GEOTHERMAL RISING POLICY
ENERGIZING OUR RENEWABLE FUTURE.

May 7, 2025

Neelesh Nerurkar, Director of Infrastructure Policy
Office of Policy, Department of Energy
Submitted Electronically to: *aiinfrastructure@hq.doe.gov*

RE: Request for Information (RFI) on Artificial Intelligence Infrastructure on DOE Lands

Dear Mr. Nerurkar and Whom It May Concern:

As the largest and longest-running trade association of the geothermal industry in the United States, representing over 100 organizations, Geothermal Rising writes in response to select questions from the RFI.

Geothermal Rising builds and empowers the geothermal industry by championing American geothermal technologies and applications, including ground source heat pumps, direct-use geothermal, thermal energy networks, and electricity generation from geothermal resources to widen the frontiers of geothermal energy across the country. Our industry leverages the heat of the earth's core to provide unlimited, secure, 24/7 baseload power and heat–essential for energy-intensive AI data centers.

Category 1: Interest in Solicitation

Q.#1: Are any sites identified in Section III of more interest than others for possible development? Q.#2: What characteristics of a site make it more or less favorable for development? Q. #3: What regional characteristics (e.g., workforce availability, supply chains, existing transmission capacity, related industries) would impact site favorability?

A: Sites of most ideal for geothermal power generation are those most proximate to 1) proven or potential geothermal resource availability suitable for power generation (from either conventional hydrothermal or next-generation geothermal systems) and 2) proximity to interconnection infrastructure and/or to the end-user or potential data center site. Alongside resource availability, securing feasible and cost-effective grid interconnection represents a critical hurdle and key factor influencing site favorability. Proximity to robust transmission infrastructure with available capacity can significantly reduce project costs and timelines, making efficient interconnection essential for both the geothermal plant and the large data center load.

Although for the purpose of this RFI, a plant would ideally be proximate to the data centre (primary customer), it should also be considered that excess power can be connected to the grid, where feasible, or cascading geothermal heat from the site can be harnessed for direct-use industrial processes and/or district thermal energy networks.

In Western states, given the presence of high quality geothermal resources and large swaths of federal land, sites identified in the RFI of particular interest include Idaho National Laboratory (INL), Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL - New Mexico), Sandia National Laboratories (SNL - California), National Renewable Energy Laboratory (NREL - Colorado), Pacific Northwest National Laboratory (PNNL - Washington). There is untapped hydrothermal potential in all of these regions– the possibility of deploying next-generation geothermal technologies further widens their geothermal generation potential.

While geothermal plants must be located at the specific resource site, the required workforce and supply chains offer more geographical flexibility. Skills are often transferable from industries like oil and gas, and national supply networks can be utilized. However, despite this flexibility, close proximity to experienced labor pools and supply hubs remains a significant advantage for controlling costs and simplifying logistics.

Q.#4: Are there other DOE sites not listed that would be of more interest to possible development?

These sites may or may not be of more interest to geothermal developers than those already listed, but could also be considered:

- Nevada National Security Site (NNSS).
- Lands near the FORGE Site, Milford, Utah.
- Waste Isolation Pilot Plant (WIPP) Area, New Mexico.
- Other DOE Lands in high-potential geothermal regions in states such as Nevada, California, Oregon, Utah, and Idaho that might not be associated with the major laboratory or plant complexes listed in the RFI.

Category 2: Site Information and Considerations for Data Center Design and Technology

Q.#7: What are some technologies that would enable data centers to be sited in locations with hot humid weather where little water is available?

Geothermal energy provides baseload, dispatchable power– which would enable 24/7 electricity for electrical cooling systems. Alternatively, geothermal heat can be implemented directly into absorption chiller cooling systems, thereby eliminating energy waste from converting heat to electricity, and thereby alleviating strain on the electric grid and/or electricity demand of the data center.

The choice of energy source is critical– few alternatives match the benefits of geothermal that can provide safe, low-emitting, efficient, baseload power, heat, and cooling for decades– critical to the lifespan and security of a AI data centers, especially in hot, humid, and water-constrained regions.

Q.#8: What are the prospects for using advanced data center technologies (e.g., innovative cooling, high efficiency power electronics, and innovative conductors and ultra-energy efficient compute technologies that require cryogenics)? Is there additional information on each site DOE could provide that would inform use of these technologies?

