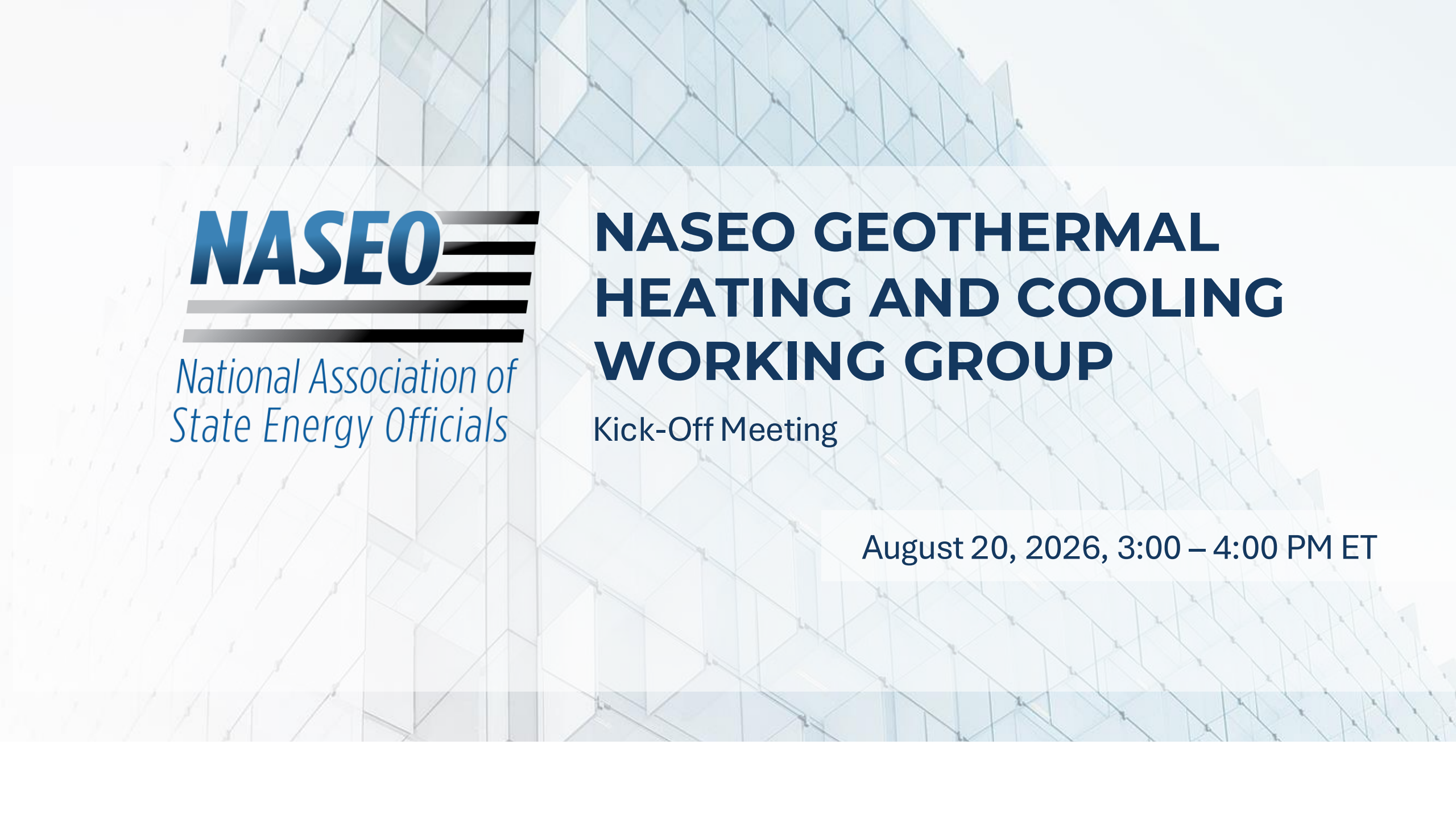




NASEO

*National Association of
State Energy Officials*

NASEO GEOTHERMAL HEATING AND COOLING WORKING GROUP

Kick-Off Meeting

August 20, 2026, 3:00 – 4:00 PM ET

WORKING GROUP OBJECTIVES

- To create a forum for **all State Energy Offices** to explore the **affordability and reliability** benefits of geothermal heating and cooling technologies;
- To bring together **State Energy Offices and private sector partners**, including geothermal heat pump manufacturers, developers, industry associations, and workforce specialists, on lowering the cost of heating and cooling buildings using geothermal technologies;
- To elevate **State Energy Office authority and experience** in addressing key geothermal market challenges, such as streamlining local regulations, workforce training and development, demonstrating technology innovations, financing, and strengthening industry partnerships and investment.

