SEPTEMBER 2026 - I

Enhanced Geothermal Systems

Clean, Firm, 24/7 Power
for a Demand-Driven Grid

WHITEPAPER

SCAN TO EXPLORE

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Abstract

Enhanced geothermal systems (EGS) have crossed from pilot to commercial scale. By applying horizontal drilling and reservoir stimulation techniques borrowed from shale, developers can now create geothermal reservoirs in hot, dry rock far from the rare natural hydrothermal sites that defined the industry for a century. The result is a source of **clean firm power** that runs around the clock, occupies little land, and can be sited across much of the Western United States. Technology companies seeking **24/7 carbon-free energy** for data centers have become the anchor customers, signing agreements that now approach a gigawatt at a single site. This paper examines the cost trajectory of **next-generation geothermal**, the drilling and subsurface advances that drive it, the resource geography and transmission realities of Western siting, the evolving permitting landscape, and how EGS compares with nuclear, gas with carbon capture, and long-duration storage as a source of dispatchable clean power.

About this Paper

This white paper was prepared by Vedeni Energy as an independent, non-partisan assessment of the commercial status of enhanced geothermal power. It draws on public disclosures by developers and offtakers, U.S. Department of Energy and national laboratory analyses, U.S. Geological Survey resource assessments, federal permitting actions, and published cost benchmarks through September 2026. The paper explains the technology in plain terms, presents the evidence for and against a steep cost decline, and places EGS in the context of the wider race to supply firm power to a demand-driven grid.

Audience and Use Cases

The paper is written for utility resource planners, transmission and market participants in the Western Interconnection, data center and industrial energy buyers, project developers and investors, and policy staff who need a grounded view of what EGS can and cannot deliver over the next decade. Readers can use it to frame procurement decisions, interconnection and siting strategy, and policy positions on geothermal leasing and permitting.

Executive Summary

For the first time in decades, the United States needs large quantities of new firm generation, and enhanced geothermal has arrived at exactly the moment that need became acute.

Electricity demand growth, driven by data centers, electrification, and industrial reshoring, has revived the question of where clean, dispatchable power will come from. Wind and solar are the cheapest energy on the grid, but they are not firm. Conventional geothermal is firm, but it is confined to a handful of natural hot-water reservoirs. Enhanced geothermal breaks that constraint by engineering the reservoir itself, using directional drilling, multistage stimulation, and fiber-optic diagnostics that the shale industry perfected over twenty years.

The commercial evidence has moved quickly. Fervo Energy's Project Red in Nevada began delivering power in 2023. Its Cape Station project in Utah is approaching first power on a 100 MW initial phase, with a further 400 MW contracted for 2028 and, as of September 2026, a 396 MW agreement with Google that carries an option to approach one gigawatt by 2030. Meta has contracted 150 MW each with Sage Geosystems and XGS Energy, and Google has added 150 MW of Ormat capacity in Nevada. Fervo's May 2026 public offering raised roughly $1.9 billion, a signal that capital markets now treat EGS as an infrastructure asset rather than a science project.

Costs are falling because drilling is getting faster. Fervo has cut drilling time by roughly 70 percent since 2022 and reports a 143 percent improvement in drilling rate since its first Cape Station well; cost per foot on comparable Cape wells fell from about $633 to $357 across the campaign. Company capital cost has dropped from roughly $7,000 per kW toward a $5,500 per kW target for Cape Phase II, with $3,000 per kW as the long-term goal. Lazard's July 2026 benchmark places unsubsidized geothermal at $67 to $111 per MWh, inside the range of gas combined cycle and well below new nuclear.

The constraints are real. The resource is concentrated in the Great Basin and Intermountain West, far from most load; Cape Station itself holds fewer transmission rights than it has contracted capacity. Long-term reservoir performance is still being proven, with the Utah FORGE extended circulation test under way. And the learning curve of a drilling-based technology will not mirror solar's. Even so, among the candidates for clean firm power available before 2030, EGS is the only one with operating plants, bankable contracts, and a demonstrated cost decline. For Western planners and market designers, the relevant question is no longer whether EGS works but how fast transmission, permitting, and market rules can be aligned to use it.