A: Co-locating AI data centers with geothermal power plants creates a highly favorable opportunity to implement cutting-edge technologies– both on the power generation side and data-center side working synergistically. The following additional site-specific information from DOE would be valuable:

- Detailed geothermal resource and geological subsurface data.
- Power capacity needs of the data center.
- Cooling needs of the data center.
- Proximity to and accessibility to interconnection infrastructure.

Q.#10:What types of industrial ecology principles can be employed to integrate data centers with nearby industries or facilities, such as but not limited to integration of data center waste heat into district heating networks?

A: Geothermal heat or waste heat can be harnessed for industrial applications that require heat such as greenhousing, aquaculture, pulp and paper processing, brewing, wood and crop drying, etc. With the right circumstances (e.g., end uses within feasible proximity of each other), a single geothermal heat resource can generate power at a plant, cool a data centre, and provide heat to heat-intensive industries. Geothermal heat can also be used for district heating networks and at a residential scale. Further, a substantial amount of relatively low-grade waste heat generated by the data center fits perfectly into this cascaded system– instead of rejecting this heat to the atmosphere, it can be captured and utilized for direct uses (heating or cooling).

Co-locating a power plant and data center with potential industrial direct-use geothermal applications and district heating creates obvious benefits. It allows a more comprehensive and diverse utilization of a geothermal resource with less waste. DOE sites, often with multiple buildings and proximity to communities or potential industrial partners, are ideal locations to demonstrate these integrated, highly efficient energy systems.

Category 3: On-Site Energy Development

Q.#1: What type of co-located energy technologies are of highest interest in being developed with AI data centers? What type of site information would need to be provided to inform use of a given energy technology (e.g., subsurface data, solar resource potential)?

A: As previously discussed, the opportunity for co-located geothermal energy generation is paramount. Geothermal energy is uniquely suited to meet the demanding energy requirements of modern AI infrastructure– it is baseload, reliable with high capacity factors, low-emitting and domestic, firm and dispatchable.

Realizing the potential for geothermal energy development at any given DOE site requires an understanding of the local geological and geophysical data.

Q.#4: What information would be needed in consideration of geothermal power generation development (enhanced geothermal systems or conventional hydrothermal resources) to determine necessary further steps?

A: As previously outlined, comprehensive site characterization and assessment is paramount. From initial screening through reconnaissance, exploration, feasibility assessment, permitting, financing, and construction – the following categories of information are crucial:

- Early stage assessment information including geological maps, topography, heat flow data, temperature gradients, lithology, geophysical data etc.
- Later stage geophysical surveys, exploratory well data (confirming conditions such as temperature, permeability, fluid chemistry).
- Regulatory and permitting roadmap– including NEPA requirements and state requirements if applicable.
- Interconnection feasibility assessments.

Comprehensive subsurface data, which can often require exploratory drilling (for conventional hydrothermal) and resource confirmation drilling (for next-generation systems), represents the most significant upfront cost and risk in geothermal development. Therefore, any existing relevant data that DOE can provide would be exceptionally valuable. This information is fundamental for de-risking projects and allows developers to confidently determine the appropriate "further steps" – whether that involves more detailed exploration, initiating feasibility studies, or production drilling. Access to clear information on land use, permitting, and grid access is similarly essential for planning and decision-making throughout the project lifecycle.

Category 4: Off-Site Energy and Transmission Capacity

Q.#3: Assuming additional capacity could be procured or built in stages, what are desired timelines for electricity capacity availability?

A: Aligning the timing for grid transmission capacity availability with the multi-year development lifecycle of a geothermal power project is tricky, as development timelines depend on various factors such as chosen technology (e.g., hydrothermal or next-generation geothermal) and stages– exploration and resource confirmation (1-3 years), permitting and PPA (2-4 years), financing (1-2 years), drilling and construction (2-4 years). Permitting barriers on federal lands can be reduced with policy, legislative and/or administrative action. Please contact us for more details.

