



# Tapping the Thermal Opportunity

October 2025

Utility-Scale Electricity  
GEO POWER

District Heating  
GEO DIRECT USE

Heating & Cooling  
GEO BUILDING

Utility-Scale Heating & Cooling  
GEO NETWORK

## GEOTHERMAL ENERGY - AMBIENT vs. HOT

All Geothermal Technologies provide STABLE 'rock-solid' non-intermittent energy.

Ambient 'surface' geothermal technologies can provide energy everywhere for heating and cooling with zero emissions.

GROUND TEMP:  
45°F - 65°F / 7°C - 18°C

80°F - 200° F / 27°C - 93°C

250°F / 121°C and up



**“The technical potential of geothermal would be more than enough to meet all heat demand in Africa, China, Europe, Southeast Asia, and the United States.”**

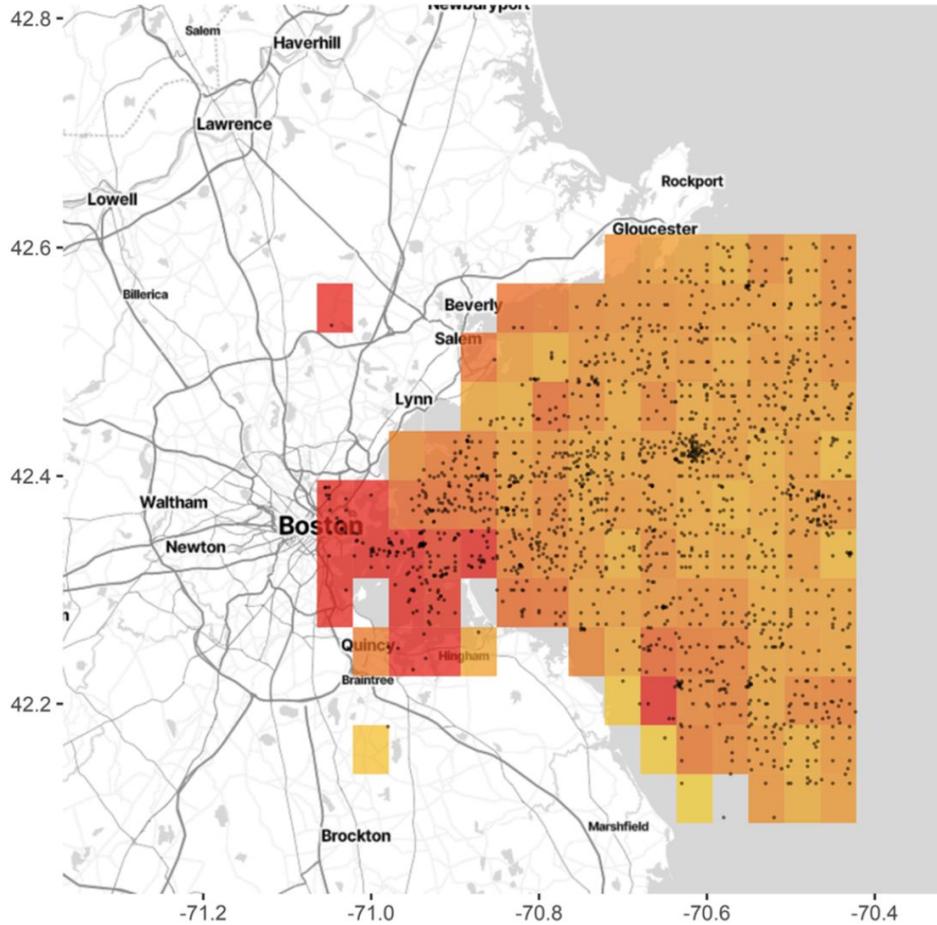
IEA 2024

## **WHY AMBIENT THERMAL ?**

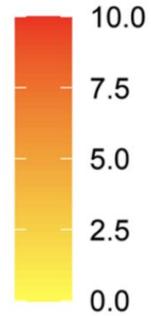
Climate change is increasing Earth’s surface thermal energy at an annual rate of more than 10 times the energy all of humanity uses in a year.

We can tap and move that geothermal energy, restoring thermal equilibrium.

