

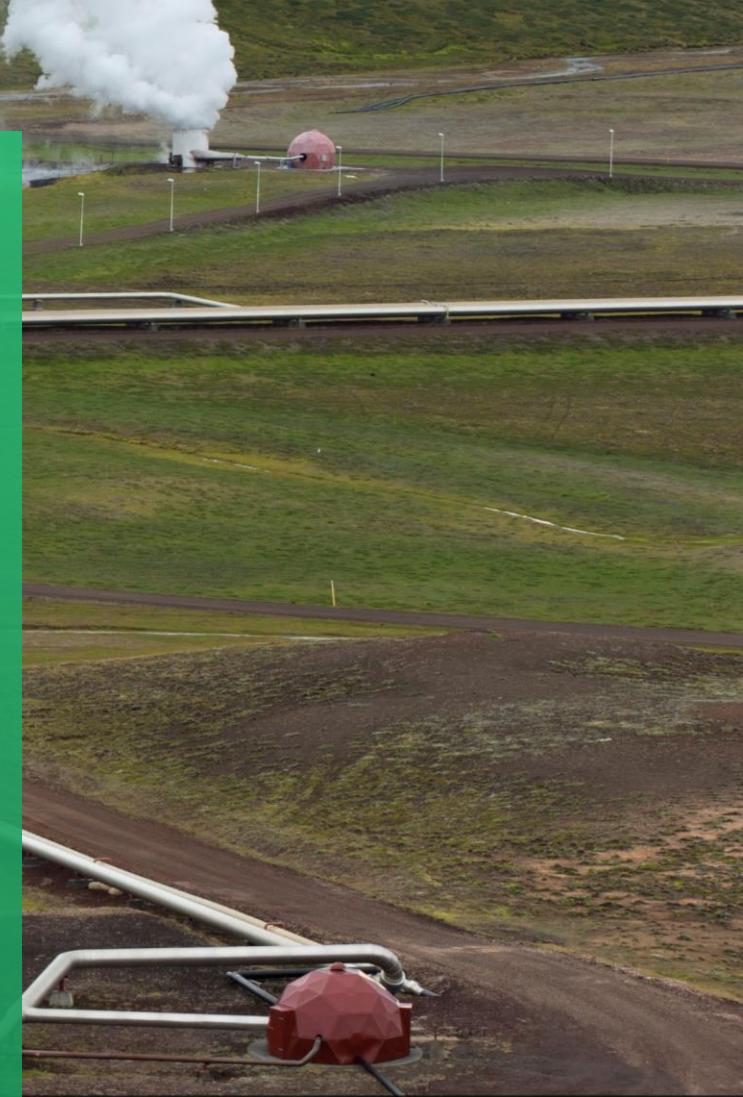


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# Geothermal Energy Machinery and Systems (GEMS) Workshop

2024 Recap

NOVEMBER 2024



# In 2024, US geothermal ecosystem experienced significant advancements

## Major technology progress

- **Record flow rate in EGS<sup>1</sup> achieved** (10 MWe, 107 Kg/s), close to commercial viability at scale
- **Breakthroughs in drilling execution** thanks to transferring learning from O&G
- **Progress in next-gen technologies** continues with FORGE<sup>2</sup> and private pilots (e.g., Sage)

## Favorable demand outlook

- **Strong demand for clean baseload power** driven by both data centers and utilities
- **Geothermal PPA prices increasing** and already above \$100 MWh (\$100-120 MWh Q4 2024)
- **Flagship geothermal PPAs signed** over 2024 (e.g., 320 MW PPA between Fervo and SCE<sup>3</sup>)

## Bipartisan policy support

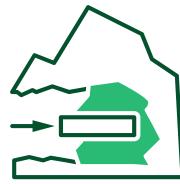
- **Permitting challenges eased**, adoption of categorical exclusions in federal lands
- **Active DOE support for pilots** (e.g., \$60M of funding) and LPO<sup>4</sup> support
- **Successful acreage auction** in federal lands, with record prices registered

Growing interest across investors, O&G companies and power companies

1. Enhanced Geothermal Systems, 2. Frontier Observatory for Research in Geothermal Energy (FORGE), 3. Southern California Edison (SCE), 4. Loan Programs Office (LPO).  
Source: BCG analysis