The "desired timeline" for a geothermal project is the shorter the better– ideally electricity capacity needs to be available prior to the plant being ready to generate (commercial operation date). However, certainty (PPA and assurance that geothermal power will be purchased) is most critical and necessary to finance the project (attract confident investors). It's less about *when* capacity ideally *starts,* but assurance that it *will.*

Category 5: Financial and Contractual Considerations

Q.#1: What realty agreement time frames would be preferred?

A: Geothermal projects not only have a development lifecycle that spans into years, but once online, the plants can generate sustainable power for decades. Therefore, an initial lease term of 30 to 40 years is preferred, and/or high-certainty renewal options.

Q.#5: What opportunities are there for collaborating with the nearby communities on ultra energy-efficient, low-noise advanced technologies that minimize adverse impacts and maximize local job creation?

A: Abundant, reliable, renewable, low-footprint, low-emitting, job-creating– geothermal energy checks all the boxes. Community and Tribal engagement is of utmost importance to developers in our industry. Each proposed geothermal project provides opportunities to gather feedback and educate communities on its benefits to them such as:

- Local job creation and economic activity.
- Local heat for local needs.
- Potential recreation and tourism.
- Energy without air and noise pollution.
- Opportunities for co-ownership.

Q.#7: What facilities or capabilities should exist for ongoing research, development, and demonstration (RD&D) of efficient data center technologies at a federal AI data center to improve operations and reduce energy and resource demand?

A: These RD&D efforts should extend beyond the data center itself to encompass the integrated system of the co-located geothermal power plant and the data center, focusing on their synergistic operations.

Q.#8: Would industry be open to partnering with National Laboratory personnel to use existing grid testbed infrastructure for research (e.g. operational impacts, security, interconnection equipment, load flexibility, protection schemes and ride-through behavior, etc.)?

A: Yes, absolutely. Industry consists of not only developers, but also technology providers, inventors, and researchers– all of which are continuously seeking to innovate, and their expertise could widely be leveraged to maximize the efficiencies and synergies of a geothermal plant-data center location– access to the Lab's facilities and resources would be invaluable.

Category 7: Economic Opportunities and Considerations

Q.#1: What workforce requirements would inform the feasibility of development at a particular site?

A: Geologists, geophysicists, reservoir engineers, drillers, plant operators and engineers.

Q.#3: Which components of data center infrastructure (e.g., advanced chips and other components of AI servers, advanced busbar, substation equipment, on-site energy generation/storage equipment, etc.) for these sites can be manufactured domestically now or for regular future server upgrades?

Key geothermal power plant components with established and/or potential domestic manufacturing capabilities include turbines and generators, heat exchangers, pumps, wellheads, drillbits, casing and tubing, etc.

Q.#4: What other economic impacts are projected barriers to developing a data center or new energy infrastructure on these sites?

A: Project financing, investor confidence in geothermal projects– particularly exploration drilling– can be adversely affected by permitting uncertainties, inconsistent policy including uncertainty on tax incentives, long development timelines, and/or interconnection/PPA uncertainty. Guaranteeing a customer (data center partner) is not only a massive opportunity, it is critical to overcoming economic barriers to geothermal energy development. Policy frameworks that enable and incentivize co-location of new reliable, baseload power generation with new data center buildout can support these projects.

Proactive de-risking initiatives are critical for getting needed capital off the sidelines, such as targeted public-private partnerships or federal programs that support the drilling of additional test wells and/or confirmation wells in promising but unproven areas. The dissemination of knowledge improves the collective understanding of resource potential in similar geographies/geologies, reduces redundant exploration by subsequent developers, accelerates industry learning curves, and helps more projects attract the necessary private investment by lowering perceived risks across the sector.

Category 8: Relevant and Available Environmental Documentation

Q.#2. What background information on land use constraints and environmental permits could accelerate the project development timeline?

A:

- Previous NEPA analyses to help BLM and/or Congress to issue categorical

exclusions from Environmental Assessments (EAS) or Environmental Impact Statements (EIS) for phases and processes already found to be of no significant environmental impact.
- Existing environmental surveys and studies.
- Current, past, and in progress site permits.
- Information identifying Tribal communities, treaties, and/or MOUs with these Tribes.
- A list of all categorical exclusions, including those from other agencies, that can be used for geothermal development.

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Respectfully submitted,

Dr. Bryant Jones
Executive Director
Geothermal Rising