## Average Bottom Temperatures (deg C) 1912-2022



Temperature (C)

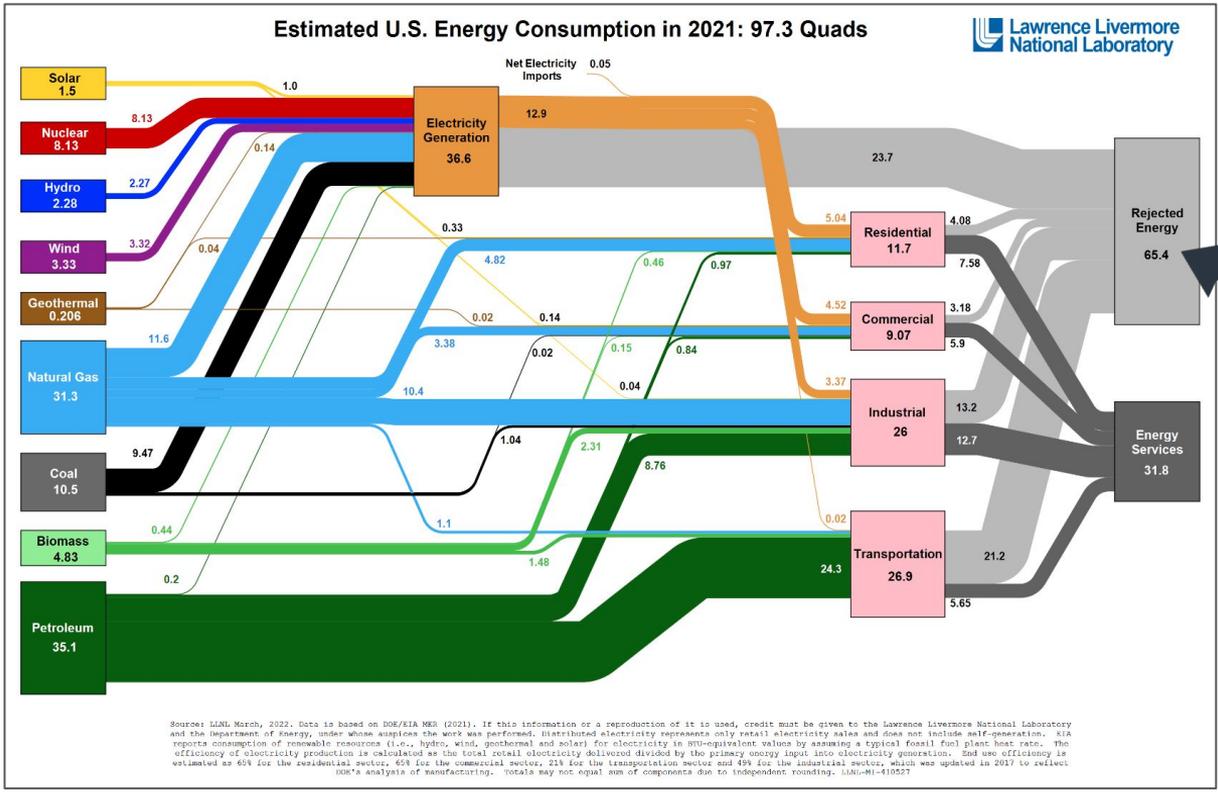


## ANTHROTHERMAL

The excess ocean temperature accumulated in the past 100 years can be calculated and we can drawdown this ambient energy, a restoration move the local lobsters are supporting! Pictured here is NOAA data indicating a 3.4C change in our harbor temperature.

**Thermal Commons** - defining our thermal resources as a shared and regulated resource.

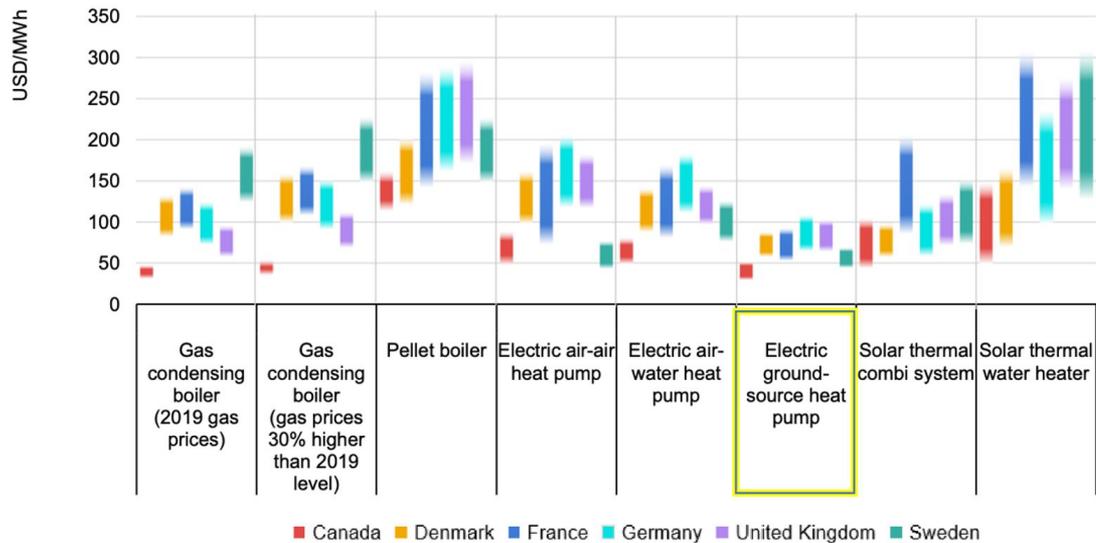




## WASTE THERMAL

The majority of energy humans use is wasted. All of humanity uses roughly HALF A ZETAJOULE every year.