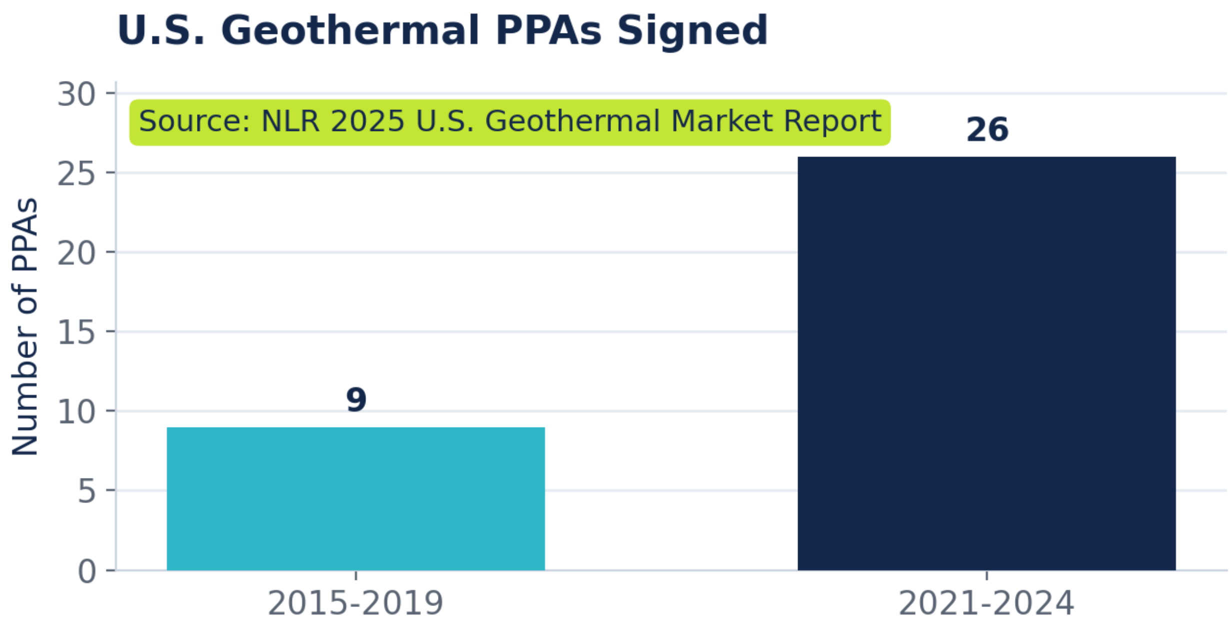

Figure 1. Geothermal power purchase agreements signed in the United States nearly tripled between the late 2010s and the 2021-2024 period, with next-generation projects accounting for 11 of the 26 recent contracts.

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01 The Return of the Firm Power Question

After two decades of flat load, the U.S. grid is growing again, and the character of that growth favors resources that run all the time.

The demand story is by now familiar. Hyperscale data centers, many of them purpose-built for artificial intelligence training and inference, are being sited in clusters that individually request hundreds of megawatts and collectively request tens of gigawatts. Layered on top are new manufacturing facilities, electrified transportation and buildings, and, in the West, a hydrological regime that has made hydropower less reliable in dry years. Utilities that spent the 2010s managing a surplus are now filing integrated resource plans that add capacity at a pace unseen since the 1970s.

What distinguishes data center load from earlier growth is its shape. A training campus runs near its rated power around the clock, with a load factor that can exceed 90 percent. That profile is poorly served by variable renewables alone, and hyperscalers have responded by seeking what the industry now calls clean firm power: generation that is carbon-free and available in every hour. Google formalized the goal as 24/7 carbon-free energy in 2020, matching load with clean supply hour by hour rather than annually; Microsoft, Meta, and others have adopted comparable commitments, and all of them have concluded that the goal is unreachable with wind, solar, and four-hour batteries.

The Department of Energy's Pathways to Commercial Liftoff analysis frames the scale of the gap: the United States may require 700 to 900 GW of additional clean firm capacity by 2050. The candidate technologies are few. New nuclear, whether large light-water units or small modular reactors, carries a first-of-a-kind cost and schedule burden. Natural gas with carbon capture depends on tax credits and on pipelines and storage that are still being permitted. Long-duration storage extends the reach of renewables but is not itself a source of energy. Geothermal is the one clean firm resource whose underlying physics has been producing baseload electricity for over a century; the barrier has always been geography.

700-900 GW	26	$1.5B
additional clean firm capacity DOE estimates the U.S. may need by 2050	U.S. geothermal PPAs signed 2021-2024, versus 9 in 2015-2019	private capital invested in next-generation geothermal companies since 2021

Conventional hydrothermal geothermal requires three things to coincide in nature: heat, permeable rock, and water. Those coincidences are rare, which is why U.S. installed geothermal capacity stood at just under 4 GW at the end of 2024 after decades of development, most of it in California and

Nevada. Enhanced geothermal removes two of the three requirements. Heat is nearly everywhere at sufficient depth; the developer supplies the permeability and the water. The resource base expands from a few dozen sites to a substantial share of the Western landmass, and the question becomes one of drilling cost rather than geological luck.

KEY TAKEAWAY

Demand growth with a flat, around-the-clock profile has made clean firm power the binding constraint on corporate decarbonization and utility resource plans, and it has turned geothermal from a niche resource into a strategic one.

Data center campuses with load factors above 90 percent are the anchor customers for around-the-clock clean generation.

02 What Enhanced Geothermal Actually Is

EGS does not discover a reservoir. It builds one, using the same toolkit that turned tight shale into the world's largest oil and gas province.

