PMC-ND

(1.08.09.13)

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

RECIPIENT: North Carolina State University **STATE:** NC

PROJECT TITLE: Mobile Sorption-based Solar ZLD Desalination System

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
American-Made Challenges: Solar Desalination Prize		GFO-SolarDesalPrize-004	

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.
B5.16 Solar photovoltaic systems	The installation, modification, operation, and removal of commercially available solar photovoltaic systems located on a building or other structure (such as rooftop, parking lot or facility, and mounted to signage, lighting, gates, or fences), or if located on land, generally comprising less than 10 acres within a previously disturbed or developed area. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to authorize the administration of the fourth and final phase (Test Contest) of Round 2 of a prize competition (The American-Made Challenge: Solar Desalination, or “Prize”) to accelerate technology innovation through the design, development, and demonstration of desalination systems that use solar thermal energy to produce clean water from very high-salinity water. The Prize would be administered by the Solar Energy Technologies Office (SETO) in partnership with the National Renewable Energy Lab (NREL).

The Prize is a four-contest program designed to accelerate the commercial development of thermal desalination systems powered by low-cost solar-thermal energy. The contests provide innovators a pathway from initial concept to technical design to prototype to field-tested systems. Each successive phase of the competition will be more challenging than the last, with larger prizes and fewer competitors advancing.

Round 1 of the Desal Prize was launched in April of 2020, and teams advanced through the first two phases (Innovations and Teaming Contests) until April 2021, when the 8 winning teams from Round 1 advanced to the Design Contest. Round 2 of the Prize was launched in April of 2021, and teams likewise advanced through the first two phases until April 2022, when the 6 winning teams from Round 2 advanced to the Design Contest. In April 2022, all 14 teams competing in the Design Contest were grouped into one pool of competitors. If selected, they will advance to the Test Contest. North Carolina State University (NC State) has been selected as a finalist to compete in the Test Contest, after which one (or possibly two) team(s) would be declared the Grand Prize Winner of $1,000,000.

NC State was one of the semifinalists competing in the Design Contest and has been selected to advance to the Test Contest. During the Test Contest, NC State would bring their design to fruition by building and testing a prototype sorption-based solar zero liquid discharge (ZLD) desalination system. This NEPA Determination (ND) is applicable only to NC State’s proposed Test Contest work. This ND does not apply to actions undertaken using any potential Grand Prize funds awarded to the recipient or to any of the other Design or Test Contest competitors reviewed in the

existing NDs for this Prize (GFOSolarDesalPrize-001; CXs A9, B3.6; 10/13/2021; GFO-SolarDesalPrize-002; CXs A9, B3.6, B5.1; 3/20/2023; GFO-SolarDesalPrize-003; CXs A9, B3.6, B5.1; 4/17/2023).

Test Contest activities proposed by NC State would include the development, design, fabrication, and demonstration of the ZLD system, as well as wastewater testing, and mobile shipping container installation. Design, development, fabrication, and testing would occur at NC State (Raleigh, NC). Oak Ridge National Laboratory (Oak Ridge, TN) would provide technical consultations. Clos de la Tech (Woodside, CA) would be the site of final testing for the mobile ZLD system.

The ZLD system would be a skid-mounted system housed in a 20-foot (ft) shipping container with a footprint of approximately 2000 square ft. The system would include two sun-tracking solar collectors, a thermal energy storage unit, and multiple pumps and reservoirs. The solar collectors would be placed on top of the shipping container. The shipping container would be housed on the NC State's campus in a dedicated research area containing similar shipping containers, outdoor sheds, and experimental set-ups. The system is equipped with 1,500 liters of containers for feed wastewater, permeate, and sludge that would be connected to the existing NC State and winery wastewater system. Wastewater from Clos de la Tech would be used as feed for the ZLD system. Any solid sludge produced at NC State or Clos de la Tech would be processed through local waste management systems.

Potential workplace hazards would include the fabrication, testing, and installation of the ZLD system, and the use and handling of hazardous materials including metals, plastics, and desiccant solutions. Personal protective equipment would be used, as well as existing engineering controls.

DOE has considered the scale, duration, and nature of proposed activities to determine potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate impacts on these resources which would be considered significant or require DOE to consult with other agencies or stakeholders.

NEPA PROVISION

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office (SETO)
NEPA review completed by Alex Colling on 04/22/2024.

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: Andrew Montano Date: 5/9/2024

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] 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