# Improvements in drilling and flow rates have enabled significant cost reductions for Enhanced Geothermal Systems (EGS)

Major improvements in subsurface costs have been published in the last 12 months

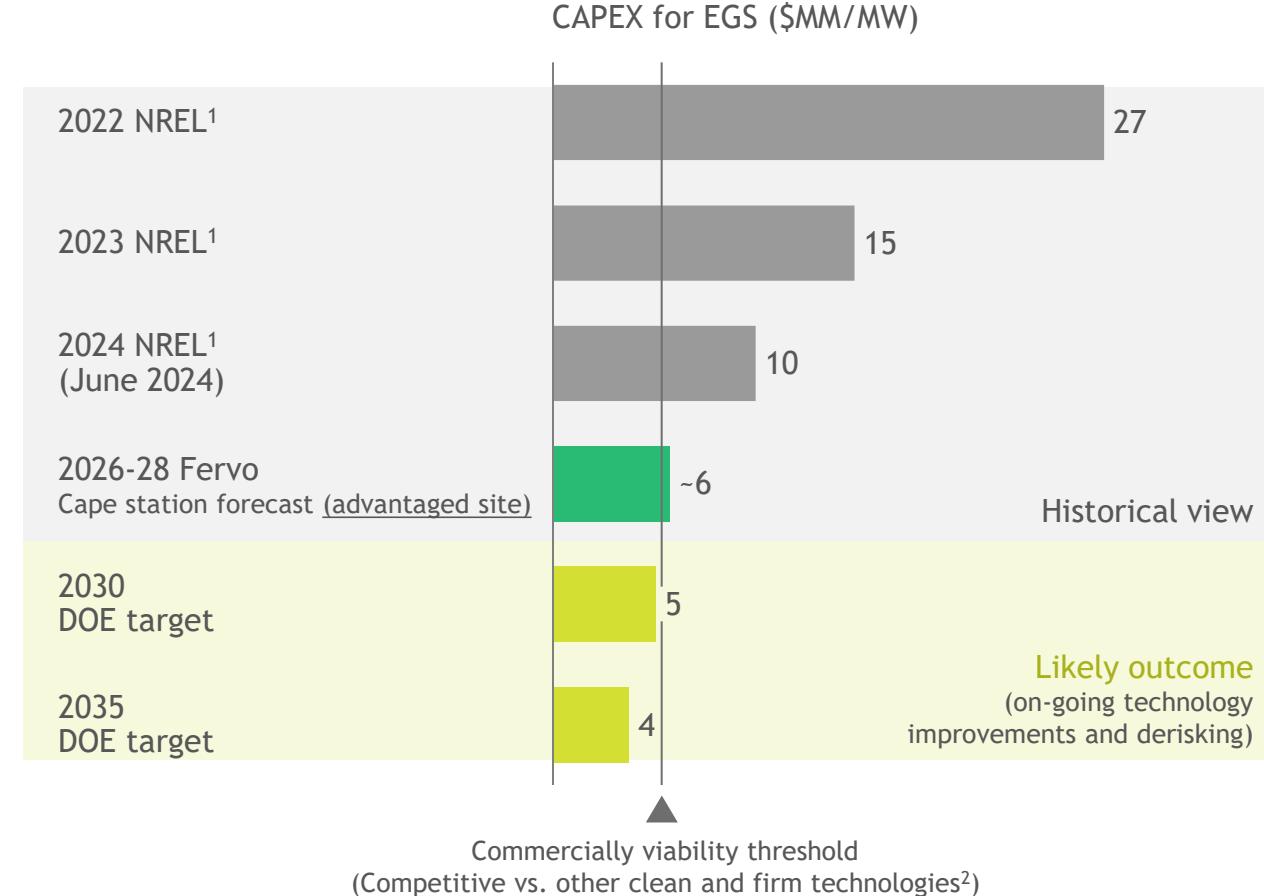


Major subsurface cost improvements achieved by applying O&G practices  
Drilling times have improved by 70% since 2022



Record flow rate in Fervo's Cape station  
The 30-day test, enabling over 10 MWe of generation, 3x the production of previous commercial pilot, Project Red

Today, EGS is close to be commercially viable at scale



1. First Of A Kind NREL estimate ATB Advanced case 2. CCGT + CCS.  
Source: NREL; DOE next generation commercial liftoff report; BCG analysis

# Increasing demand for geothermal power driven by both data centers and utilities that place high value on its clean and firm power attributes

## Estimated total US projected energy demand (TWh)

60% of demand increase expected to come from data centers. Geothermal is seen as one of the leading option for clean 24/7 power requirements if resource is available.

4,300

+3% CAGR

5,100

2024

2030

## Recent geothermal PPAs

Baseload: offtaker utility



**FERVO**  
ENERGY

 **SOUTHERN CALIFORNIA**  
EDISON  
An EDISON INTERNATIONAL Company

World's largest geothermal PPAs to date



320  
MW

Geopressured Geothermal Systems: offtaker data center



 **Meta**

East of Rocky Mountains

150  
MW

First utility scale PPA for Geopressured Geothermal System



 **Google**

Baseload: offtaker data center demand



Enabled by first of a kind contract structure with local utility (Clean Transition Tariff)



115  
MW

Growing premium for clean firm power seen in current PPA negotiations (\$100-120 MWh Q4 2024 vs. \$90-100/MWh in Q3 2024)

Source: BCG US Data Center Power Outlook; BCG analysis

# Policymakers are actively supporting geothermal scale-up with policies that aim to reduce permitting timelines and support technology improvements

## New policies enacted to improve permitting and increase demand



Federal actions focused on reducing permitting timelines

- BLM<sup>1</sup> adopts **categorical exclusions** to expedite geothermal energy permitting