WORKING GROUP APPROACH

- Bimonthly meetings
 - Third Thursday of every other month, beginning August 2026
- Upcoming / recent in-person events

Event Name	Date	Virtual / In-Person	Description
2026 NASEO National Buildings Summit – <i>Scaling Geothermal Heating and Cooling with Federal Tax Credits and Innovative Financing</i>	July 29, 2026	In-Person; Arlington, VA	Pre-conference, invite-only workshop • Slides
NASEO Geothermal Heating and Cooling Working Group: Kick-Off Meeting	August 20, 2026	Virtual	Bimonthly working group meeting
2026 NASEO Annual Meeting	October 30, 2026	In-Person; Boulder, CO	Plenary session

OPEN DISCUSSION

GUIDING QUESTIONS

1. What resources can NASEO, in collaboration with members of the Working Group, develop or amplify to support your goals?

Geothermal Power Development: Policy Considerations and Cross State Comparison



1

WHAT DOES INDUSTRY NEED TO KNOW?

Resource and site suitability

- Subsurface resource profiles
- Groundwater and aquifer profile
- Climate and load needs
- Existing projects

Incentives and finance

- Rebates
- Financing structures

Permitting and regulation

- Permits
- Permitting process flow
- Environmental review
- Subsurface rights
- Water rights

Workforce and supply chain

- Available drillers, designers, installers
- Training and certification opportunities
- Licensing requirements

Codes and building performance standards

- Code adoption and status
- Building performance standards

Economics and Process

- Typical costs
- Case studies
- Pre-development checklist

Utility landscape

- Service territories
- Relevant rates
- Interconnection requirements
- Thermal Energy Network policies

Support

- Point of contact
- Partners

OPEN DISCUSSION

GUIDING QUESTIONS

1. What is driving your state's interest in geothermal heating and cooling? What do you see as your office's role?
2. What are your state's biggest challenges to deploying geothermal heating and cooling?
3. What has been working for:
 - a) Market transformation
 - b) Stakeholder education
 - c) Technology innovation
 - d) Workforce development?

GET IN TOUCH

[NASEO Geothermal Heating and Cooling Working Group](#)

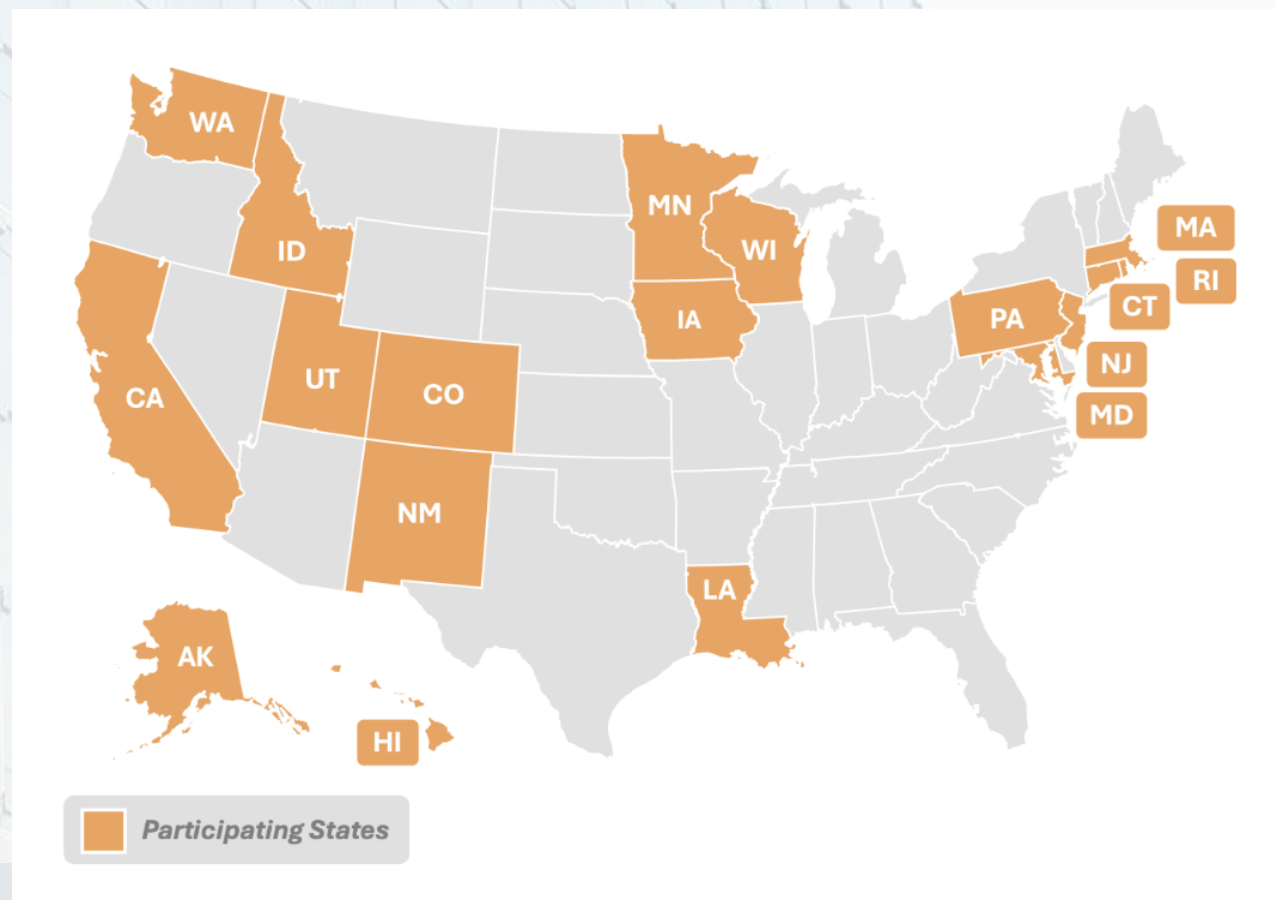
NASEO Staff Leads:

