

PMC-ND

(1.08.09.13)

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

**RECIPIENT:** Littoral Power Systems, Inc.**STATE:** MA

PROJECT TITLE: XCT System for Harvesting In-Current Hydrokinetic Energy from Low-Velocity Sites

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001837	DE-EE0008628	GFO-0008628-003	GO8628

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.)

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 (DOE) is proposing to provide funding to Littoral Power Systems Inc. (LPS) to develop a novel turbine system for energy generation in slow-moving water currents. The project would seek to mature the design of major system components within the turbine system. As part of the project, a laboratory scale test article (LSTA) would be fabricated and tested in laboratory settings to validate the system's performance capabilities. The LSTA would serve as a proof of concept, before fabricating a proportional prototype (XCT-1) for in-water testing.

Two NEPA Determinations (GFO-0008628-001 and GFO-0008628-002; CX's A9, B3.6) were completed previously for this award which reviewed all BP1 tasks, including LTSA fabrication and testing. BP2 tasks were restricted, as they included XCT-1 prototype fabrication and in-water testing to be performed at outdoor testing sites that had not yet been selected. Since that time, site selection has occurred. Accordingly, this NEPA Determination will review XCT-1 prototype design, fabrication, and test planning activities included in Task 7, Subtasks 8.1, 8.2, 9.1, Task 10, and Task 11. Testing activities to be performed as part of Subtask 8.3 and 9.3 would be restricted until testing plans and all associated information are submitted to DOE for review. Subtask 9.2 would also be restricted, as it depends on completion of the testing plans.

Development of the XCT-1 prototype would include conceptual design work, analysis, prototype fabrication/assembly, system verification testing, and test plan development. These activities will be discussed in detail below:

Task 7 - Finalize detail for the design of the XCT-1: This task would consist of the development of design specifications for the XCT-1 prototype and for its integration into an existing floating and mooring system at the Bourne Tidal Test Site (BTTS) test site located at the Cape Cod Canal in Bourne, MA. LPS would lead design specifications development in coordination with its project partners (see below for additional info on project team). This task would consist solely of computer-based conceptual design work, including the completion of a failure modes and effects analysis and fish mortality assessment. The fish mortality assessment would be computer-based and would not include live fish testing. Field testing of the mooring arrangement would not be performed until Subtasks 8.3 and 9.3, which are restricted until testing plans and all relevant information has been submitted to DOE for review.

LPS would perform conceptual design work and computer modeling at its office facility in Bedford, MA. GE Global Research (GE) would lead system and component design and procurement. Turbo Solutions Engineering (TSE) would perform engineering design work and computational analysis at their office facilities in Thetford, VT. Alden Research

Laboratory (Alden) would perform engineering design, computer modeling, and component/system review and characterizations at its laboratory facilities in Holden, MA. University of Alaska Fairbanks would contribute to engineering design development.

Subtask 8.1 – Fabricate the XCT-1: This task would consist of the fabrication and assembly of the fully integrated XCT-1 hydrokinetic turbine prototype. The XCT-1 device would be a scaled up version of the laboratory scale test article (LSTA) that was developed and tested as part of Task 2. The LSTA was reviewed previously (GFO-0008628-002; CX's A9, B3.6). The XCT-1 would be capable of electric generation. The device would consist of a dual blade hub turbine, with small propellers on the tips of each blade (i.e., tip turbine generators). XCT-1 components would include propellers, blades, bearings, device housing, a nose cone, generator, transformer, and mounting attachments. The integrated device would measure approximately 3 meters in diameter.

LPS would oversee and coordinate all fabrication and assembly activities. GE would fabricate select electrical components and perform component testing at its research campus in Niskayuna, NY. Additional third-party manufacturers would be contracted to produce and calibrate various other specialized components. Assembly of the device would occur at purpose-built machine shop facilities operated by LPS' project partners and contracted manufacturers. Once the XCT-1 has been shop-tested it would be partially disassembled and transported to Alden where it would be reassembled, inspected, outfitted with sensors, and transported to the BTTS for outdoor testing. Outdoor testing would be performed as part of Subtasks 8.3 and 9.3, which are restricted until testing plans and all relevant information has been submitted to DOE for review.

Subtask 8.2 – Finalize the Plan for Installation and Shakedown Testing Activities: This task would consist of the finalization of planning for installation of the XCT-1 prototype at the BTTS, as well as the development of a testing plan for the device. LPS and its project partners would outline all testing activities to be performed in a testing plan, which would be submitted to DOE for NEPA review prior to any activities being performed. Outdoor testing at the BTTS would be performed as part of Subtask 8.3, which is restricted until testing plans and all relevant information has been submitted to DOE for review.

Subtask 9.1 – Finalize the plan for testing the XCT-1: This task would consist of the development of a testing plan for field testing of the XCT-1 device. Field testing would occur at the Tanana River Test Site (TRTS), operated by the University of Alaska Fairbanks outside of Nenana, AK. LPS and its project partners would outline all testing activities to be performed in a testing plan, which would be submitted to DOE for NEPA review prior to any activities being performed. LPS would also obtain any and all permitting requirements needed for field testing. Field testing at TRTS would be performed as part of Subtask 9.3, which is restricted until testing plans and all relevant information has been submitted to DOE for review.

Task 10 - Assess progress toward LCOE goals: This is an ongoing task that would be performed by LPS and its project partners throughout BP2. Data relevant to meeting the levelized cost of energy targets for the project would be collected and analyzed.

Task 11 - Plan for open water pilot site testing: LPS and its project partners would develop a test plan for potential future outdoor testing. Testing, if it were to occur, would not be performed as part of this DOE-funded project.

Project work would involve the use and handling of industrial chemicals and powered equipment. All such handling would be performed in controlled laboratory spaces or designated outdoor testing areas. Potential hazards would be mitigated through adherence to established institutional health and safety policies and procedures. All personnel would receive training and utilize personal protective equipment appropriate for the tasks to be performed.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

Task 7 - Finalize detail for the design of the XCT-1
Subtask 8.1 – Fabricate the XCT-1
Subtask 8.2 – Finalize the Plan for Installation and Shakedown Testing Activities
Subtask 9.1 – Finalize the plan for testing the XCT-1
Task 10 - Assess progress toward LCOE goals
Task 11 - Plan for open water pilot site testing

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

Subtask 8.3 – Perform shake down testing activities
Subtask 9.2 - Facilitate measuring

Subtask 9.3 - Monitor performance data

Notes:

Water Power Technologies Office

This NEPA determination requires a tailored NEPA provision.

Review completed by Jonathan Hartman, 03/24/2021

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.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:

 Electronically Signed By: **Roak Parker**

NEPA Compliance Officer

Date: 3/25/2021**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: _____

Field Office Manager

Date: _____