

Notice of Intent No. DE-FOA-0001069

**Notice of Intent to Issue
Funding Opportunity Announcement No. DE-FOA-0001016**

Background

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Geothermal Technologies Office (GTO), a Funding Opportunity Announcement (FOA) entitled “Low Temperature Mineral Recovery Program”.

While geothermal power is an attractive potential source for sustainable energy creation, the high heat temperature requirements (typically $>150^{\circ}\text{C}$) of most geothermal capture systems constrain the geographic distribution and economic viability of geothermal production. This focused FOA will address this limitation by advancing a more non-traditional aspect of geothermal systems - strategic material or mineral recovery. By partnering with geothermal and mineral industry stakeholders to develop additional revenue streams from brines, the economic viability of geothermal projects will increase while also allowing for increased geographic diversity of this base-load energy resource.

EERE's objective in this FOA is to promote the advancement of thermal energy processes capable of converting geothermal heat sources into power, in conjunction with the development or exploitation of technologies capable of capturing, concentrating, and/or purifying valuable materials contained within geothermal brines to economically extract resources that can provide additional revenue streams to geothermal operators. This targeted initiative of the GTO focuses on strategic mineral extraction as a path to optimize the value stream of low-to-moderate temperature resources.

Rare earth and near-critical metals are essential for clean-energy technologies, but are subject to supply risk in the face of ever increasing demand. Minerals like tellurium, lithium, manganese, and zinc supply the raw materials for cathodes, glass, ceramics, lubricants, and many other products. Many minerals also have critical value for advanced manufacturing technologies. Yet, as demand grows for these materials, supply is a growing concern. This FOA aims to help alleviate that supply bottleneck. Since geothermal brine has the potential to contain relatively high concentration of rare earths and other strategic materials, EERE's goal is to promote the development and application of energy production from low temperature fluids in parallel with the extraction of valuable mineral commodities; thereby expanding geothermal development while providing access to strategic materials for domestic industry.

In a prior funding opportunity, GTO partnered with an awardee to develop technologies that extract these strategic materials from geothermal brines at a mining operation – a first-of-its-kind achievement. GTO support enabled the company to build the first demonstration facility there and mine lithium, manganese, and zinc from geothermal brines. As that project creates an

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additional revenue stream from geothermal power production in the near-term, this model will be replicable for mineral extraction at other sites going forward.

For this funding opportunity, collaboration among industry, national laboratories and academic institutions is highly encouraged; teaming will be an element strongly considered during the application reviews. Applicants are also encouraged to coordinate activities with the newly funded DOE Critical Materials Hub led by Ames laboratory. Selected projects will be expected to incorporate, as appropriate, the following performance measures into their applied R&D, feasibility study or analysis work:

- Clearly defined success-rate metrics and quantification of value added to the geothermal production system from the innovative extraction method for the target material(s).
- Data gathering on geothermal and mineral resources that employs innovative techno-economic criteria/modeling that has not previously been applied in a geothermal context.
- Project-specific feasibility studies that demonstrate the techno-economic viability of the technology and the applicability of the site to a number of reciprocal sites.

EERE envisions awarding multiple financial assistance awards in the form of cooperative agreements. The estimated period of performance for each award will be up to 2 years, with more expedited completion preferred. Applications designed to enhance technological diversity of the GTO program portfolio, and enhance the geographic/climatic diversity of the program (e.g., projects that identify or are conducted at candidate sites in areas in which electricity is not currently produced from geothermal energy), may be given additional consideration during the EERE reviewing process.

Areas of Interest

It is EERE's intent that this opportunity will lead to commercialized technologies for the efficient recovery of strategic materials from geothermal brines, effectively lowering the cost to produce geothermal energy while at the same time diversifying and stabilizing the supply of critical materials for domestic industries.

For the purposes of this FOA, material or mineral shall be broadly defined to include any substance (excluding hydrocarbons) that is entrained in a geothermal fluid that can be extracted using new or existing technologies and be put to a useful purpose. However, geothermal mining of rare earth and near-critical metals are the focus.

An additional area of interest for this FOA is in assessments of the current rare earth and near-critical metal resource base, with potential extraction volumes/rates including coupled techno-economic analysis. Assessments should focus on identifying viable mineral types located within the United States, as well as potential mining technology and extraction volumes for any selected material(s). Evaluation of the current state of extraction technologies for the various mineral types and an economic analysis to determine the viability of developing mineral extraction facilities should also be conducted.

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Finally, applied R&D of innovative extraction technologies with accompanying feasibility studies of currently available technologies and/or potentially novel alternatives, and modeled test results for the most promising candidates is of interest. R&D projects should include evaluations of their feasibility as selective extraction mechanisms from known brine chemistries. Bench scale testing will be allowed. Geochemical modeling and leaching experiments to optimize the composition of down-hole fluids and identify additives that selectively leach high value strategic elements will also be considered.

This Notice is issued so that interested parties are aware of the EERE's intention to issue this FOA in the near term. All of the information contained in this Notice is subject to change. EERE will not respond to questions concerning this Notice. Once the FOA has been released, EERE will provide an avenue for potential Applicants to submit questions.

EERE plans to issue the FOA in February 2014 via the EERE Exchange website (<https://eere-exchange.energy.gov/>). If Applicants wish to receive official notifications and information from EERE regarding this FOA, they should register in EERE Exchange. When the FOA is released, applications will be accepted only through EERE Exchange.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are **required** for application submission:

- Register and create an account in EERE Exchange at <https://eere-exchange.energy.gov/>. This account will allow the user to register for any open EERE FOAs that are currently in EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov

- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>
- Register with the System for Award Management (SAM) at <https://www.sam.gov>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually.
- Register in FedConnect at <https://www.fedconnect.net/>. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf
- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. However, please note that applications will not be accepted through Grants.gov. <http://www.grants.gov>. All applications must be submitted through EERE Exchange.

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