Maddie Koewler

Email: mkoewler@naseo.org

Jasmine Xie

Email: jxie@naseo.org



The Heat Beneath Our Feet

How Colorado Leveraged State Tools to Scale Geothermal



Introduction



BRYCE CARTER

Senior Geothermal Program Manager

Strategic Initiatives and Finance Team (SIFI)
Colorado Energy Office

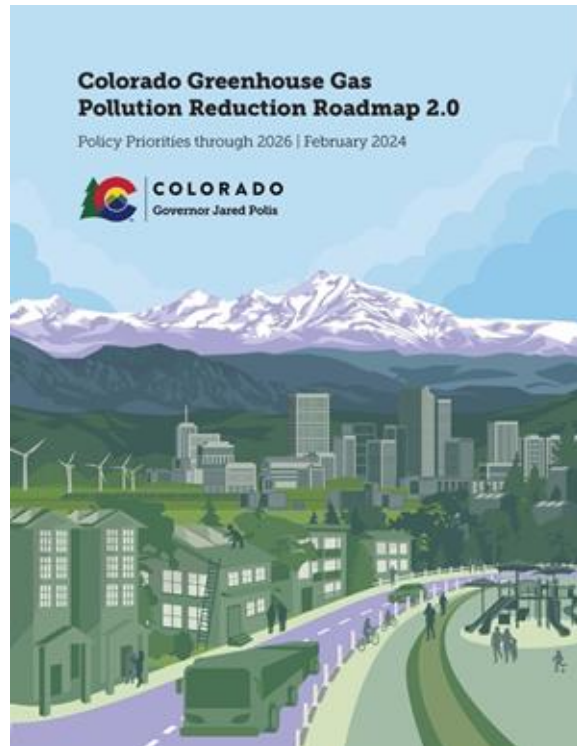


Why Geothermal Heating and Cooling in Colorado?



Policy: Statewide Targets & Roadmap

- Colorado is statutorily committed to **net-zero** GHG emissions **by 2050**, with economy-wide targets of (relative to 2005 baseline):
 - 26% reduction by 2025, 50% by 2030, 100% by 2050
- GHG Pollution Reduction Roadmap establishes **Near Term Actions** to achieve these targets by sector:
 - Utilities, Strategic Growth, Transportation, Buildings, Oil & Gas, Industry, Agriculture, Multi-Sector



<https://energyoffice.colorado.gov/ghg-pollution-reduction-roadmap>

Policy: Gas Utility Targets

- Gas distribution utilities must achieve (relative to 2015 baseline):
 - 4% reduction by 2025
 - 22% reduction by 2030
- Colorado PUC must set post-2030 emissions reduction targets.
- Gas distribution utilities must file Clean Heat Plans to demonstrate how they will comply with these targets.
- Thermal energy is a clean heat resource.



Image credit: Bryce Carter, 2023

Why geothermal in Colorado?

