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IN FOCUS

Enhanced Geothermal Systems (EGS) Commercialization

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Enhanced geothermal systems (EGS) use directional drilling and hydraulic stimulation technologies to add porosity and fluid circulation to locations of naturally occurring underground heat to create conditions necessary for geothermal energy production. Related closed-loop systems use some of the same technologies and, along with EGS, can be collectively referred to as "next-generation geothermal." Of available geothermal technologies, EGS have the greatest potential for utility-scale electricity generation due to recent technological advances and investments that have reduced related costs and risks. The future viability of commercial-scale EGS remains uncertain, though, with only one operational EGS plant in the United States as of July 2026. This InFocus summarizes the commercial status of EGS and discusses selected issues for Congress, including federal support for research, development, and deployment (RD&D) as well as remaining challenges, including operational safety concerns and reported administrative hurdles.

Background on EGS Development

The development of EGS started in the mid-2000s, spurred largely by a seminal Massachusetts Institute of Technology (MIT) report, *The Future of Geothermal Energy* (2006), and the directional drilling and stimulation tools developed by the oil and gas industry. Since then, the geothermal industry has been developing and adapting tools and techniques to work within high-temperature, high-pressure, chemically active geothermal environments and to commercialize EGS.

In 2014, the U.S. Department of Energy (DOE) released the first funding opportunity announcement (FOA) for an EGS demonstration and commercialization program—which would eventually become the Utah Frontier Observatory for Research in Geothermal Energy (FORGE). In 2023, both Utah FORGE and the private company Fervo Energy (Fervo) announced successful fluid circulations at their respective EGS test sites. In November 2023, Fervo started producing electricity at its first commercial EGS plant (Project Red, in Nevada), supplying 3.5 megawatts (MW) of electricity for Google data centers. Fervo began drilling for a second, larger EGS power plant called Cape Station in late 2023. The Cape Station phased development plan targets the eventual production of 500 MW of electricity by 2028, with permitting approval for up to 2 gigawatts (GW) if geological and market conditions warrant such expansion.

Commercial Interest and Developments

Federal Leasing and Record Geothermal Lease Sales

Federal leasing involves many steps and review processes. After a land management agency, such as the Bureau of Land Management (BLM), reviews lands for suitability for leasing, and solicits bids and selects the winning bid, the geothermal developer completes exploration, drilling, construction, and production steps. Each step is typically preceded by environmental reviews and other federal oversight during implementation—with a full development timeline from lease to operation of, typically, 7-10 years. For more information on leasing, see CRS Report R48064, *Considerations for Federal Leasing of Onshore Energy: Oil and Gas and Geothermal Power*.

In 2025 and 2026, geothermal developers invested record amounts in federal lease sales demonstrating increasing commercial interest. In October 2025, BLM held a geothermal lease sale in Nevada. That sale generated $9.5 million in revenue—the largest geothermal lease sale in U.S. history. All geothermal lease sales by BLM in 2025 generated $24.0 million from 451,893 acres. In June 2026, BLM held a lease sale of 152,381 acres in New Mexico that generated $16.6 million in revenue, a new single geothermal lease sale record.

Fervo's Record-Breaking Initial Public Offering

On May 13, 2026, Fervo held an initial public offering (IPO) of stock. After targeting a company valuation of between $2 billion and $3 billion in the months prior, Fervo launched the IPO with a valuation of approximately $7.7 billion, and investor interest increased share prices until valuation reached $10.21 billion by the end of the IPO day. This was reportedly the largest renewable energy IPO ever. Some public reporting on the offering has concluded that this valuation indicated strong interest in the company and in geothermal energy, and confidence that geothermal energy could supply the baseload power needed by increasing data center demand.

Expansion of Geothermal Power Purchase Agreements

Power purchase agreements (PPAs) are contracts between an electricity consumer and a specific power plant or supplier to deliver electricity—at an agreed-upon price and/or an agreed-upon amount of electricity, over a contracted time frame.

In June 2025, DOE released its 2025 U.S. Geothermal Market Report, which noted that from 2021 (the date of its previous market report) to June 2025, 27 new geothermal PPAs had been signed—an increase over the nine geothermal PPAs signed between 2015 and 2019. Of the 27 new PPAs, 12 were for next-generation geothermal (either EGS or closed-loop).

Since June 2025, additional EGS PPAs have been announced. Google signed an agreement for 115 MW from Fervo's new Corsac Station to supply data center and cloud computing demand. Multiple buyers, including Southern California Edison and Shell Energy, signed agreements for the remaining capacity of Fervo's Cape Station (500 MW total anticipated capacity).

In March 2026, Fervo and Google signed a 3 GW framework agreement to provide Google's data centers with power through 2033. Google will have the right of first refusal to purchase up to 3 GW of electricity from certain new Fervo projects, which could result in additional PPAs.

