
GEOTHERMAL RISING
2026 MINING AND LAND
RESOURCES INSTITUTE
AAPL
Powering The Profession

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Geothermal in 2026: Market, Policy, and the Subsurface Opportunity

2026 Land and Mining Resources Institute

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geothermal.org

MEET THE SPEAKER

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Director of Policy and Education

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- Leads GR’s education, outreach, and policy initiatives across all levels of government
- Coordinates stakeholder engagement, advocacy, and public awareness campaigns
- Brings over a decade of experience in energy education, outreach and nonprofit leadership

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Agenda

1. **Geothermal 101** – What it is & why it's different
2. **Market Landscape** – Where & why growth is happening
3. **Policy Momentum** – Federal & state drivers
4. **Technology** – What's unlocking new regions
5. **Land & Mining Intersections** – What this means for you
6. **How to Get Involved** - **Join the growing geothermal industry**

Learning Objectives

1. Describe the current U.S. geothermal market landscape, including key growth regions and primary investment drivers in 2026.
2. Identify at least three federal or state policy mechanisms contributing to bipartisan support and accelerated geothermal development .
3. Explain how recent drilling and subsurface technology advancements are expanding geothermal deployment beyond traditional resource areas.
4. Recognize at least two practical ways geothermal development may intersect with land, mineral, or resource management activities in regions with active mining operations .

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Geothermal Rising Overview

•World’s leading geothermal membership organization (est. 1972)

•Nonprofit (501(c)(3) & (c)(4)) advancing geothermal development

•Connects industry through education, engagement, and policy

•Elevates geothermal as a reliable, 24/7 energy solution

•Active across federal, state, and Tribal policy

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What do we do?

01.

Education & Outreach

- Increase geothermal visibility through media, outreach, and student engagement
- Provide trusted information to policymakers and stakeholders

02.

Shaping Policy

- Engage with policymakers to support geothermal development
- Provide industry -informed insights to decision -makers

03.

Connecting the Industry

- Convene stakeholders through events and forums
- Facilitate collaboration across industry, government, and academia

04.

Data & Research

- Publish research and insights through industry -leading platforms
- Maintain extensive geothermal data and resource libraries

Our Work in Action

Geothermal Rising engages across policy, industry, and on the ground — from federal advocacy to field visits and professional education.

Our Members & Partners

From global energy leaders to innovative startups —our members span the entire geothermal ecosystem.

Earth Energy Visionaries

Baker Hughes, Eavor, Kenai, Siemens Energy, Turboden, The Geysers Calpine, egg geo, Quise, slb

Geothermal Champion Members

Bantam, BHE Renewables, Burns McDonnell, Carbo, Fervo Energy, Halliburton, Kurita, NOV, the human energy company, COMSOL, COSO Operating Company, Exergy, Ormat, OXY, Sinclair Well Products & Services, Southern Company

Clean Energy Sustainer Members

Ameresco, Baseload Capital, D A Davidson, Darcy Sustainable Heating and Cooling, Distributed Energy Group, Geologica Geothermal Resource Solutions, Imperial County, Nabors, Respec, StreamFlo, XGS Energy, zanskar

Renewable Energy Enthusiast Members

10 organizations committed to advancing geothermal

Small Organization or Startup Member

75+ innovative startups, research institutions, and emerging technology companies building the future of the industry.

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Why Geothermal?

One resource. Dozens of benefits.

- 24/7 Baseload Power
- Small Land Use
- Long Life Span
- Grid Stability
- Job Boost
- Thermal Energy Storage
- Efficient Heating and Cooling
- Economy Boost
- Sustainable Investment
- No Emissions
- Locally Produced
- Critical Minerals

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Geothermal 101

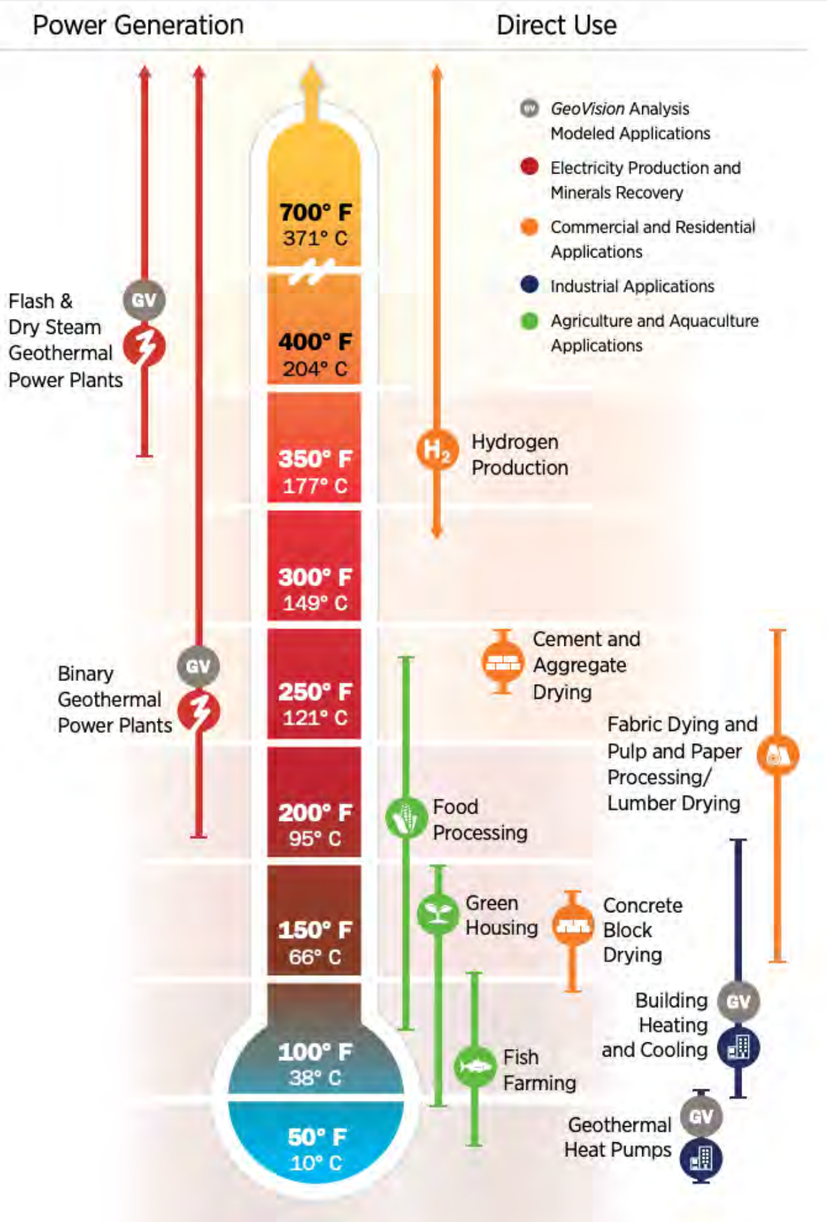
What is Geothermal?

Geothermal energy is heat derived from the Earth. Today, we have the ability to harness this natural heat to produce energy in multiple ways—including electricity generation at power plants, direct-use applications, and geothermal heat pumps for heating and cooling buildings.

3,969 MW
U.S. Installed Geothermal Capacity. Enough to power ~3.2 million homes

99
U.S. Geothermal Power Plants

~15,000 MW
Global Installed Geothermal Capacity U.S. leads with 23% share



Source: DOE

How Geothermal Works & Its Applications

Geothermal energy spans a wide range of temperatures and applications. From heating and cooling individual buildings to powering the electric grid. Next-generation technologies aim to unlock this resource nationwide.

Geothermal Heat Pumps

Circulate fluid through shallow ground loops; uses stable earth temperature for heating/cooling

Direct Use

Use naturally heated groundwater directly—without a heat pump or power plant—to provide warmth for buildings, greenhouses, aquaculture ponds, and industrial processes.

Power Generation (Conventional)

Extract steam or hot water from natural reservoirs to drive turbines

Power Generation (Next -Gen)

Next-generation technologies expand geothermal beyond natural reservoirs—including Enhanced Geothermal Systems (EGS), Closed-Loop systems, superhot rock, and co-production from oil and gas wells.

Surface vs Subsurface

Limited surface expression. Significant subsurface resource.