The concept is simple to state. A developer drills a pair of wells, or several pairs, into hot rock at depths of roughly 8,000 to 20,000 feet, where temperatures reach 350 to 500 degrees Fahrenheit. The wells are turned horizontal and extended thousands of feet through the hot zone. Water is then pumped into the injection well at pressure sufficient to open a network of fractures in the rock, creating flow paths that connect the injector to a production well drilled parallel to it. Cold water goes down the injector, sweeps heat from the fractured rock, and returns up the producer as hot brine, which drives a conventional binary or flash power plant at the surface before being reinjected in a closed loop.

Every element of that description was attempted in the 1970s at Fenton Hill in New Mexico and in later European projects, and every element fell short for the same reason: the tools were vertical wells and single large fractures, which produced too little contact area with the rock and short-circuited too easily. What changed was the shale revolution. Between 2005 and 2020 the oil and gas industry industrialized horizontal drilling, multistage plug-and-perf stimulation, polycrystalline diamond compact bits, rotary steerable systems, and fiber-optic sensing that can image fluid flow along an entire lateral in real time. Fervo Energy, founded by former shale engineers, was the first to apply that package to geothermal at commercial scale.

The results have tracked shale's own history of rapid design iteration. Fervo's first-generation design at Project Red used 3,250-foot laterals and five-inch casing at about 11,200 feet measured depth in 350-degree rock. The second generation at Cape Station Phase I extended laterals to 5,000 feet with seven-inch casing at an average depth of roughly 14,500 feet and 400-degree rock. The third generation, now being drilled for Cape Phase II, uses 7,500-foot laterals and 8 5/8-inch casing; the Sawtooth 7 well reached 19,448 feet measured depth in 460-degree rock and was drilled from spud to total depth in 21 days. Larger casing and longer laterals mean more rock contact and higher flow per well, which is the single most important lever on cost per megawatt.

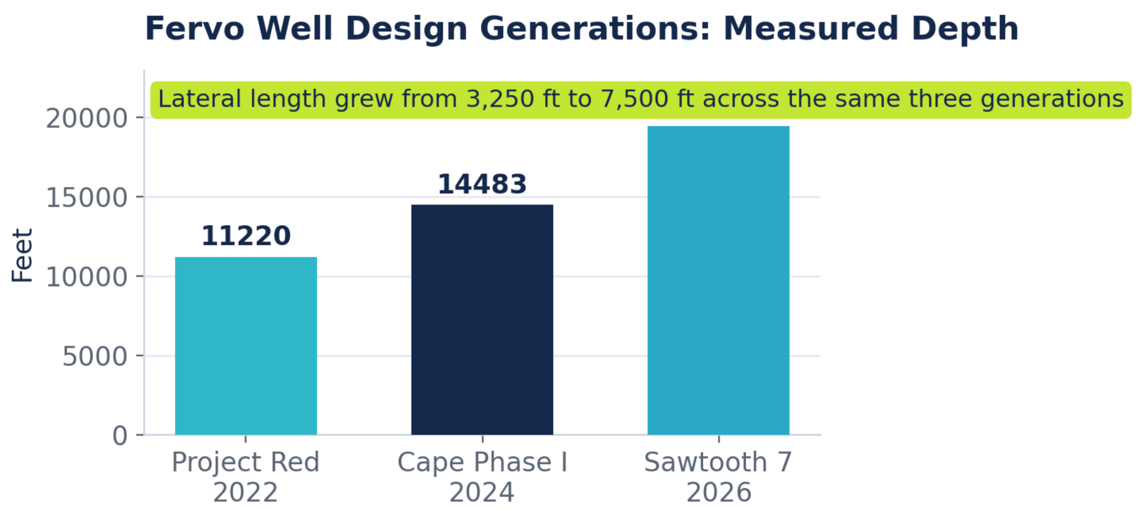

Figure 2. Each generation of Fervo's well design has gone deeper, hotter, and longer, raising energy output per well.

Other developers are pursuing variants of the same idea. Sage Geosystems uses a single well and a pressurized fracture as a mechanical energy store, releasing stored water through a turbine on demand; its 3 MW pilot near San Antonio came online in April 2026 as only the third next-generation geothermal project connected to the U.S. grid. XGS Energy and Eavor pursue closed-loop designs that circulate fluid through sealed wellbores without fracturing, trading lower thermal output for independence from reservoir rock and near-zero water loss. Quaise and others are developing millimeter-wave drilling for superhot rock beyond 700 degrees, which would raise plant efficiency dramatically but remains at the prototype stage.

Two technical questions still determine long-term economics. The first is thermal decline: how fast the rock around a fracture network cools as heat is withdrawn, and therefore how many years a well pair produces at rated output before it must be redrilled or restimulated. The second is water loss to the formation. Utah FORGE, the DOE field laboratory adjacent to Cape Station, began a 90-day extended circulation test in August 2026, with a possible extension to 120 days, precisely to measure both. Fervo's own Cape Station flow test reached a peak production rate of 120 kilograms per second, and Sage reports water loss below 10 percent in cycling. These are encouraging data points, but multi-year field performance is the evidence that will ultimately set the cost of capital for the sector.