Colorado has statutory goal of **net-zero GHG emissions by 2050**:

- Geothermal energy is the most efficient means of heating and cooling, which **reduces peak demand** and **supports rapid grid electrification**
- A lower life cycle cost and predictable return on investment **reduces energy burden** for families and businesses alike
- Geothermal energy is a key tool for **community resilience** in the face of extreme weather events, which can keep both the lights and heat on
- Geothermal electricity is a **carbon-free, renewable and consistent electricity resource** which will help decarbonize our electric grid
 - Cascading use creates a new **thermal economy** for industries and district heating

Why geothermal in Colorado?

Colorado has over **33,400 miles** of gas distribution pipelines (NCEL, 2011) and over **54,000 workers** in the natural gas and oil industry (API, 2023)

- Geothermal energy networks for heating and cooling use the **same type of pipes** as gas networks, requiring the **similar workforce skills** to build and facilitate these systems.
- Deep geothermal projects require the **same drilling technology** as the oil and gas industry to access high temperature heat many thousands of feet below.
- High and low temperature geothermal energy can be produced **LOCALLY**, which supports **long-term careers** and **keeping energy dollars within the community**
- Thermal energy networks provide an opportunity to **minimize investments in gas infrastructure** and **avoid stranded gas assets** in the future.

Policy: Colorado's Evolving Statute

- HB19-1261 and SB23-016: Statewide Greenhouse Gas (GHG) pollution reduction goals including net zero emissions economy-wide by 2050
- SB21-264: Clean Heat Framework to support gas to electric transition for utilities and consumers; reducing natural gas emissions by 22% by 2030
- HB22-1381: CEO Geothermal Energy Grant Program established with \$12 million
- HB23-1252: Gas utilities may create Thermal Energy Networks; Xcel TEN pilot project
- HB23-1272: Creation of Colorado Geothermal Energy Tax Credit Offering; Heat Pump Tax Credit
- SB26-142: Clarifies local government's ability to deploy TENs; requires Xcel solicitation of deep geothermal projects; resource data collection and create market recommendations

Inflation Reduction Act - Geo Investment Tax Credit

Residential

- **30% | 2022-2025**



Image Credit: [Montclair State University](#)

Investment Tax Credit (Commercial):

- **6% | Base Rate**
- **30% | 5x Bonus Rate (6% base x 5)**
 - Projects under 1 MW (approx. 284 tons) qualify
 - Projects over 1 MW (approx. 284 tons) must meet prevailing wage and apprenticeship requirements
- **10% | Domestic content bonus**
 - US production of steel/iron; % requirements of components
- **10% | Energy Community**
 - Brownfield redevelopment, fossil-fuel focused economy, census tract tied to retiring coal communities

*CEO cannot provide tax advice.
Please consult your tax advisor.*

HB23-1272: State Geothermal Tax Credits

Geothermal Energy	2024 - 2033
Geothermal Electricity (Investment Tax Credit)	30% - 50% ITC, merit-based \$5 million cap per project
Thermal Energy Network (Investment Tax Credit)	30% - 50% ITC, merit-based \$5 million cap per project / study
Production Tax Credit	\$0.02/kWh

Heat Pump Technology (per residential unit)	2024 - 2025	2026 - 2029	2029 - 2033
Air-Source	\$1,500	\$1,000	\$500
Ground-Source, Water-Source, or combination system including either	\$3,000	\$2,000	\$1,000
Heat Pump Water Heater	\$500	-	-

The nonresidential building rate is the tax credit multiplied by the number of increments of 4 tons.

Thermal energy networks may combine the credit per connected residential unit and nonresidential building.

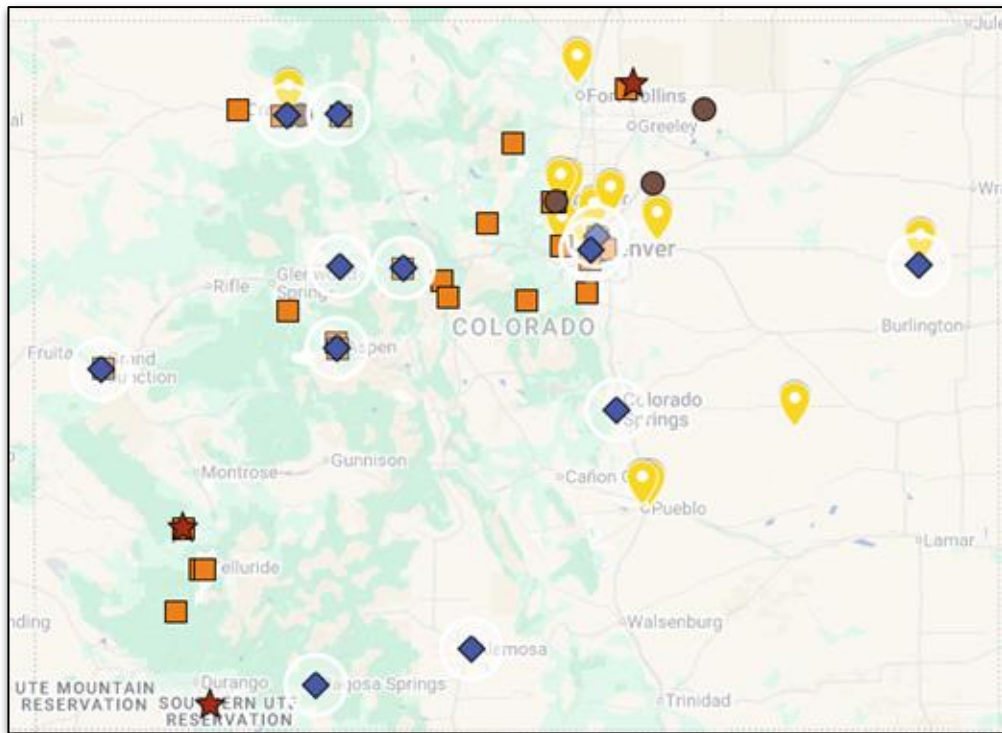
HB23-1272: Heat Pump Contractor Certification