Small footprint above ground

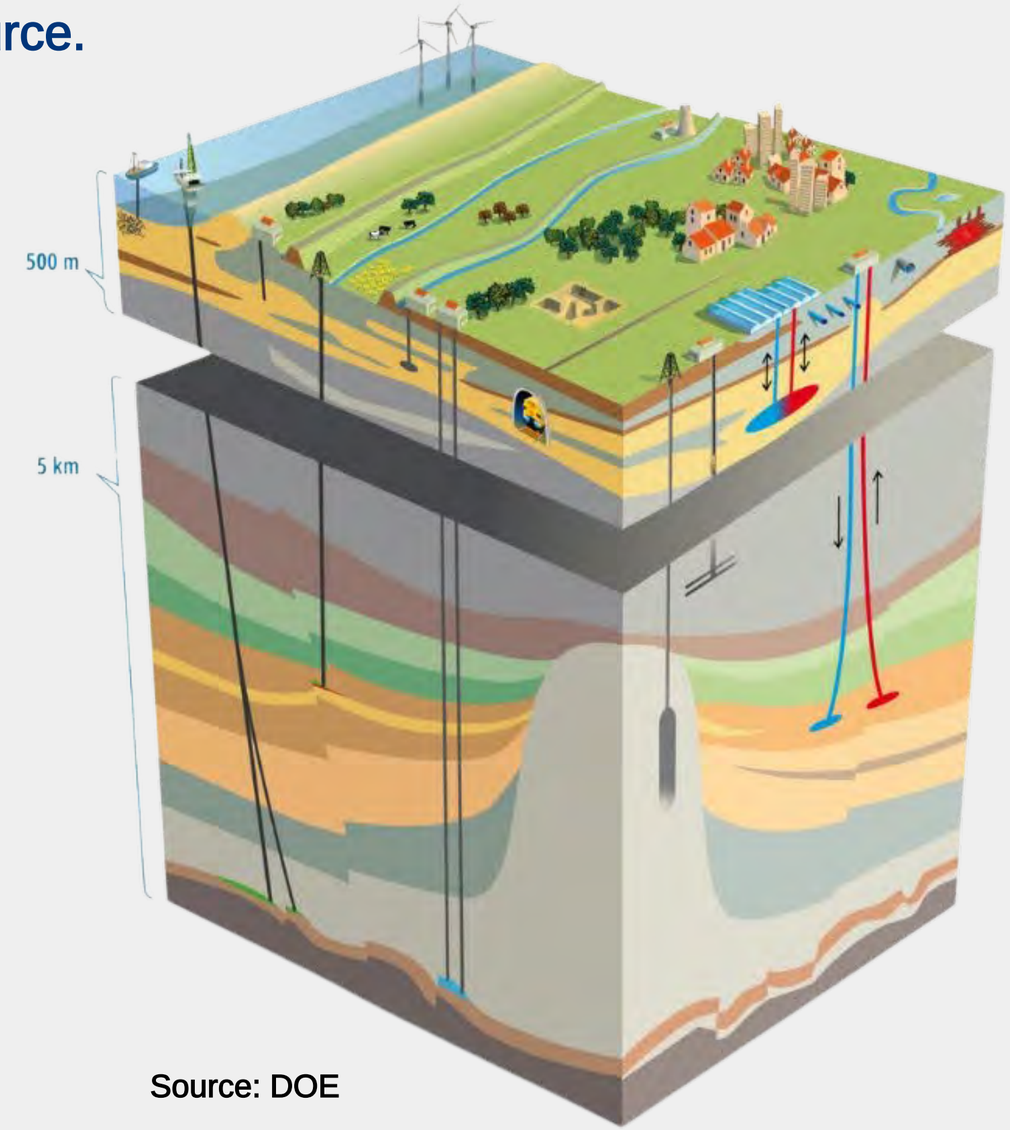
Surface

- ~1–5 acres per MW (compared to 5 –10 for solar, 50–100 for wind)
- Wells + pipelines + small plant + access roads
- Can coexist with grazing, mining, or wildlife habitat

Large resource below

Subsurface

- Wells typically 5,000–10,000+ ft depth
- Reservoir temperatures: 150°C–370°C (300°F–700°F)
- Reservoir drives viability — not surface infrastructure



Source: DOE

Conventional Hydrothermal

What it is – Extracts steam or hot water from naturally permeable reservoirs

Current Status

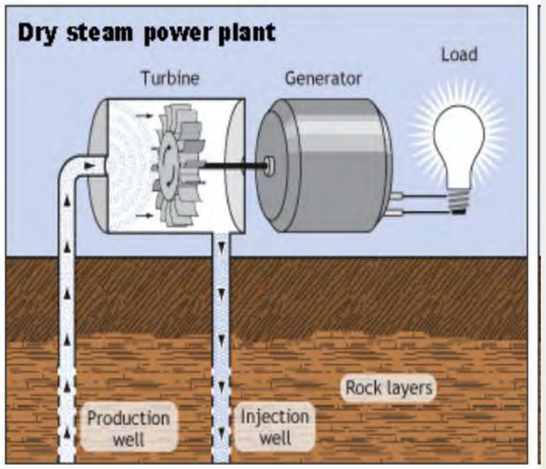
3,969 MW
installed – 99 power plants across 7 states

62%
of capacity from plants >30 years old

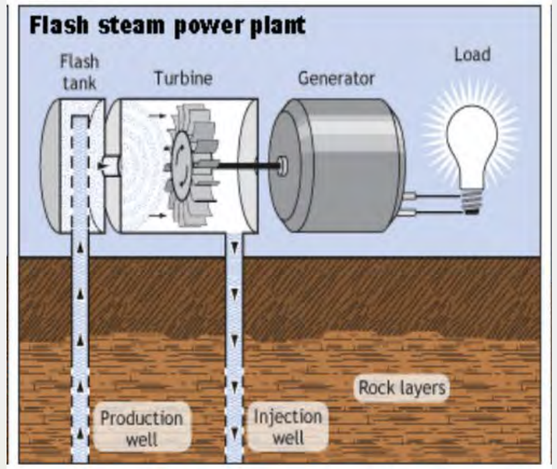
LCOE
$90–110/MWh (binary)
$63–74 /MWh (flash)

Plant Types

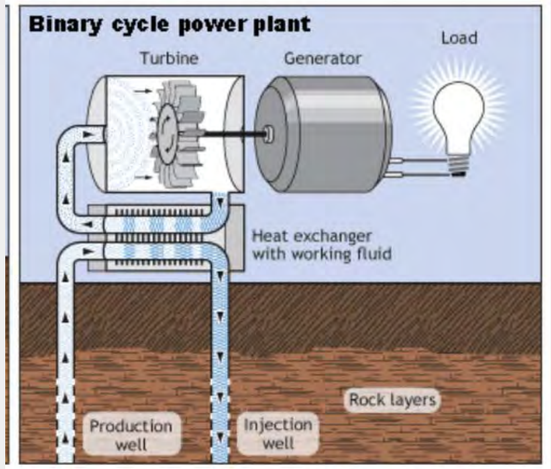
Source : DOE



Steam piped directly from ground to turbine



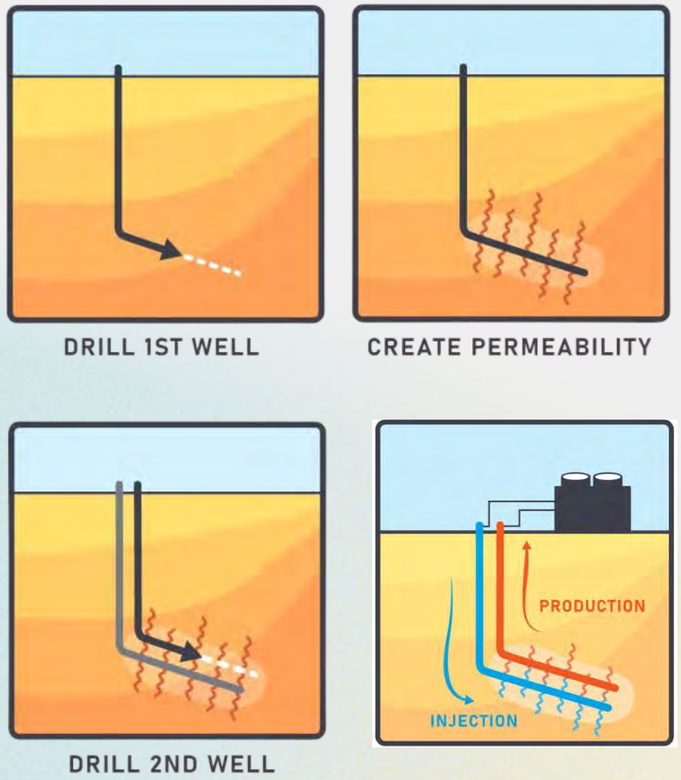
High-pressure hot water "flashes" to steam in a tank



Heat from geothermal fluid transferred to secondary working fluid

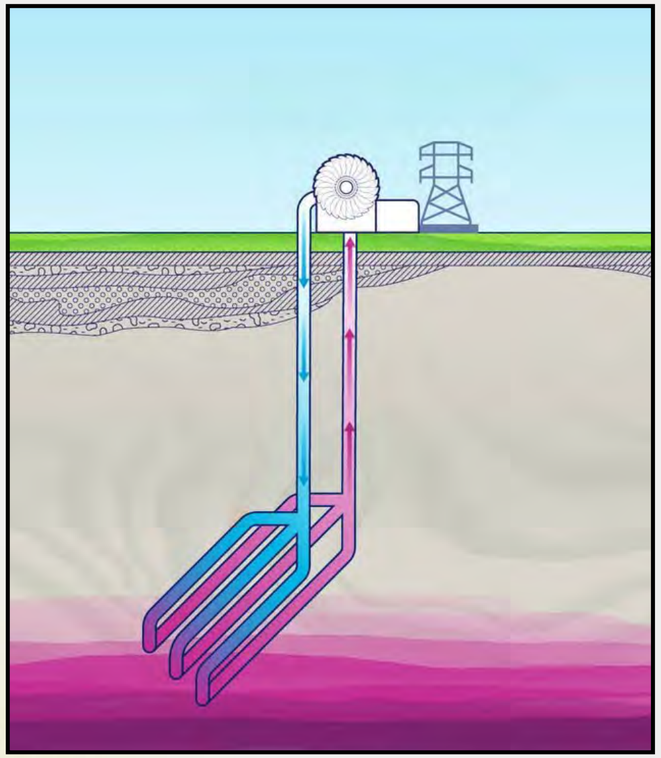
Next -Generation Geothermal

Enhanced Geothermal Systems (EGS)



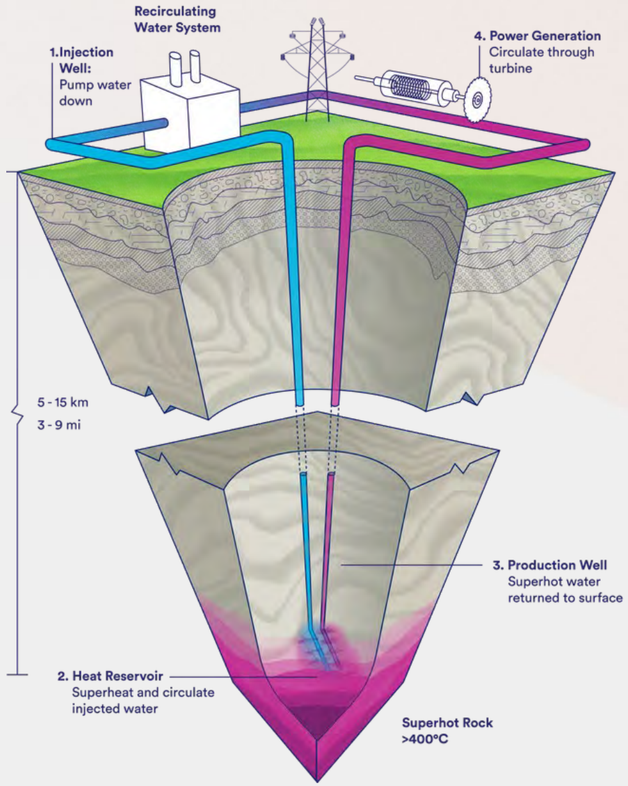
Source: Utah FORGE

Advanced Geothermal Systems (AGS)