KEY TAKEAWAY

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EGS is not a new physics; it is shale engineering aimed at heat instead of hydrocarbons, and its commercial viability rests on the same drivers, namely longer laterals, faster drilling, and reservoir behavior proven over years rather than weeks.

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03 The Cost Trajectory

Drilling is roughly half the cost of an EGS plant, and drilling is where the learning has been fastest.

The national laboratory drilling cost-curve update published in 2025 documents the shift. Average rate of penetration in the models rose from 25 feet per hour in the 2017 GeoVision baseline to 75 feet per hour, with Cape Station wells averaging about 70 feet per hour and a Utah FORGE well reaching 102. Casing running speeds nearly tripled. Modeled well costs fell 12 to 24 percent for vertical wells and 18 to 26 percent for horizontal wells relative to the baseline, and the analysis identified a 35 percent inter-project learning rate between Project Red and Cape Station. On individual Cape wells of similar depth, drilling cost per foot fell from roughly \$633 to \$472 to \$357 over the course of the first campaign.

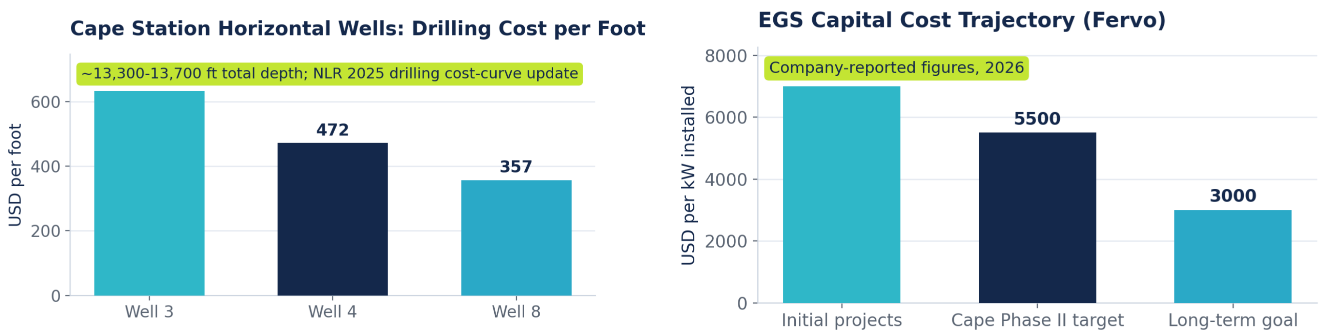

Figure 3. Drilling cost per foot on comparable Cape Station wells (left) and Fervo's reported capital cost per kW trajectory (right).

Fervo's public disclosures extend the picture. Cape Phase I wells were drilled 70 percent faster than Project Red wells in 2022, and the third-generation design has lifted drilling rates 143 percent since the first Cape well. At the corporate level, the company cites roughly \$7,000 per kW for its initial projects, a \$5,500 per kW target for Cape Phase II, and a long-term goal of \$3,000 per kW. Since the surface plant is mature technology with a flat cost curve, nearly all of that reduction must come from fewer, faster, more productive wells per megawatt, which is exactly what the generational design changes are intended to deliver.

Benchmarks agree on the direction. The NLR market report places conventional flash plants at \$63 to \$74 per MWh and expects EGS to reach parity with that band within a decade. Lazard's July 2026 unsubsidized analysis shows geothermal at \$67 to \$111 per MWh, overlapping gas combined cycle at \$51 to \$129 and far below new U.S. nuclear at \$175 to \$255. DOE's Liftoff pathway targets an average EGS cost of \$60 to \$70 per MWh by 2030 and \$45 per MWh by 2035 under the Enhanced Geothermal Shot. The Energy Information Administration is more conservative, modeling geothermal entering service in 2031 at about $119 per MWh, a figure that reflects generic conventional projects rather than the leading EGS developers.

Metric	Project Red (2022)	Cape Phase I	Cape Phase II (3.0 design)
Measured depth	11,220 ft	14,483 ft avg.	19,448 ft (Sawtooth 7)
Lateral length	3,250 ft	5,000 ft	7,500 ft
Casing size	5 in.	7 in.	8 5/8 in.
Resource temperature	350 F	400 F	460 F
Drilling time	Baseline	~70% faster	21 days spud to TD
Capital cost	~$7,000/kW	~$7,000/kW	$5,500/kW target

Table 1. Fervo Energy well-design generations and reported performance, 2022-2026.

There is a credible counterargument, and planners should weigh it. Critics note that EGS assembles mature components rather than inventing new ones, so the components themselves will not fall in price the way photovoltaic cells did; that project cycles of four to seven years permit only a few cumulative doublings of deployed capacity in a generation; and that current all-in costs of $10,000 to $15,000 per kW would remain expensive even after a 40 percent reduction. The rejoinder is that the relevant learning is in operations, not manufacturing, and shale showed that operational learning can compound quickly when the same crews drill hundreds of similar wells. Which view proves correct will be visible in Cape Phase II's realized costs by 2028.