- Contractors administering state tax credits must be certified by the CEO
 - Streamlines credit for consumers
 - Provides needed market data to better inform future policy to support the sector; workforce development
- Contractors may retain a percentage of the tax credit to support overhead
 - e.g. 66% or \$1,333 per GSHP in 2026



Image Credit: Bryce Carter

Projects Utilizing Colorado's Geothermal Incentives



\$12 million in grants and upward of **\$70 million in tax credits** support the use of zero-emission, geothermal energy for electricity generation and space/water heating and cooling in homes, businesses, and communities.



**Single-Structure
Geothermal Installation**



**Thermal Energy
Network Study**



**Thermal Energy
Network Installation**



**Geothermal Electricity
Award**

As of May 2026, \$42.6 million has been awarded across 64 Colorado geothermal projects!



Case Study: Lennar Homes and Dandelion Energy



CANARY MEDIA

Clean energy journalism for a cooler tomorrow

Lennar will build 1,500 new Colorado homes with geothermal heat pumps



- One of the country's largest deployments of ground-source systems being built in Ken Caryl, a southwest Denver suburb
- Expected to save residents approximately \$30 million in energy costs over 20 years
- Will reduce anticipated peak electric demand by 6 MW, helping reduce costs for all utility ratepayers



COLORADO
Energy Office



Case Study: Colorado Mesa University

- **1.2 million sq feet networked with diversity of heating/cooling needs**
 - 3,113 ton cooling load
 - 2,728 ton heating load (boilers not used in recent years)
- **Compared to a conventional system:**
 - ~650 kW demand reduction (13%)
 - ~1.3 GWh energy savings (10%)
 - ~58,000 Dth natural gas savings (55%)
 - ~10 million gallons water savings
- **\$1.5 million savings per year have resulted in a 2% reduction of student tuition**



CMU networked geothermal efficiency vs. a standard system

	Networked Geo COP	Conventional COP
Spring	7.0	1.9
Summer	3.6	3.4
Fall	5.8	2.0
Winter	8.9	1.2
Overall	5.7	1.9

Source: Evaluating a Community Ground Source Heat Pump System at Colorado Mesa University,



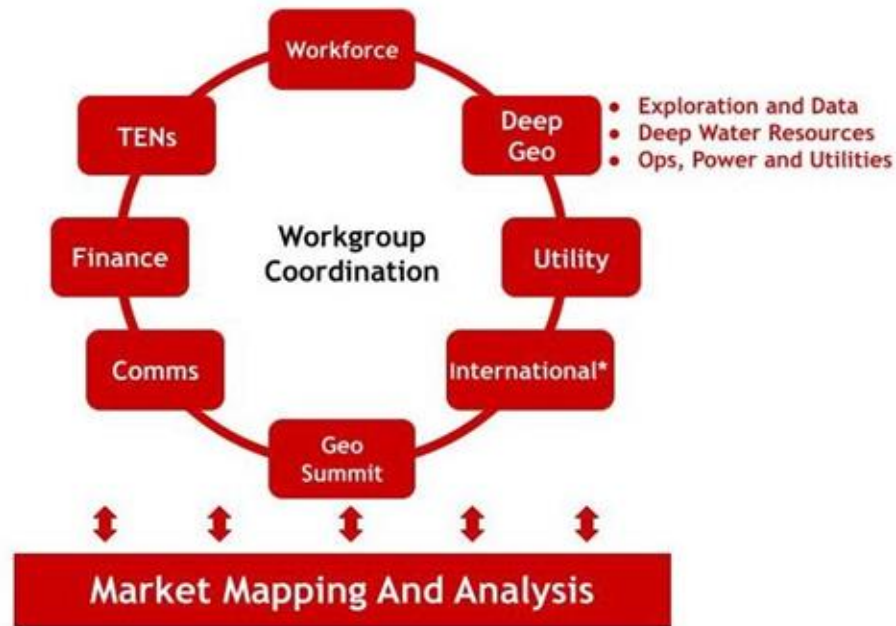
Learning Together with Program Implementation