Source: Clean Air Task Force

Emerging Next Generation Geothermal Technologies



Source: Clean Air Task Force

Geothermal Landscape

1 Objective 1

Geothermal is Already Working for America

Power Generation

Total U.S. Capacity: **3,969 Megawatts (MWe)**

Growth Since 2020: **+8% (from 3,673 MWe)**

What that means: **Powers ~ 3.2 million U.S. homes**

99 power plants across 7 states

Heating & Cooling

1.27M+ residential units with GHPs **27,300+** commercial buildings

Direct Use

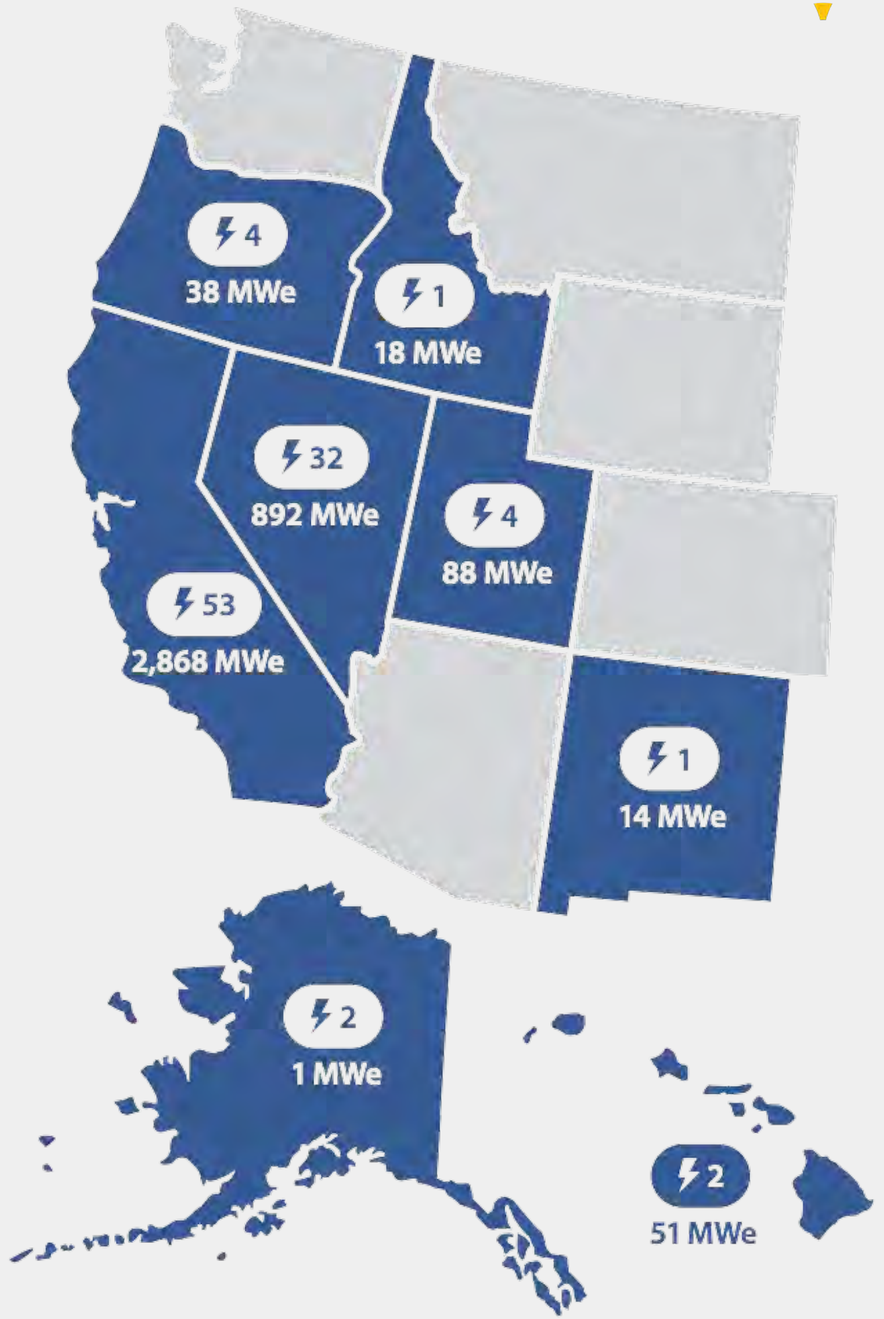
500+ installations nationwide

Resorts & pools: **281 installations**

Greenhouses: **37 installations**

Aquaculture: **47 installations**

District heating: **25 systems**



Geothermal Heat Pumps

Scale

1.27 million Residential units

27,300 Commercial buildings

Operating in all 50 states

Top States (Residential):

Florida, Tennessee, North Carolina.

Grid Value

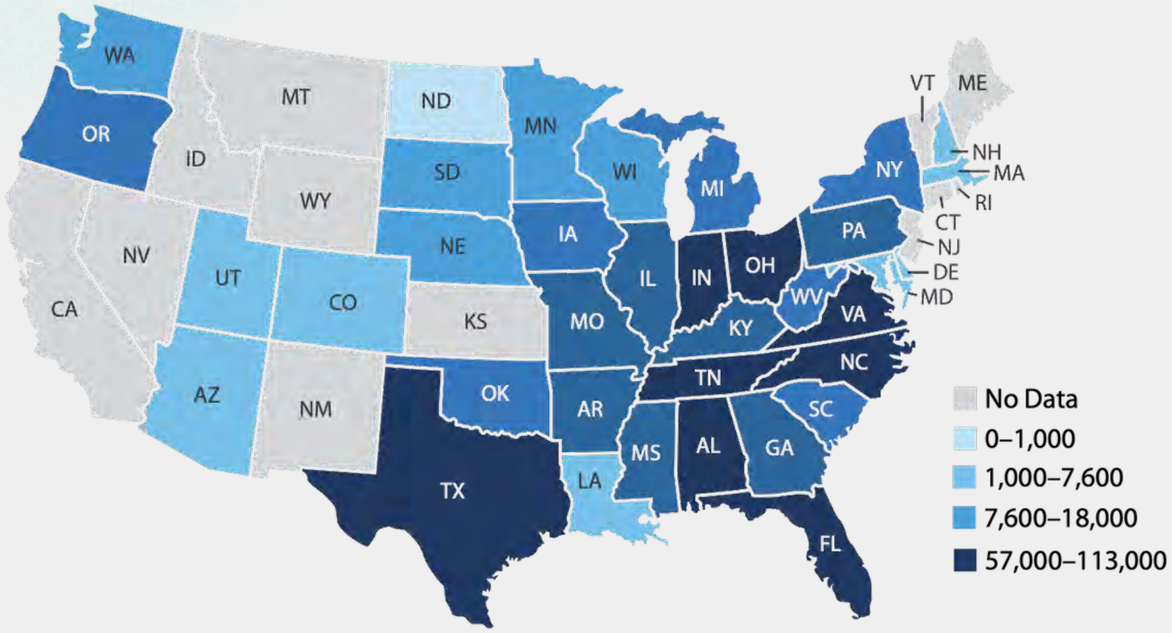
Mass GHP deployment could avoid:

$1 trillion in future grid costs

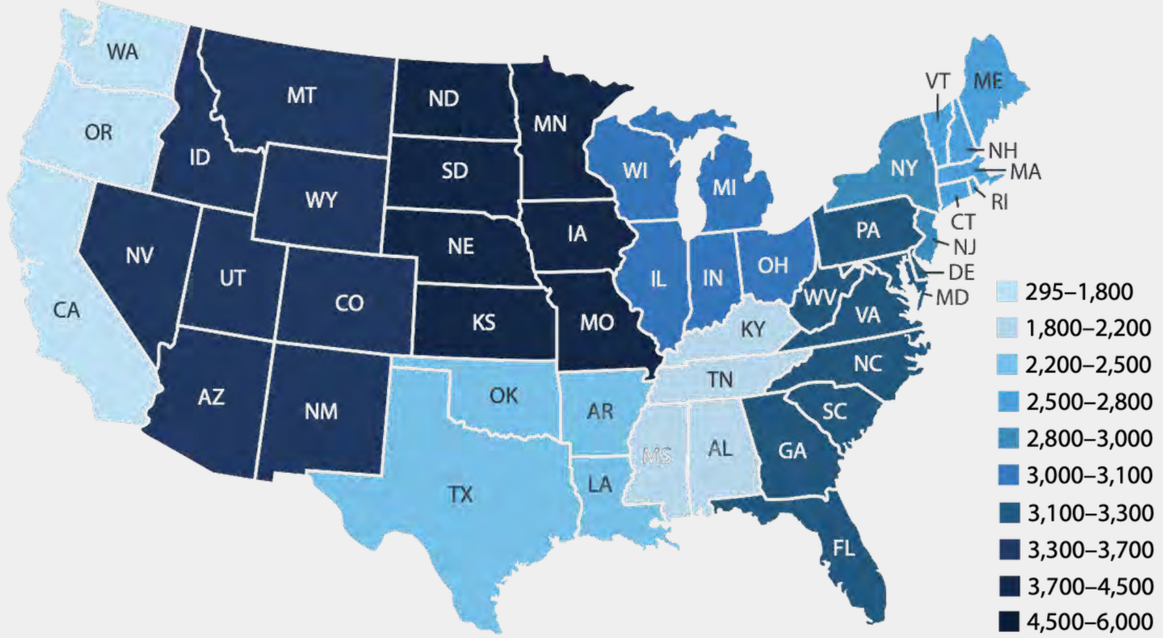
↓ 585–937 TWh/year new generation

↓ 3.3–65.3 TW-miles transmission

The Number of Residential Housing Units with GHPs



The Number of Commercial Buildings with GHPs



Thermal Energy Networks (TENs)

What is a TEN? 5th-generation district system: ambient loop connecting decentralized GHPs in multiple buildings.

Market Catalyst

8 states (MA, NY, CO, MD, VT, WA, MN, CA) now have TEN-enabling policies.