Most of that wasted energy is thermal energy - heat.



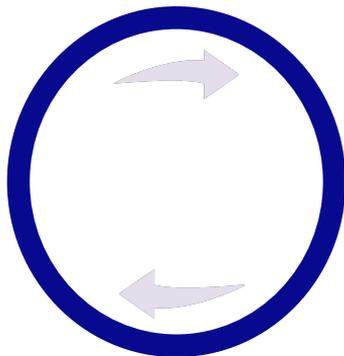
## WHY GEOTHERMAL?

Thanks to it's #rocksolid thermal energy supply the geothermal heat pump is the most efficient heating and cooling technology, resulting in the lowest cost of energy.

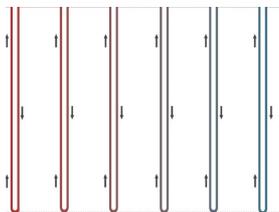
Chose not to fight physics.



**BUILDINGS :**  
(GEOHERMAL HEAT PUMP)



**DISTRIBUTION LOOPS:**  
(THERMAL ENERGY NETWORK)



**THERMAL RESOURCES:**  
(GEOHERMAL BOREHOLES)

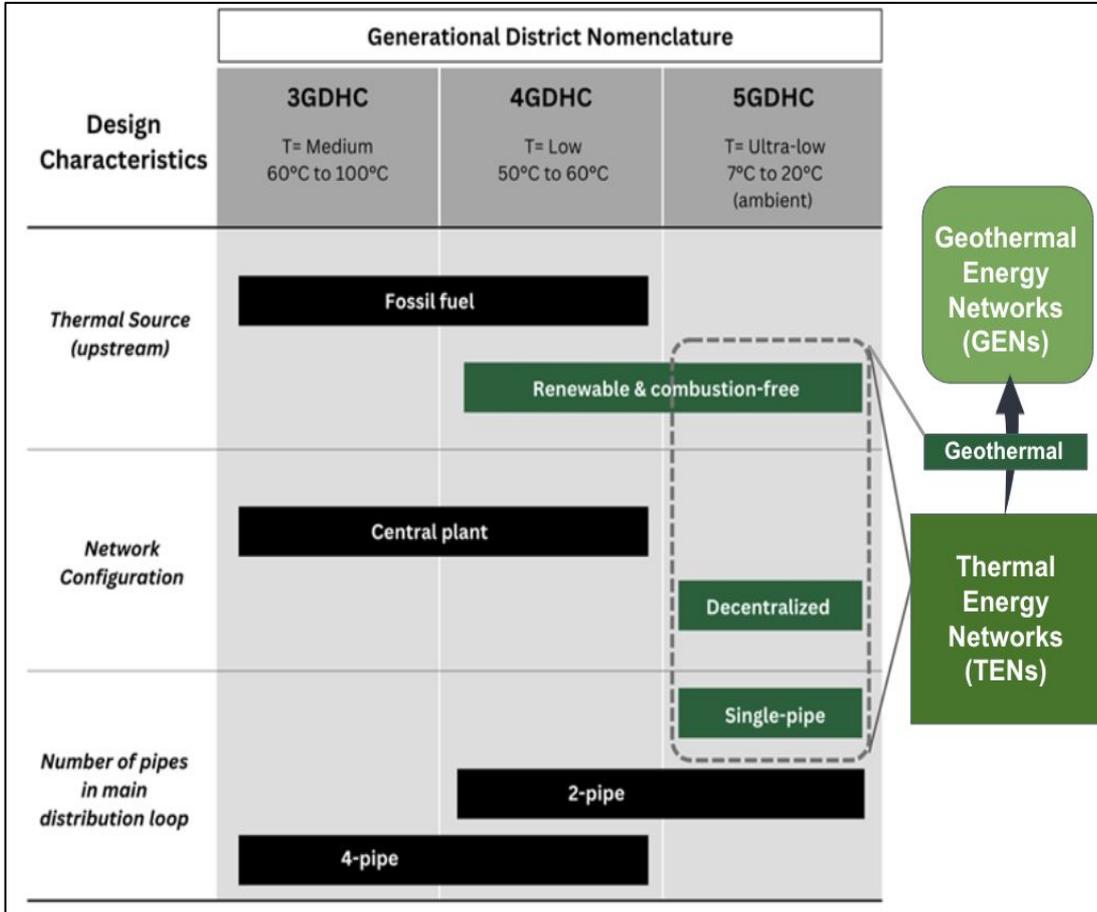
*Also ...*  
WASTEWATER EXCHANGE  
INDUSTRIAL WASTE HEAT  
LAKES, RIVERS, PONDS  
OTHER THERMAL ...