70%
reduction in drilling time, Project Red to Cape Phase I

$357/ft
drilling cost on Cape Well 8, down from $633/ft on Well 3

$45/MWh
DOE Enhanced Geothermal Shot cost target for 2035

KEY TAKEAWAY

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The cost decline in EGS is real and documented, driven by drilling speed rather than component prices; whether it continues toward $3,000 per kW depends on repeated campaigns rather than on any single breakthrough.

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04 Resource Geography and Western Siting

The heat is in the West. So is most of the public land, and so are many of the transmission constraints.

The U.S. Geological Survey's 2025 assessment of the Great Basin, covering 633,000 square kilometers across Nevada, Utah, and parts of Oregon, Idaho, California, Arizona, and Wyoming, estimates a best provisional EGS electric resource of 135 gigawatts in the upper six kilometers of crust, with temperatures at that depth ranging from 115 to 275 degrees Celsius. The assessment lowered the minimum useful temperature from 150 to 90 degrees Celsius to reflect modern binary plants, and it notes that with technological advances the upper bound could be more than ten times larger. The practical message is that the recoverable resource in one geologic province is thirty times today's installed national capacity.

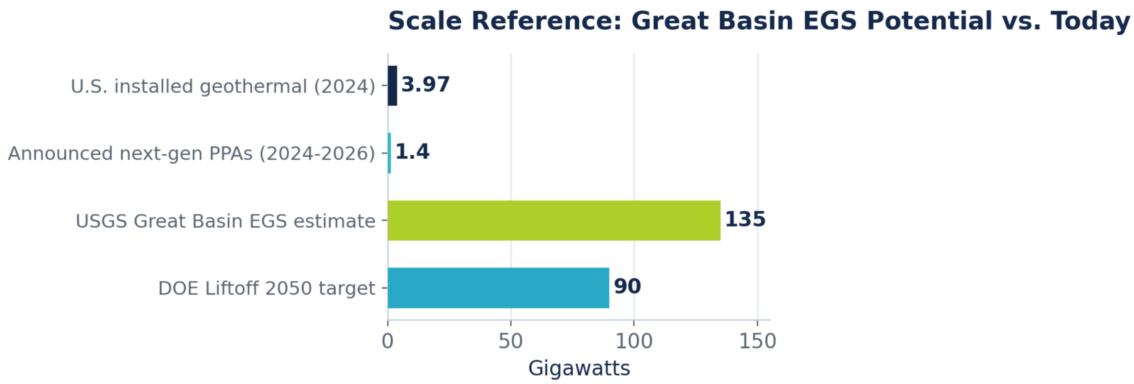

Figure 4. The Great Basin EGS resource dwarfs both installed U.S. geothermal capacity and the next-generation contracts signed to date.

Within that province, the most active corridor runs from the Milford and Beaver County area of southwest Utah, where Cape Station and Utah FORGE sit, across central and northern Nevada, where Project Red and Ormat's portfolio operate, into the Imperial Valley of California. Secondary prospects extend into Oregon's Cascades, the Snake River Plain of Idaho, New Mexico's Rio Grande rift, and, for closed-loop and pressure-based approaches that do not depend on fractured basement, the deep sedimentary basins of Texas and the Gulf Coast. The 13-state geothermal alliance launched in December 2025 reflects that spread, joining Western states with Louisiana, Pennsylvania, and West Virginia.

The Western concentration of the resource carries an obvious implication for transmission. Most prime EGS sites lie in rural basins served by lightly loaded lines that were never built to export hundreds of megawatts. Cape Station is the leading example. Fervo holds approximately 290 MW of interconnection and transmission rights for Cape Phase II against 384 MW of contracted capacity for that phase, and a Jefferies analysis following the May 2026 IPO warned that the company's 42 GW pipeline depends entirely on third-party transmission that is thin in most of the areas where the resource is best. The response has been twofold: securing new capacity through utility expansion and Western regional planning, and pursuing behind-the-meter or co-located arrangements that deliver power directly to a data center at or near the wellfield.

For participants in the Western markets, this is where EGS intersects with market design. Utah's SB 132 allows large customers to contract directly for specific generation, which is the mechanism behind the Google agreement. Nevada's Clean Transition Tariff, approved for the Fervo-Google 115 MW arrangement by the Public Utilities Commission in May 2025, lets a utility pass a specific clean resource through to a specific large customer. As the CAISO Extended Day-Ahead Market and SPP Markets+ define the seams across the Interconnection, the treatment of firm geothermal in resource adequacy accreditation, transmission allocation, and greenhouse gas attribution will shape whether the resource is built where the heat is or where the lines are. Geothermal's high capacity factor and lack of fuel exposure make it an unusually clean fit for accreditation frameworks that are penalizing variable resources, but only if deliverability is solved.