NY funded design/construction at over **50 project sites**

Landmark Project

Eversource's Framingham, MA pilot:

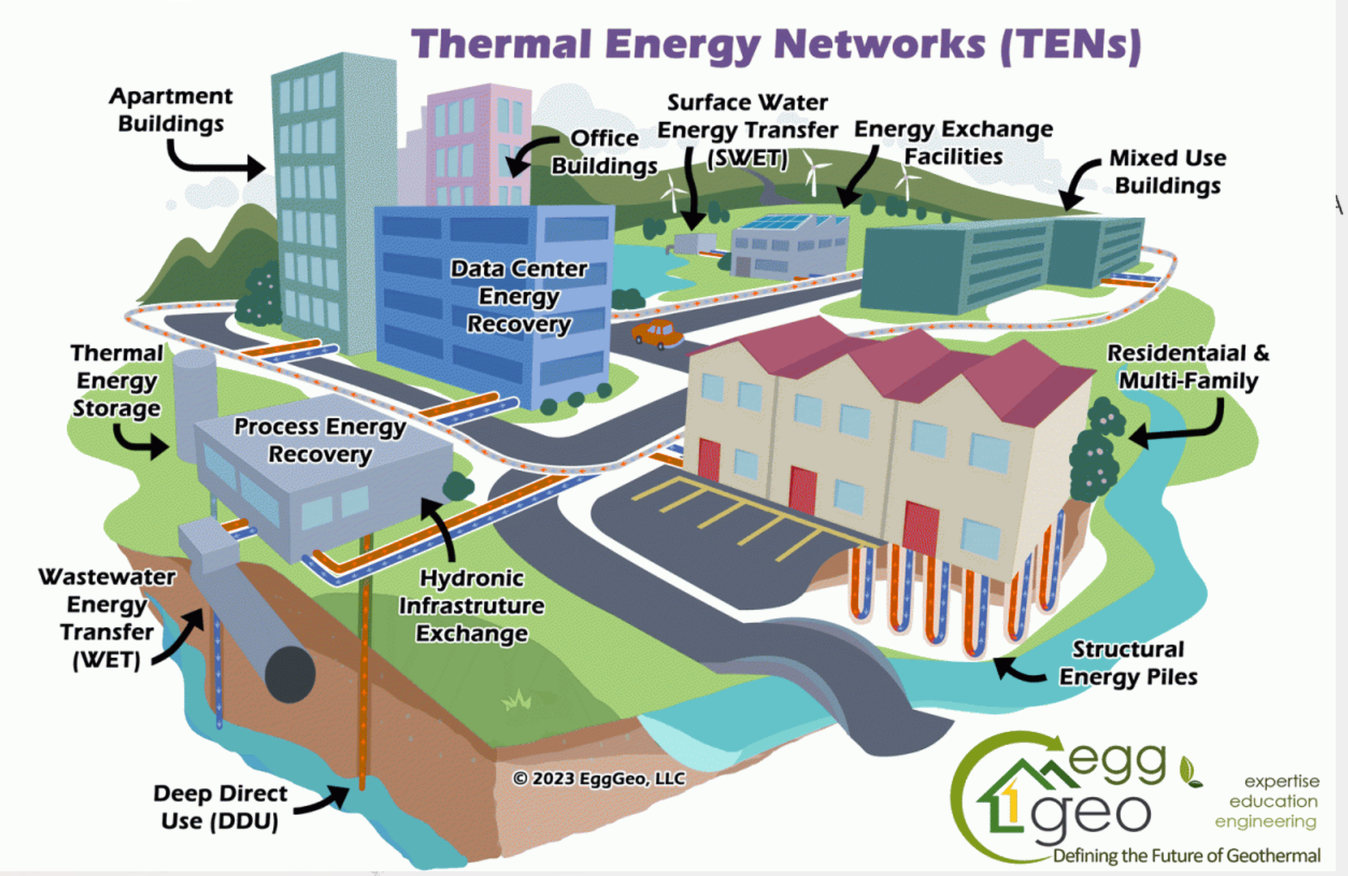
36 buildings (24 residential, 5 commercial).

Operational as of Dec. 2024. Second expansion planned for 2026.

Federal Support

DOE selected **11 communities in 10 states** for district-scale pilot design.

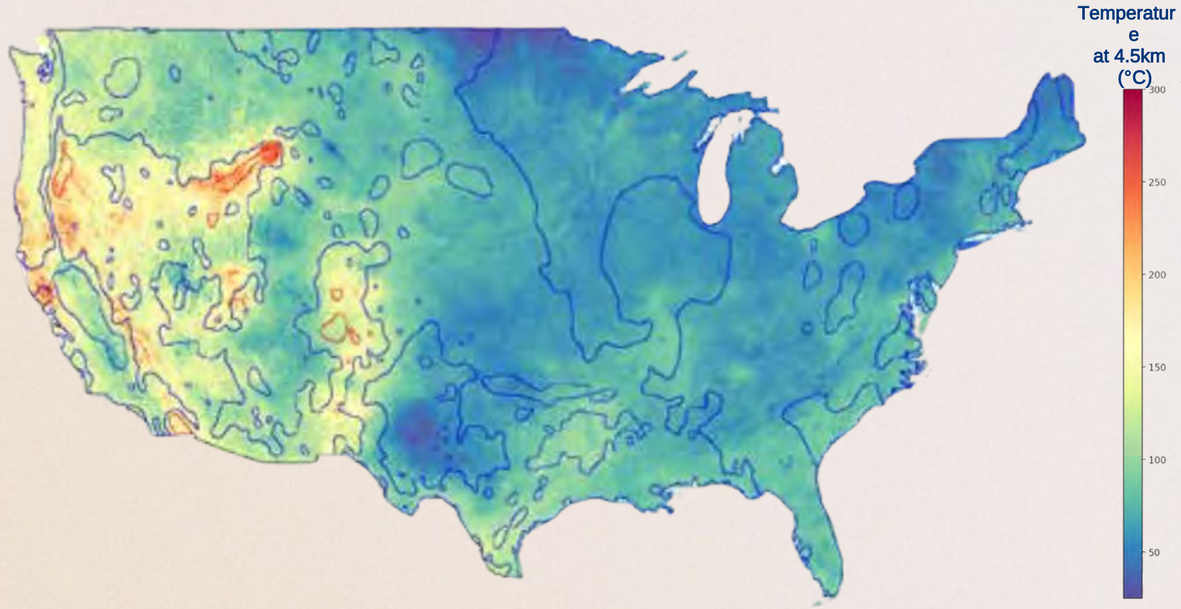
5 communities shortlisted for implementation after feasibility studies.



Conventional Hydrothermal Potential

SMU Isotherms

General Temperature ≥ 200°C Temperature ≤ 100°C



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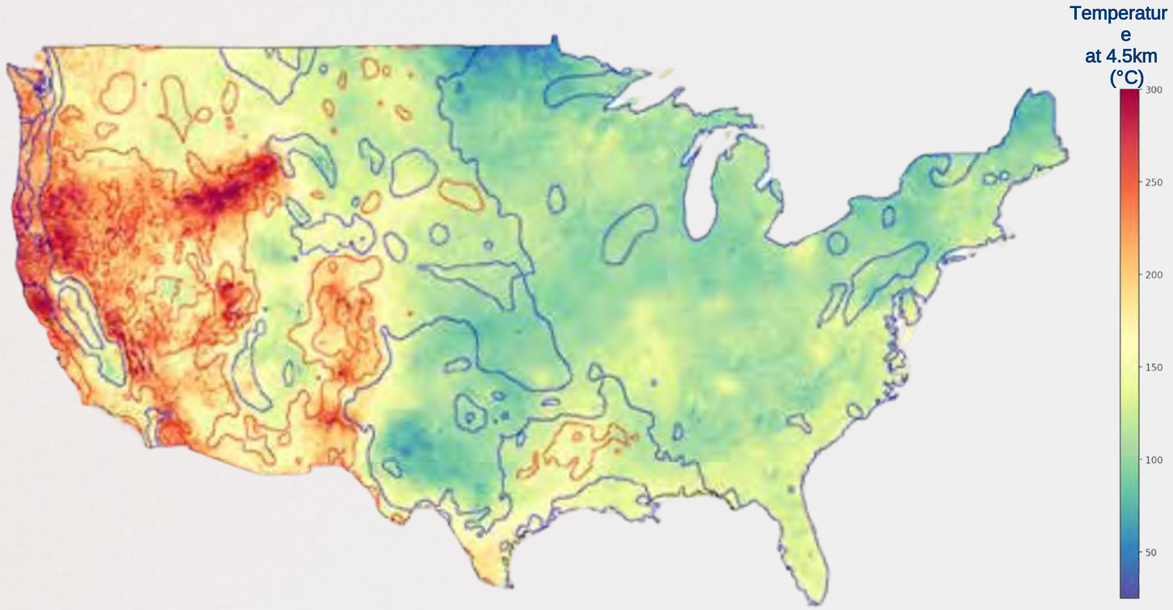


~3.6 GW
Identified hydrothermal resource

~17.8 GW
Undiscovered hydrothermal resources

>20 GW
Total conventional potential

Technology Updates – Hydrothermal

Exploration: Then vs. Now

Traditional Exploration	Modern Exploration (AI/ML)
Manual geologic mapping	Machine learning models integrate multiple data types
Limited geophysical surveys	High-resolution remote sensing and 3D modeling
High-risk drilling decisions	Data-driven targeting reduces exploration risk
Years of analysis	Faster resource assessment

