

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



RECIPIENT: Sunvapor, Inc.

STATE: CA

PROJECT TITLE: Solar Hybrid Desalination of Produced Water

Funding Opportunity Announcement Number **Procurement Instrument Number** **NEPA Control Number** **CID Number**
 American-Made Challenges: Solar Desalination Prize GFO-SolarDesalPrize-003

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.

B5.1 Actions to conserve energy or water

(a) Actions to conserve energy or water, demonstrate potential energy or water conservation, and promote energy efficiency that would not have the potential to cause significant changes in the indoor or outdoor concentrations of potentially harmful substances. These actions may involve financial and technical assistance to individuals (such as builders, owners, consultants, manufacturers, and designers), organizations (such as utilities), and governments (such as state, local, and tribal). Covered actions include, but are not limited to weatherization (such as insulation and replacing windows and doors); programmed lowering of thermostat settings; placement of timers on hot water heaters; installation or replacement of energy efficient lighting, low-flow plumbing fixtures (such as faucets, toilets, and showerheads), heating, ventilation, and air conditioning systems, and appliances; installation of drip-irrigation systems; improvements in generator efficiency and appliance efficiency ratings; efficiency improvements for vehicles and transportation (such as fleet changeout); power storage (such as flywheels and batteries, generally less than 10 megawatt equivalent); transportation management systems (such as traffic signal control systems, car navigation, speed cameras, and automatic plate number recognition); development of energy-efficient manufacturing, industrial, or building practices; and small-scale energy efficiency and conservation research and development and small-scale pilot projects. Covered actions include building renovations or new structures, provided that they occur in a previously disturbed or developed area. Covered actions could involve commercial, residential, agricultural, academic, institutional, or industrial sectors. Covered actions do not include rulemakings, standard-settings, or proposed DOE legislation, except for those actions listed in B5.1(b) of this appendix. (b) Covered actions include rulemakings that establish energy conservation standards for consumer products and industrial equipment, provided that the actions would not: (1) have the potential to cause a significant change in manufacturing infrastructure (such as construction of new manufacturing plants with considerable associated ground disturbance); (2) involve significant unresolved conflicts concerning alternative uses of available resources (such as rare or limited raw materials); (3) have the potential to result in a significant increase in the disposal of materials posing significant risks to human health and the environment (such as RCRA hazardous wastes); or (4) have the potential to cause a significant increase in energy consumption in a state or region.

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 2 of the Solar Desal Prize was launched in April of 2021. Sunvapor, Inc. was one of six semifinalists to compete in the third phase (Design Contest) and 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. During the Test Contest, Sunvapor would bring their design to fruition by building and testing a prototype solar thermal powered desalination (STPD) system. This NEPA Determination (ND) is applicable only to Sunvapor'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 existing NEPA Determinations for this Prize (GFO-SolarDesalPrize-001; CXs A9, B3.6; 10/13/2021; GFO-SolarDesalPrize-002; CXs A9, B3.6, B5.1; 3/20/2023).

Test Contest activities proposed by Sunvapor would include the development, design, fabrication, and demonstration of the STPD system, as well as water sampling, bench-top laboratory research, and administration activities. Office and in-lab activities would occur at Sunvapor (Pasadena, CA), Veolia Water Technologies and Solutions (Bellevue, WA), and the University of Southern California (USC; Los Angeles, CA) facilities.

NGL Energy Partners would provide an existing oil and gas wellsite, located at their Striker 1 saltwater disposal (SWD) facility (Loving, NM) for the temporary installation and field testing of Sunvapor's prototype. Team activities would occur on a previously developed pad associated with an active SWD well and produced water treatment train. The site currently contains produced water pre-treatment equipment and saltwater disposal injection equipment. The footprint of the STPD system and related work would be approximately 8,000 square feet (ft). Installation of the equipment would require the deployment of 52 conventional foundations with a diameter of 2 ft and a depth of 1 ft. The excavation required for this would not require any grading for the foundations. Excavated soil would remain on site and would be less than 20 cubic yards of soil. A 20x30 ft foundation slab with a depth of 1 ft would be laid to house plant equipment.

Produced water pretreated at NGL's facility would be further treated by Sunvapor's process to create a concentrated brine stream and a distillate stream, which would then be recombined and injected into the existing SWD well for disposal. A very small portion of the Sunvapor system distillate and the feedwater to the Sunvapor system (pre-treated produced water) would be sampled for evaluation by the NM Produced Water Research Consortium to evaluate the suitability of the distillate for future reuse and to establish the performance of the solar desalination system relative to performance metrics. The intent of the Team is to operate the facility for at least one year, monitor performance, provide samples for evaluation, and invite stakeholders to validate the performance.

The pretreatment process for the incoming water would use hydrogen peroxide, barium chloride, flocculant to catch mineral particles and reduce cloudiness, and anti-scalant to reduce the precipitation of minerals. Sludge and scum from pretreatment water would be injected downhole for disposal by slurry pumping. The desalination facility would treat the produced water at a rate of approximately 30 barrels per day, recombining all concentrate, output, and distillate to return back to the main SWD well for disposal. 150 gallons of non-toxic and non-hazardous thermal oil would be used as a heat transfer fluid within the closed loop solar collection system. The facility has an existing desalination process for produced water on site, so the produced concentrate and distillates would be disposed of in the same way as existing produced water. No major expansion of existing on-site waste storage, disposal, recovery, or treatment actions would be required.

All permits necessary for the Team's work have already been procured from the New Mexico Oil Conservation Division by NGL Energy Partners, and the Sundry Notice has been procured from the Bureau of Land Management by Sunvapor, Inc. The existing federal permit for the oil and gas well site would be valid for the proposed work, including all water management activities.

No permanent change in the use, mission, or operation of the facility would arise out of Sunvapor's Prize-related actions. Proposed activities would be confined to previously developed, cleared well pads. The equipment would be installed temporarily. Based on the types of activities proposed within the context of past development and current SWD operations, DOE does not anticipate any impacts to resources of concern due to the proposed Test Contest activities.

Potential workplace hazards would include the installation and operation of high temperature thermal systems, that include heated contaminated water, oil, and steam. Existing corporate health and safety policies and procedures would be followed, including employee training and the use of personal protective equipment.

DOE has made a final NEPA determination.

Notes:

Solar Energy Technologies Office (SETO)
NEPA review completed by Alex Colling on 04/13/2023.

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:  _____ Date: 4/17/2023
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