> For the 5- to 15-year transmission planning horizon, the Great Basin's EGS corridor from southwest Utah through central Nevada is the single most consequential new generation cluster in the Western Interconnection that existing plans have not fully anticipated.

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KEY TAKEAWAY

The Great Basin holds a resource of roughly 135 GW, but converting it to delivered energy depends on transmission and market rules that were designed for a grid without large rural firm resources.

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05 Permitting and Policy

Geothermal has enjoyed rare bipartisan support, and the permitting reforms of 2024 through 2026 have removed some of the longest delays in the development cycle.

Because so much of the resource lies beneath federal land, the Bureau of Land Management is the gatekeeper. The Bureau manages roughly 245 million surface acres and 700 million acres of subsurface mineral estate, and geothermal projects on that estate historically required as many as six separate environmental reviews across leasing, exploration, drilling, utilization, and transmission. In December 2024 and again in April 2026 the Bureau adopted categorical exclusions that allow geophysical surveys, core drilling, and temperature-gradient wells disturbing up to ten acres to proceed without a full environmental assessment, provided no extraordinary circumstances involving endangered species or cultural resources are present. Instruction Memorandum 2026-004 requires annual competitive geothermal lease sales and narrows public participation to cases where an environmental impact statement is required.

The federal tax framework survived the 2025 budget reconciliation law largely intact for geothermal. While wind and solar credits were curtailed, geothermal retained technology-neutral eligibility through at least 2033 and 2034, with base and bonus rates for domestic content and energy community siting. In Congress, a cluster of bills advanced through the House Natural Resources Committee in late 2025 addressing cost recovery for federal geothermal reviews, royalty reform, lease access, and a permitting ombudsman, several with cosponsors from both parties. State action has been complementary: Colorado streamlined permitting and created a geothermal tax credit, Utah enacted direct-contracting authority, and Texas clarified that subsurface heat belongs to the surface owner.

Two environmental questions accompany EGS and deserve direct treatment. The first is induced seismicity, since stimulation by definition creates fractures. Cape Station's monitoring network, built with the University of Utah and Lawrence Berkeley National Laboratory, combines borehole fiber optics, broadband seismometers, and a surface nodal array producing more than a terabyte of data per day. During stimulation between February and June 2024 the largest event was a local magnitude 2.65, none of the events were felt at the surface, and the project's traffic-light protocol triggered five yellow-level operational adjustments without ever reaching the red threshold that would mandate a pause. That record is consistent with the experience of decades of monitored geothermal operation and stands in contrast to the wastewater-disposal seismicity that troubled some oil and gas basins.

The second question is water. EGS operates as a closed loop, but some injected water is lost to the formation, and in the arid Great Basin every acre-foot is contested. Developers are responding with brackish and produced-water sources, cycling designs that minimize loss, and closed-loop systems that eliminate it. The Utah FORGE endurance test will provide the first public multi-month measurement of water loss at commercial conditions, and regulators in Utah and Nevada are already watching it as the basis for future water-rights conditions on permits.

10 acres maximum disturbance for exploration under the BLM categorical exclusion	**M 2.65** largest induced event at Cape Station, not felt at the surface	**2033-34** geothermal tax-credit eligibility retained under the 2025 reconciliation law

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KEY TAKEAWAY

Permitting for geothermal exploration on federal land is faster than at any time in the program's history, and the environmental record on seismicity is strong; water and transmission, not federal review, are now the pacing constraints.

Categorical exclusions now allow small-footprint geothermal exploration on public land without a full environmental review.

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06 Competitive Positioning Among Clean Firm Options

Every clean firm technology is being courted by the same buyers. The comparison that matters is cost, timing, and risk over the period in which the demand actually arrives.

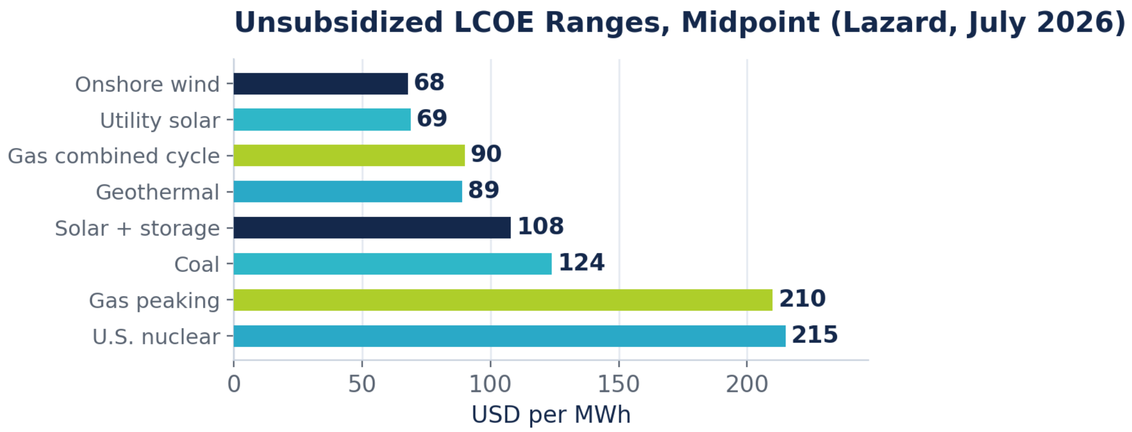

Figure 5. Midpoints of Lazard's July 2026 unsubsidized LCOE ranges. Geothermal now sits alongside gas combined cycle and well below new nuclear and gas peaking.