Opportunity

Repowering
Upgrade older plants with modern technology; extend life 20–30 years

Brownfield expansion
Add capacity at existing fields; lower exploration risk

New discoveries
Undiscovered hydrothermal potential: ~17.8 GW

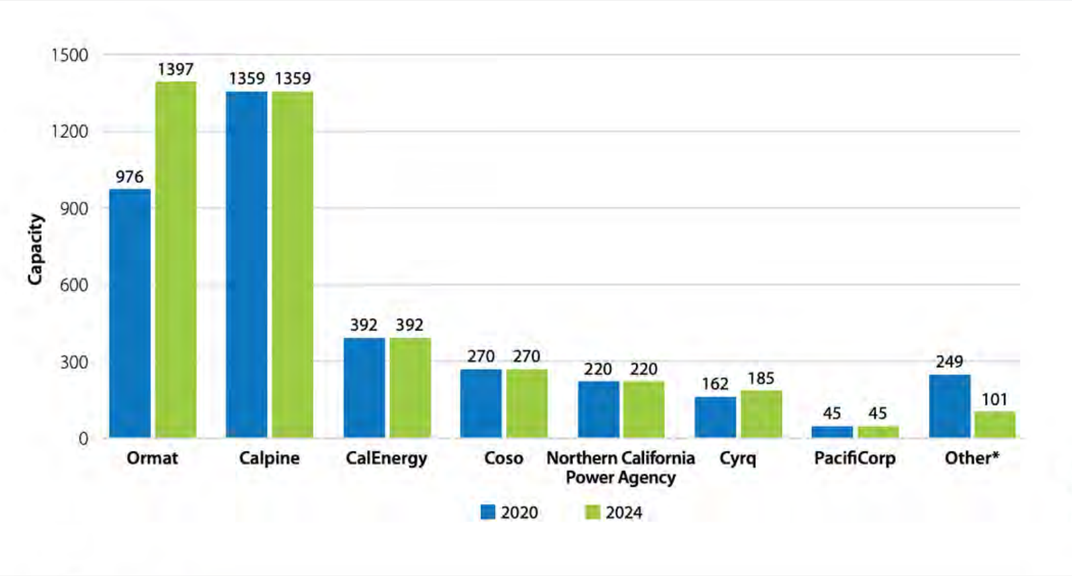
Cost Trends

Hydrothermal costs have remained stable since 2021

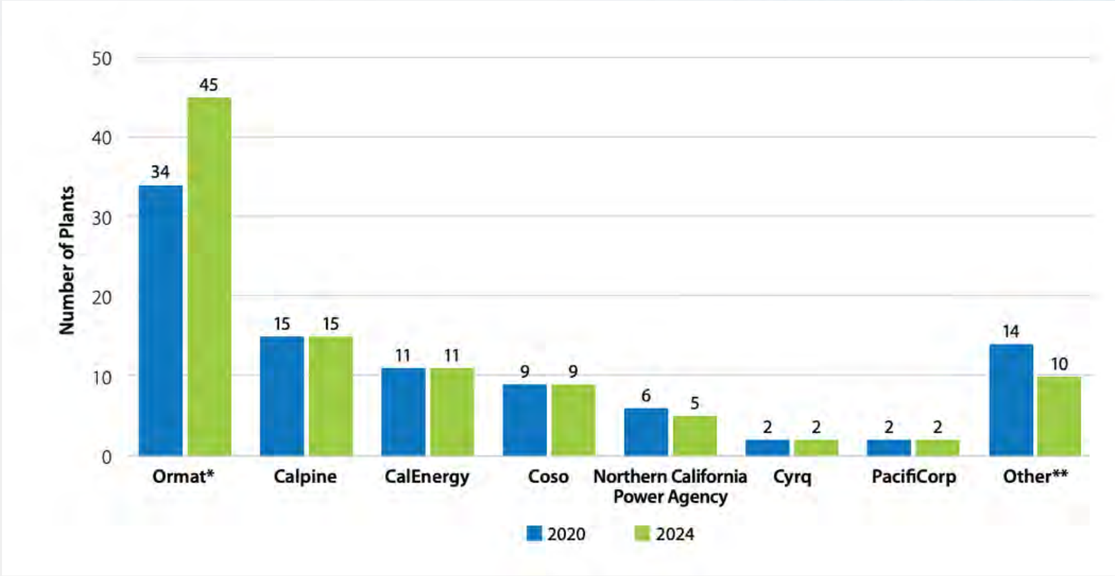
Drilling improvements from next -gen R&D are transferable to hydrothermal

Market Concentration

- Two Dominant Players: **Ormat and Calpine.**
- Their Share: Together, they own/operate **69%** of all U.S. geothermal capacity.
- Business Model Difference:
  - Calpine: Fewer, larger plants (**avg. 91 MWe/plant**).
  - Ormat: More, smaller plants (**avg. 32 MWe/plant**), often using lower-temperature resources.



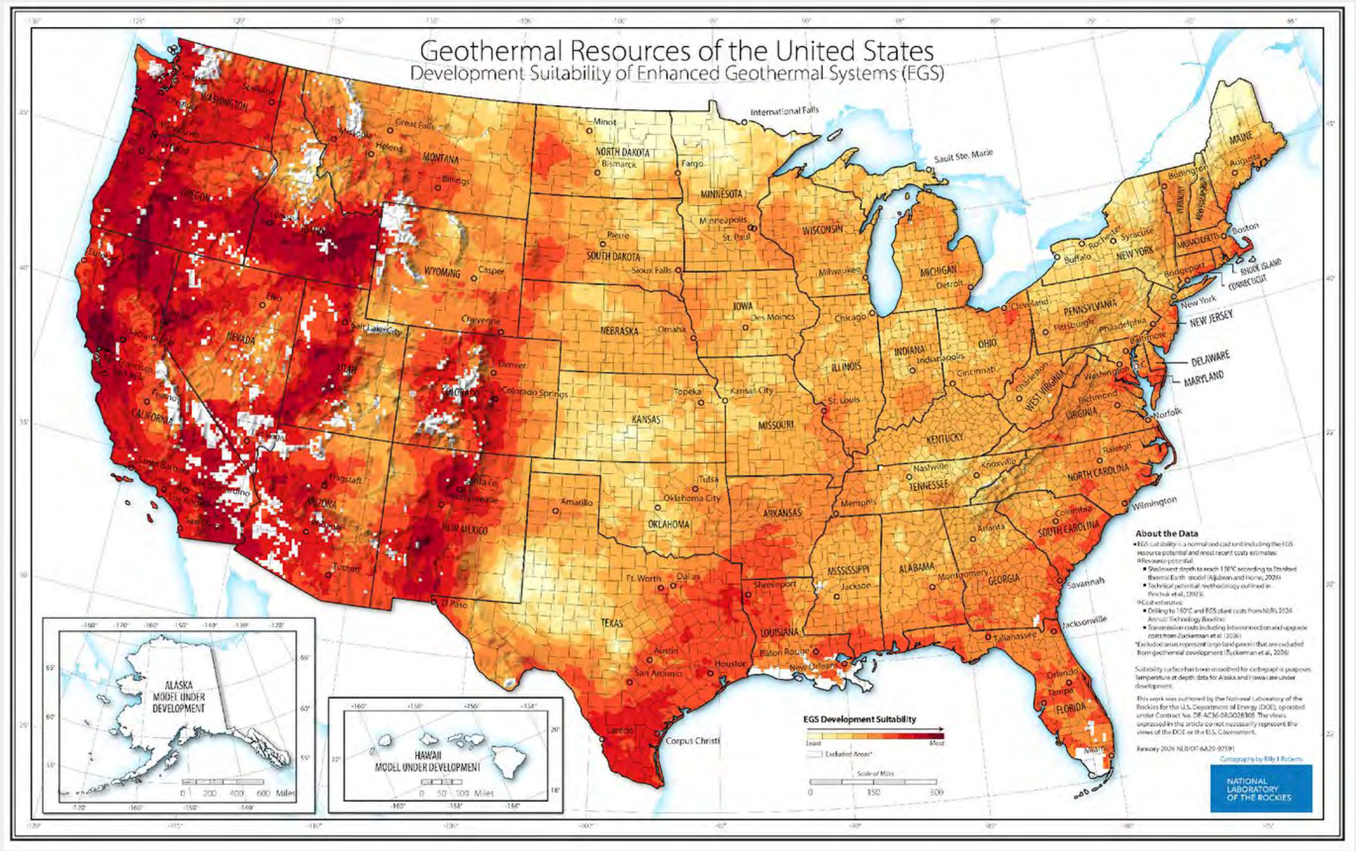
U.S. Geothermal Nameplate Capacity by Operator



U.S. Geothermal Power Plant Count by Operator

Key U.S. Regions

Where Development is Happening



Source: National Laboratory of the Rockies

Established Markets

Great Basin (NV, UT) – Nevada: **32 plants**; Utah: growing rapidly with FORGE EGS demonstration site

California (Salton Sea) – **53 plants**, 73% of U.S. installed nameplate capacity

Emerging Markets

New Mexico, Colorado, Idaho, Oregon
Active exploration and early-stage development

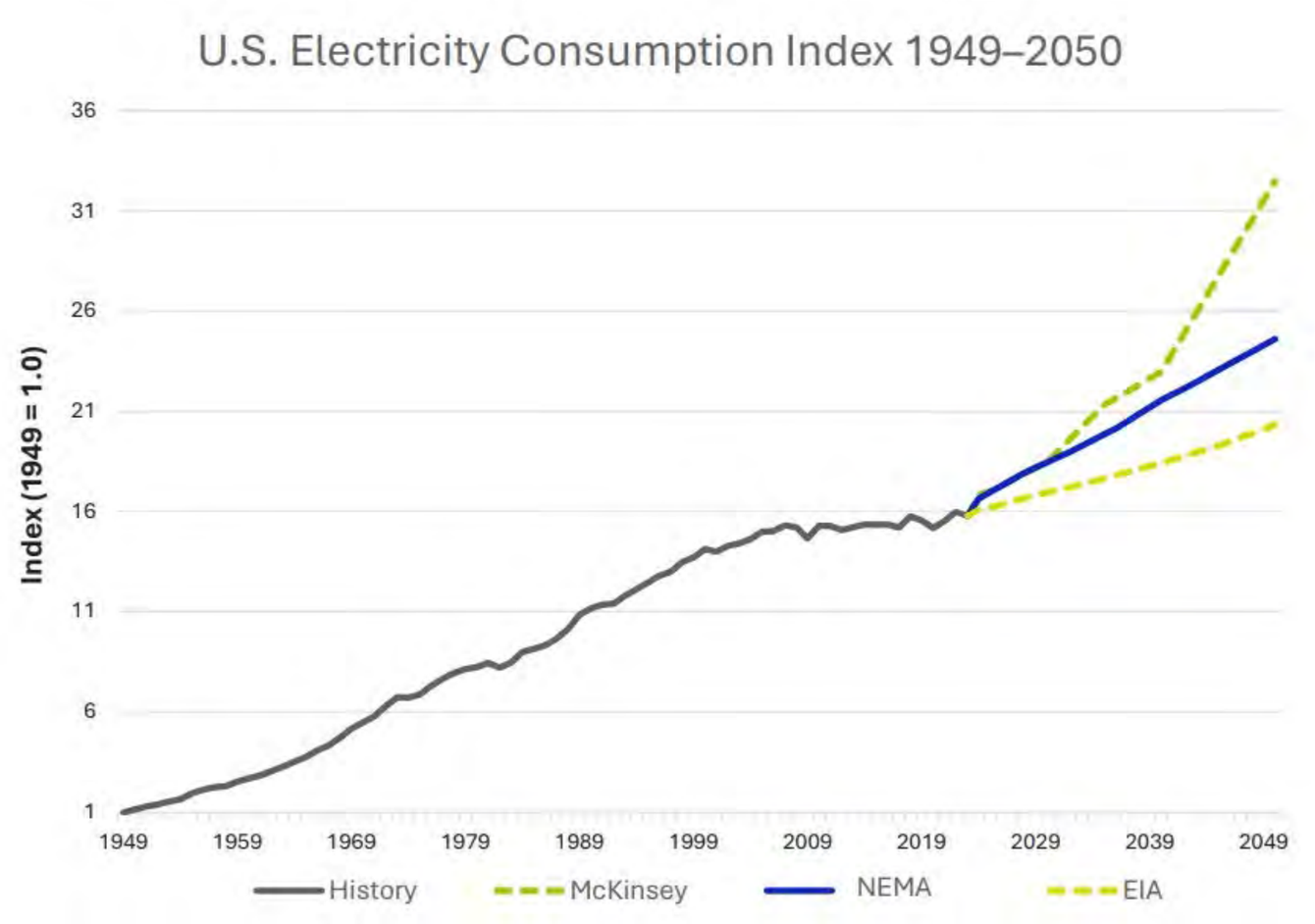
Texas – Next-gen potential; first EGS project under development; DOE partnering with Sage Geosystems

