NREL communicated this determination to FWS on February 12, 2021. The FWS concurred with this determination on February 19, 2021.

NMFS Consultation
There are 9 federally listed endangered species under NMFS's jurisdiction that could occur in the proposed project area. The proposed project location also includes designated critical habitat for one species, the Loggerhead sea turtle. The proposed project has the potential to impact these species and designated critical habitat, and DOE requested expedited informal Endangered Species Act consultation with the National Marine Fisheries Service (NMFS) on April 5, 2021.

Physical effects to species could include collisions with the vessel and/or project equipment during deployment and retrieval. The likelihood adverse impacts is anticipated to be very low due to: the deployment of anchors in a slow and controlled manner to avoid marine mammal strikes; adherence to NMFS-recommended BMPs and conservation measures; the presence of divers and marine mammal observers and use of the onboard active acoustic fish finder to alert to the team to the presence of marine life; avoidance of sea turtle nesting season (which begins in mid-May); and the spacing of devices and anchors to allow marine animals safe and unrestricted access through the area.

NMFS concurred with DOE's determination that the proposed project is not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat. The letter of concurrence was received by DOE on April 13, 2021.

In the event that the design of a device raises concerns about the potential impact of the system to species, the device may be deemed ineligible to participate or DOE shall reinitiate consultation with NMFS or FWS to assess potential impacts.

Additional Impacts
Cultural resources were not identified in the project area. The proposed project would occur at an established wave energy test site that is used for device testing, and all land-based activities would occur at existing facilities (i.e. the Pier and its parking lots); as such, the project would not affect the use of the area by marine life or human activity. The discharge of brine and fresh water produced by the devices and the operation of vessels would not affect the use, availability, or quality of water resources, or planned or ongoing land uses.

Vessel and vehicle use would result in de minimus air emissions. Project activities may temporarily elevate noise levels and would likely be masked by the existing background noise in the area from waves, existing recreational and commercial vessel activity, and other activities that regularly occur in the project area.

Individuals working on this project could be exposed to various hazards during equipment and device assembly, deployment, testing, and retrieval. Existing corporate health and safety policies and procedures would be followed, including employee training, proper protective equipment, and engineering controls; additional policies and procedures would be implemented as new health and safety risks are identified.

NEPA PROVISION

DOE has made a final NEPA determination.

Include the following condition in the financial assisstance agreement:

All required permits, permissions, notifications, and approvals shall be received prior to commencing project activities.

The prize team shall abide by all of the mitigation measures resulting from DOE's consultation with NMFS and FWS. In the event that the design of a device raises concerns about the potential impact of the system to species, the device may be deemed ineligible to participate or DOE shall reinitiate consultation with NMFS or FWS to assess potential impacts.

Notes:

NREL
Nicole Serio 4/15/2021

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Roak Parker Date: 4/15/2021
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

☑ Field Office Manager review not required
☐ Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____
Field Office Manager