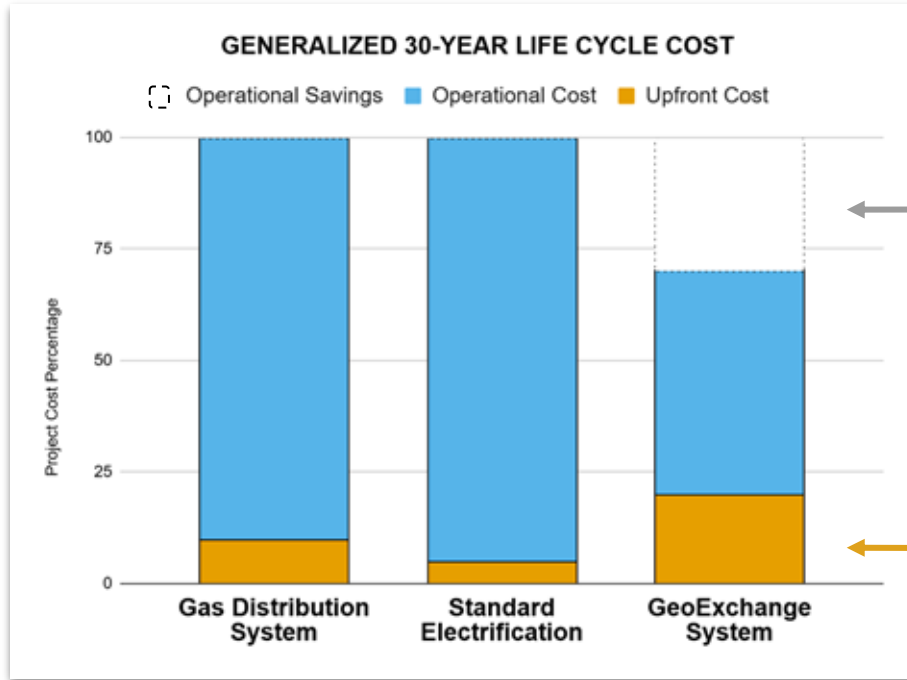
Colorado Geothermal Market Assessment

We aim to foster a learning community across our incentive awardees and the general market to:

- Establish publicly accessible baseline data to track ongoing market progress
- Build community trust and buy-in across geographic networks
- Establish and facilitate technical engagement framework
- Highlight opportunities for private sector leadership
- Will be published this September!



Life Cycle Cost Savings of Geothermal



Geothermal is the most efficient way to heat and cool, delivering substantial operational energy savings.

Federal, state, municipal and utility incentives can reduce upfront cost of geothermal by 30% to 50% or more.

Ways to Unlock Long-Term Capital:

✓ Bridge Loans

✓ Bonding

✓ Leasing

✓ Energy-as-a-Service

✓ Utility Rate Structures

Could a state-backed financing model create the market confidence to move long-term capital for rapid geothermal energy development?

Stay tuned...

More Information

More information is available at:
geothermal.colorado.gov

Join us in Golden, Colorado:
[Geothermal Solutions Summit](#)
November 30 - December 3, 2026

Contact:

ceo_geothermal@state.co.us

bryce.carter@state.co.us

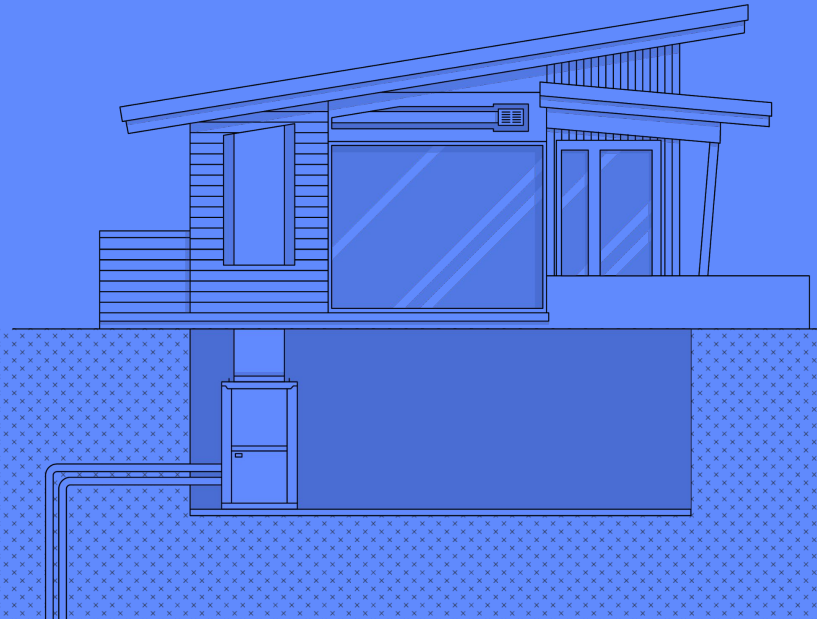


Stay grounded as Colorado
geothermal heats up:
[Join the CEO GEO](#)
[newsletter!](#)

Unlocking Residential Geothermal At Scale

Maggie McCarey | VP, Policy + Marketing

NASEO Working Group
August 20, 2026



Agenda

- ① **Dandelion Background**
- ② **Policy Approaches to Scale Geothermal**
- ③ **Case Study: Lennar Colorado**
- ④ **Leasing and the Federal ITC**
- ⑤ **Utility Investment to Scale**

About Dandelion

The nation's leading residential
geothermal heating and cooling provider

Our background

Dandelion spun out of Google X in 2017 with the mission to scale geothermal for residential buildings.

Leading expertise

We have industry-leading expertise in ground-loop system designs. Our design engineers have designed over 15,000 single and multi-family geothermal systems.

Nearly 4,000 heat pumps installed, over 1M feet drilled

Dandelion pioneered small rig drilling in the U.S. to enable lower cost, smaller residential deployment of geothermal. We are bringing our solutions to large scale developers and homeowners across the country.

The Energy Affordability Challenge

What we're facing today and why the solutions we invest in matter



Energy affordability & grid reliability

States are grappling with energy affordability & grid reliability at the same time



Most solutions can't do it all

Not every option solves affordability and reliability together, and not every option can help right away.



Geothermal delivers on both fronts

Geothermal cuts energy costs & eases pressure during peak demand – a clear reason states want more of it in the market.

Policy Approaches

Public Policy to Support Scaled Adoption of Geothermal

- Energy Efficiency/Electrification Rebates
 - Geothermal-Specific Incentives
 - Rebate Reservation Systems for Builders
 - Ex - CO, NY, MA
- Geothermal Renewable Energy Credits
 - Performance-based crediting/RPS carve out for Geo
 - Maryland (in place), Illinois (passed/under dev.), Virginia (passed, effective 2027), NY (introduced in 2026)
- Zoning/Code
 - Gas line extensions
 - All-electric or high efficiency code
- State Tax Policy (sales tax exemptions, consumer tax credit)



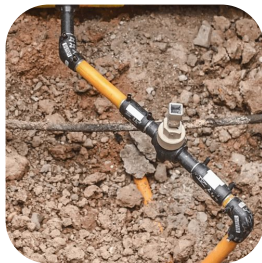
Industry Challenges

What we've heard from Colorado builders



Evolving codes

Push for all-electric, energy-efficient standards in Colorado



Gas-line headaches

There's a utility shift... gas-lines are becoming harder to get *(and more costly)*



Lot sizes are shrinking

With space constraints, outdoor condensers are bulky, noisy, and a huge design headache



Affordability pressures

Margins are in focus for builders, affordability in focus for buyer

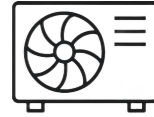
What are builder options?

The HVAC Decision



Natural Gas + AC

Status quo, challenged with tightening all-electric codes



Air-Source

All-electric, relies on outdoor air, efficiency varies with temperature



Ground-Source

Uses stable ground temperature, highest efficiency, all-electric

Lennar Colorado

1,500 geothermal homes with Dandelion

- Will be the **largest residential geothermal** project in US
- Over **14 communities** across the Front Range
- A mix of **single family and townhomes**
- Key CO policy drivers:
 - Gas line costs to developers
 - Xcel clean heat rebates (\$25k per home)
 - State tax credit (\$2-3k per home)



Energy bill savings
for homeowners
averaging
**\$1,125 / year (50%
lower than ASHP)**



65% winter peak
reduction,
20% summer peak
reduction

Lennar + Dandelion

Lennar (Colorado) wanted premium, sustainable home technologies to be more accessible to everyday homebuyers.