New nuclear is the technology most often paired with data centers in public discussion, and the hyperscalers have signed agreements for restarts, uprates, and small modular reactors. But the cost evidence remains difficult. Lazard's unsubsidized range for new U.S. nuclear is $175 to $255 per MWh. First-of-a-kind SMR estimates cluster around $180 per MWh, with the industry's own aspiration for mature units at $50 to $80. The cancelled NuScale project in Idaho saw its target price rise from $58 to $89 per MWh after subsidies before it was abandoned, and Ontario's four-unit BWRX-300 program is budgeted at C$20.9 billion. The first U.S. commercial SMRs are not expected to deliver power before the end of the decade. Nuclear's advantage is scale and a 60-year life; its disadvantage is that none of it will be available in the window when current data center load materializes.

Natural gas with carbon capture is the most direct competitor on timing, because turbines are familiar and gas is abundant in the West. The 45Q credit of $85 per tonne is worth roughly $30 per MWh to a combined-cycle plant capturing most of its emissions, and EIA's 2031 modeling, which includes tax credits, shows combined cycle with capture below unabated combined cycle on a levelized basis. The complications are practical: capture plants need CO2 pipelines and permitted storage, capture rates at part load fall well short of nameplate, residual emissions and upstream methane count against a 24/7 carbon-free claim, and the technology is exposed to fuel prices in a way geothermal is not. Turbine lead times of five years or more have also erased much of the speed advantage gas once had.

Long-duration storage is a complement rather than a rival. Form Energy's iron-air batteries offer 100 hours of discharge, and its August 2026 agreement with Google and Xcel Energy for a 300 MW, 30 GWh installation in Minnesota is the largest battery yet announced. Costs have not reached the company's original $20 per kWh target, with recent estimates in the $33 to $50 range, and Lazard's firming analysis shows that solar plus storage in a region like MISO still lands above $100 per MWh once firming is included. Multi-day storage can shape variable renewables into something that looks firm for most of the year; it cannot manufacture energy during a week-long winter inversion, which is precisely when a geothermal plant is still running at full output.

Attribute	Enhanced geothermal	New nuclear / SMR	Gas with CCS	Long-duration storage
Unsubsidized cost (2026)	$67-111/MWh	$175-255/MWh; FOAK SMR ~$180	Gas CC $51-129 plus capture	Solar+storage $61-156/MWh
Earliest large-scale delivery	Operating; 100-500 MW 2026-2028	Early 2030s for SMRs	Late 2020s, pipeline-dependent	2027-2028
Carbon profile	Near-zero	Zero	Residual CO2 and methane	Depends on charging source
Fuel exposure	None	Low	Full gas price exposure	None
Land and siting	Small footprint; Western basins	Any; long licensing	Near gas and CO2 infrastructure	Any; needs charging supply
Principal risk	Reservoir longevity; transmission	Cost overrun; schedule	Capture rate; pipelines	Cost; energy-limited

Table 2. Comparative positioning of clean firm options for load arriving before 2032.

Geothermal's own weaknesses in the comparison are geographic reach and a reservoir track record measured in years rather than decades. Its strengths are that it is operating today, that its contracts are being signed at prices offtakers accept, that it uses a fraction of the land of any alternative, that it has no fuel cost, and that its capacity factor exceeds 90 percent. Data center buyers have made their assessment with their procurement budgets: Google alone has moved from a 3.5 MW pilot in 2023 to more than 650 MW of geothermal under contract, with an option to approach 1.2 GW.

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KEY TAKEAWAY

Among clean firm options for load arriving before 2032, EGS is the only one that is simultaneously operating, contracted at scale, and falling in cost; nuclear and gas with capture remain important for the 2030s, and long-duration storage is a partner rather than a substitute.

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07 Outlook and Implications for the West

The next three years will show whether EGS scales like shale or plateaus like conventional geothermal, and the outcome will be decided as much by wires and rules as by wells.

The milestones are specific. Cape Station Phase I is expected to deliver first power in late 2026, and its realized capital cost and early reservoir performance will be the first commercial data from a third-generation design. Phase II's 400 MW follows in 2028, alongside the Google GeoCluster that carries an option to about a gigawatt by mid-2030. Utah FORGE's endurance test will report on thermal decline and water loss in early 2027. Sage's Nevada work and the XGS project in New Mexico will show whether pressure-based and closed-loop approaches can follow Fervo into the 100 MW class. If those results hold, Fervo's 2030 target of roughly 1.1 GW and DOE's national trajectory of 90 GW by 2050 become plausible rather than aspirational.