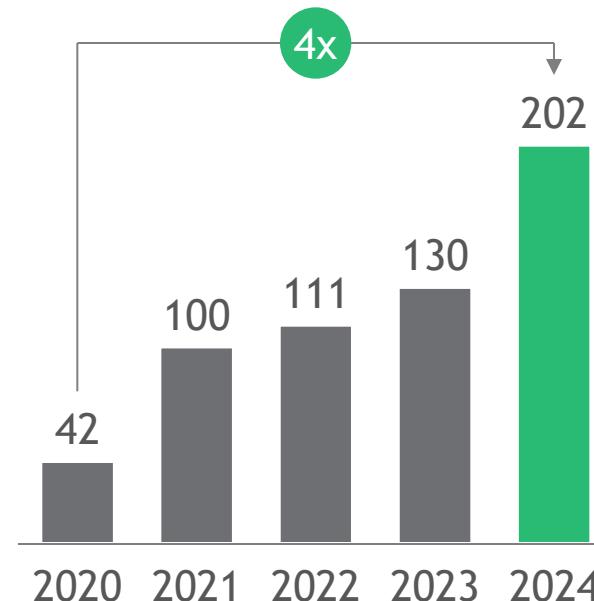


California regulators approved in Aug 2024 a **plan to procure 1 GW of additional geothermal capacity** between 2031 and 2037

## Strong interest for federal land acreage continues

### NV land auction prices up 55% YoY

Max bid/acre (\$)



## DOE actively supporting next-generation of technologies

DOE announced **\$60MM funding toward 3 EGS pilots**



"Super-hot" EGS demo site



EGS pilot in Cape Station



EGS pilot near Geysers



Activating ecosystem to support funding opportunities

1. Bureau of Land Management (BLM). Source: Press research; October 2024 Nevada BLM auction results; BCG analysis

# Disclaimer

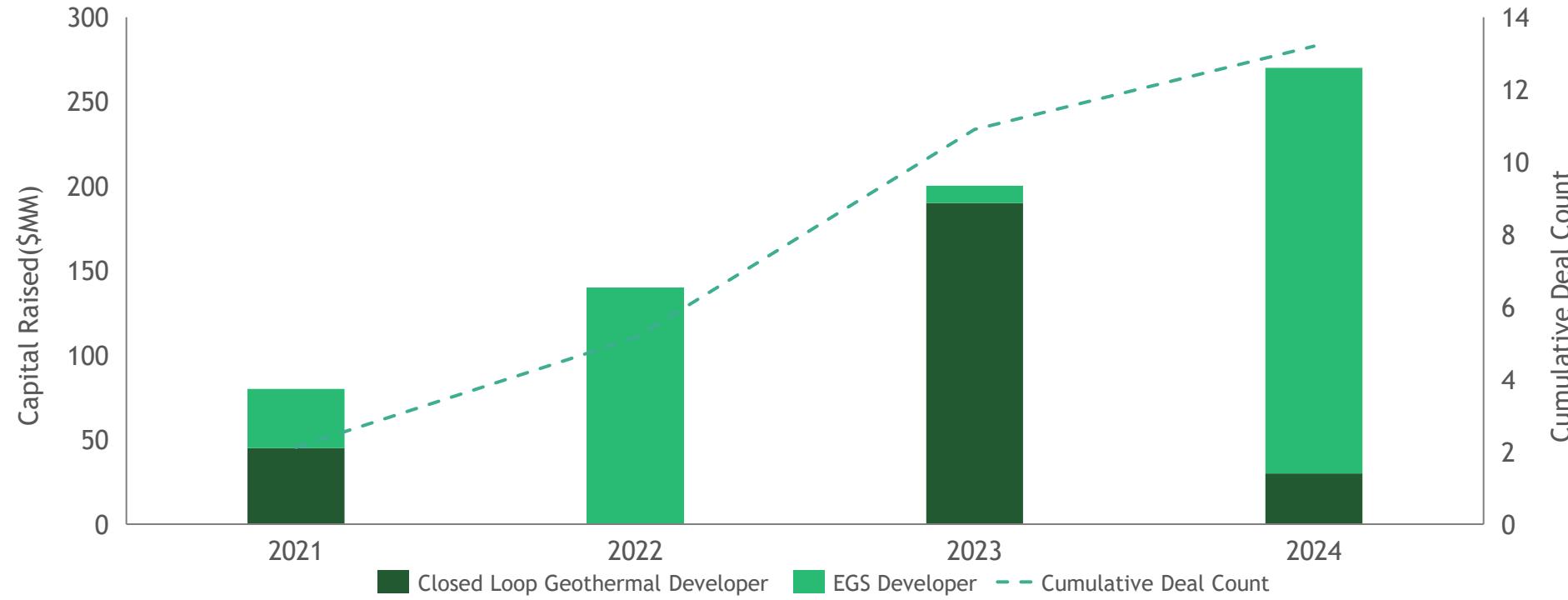
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# Next generation technologies are experiencing a significant increase in deal activity and capital funding

Capital raised and cumulative deal count in next-generation geothermal, 2021-2024





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