PMC-ND
(10.09.13)

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

**RECIPIENT:** Oregon State University **STATE:** OR

**PROJECT TITLE :** Advanced Laboratory and Field Arrays (ALFA) for Marine Energy

| Funding Opportunity Announcement Number | Procurement Instrument Number | NEPA Control Number | CID Number |
|---|---|---|---|
| DE-FOA-0001098 | DE-EE0006816 | GFO-0006816-001 | |

**Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Order 451.1A), 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 Oregon State University and the Northwest National Marine Renewable Energy Center (NNMREC) for their Advanced Laboratory and Field Arrays (ALFA) project. The project's goal is to accelerate the development of next-generation arrays of wave energy conversion (WEC) and tidal energy conversion (TEC) devices through a suite of field-focused R&D projects.

Each task listed in the SOPO for this award is a separate project being conducted by NNMREC partners for a total of six different projects. Project activities would involve debris modeling; detection and mitigation; autonomous monitoring and intervention; wave resource characterization; power transmission system research; anchoring and mooring systems; array design for performance enhancement; and refining biological sampling techniques.

Tasks for this award are as follows:

Task 1: Debris Modeling, Detection, & Mitigation
* Subtask 1.1: Development of Field Observational Techniques to Quantify Marine and River Debris
^ Subtask 1.1.1: Literature Review, Preliminary Design and Laboratory Testing
^ Subtask 1.1.2: Field Deployment and Analysis
* Subtask 1.2: Development of a Coupled Computational Fluid Dynamics/Discrete Element Method Modeling System

Task 2: Autonomous Monitoring & Intervention
* Subtask 2.1: Evaluating AUV systems for monitoring, & intervention
* Subtask 2.2: AUV navigation within MEC arrays
* Subtask 2.3: Autonomous manipulation and monitoring of marine renewable energy arrays using AUVs

Task 3: Resource Characterization for Extreme Conditions
* Subtask 3.1: Characterize extreme conditions from buoy data
* Subtask 3.2: Assess and improve prediction of extreme conditions
* Subtask 3.3: Wave Metrics for Extreme Conditions

Task 4: Robust Models for Design of Offshore Anchoring and Mooring Systems
* Subtask 4.1: Soil-Structure Interaction Model Development
* Subtask 4.2: Development of a Compliant Mooring Model

* Subtask 4.3: Model Verification and Validation
* Subtask 4.4: Model Integration, Coupling, and Synthesis

Task 5: Performance Enhancement for Marine Energy Converter (MEC) Arrays
* Subtask 5.1 WEC Array Design and Operations - Layout Optimization
* Subtask 5.2 WEC Array Design and Operation – Simulation for Control
* Subtask 5.3 WEC Array Design and Operations - Real-time Estimation
* Subtask 5.4 WEC Array Design and Operations – Coordinated WEC Array Control
* Subtask 5.5 Coordinated Control of Dense Arrays of Cross-flow Turbines – Laboratory Characterization of a Single Turbine
* Subtask 5.6 Coordinated Control of Dense Arrays of Cross-flow Turbines – Laboratory Control of Turbine Array
* Subtask 5.7 Coordinated Control of Dense Arrays of Cross-flow Turbines – Field Testing of Dense Array

Task 6: Evaluating Sampling Techniques for MHK Biological Monitoring
* Subtask 6.1: Passive and Active Acoustic Systems Development
* Subtask 6.2: Evaluate Habitat Utilization
^ Subtask 6.2.1: Passive Acoustic Receiver Array Deployment and Recovery
^ Subtask 6.2.2: Preliminary Active Acoustic Survey
^ Subtask 6.2.3: Fixed Position, Bottom-deployed echo-sounder
* Subtask 6.3: Technological Comparison of Passive and Active Acoustic Systems

Task 7: Project Management

The primary activities of this award involve conducting in-field R&D in ocean environments. University personnel and students for each individual project (or task) would conduct desk-top and/or laboratory technical studies prior to all field deployments in order to verify components and monitoring plans. Each project's field deployment would be subject to additional NEPA and Endangered Species Act consultations once details and plans have been completed and submitted to DOE. Until consultations and final deployment plans have been established, all in-water field work will be conditioned pending a final NEPA analysis.

This review is being conducted for all project tasks and subtasks that only involve desk-top and laboratory studies. Tasks involving only desktop data analyses, literature surveys, computer modeling, and planning are 1.2, 4.0 (all subtasks), and Task 7.0. These activities are consistent with DOE CX A9.

Task 1.1.1 laboratory activities would take place in existing laboratory facilities at the University of Alaska Fairbanks at the Alaska Center for Energy and Power's, Energy Technology Facility.

