

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



**RECIPIENT:** ICE Thermal Harvesting, LLC

**STATE:** TX

**PROJECT TITLE :** Zero-emission Power Generation from Oil and Gas Production Stream

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
DE-FOA-0002525	DE-EE0009963	GFO-0009963-001	

**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:

<b>A9 Information gathering, analysis, and dissemination</b>	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.)
<b>B5.2 Modifications to pumps and piping</b>	Modifications to existing pump and piping configurations (including, but not limited to, manifolds, metering systems, and other instrumentation on such configurations conveying materials such as air, brine, carbon dioxide, geothermal system fluids, hydrogen gas, natural gas, nitrogen gas, oil, produced water, steam, and water). Covered modifications would not have the potential to cause significant changes to design process flow rates or permitted air emissions.
<b>B5.15 Small-scale renewable energy research and development and pilot projects</b>	Small-scale renewable energy research and development projects and small-scale pilot projects, provided that the projects are located 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 provide federal funding to ICE Thermal Harvesting, LLC (ICE) to demonstrate the ability of a heat-to-power technology to efficiently produce electrical power through the harvesting of geothermal heat sources in a manner that is scalable to over 1MW of power. The proposed project would design, engineer, integrate, install, and commission ICE's pilot plant over a total estimated project duration of approximately 44 months.

The proposed project aims to generate electricity from heat captured from produced fluids at the privately owned California Resource Corporation (CRC, subrecipient) Stevens 7 production facility (Elk Hills Field, Kern County, CA). The complete thermal harvesting package and thermal power generator would be installed at this location, which is used to gather produced fluids from local oil wells. Initial project activities would include the measurement of currently produced fluids (including flow rates, temperatures, constituents, etc.) from multiple nearby wells at the proposed field site. The project would characterize eleven wells to evaluate thermal energy available for harvesting from produced fluids.

After field testing, the analysis of measured data, modeling, and engineering activities for the optimal design of the heat capturing system and thermal power generation system would be conducted by subrecipient the University of Houston (Houston, TX). The ICE Thermal Harvesting and power generation systems would then be integrated and tested at ICE's existing shop facility (Conroe, TX). Administrative and engineering tasks concerning the project would be performed here as well as remote monitoring and management of the field system deployed in Elk Hills. The performance and efficiencies of the process would be continuously monitored, recorded, and improved throughout the life of the proposed project.

A section of pipeline at Elk Hills that is currently conveying produced fluids would be modified to house project equipment that would convey heat to the thermal generating system from the produced fluid that passes through it. Electricity produced at the Elk Hills facility from the thermal generator system would be plugged into the local privately

owned utility grid. A physical site survey of the Elk Hills facility would be performed with the field staff and engineers of CRC along with ICE personnel to determine the potential placement(s) of the heat extraction equipment in consideration of available space and avoidance of disturbing or retarding ongoing operations. Items of consideration would include but not be limited to access to optimized temperature and combined flow rate of production wells, existing production lines that can be modified to insert heat extraction equipment, available space to install ORC equipment, and feasibility of connecting into local electrical distribution. Utilizing the data gathered during the feasibility study, ICE engineers would design a heat exchanger that would provide optimum thermal capture from the flowing wells to feed that thermal energy to the selected ORC machine.

CRC staff would prepare the site that was determined for placement of the heat exchangers and ORC equipment. The ground would be leveled and made ready for equipment delivery and setup. CRC staff also would prepare the interconnection point where the ORC machine's electrical output would tie in. There would be two skidded containers installed at the Elk Hills facilities, with dimensions of approximately 20 feet (ft) x 8 ft and 40 ft x 8ft. These containers would house the equipment required for the thermal capture and power generation. The ground they would be placed upon is already conditioned and compacted dirt. No roads would be modified or added.

After receipt of procured heat exchangers, piping, and valves, CRC would shut down or divert the producing well flowline to allow ICE to install the bypass lines that divert the produced fluids to the heat exchanger. This would require the use of a crane. Upon completion of the installation of the heat exchanger diversion line, the system would be pressure tested with fresh water to ensure integrity prior to introduction of hydrocarbons to the system. After a successful pressure integrity test of the heat exchanger diversion line, the working fluid loop piping connecting the heat exchanger to the ORC machine would be installed and filled with demineralized water. The electrical output of the ORC would be connected to the prepared CRC grid connection point and inspected by a qualified electrician. The installed pilot plant system would operate and be monitored continuously for a period of 24 months. Plans would be made to either continue operations of the plant under a new arrangement beyond the scope of the DOE project or decommission the plant by removing the heat exchanger, ORC system, and associated equipment from the site.

There is no feedstock or fuel required to power the equipment beyond routing the currently produced fluids (water, oil and gas) through the system in order to harness thermal energy from the fluids. The proposed project would involve the use and management of produced fluids from wells, which can be hazardous to the local environment and to workers. Handling of fluids would only be conducted by properly trained personnel and within secondary containment to mitigate the potential for uncontrolled spills. All project personnel would be supplied with required PPE for the proposed tasks. No siting, construction, or major expansion of existing containment, treatment, and/or disposal systems would be required. All equipment to be used by the proposed project would be properly inspected before use and safe zones would be created to provide barriers between personnel and hazards. ICE and CRC both have established environmental, health, and safety policies that meet or exceed state and federal regulations concerning safe operations.

There are no new or additional permits currently expected to be required for project activities. Project activities would have limited impacts to the surface environment beyond the temporary footprint of the skids, which would be confined to an area of extensive previous disturbance. Based on the relatively small scope of work within the setting of the Elk Hills facility and the temporary nature of activities proposed, DOE does not anticipate any impacts to resources of concern due to the proposed project.

## **NEPA PROVISION**

DOE has made a final NEPA determination.

Notes:

Geothermal Technologies Office (GTO)  
Review completed by Whitney Donoghue on 08/24/2022

## **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: Casey Strickland** Date: **8/25/2022**  
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