PMC-ND
(1.08.09.13)

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

RECIPIENT: Rice University **STATE:** TX

PROJECT TITLE: Low Cost Desalination Using Nanophotonics Enhanced Direct Solar Membrane Distillation

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001778	DE-EE0008397	GFO-0008397-001	GO8397

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 federal funding to Rice University to research the potential to use Nanophotonics Enhanced direct Solar Membrane Distillation (NESMD) technology for commercial solar desalination. The project would be completed over three Budget Periods (BP). This NEPA determination is for all BPs and all tasks and subtasks as identified in the Statement of Project Objectives.

Project activities would include: project management and reporting; computer modeling and design; stakeholder engagement; lab scale system fabrication and testing; pilot project system fabrication, installation, and testing. Project management and reporting, computer modeling and design, and stakeholder engagement work would be conducted at Rice University and Carnegie Mellon University in dedicated university office facilities.

In BP1, Rice University would design, fabricate and test a three chambered NESMD reactor with heat exchanger. This system would be composed of commercially available polyacrylic sheets, rubber, silicone sheets, graphite sheets, and stainless steel. The system would be approximately 70 centimeters by 30 centimeters. The system would be laboratory tested using sodium chloride, saline solution and tap water. All fabrication and testing work would be conducted at the Rice University Li Laboratory.

In BP2, Rice University would incorporate the NESMD system into a full scale desalination system and laboratory test the desalination system. This would include linking the NESMD system to a 50 gallon feed reservoir (polypropylene), two cartridge filters (HDPE shell), up to 4 peristaltic pumps, up to two heat exchangers, an air compressor, pressure gauges, flow meters, online TDS sensors, thermometers, and a control panel. All parts would be purchased off the shelf components (not fabricated). Components would be assembled atop a stainless steel skid. The system would be approximately 2 meters by 1.5 meters. The system would be assembled and tested at Li Laboratory. Testing of the system would involve the use of sodium chloride, saline solution, and tap water.

For all testing at Li Laboratory (BP1 and BP2), up to 50 kilograms of sodium chloride, 4000 liters of saline solution,

and 1000 liters of tap water would be used. The by-product of testing would be water and a concentrated brine solution. Brine created through the testing process would be disposed of in accordance with Rice University laboratory waste disposal guidelines.

Li Laboratory is a facility designed for this type of work. No modifications to the facility would be required. All Rice University health and safety procedures would be followed during fabrication and testing, including providing safety, technical, and professional training to all staff who would be involved in the project.

In BP3, Rice University would pilot test the desalination system at the Kay Bailey Hutchison Desalination Plant in El Paso, Texas. This plant is an existing full scale desalination plant that also contains an existing pilot testing facility with several pilot systems currently running. All existing testing infrastructure is in place at the plant. The Rice University desalination system would be shipped to the plant where it would be unloaded, placed in the testing area, and connected to the plants infrastructure. No ground disturbing activities or changes to the plant would be required. All health and safety procedures at the plant would be followed during installation and operation. The Rice University desalination system would be tested with approximately 12,000 liters of sea water (reverse osmosis concentrate). By-product of the testing would be water and brine. Brine generated would be disposed of together with the plant's own brine according to the plant's permit.

Based on the review of the proposal, DOE has determined that the proposal fits within the class of action(s) and the integral elements of Appendix B to Subpart D of 10 CFR 1021 outlined in the DOE categorical exclusion(s) selected above. DOE has also determined that: (1) there are no extraordinary circumstances (as defined by 10 CFR 1021.410(2)) related to the proposal that may affect the significance of the environmental effects of the proposal; (2) the proposal has not been segmented to meet the definition of a categorical exclusion; and (3) the proposal is not connected to other actions with potentially significant impacts, related to other proposals with cumulatively significant actions, or an improper interim action. This proposal is categorically excluded from further NEPA review.

NEPA PROVISION

DOE has made a final NEPA determination for this award

Insert the following language in the award:

If the Recipient intends to make changes to the scope or objective of this project, the Recipient is required to contact the Project Officer, identified in Block 15 of the Assistance Agreement before proceeding. The Recipient must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved. If the Recipient moves forward with activities that are not authorized for Federal funding by the DOE Contracting Officer in advance of a final NEPA decision, the Recipient is doing so at risk of not receiving Federal funding and such costs may not be recognized as allowable cost share.

Note to Specialist :

Solar Energy Technology Office
This NEPA determination does not require a tailored NEPA provision
NEPA review completed by Roak Parker 8/20/2018

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Kristin Kerwin Date: 8/20/2018

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