Tasks 2.1-2.3 laboratory activities would take place at Oregon State University's Robotic Decision Making Lab and the O.H. Hinsdale Wave Research Laboratory located on University grounds in Corvallis, Oregon.

For Tasks 5.1-5.6 laboratory activities would take place at Oregon State University's O.H. Hinsdale Wave Research Laboratory in Corvallis, Oregon and at the University of Washington's Marine Renewable Energy Laboratory and Multi-phase Flow Laboratory in Seattle, Washington.

Task 6.1 laboratory activities would take place at the University of Washington's School of Aquatic and Fishery Sciences dry lab in Seattle, WA.

Laboratory activities listed above are all small-scale actions that would occur in existing facilities with established safety, health and waste disposal procedures. The facilities listed all have safety procedures which are monitored by an appointed laboratory Safety Officer and the University's Environmental Health and Safety Office. No alteration to any of the facilities would be needed to conduct project activities. These tasks are consistent with DOE CX B3.6.

DOE has determined that Tasks 1.1.1, 1.2, 2.1-2.3, 4.0, 5.1-5.6, 6.1 and 7.0 of the OSU award are consistent with actions covered under DOE CX A9 (A9 Information gathering, analysis, computer modeling, feasibility studies, and information dissemination) and B3.6 (Small-scale research and development projects and conventional laboratory operations); and therefore are categorically excluded from further NEPA review.

**NEPA PROVISION**

DOE has made a conditional NEPA determination for this award, and funding for certain tasks under this award is contingent upon the final NEPA determination.

Insert the following language in the award:

You are restricted from taking any action using federal funds, which would have an adverse affect on the environment or limit the choice of reasonable alternatives prior to DOE/NNSA providing either a NEPA clearance or a final NEPA

decision regarding the project.

Prohibited actions include:
All in-field or in-water activities, including but not limited to the following tasks/subtasks:

Subtask 1.1.2: Field Deployment and Analysis

Subtask 2.2: AUV navigation within MEC arrays – FIELD ACTIVITIES/DEPLOYMENTS

Subtask 2.3: Autonomous manipulation and monitoring of marine renewable energy arrays using AUVs – FIELD ACTIVITIES/DEPLOYMENTS

Task 3: Resource Characterization for Extreme Conditions (all sub-tasks unallowable)

Subtask 5.7 Coordinated Control of Dense Arrays of Cross-flow Turbines – Field Testing of Dense Array

Subtask 6.2: Evaluate Habitat Utilization (all sub-tasks)

Subtask 6.3: Technological Comparison of Passive and Active Acoustic Systems

This restriction does not preclude you from:
Subtask 1.1.1: Development of Field Observational Techniques to Quantify Marine and River Debris - Literature Review, Preliminary Design and Laboratory Testing

Subtask 1.2: Development of a Coupled Computational Fluid Dynamics/Discrete Element Method Modeling System

Subtask 2.1: Evaluating AUV systems for monitoring, & intervention

Subtask 2.2: AUV navigation within MEC arrays – LAB/INDOOR FACITLTIES ONLY

Subtask 2.3: Autonomous manipulation and monitoring of marine renewable energy arrays using AUVs – LAB/INDOOR FACITLTIES ONLY

Task 4: Robust Models for Design of Offshore Anchoring and Mooring Systems (all subtasks allowable)

Subtask 5.1: WEC Array Design and Operations - Layout Optimization

Subtask 5.2: WEC Array Design and Operation – Simulation for Control

Subtask 5.3: WEC Array Design and Operations - Real-time Estimation

Subtask 5.4: WEC Array Design and Operations – Coordinated WEC Array Control

Subtask 5.5: Coordinated Control of Dense Arrays of Cross-flow Turbines – Laboratory Characterization of a Single Turbine

Subtask 5.6: Coordinated Control of Dense Arrays of Cross-flow Turbines – Laboratory Control of Turbine Array

Subtask 6.1: Passive and Active Acoustic Systems Development

Task 7: Project Management

If you move forward with activities that are not authorized for federal funding by the DOE Contracting Officer in advance of the final NEPA decision, you are doing so at risk of not receiving federal funding and such costs may not be recognized as allowable cost share.

Insert the following language in the award:

You are required to:
assist DOE in the completion of Endangered Species Act Section 7 consultation for all projects conducting in-water research and monitoring activities.

Note to Specialist :

1. Water Power Program
2. *This NEPA Determination requires a tailored NEPA provision
3. NEPA review completed by Laura Margason on December 16, 2014

**SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.**

NEPA Compliance Officer Signature: Electronically Signed By: Lori Gray Date: 12/17/2014

NEPA Compliance Officer

**FIELD OFFICE MANAGER DETERMINATION**

☐ Field Office Manager review required

**NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:**

☐ Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
☐ Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

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

Field Office Manager's Signature: _____ Date: _____

Field Office Manager