Alaska, Hawai'i – Operating plants in both states

What's Driving Expansion

Next-generation technologies (EGS, closed-loop) unlocking resources beyond traditional hydrothermal zones

Why Now?



Source: National Electrical Manufacturers Association

For decades, U.S. electricity demand remained relatively flat. Efficiency gains offset population and economic growth. **But that era is ending.**

According to the National Electrical Manufacturers Association, demand is projected to grow **50% by 2050**.

Why Now?

The Demand Challenge

Data Centers

- Data center load growth has tripled in past decade
- Projected to double or triple again by 2028
- AI-driven computing needs 24/7 reliable power

Electrification

- Buildings and transportation electrifying rapidly
- Heating and cooling account for ~40% of building energy use
- Heat pumps can electrify heating efficiently

Grid Reliability

- Solar and wind are growing - but they're intermittent
- Grid needs firm, dispatchable power to balance them
- Geothermal provides that baseload backbone

What has changed?

Technology

EGS and Closed-Loop are **commercializing now** –

Policy

Bipartisan support at all levels of government

Market

Tech giants are already signing deals – Google (115 MW), Meta (150+150 MW)

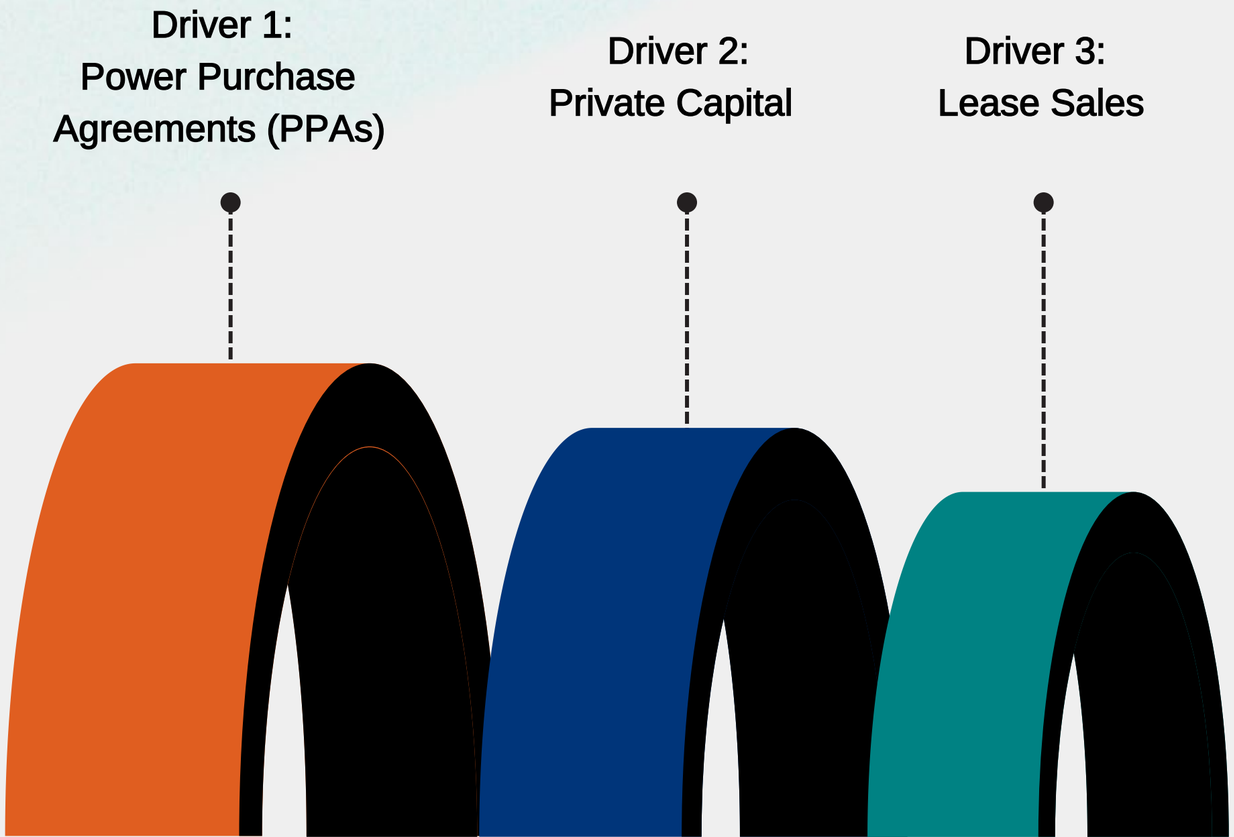
Investment

$1.5B+ in private capital since 2021 – signal that industry is ready to scale

Market Drivers

Across the industry, the numbers tell a compelling story.

Twenty -six new contracts.
1.5 billion in private investment.
Record -breaking lease sales.



Driver 1: Power Purchase Agreements (PPAs)

- 26 new PPAs signed since 2021
- Represents 1,642 MW of new capacity
- 60% are for next -generation geothermal (EGS/CLG)
- Driven by CA procurement order (1 GW firm power)

Driver 2: Private Capital

- $1.5B+ raised by next -gen companies
- Fervo, Sage, Eavor, XGS Energy
- Includes equity and debt financing
- 33% debt financing shows de -risking

Driver 3: Lease Sales

- NV (2024): 217,866 acres for $57.8M
- UT (2025): 50,961 acres for $5.6M
- All parcels leased suggesting strong industry confidence

Policy Momentum

2 Objective 2

Geothermal Policy Timeline

Early Milestones
- Geothermal Steam Act
- Geothermal Energy R&D Act
- Energy Tax Act
- Public Utility Regulatory Policies Act (PURPA)

Decline in Policy Support
- Federal funding declines, R&D investment slows
- Capacity plateau, very few new projects brought online.

Market Acceleration
- Investment accelerating
- Projects scaling
- New markets emerging

1970's | 1980's | 1980's - 2000's | 2022 -2025 | 2026

Boom Time
- 1st binary geothermal plant
- Geothermal Energy Act
- Rapid capacity rise
- California's Standard Offer Contracts

IRA and Next Generation Boom
- 45Y- Production Tax credit
- 48E Investment Tax credit
- Transferability and Direct Pay
- Categorical Exclusions and EO's

Key Federal Mechanisms

Federal Policy Supporting Geothermal

Tax incentives (45Y / 48E)

- Creates long-term lease value — transferability and direct pay mean developers can monetize credits even without tax appetite

DOE funding (OG growth to ~$410M request)

- Increased funding across multiple departments

Permitting improvements (BLM categorical exclusions)

- Faster federal approvals — CEs for resource confirmation (2025) and proposed for exploration ops can cut 6–12 months of uncertainty

Bipartisan legislative activity (8 bills reported out of committee)

- Permitting reform, annual lease sales, clear timelines, modernized systems

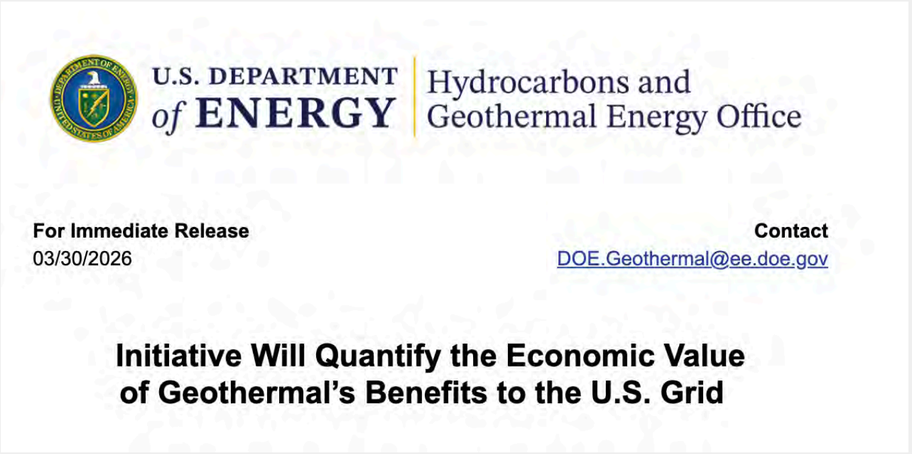
Support at all levels of government

- Executive orders + Energy Secretary direction — creates consistent pressure on BLM field offices to process, not stall

Key Federal Mechanisms

Federal funding opportunities

Funding Notice: Next-Generation Geothermal Field Tests and Geothermal Resource Characterization and Confirmation



State Leadership

Power Generation

Nevada

32 plants ; BLM approved McGinness Hills expansion and Diamond Flat exploration ; **95 geothermal wells** permitted in 2025 (highest since 2010)

California

53 plants (73% of U.S. capacity); AB 527 enacted Sept 2025, expediting CEQAreview for exploratory projects

New Mexico

BLM accepting nominations for March 2026 lease sale; geothermal remains in state renewable energy definition

14-state DOE/NASEO Geothermal Power Accelerator

Launched Jan 2026 includes AK, AZ, CA, CO, HI, ID, LA, MT, NV, NM, OR, PA, UT, WV