Challenges to Commercialization: Well Blowouts

When developing new technologies such as EGS, challenges such as well blowouts are expected. A blowout is a failure of a geothermal well that involves no explosives or combustible materials. A blowout can cause damage to the well and the drilling equipment and can potentially cause injuries to workers; the released fluid can cause environmental damage. Since blowouts occur at a well site and not at the geothermal power plant, there is little risk to power plant systems.

Geothermal technical literature—including the 2006 MIT report on EGS and a 2024 review of well control considerations—note that geothermal well blowouts are generally rare (rarer than in oil and gas development), have low risk, and are well controlled with established safety and mitigation protocols. Despite these precautions, well blowouts do occur and can adversely affect commercialization by increasing a specific geothermal project's development timeline or the perceived risk of the technology and thus commercial investment in EGS in general.

The Fervo EGS project at Cape Station in Milford, Utah, suffered a geothermal well blowout on May 25, 2026, when pressurized geothermal fluid uncontrollably breached the surface. According to communications from Fervo and Utah state officials, the blowout resulted in no injuries and no impact to the Cape Station project or schedule. They also stated it involved nonhazardous, nontoxic stimulation water; did not cause environmental damage; and is being cleaned up following standard incident protocol. Some public reporting noted the blowout may have negatively affected Fervo's stock price.

State Efforts on Financial and Permitting Certainty

On May 21, 2026, four states—Arizona, Colorado, New Mexico, and Utah—announced the creation of the Mountain West Geothermal Consortium to accelerate geothermal development. The consortium is not focused on EGS but will likely affect EGS since Arizona and Colorado have no current geothermal energy production and would likely implement EGS. The consortium plans to work with industry partners (including geothermal developers, investors, and utilities) to reduce the technology and market risks. The consortium seeks to improve the policy landscape, including by providing greater permitting and financial certainty. Some stakeholders, including DOE in its 2019 GeoVision Report, cite lengthy and uncertain permitting as a challenge to geothermal development. Others note that expedited reviews and lessened requirements could create additional risk and uncertainty and could overlook key stakeholder inputs. The consortium also plans to partner with universities and colleges to train the required workforce.

Federal Support for Commercialization

On January 20, 2025, President Trump issued EO 14156, *Declaring a National Energy Emergency*, to speed up domestic energy projects, including geothermal power, as part of his energy dominance policy. Following this policy, federal agencies have supported EGS development through RD&D, projects at federal facilities, and other activities.

Developing Data Tools for Commercial Operations

On June 22, 2026, Pacific Northwest National Laboratory (PNNL) announced a partnership with Fervo and NVIDIA to develop an AI-powered digital twin of enhanced geothermal reservoirs. The digital twin can mimic the thermal and geochemical conditions and behavior of an actual geothermal reservoir. By integrating data from subsurface sensors, the system may assist geothermal plant operators in making real-time adjustments to mitigate potential problems with reservoirs, as well as refining other aspects of plant operations. By 2029, the project aims to start deploying the digital platform at other reservoirs to support their planning and operations.

Energy Development at Federal Facilities and Field Tests

On April 10, 2025, DOE issued a request for information on AI/data center development, including integrated power generation or partnerships with energy generators such as geothermal. On July 24, 2025, DOE announced four federal sites would be targeted for this development. On February 25, 2026, DOE announced a $171.5 million funding opportunity for next-generation geothermal field-scale tests. On April 14, 2026, DOE announced a $14 million EGS field test project led by the Pennsylvania Department of Environmental Protection using geothermal resources in the Appalachian Utica Shale.

Selected Legislation in the 119th Congress

On June 2, 2026, the House passed H.R. 5631, the Geothermal Energy Advancement Act. The bill would provide the U.S. Department of the Interior greater authority to charge geothermal developers fees for various administrative tasks related to leasing. The bill would create an ombudsman and a permitting task force. The bill would modify the timeline determining production royalties to accommodate modern developments—projects with multiple generation units coming online at different dates. The bill would modify an existing categorical exclusion under the National Environmental Policy Act (NEPA) for oil and gas exploration, which qualifies certain predefined activities as satisfying NEPA requirements, to also include geothermal exploration. On July 20, 2026, the House passed H.R. 8790, the Next-Generation Geothermal Research and Development Act. The bill would expand DOE's RD&D program for next-generation geothermal technologies to improve technical performance and commercialization to address, among other things, challenges related to drilling and well completion, subsurface data collection, and water use.

Selected Considerations for Congress

EGS have received support from multiple Congresses and Administrations. However, cost, commercialization, and environmental challenges remain. Congress could consider, among other issues, whether current levels of RD&D spending are appropriate to the needs of the industry and whether workforce training and development require different levels or types of support. Congress could also consider whether changes to leasing and permitting processes could be helpful in reducing development times and costs or in increasing the effectiveness of reviews to assure financial and technical competency of developers. Another consideration is whether environmental review requirements should be modified to ensure greater protection of the environment and consideration of stakeholder concerns and/or to reduce development times.

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