→ Lennar is partnering with Dandelion for one of the largest residential geothermal deployments in U.S. history.



Energy bill savings
for homeowners
averaging
\$1,125 / year



Avoided replacement
costs, systems
lasting **2-3X** longer
than traditional HVAC



Better performance +
comfort...**65%** more
efficient in winter,
20% more efficient in
summer



Improved home
aesthetics with **no noisy
or bulky outdoor units**



Each home saves about
5,000 lbs of CO2 in 1st year
(= planting 90 trees)



Sometimes a picture is worth 1000 words

Geothermal is **efficient**, **electric**, *and* **differentiates** homes



Reliable

20-30 year lifespan indoors, 100 years outdoors



Healthy

No carbon monoxide risk, better air quality



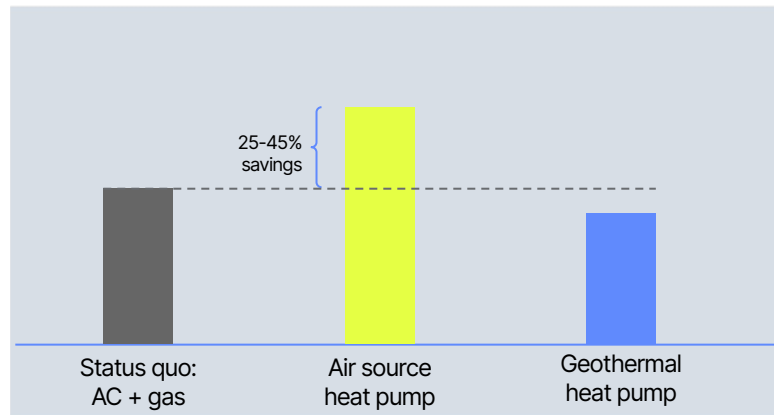
Efficient

Lowest operating costs of any HVAC system



Invisible

No exposed equipment, no noise



Geothermal HVAC
costs less to operate
than any other system,
PERIOD.

In 2026, homebuyers LOVE geo

→ We analyzed potential homebuyer conversations that talked about geothermal

Total positive response

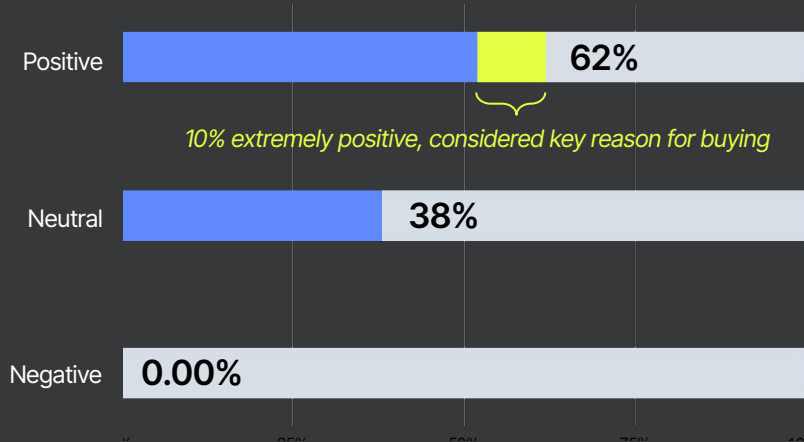
62%

Extremely positive response

10%

Negative response

0%



"That makes me like this even more. I already love the location, but that is really appealing to me."

"For me, it was a selling point for the lower energy cost."

"My current HVAC is loud... and that's not fun. I'm excited to have geothermal."

Leasing

Bringing 30-50% Federal Tax Credit to CO Homebuyers

Benefits of TPO

- Builder avoids upfront loop CapEx
- Third party owns loop and heat pump
- Unlocks commercial Federal tax credit, even when homes are for sale
- Residents pay a lease fee equal to or less than OpEx savings from geo

SMARTER HVAC FOR SMARTER BUILDS



**Now available
through our
leasing program**

Next Step to Scale Geo: Utility Investment

Vermont Gas Systems x Dandelion

36 Apartment & townhomes,
affordable for rent



Performance & Homeowner Value

- COP $\approx$ 4
- ~45% annual opex savings & annual CO2 reduction
- ~25 year HP life and GL for the life of home
- Clean, quiet, reliable HVAC



Developer Benefits

- Utility loop ownership and leaseback solves CapEx
- Eliminates outdoor condensers
- Frees site space for landscaping or dwelling units
- Low cost HVAC OpEx for affordable housing

Maggie McCarey

VP, Policy and Strategy
Dandelion Energy
maggie@dandelionenergy.com