Offtaker	Developer	Capacity	Location	Signed
Google / NV Energy	Fervo Energy	115 MW	Nevada	June 2024
Southern California Edison	Fervo Energy	320 MW	Utah (Cape Station)	2024
Shell Energy	Fervo Energy	31 MW	Utah (Cape Station)	2025
Meta	Sage Geosystems	150 MW	East of the Rockies	2024
Meta	XGS Energy	150 MW	New Mexico	June 2025
Google / NV Energy	Ormat Technologies	up to 150 MW	Nevada	Feb. 2026
Google	Fervo Energy	396 MW + ~600 MW option	Utah (Cape GeoCluster)	Sept. 2026

Table 3. Principal next-generation and data-center-linked geothermal power purchase agreements, 2024-2026.

For utilities and planners in the Western Interconnection, several implications follow. Integrated resource plans that treat geothermal as a fixed, small block of legacy capacity are understating an option that can be procured in 100 MW modules with three-year lead times. Transmission planning should treat the southwest Utah to central Nevada corridor as a firm-resource zone in the same way that earlier plans designated renewable energy zones, because the economics of exporting a 90-percent-capacity-factor resource are far stronger per mile of line than those of a variable one. Resource adequacy programs, including the Western Resource Adequacy Program, should ensure that accreditation methods reward the availability profile EGS actually delivers. And market seams between EDAM and Markets+ should not inadvertently strand a resource that sits near the boundary between the two footprints.

For buyers, the practical lesson from the Google and Meta agreements is that early commitment has secured the best sites and the best prices. Direct-contracting mechanisms such as Utah's SB 132 and Nevada's Clean Transition Tariff make it possible to sponsor a specific project without owning it, and behind-the-meter co-location offers a route around interconnection queues where the resource and the load can be brought together. For developers and investors, the discipline that matters is repetition: the cost curve is a drilling curve, and it bends only for those who drill continuously.

> *The cost curve in enhanced geothermal is a drilling curve. It bends for those who drill continuously, and it delivers only where transmission and market rules let firm power reach the load.*

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KEY TAKEAWAY

By 2028 the West will have several hundred megawatts of third-generation EGS in operation and public data on multi-year reservoir performance; the planning decisions made before then on transmission, accreditation, and market seams will determine how much of the 135 GW resource is ever used.

Key Findings

The evidence assembled in this paper supports six conclusions about enhanced geothermal as a source of clean firm power.

→ EGS has moved from pilot to commercial scale, with operating plants in Nevada and Texas, a 100 MW phase approaching first power in Utah, and more than 1.3 GW of next-generation capacity under contract with data center offtakers as of September 2026.

→ Cost reductions are being driven by drilling performance rather than component prices; drilling time has fallen about 70 percent since 2022, cost per foot has roughly halved on comparable wells, and reported capital cost is trending from $7,000 toward $5,500 per kW.

→ Independent benchmarks now place geothermal at $67 to $111 per MWh unsubsidized, competitive with gas combined cycle and well below new nuclear, with DOE targeting $60 to $70 per MWh by 2030 and $45 by 2035.

→ The Great Basin alone holds an estimated 135 GW of EGS potential, but the best sites are in rural basins with limited transmission; Cape Station's transmission rights already trail its contracted capacity.

→ Federal permitting for exploration on public land has been materially streamlined through categorical exclusions and annual lease sales, tax credits were preserved through at least 2033, and the induced seismicity record at Cape Station has been well within regulatory thresholds.

→ Against nuclear, gas with carbon capture, and long-duration storage, EGS is the only clean firm option that is operating, contracted at scale, and falling in cost within the window when current data center load arrives; the pacing constraints are now reservoir longevity data, water, transmission, and market rules rather than technology.

Method and Scope

This paper synthesizes public information available through September 2026: developer and offtaker disclosures and securities filings, U.S. Department of Energy Liftoff publications, the National Laboratory of the Rockies 2025 market report and drilling cost-curve update, the USGS Great Basin EGS assessment, Bureau of Land Management permitting actions, Lazard's July 2026 LCOE+ analysis, and the EIA Annual Energy Outlook 2026. Cost figures are quoted as stated.

Conclusion

Firm, clean, and finally scalable

Enhanced geothermal has done what no other clean firm technology has managed in the current decade: it has gone from a first commercial plant to gigawatt-class contracts in three years, while its costs fell. The reason is not a scientific breakthrough but the transfer of an industrial skill set from one subsurface business to another. That transfer is still incomplete, and the coming reservoir performance data will determine how far and how fast the cost curve continues to bend.

For the Western Interconnection, the arrival of a firm, carbon-free resource in the Great Basin at the same moment that demand is surging is an opportunity that transmission planners, market designers, and resource adequacy programs have not yet fully internalized. The heat is there, the buyers are there, and the drilling is getting faster. What remains is to build the lines and write the rules that let 24/7 carbon-free power reach the loads that need it.

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