The McGinness Hills complex (Source: Ormat)

State Leadership

Cross-Sector Policy

Thermal Energy Networks (TENs)

Laws passed in IL, OR, WA, MD, MN, NY, CO, CA enabling utility-owned geothermal heating/cooling networks

Oil & gas well repurposing

NM HB 361 provides pathway for converting depleted wells to geothermal or energy storage

Closed-loop regulatory exemption

TX SB 879 exempts closed-loop geothermal wells from certain Railroad Commission regulations (signed May 2025)

Studies + incentives

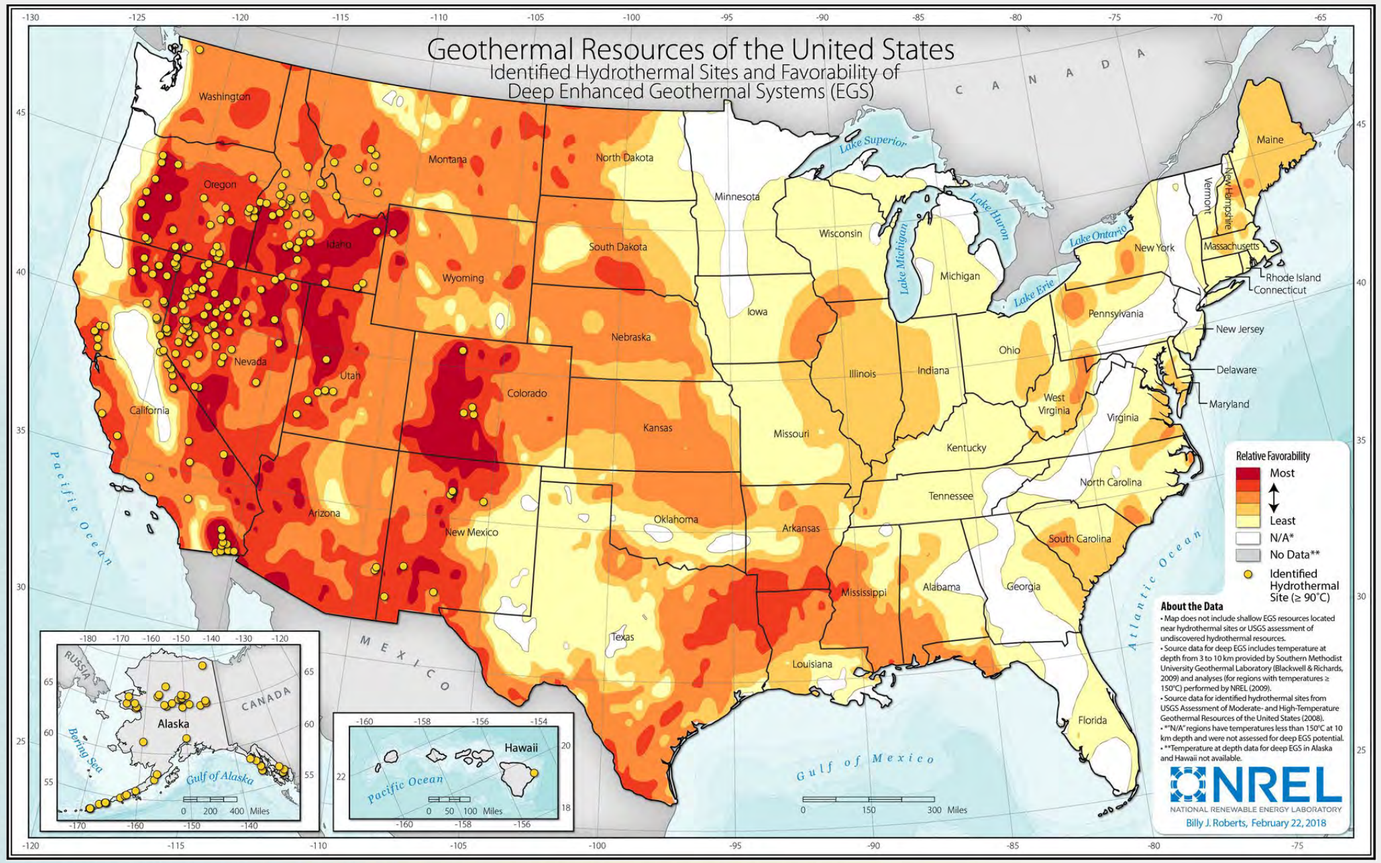
ND studying geothermal feasibility (including nonproductive O&G wells); UT modified clean energy tax credits through 2028; VA added geothermal to RPS(effective July 2025)

Oil Field Pumpjack (source: flickr/ Jonathan Cutrer, creative commons)

Technology Advancements

3 Objective 3

New Technology, New Regions



Source: National Laboratory of the Rockies

Enhanced Geothermal Systems (EGS)

- First large-scale commercial EGS plant under construction in Utah (Cape Station), coming online June 2026

Subsurface imaging & modeling

- AI and machine learning accelerating fracture detection and reservoir characterization

Advanced drilling techniques

- Reducing drilling time and cost; enabling access to deeper, hotter resources

Unlocking geothermal beyond "hot spots"

- USGS estimates 135 GW of EGS potential in Great Basin alone; 90 GW could be economically built by 2050

Oil & Gas Crossover

Overlapping competencies

Subsurface → drilling → stimulation → surface ops → monitoring → HSE

Service company engagement

Baker Hughes, SLB, Halliburton active in geothermal

EGS

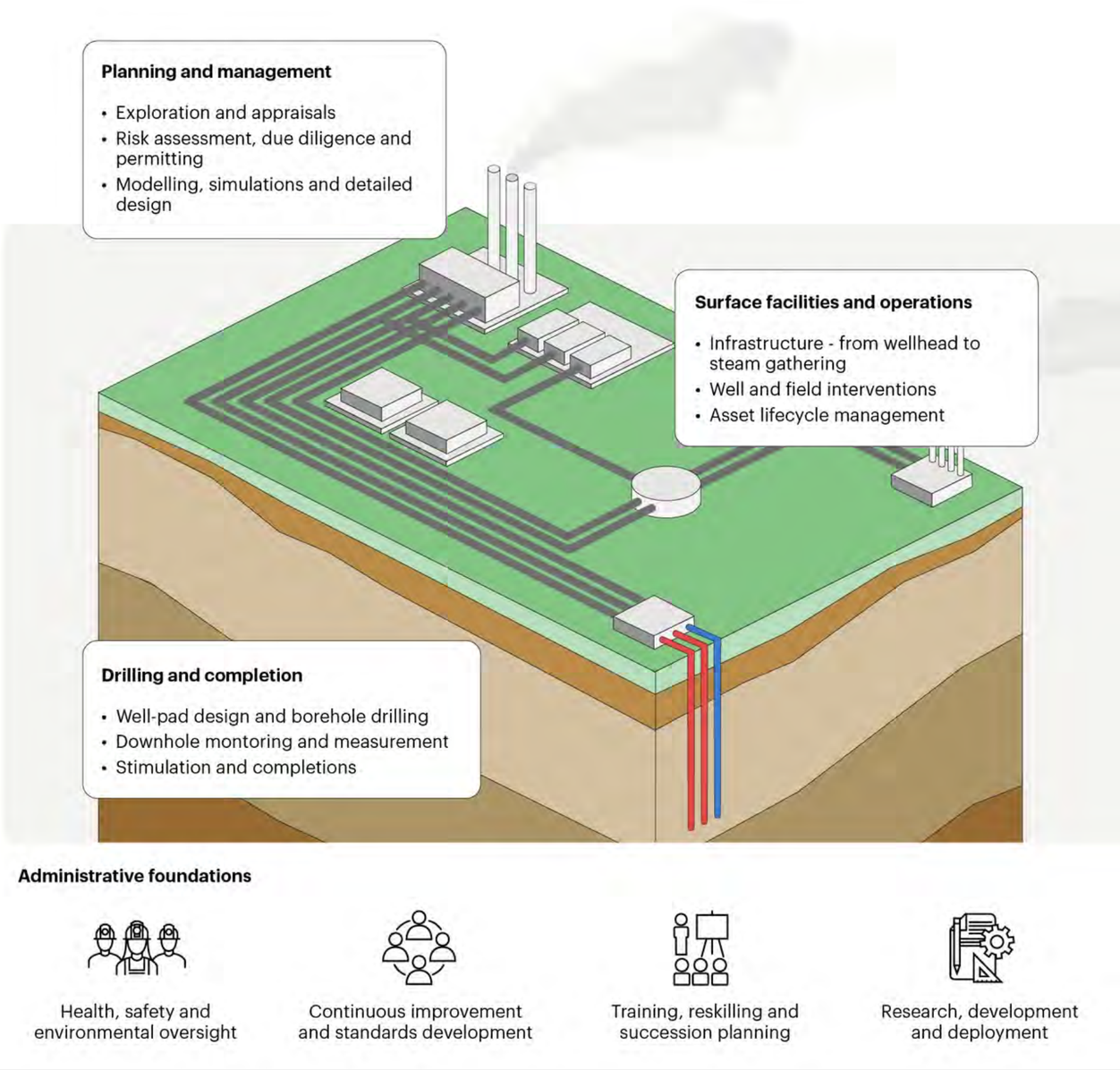
Uses shale gas stimulation + directional drilling

Closed-loop systems

Depend on high-precision directional drilling from O&G

Gradient Geothermal

Deployed modular ORC units at Blackburn Field, NV (2022-2024); now active in Williston Basin, ND replacing fluid chillers and generating power from produced fluids



Source: IEA

Geothermal & the Subsurface Economy

4 Objective 4

Why You're Seeing More Geothermal

- **Expansion into new regions** – First-ever geothermal lease sale in Idaho (2025); emerging projects in Texas, New Mexico, Alaska
- **Public land overlap** – 90% of U.S. geothermal resources on federal land; 568 active BLM leases covering 1.2 million acres
- **Increased permitting activity** – 26 new power purchase agreements since 2021 representing over 1,600 MW of new capacity
- **More multi-resource projects** – Six active Department of Defense geothermal projects across seven installations (ID, AK, CA, TX, NV, NM)

Geothermal & Mining : Similar Frameworks

Leasing + permitting systems – Governed by Geothermal Steam Act of 1970; competitive leasing mandated by 2005 Energy Policy Act

Exploration risk – High upfront risk; drilling represents 29–57% of total project capital costs

Public lands – 975 GW of enhanced geothermal potential on all federal lands (BLM, USFS,DoD, DOE)

Multi -agency coordination – BLM, USFS,DOE, DoD, and state agencies all involved

NEPA + environmental review – Traditional permitting : 7–10 years; new categorical exclusions aim to shorten by up to one year

Community + Tribal engagement – Required under NEPA; Tribal consultation now mandated in multiple states (CA AB 527, NV AB 109)

Geothermal & Mining : Important Differences

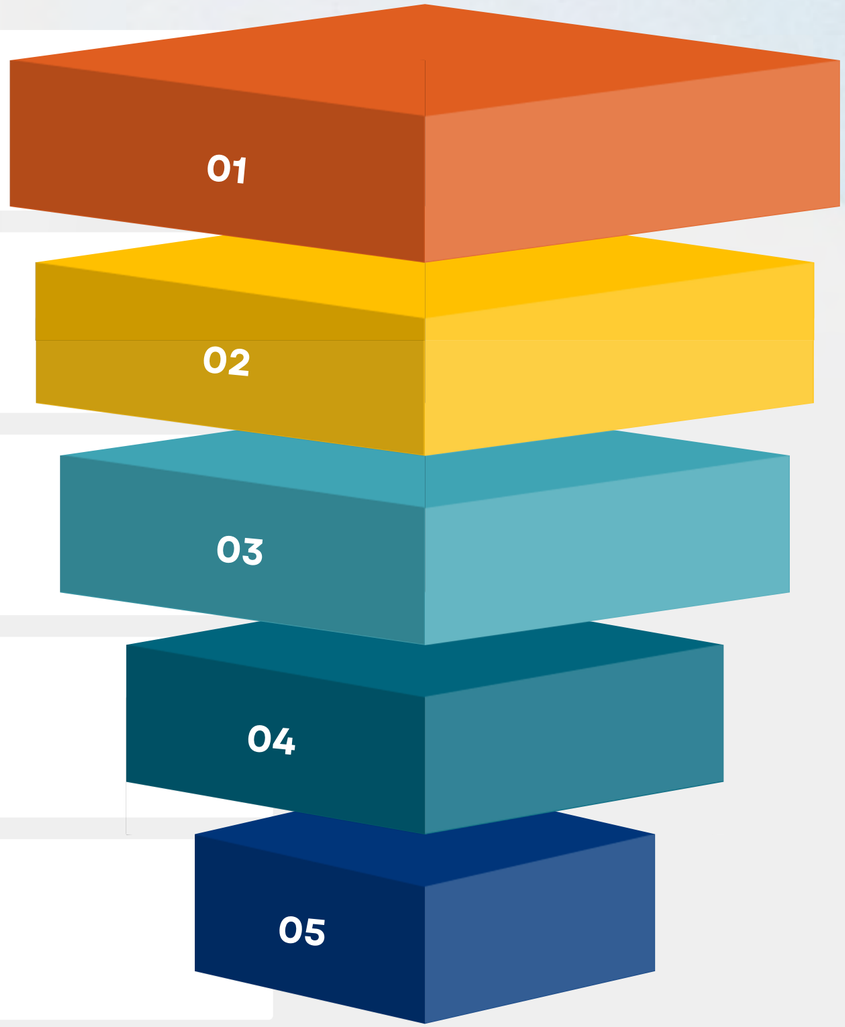
Resource type – Fluid (heat/water) is continuously reinjected and replenished; solid minerals are extracted and depleted

Project lifespan – Geothermal: 30 –50+ years of sustained production; mining: variable, tied to ore body

Surface footprint – Geothermal: ~1 –8 acres per MW; mining: larger, with tailings and processing facilities

Regulatory framework – Geothermal Steam Act of 1970 (federal leasing); Mining Law of 1872 (mineral claims)

Post-operation – Geothermal wells can be repurposed for direct heat; mines can become geothermal assets (mine water heating)



Synergies: Mining & Minerals

Where Industries Intersect

Co-location with mining

Nevada Gold Mines partnering with Quaise Energy to retrofit TS Power Plant with deep geothermal heat ; targeting 30 % GHG reduction by 2030

Lithium + geothermal

CTR's Hell's Kitchen project (Salton Sea): 50 MW power + 25,000 metric tons/year lithium carbonate in Stage 1; scaling to 650 MW + 100 ,000 tons/year

Industrial heat for mining

Zanskar partnering with Freeport -McMoRan and DOE on MILESHIGH Project to provide direct -use geothermal heat for copper recovery from previously mined material

Millimeter-wave drilling rig — Nevada Gold Mines (Source: Quaise Energy)

Synergies: Power & Infrastructure

Where Industries Intersect

Geothermal power for remote sites

Gradient Geothermal deploying technology at Chord Energy's North Dakota oil and gas facilities ; pilot in Nevada reduced asset energy use by 30-40%

Shared infrastructure

Repurposing existing oil and gas wells ; Gradient's low-to-zero drill model accelerates deployment timelines by up to 94%

O&G service company engagement

Baker Hughes, SLB, Halliburton actively engaged in geothermal technology, design, and workflows

EGS+closed-loop

Rely on stimulation and directional drilling refined for shale gas and tight oil

Drilling and completing operations in the Williston Basin. Source: Chord Energy.

Workforce Development

The Missing Piece: Workforce

01

The Opportunity

- Quaise + Nevada Gold Mines – Deep geothermal hybrid at TS Power Plant
- Ormat – Operating near multiple mining districts across NV
- Zanskar – Copper-geothermal hybrid for mineral processing + subsurface mapping
- Lithium basins – Clayton Valley, Dixie Valley

02

The Challenge

- Lack of geothermal-trained drillers
- Lack of geothermal-equipped drilling rigs
- Conventional O&G skills transfer — but geothermal requires specific experience

03

The Solution

- National Geothermal Academy – Geothermal drilling courses now available
- Workforce development ramping up to meet demand
- Major benefit for the local workforce as projects scale

GEOTHERMAL RISING

Key Takeaways

Geothermal is scaling – 1,600+ MW in new PPAs; 568 active BLM leases

Same framework, different resource – Federal leasing, NEPA, multi-agency

Different rules – Royalties vs. no royalties (1970 Act vs. 1872 Law)

Coordination is growing – Co-location, shared infrastructure, multi-resource

New value streams – Lithium, direct heat, remote power

How to get involved

BECOME A MEMBER

Open to individuals, companies, researchers, and students .
Access to exclusive resources, events, and networking opportunities .

ENGAGE & PARTICIPATE

Participa te in conferences, workshops, and webinars .

Follow GR’ssocial media, newsletters, reports, and industry updates .

VOLUNT EER & ADVOCATE

Support the Geothermal Rising Conference (GRC) through planning committees or technical roles. Advocate for geothermal policies and spread awareness of clean, renewable energy.

GEOTHERMAL RISING

MEMBERSHIP

Various levels and benefits to meet your needs

- Discounts to events, exhibit fees & advertising
- Branding and recognition
- Networking and business growth opportunities

Geothermal Rising Events 2026

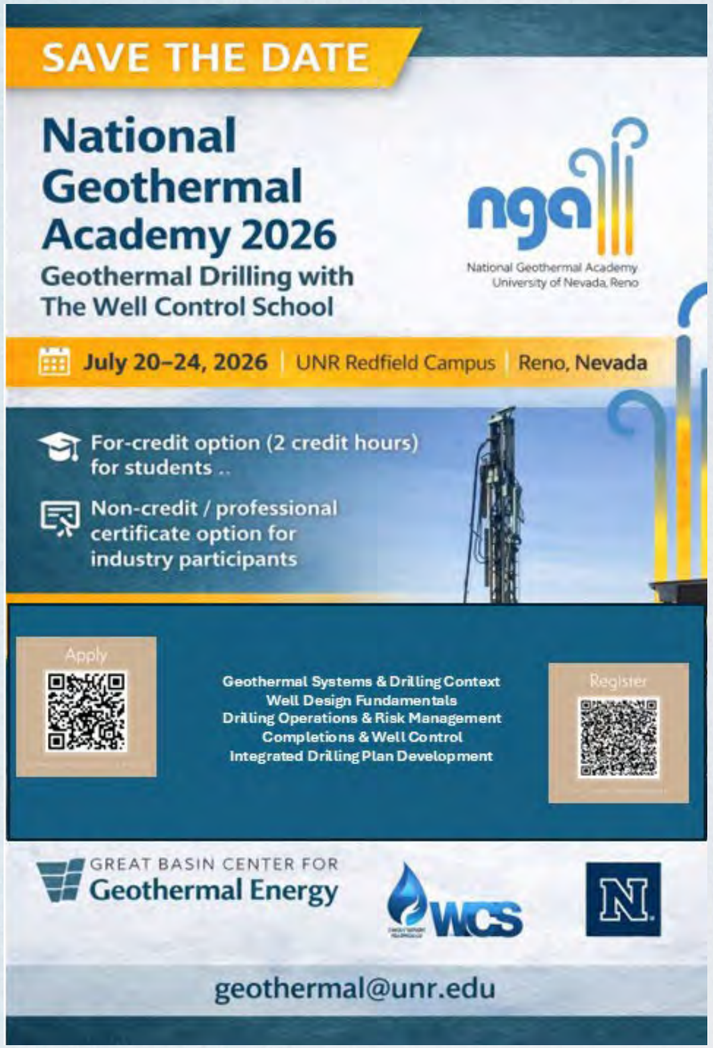
Geothermal Capitol Hill Day
Location: Washington, DC
Date: April 28 –30, 2026

Geothermal California Capitol Day
Location: Sacramento, California
Date: May 12, 2026

Indigenous Geothermal Symposium
Location: Calgary, Canada
Date: June 6-7, 2026

Geothermal Rising Conference
Location: Marriott Marquis Houston
Date: September 20 –23, 2026

Partner Events 2026



WGC 2026

FORGING GEOTHERMAL INNOVATION

JUNE 8 - 11, 2026 | CALGARY, CANADA

UK MINING CONFERENCE®

IN CORNWALL

RESOURCES & HOW TO ENGAGE

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Based on the 2025 U.S. Geothermal Market Report
National Laboratory of the Rockies & Geothermal Rising