## WHAT IS A GEOTHERMAL NETWORK ?

Every component of a Geothermal Energy Network contributes efficiencies. Together they are the most efficient heating and cooling.

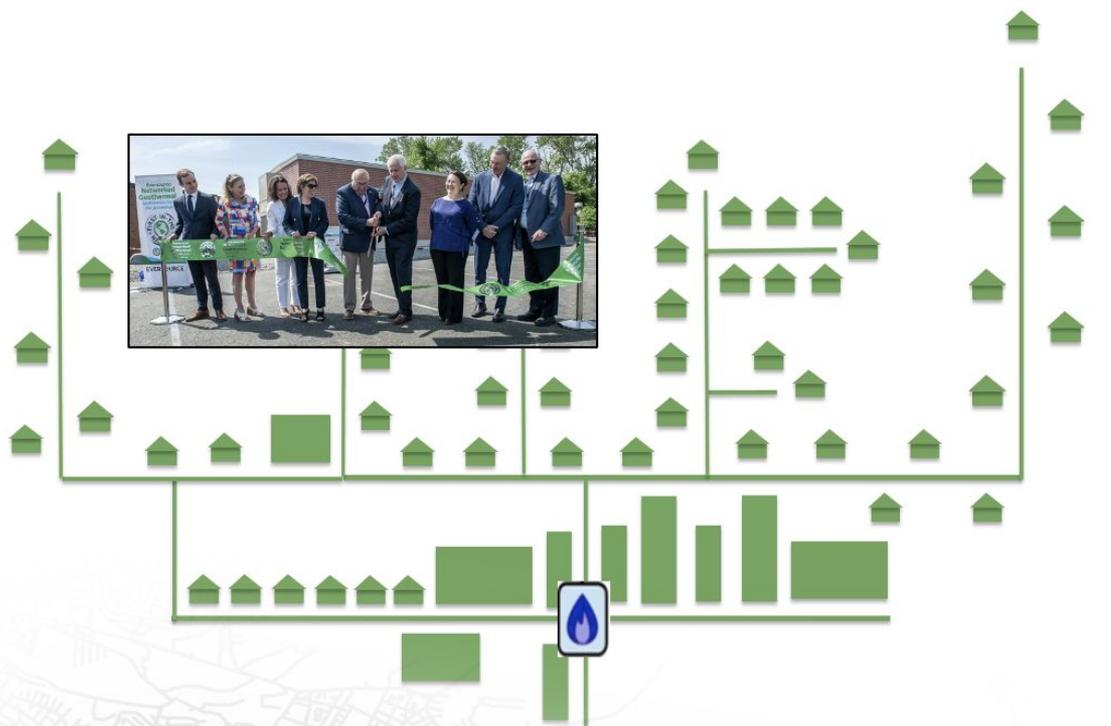
Each component is OLD TECH.

Together they are NEW TECH



## WHY NETWORK ?

District energy is an ancient technology that has evolved over time. The most recent evolution, from 4th to 5th generation is a significant one. The shift to a single-pipe further unlocks the growth model through a network effect, hence the name.



## MODULAR GROWTH

A single-pipe ambient temperature design as 'common carrier' allows modular and flexible growth of a regional thermal utility. Creating a thermal market.

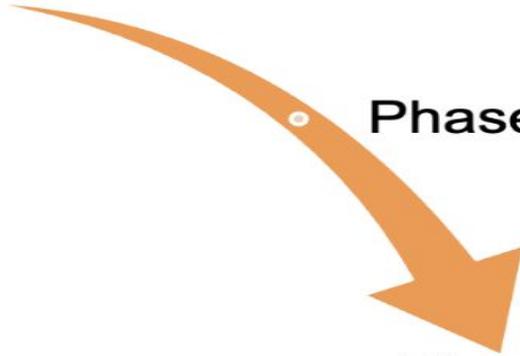




## CO MESA UNIVERSITY

- 12-year payback
- \$1M per year energy savings
- 7.9 MMT CO<sub>2</sub> per year reduction
- 100% of heating covered
- Water use cut by over 40%
- Average efficiency of 570% (COP 5.7) with a winter peak of 890% (COP 8.9)

**Phase 1**



**Phase 2**

**Phase 3**

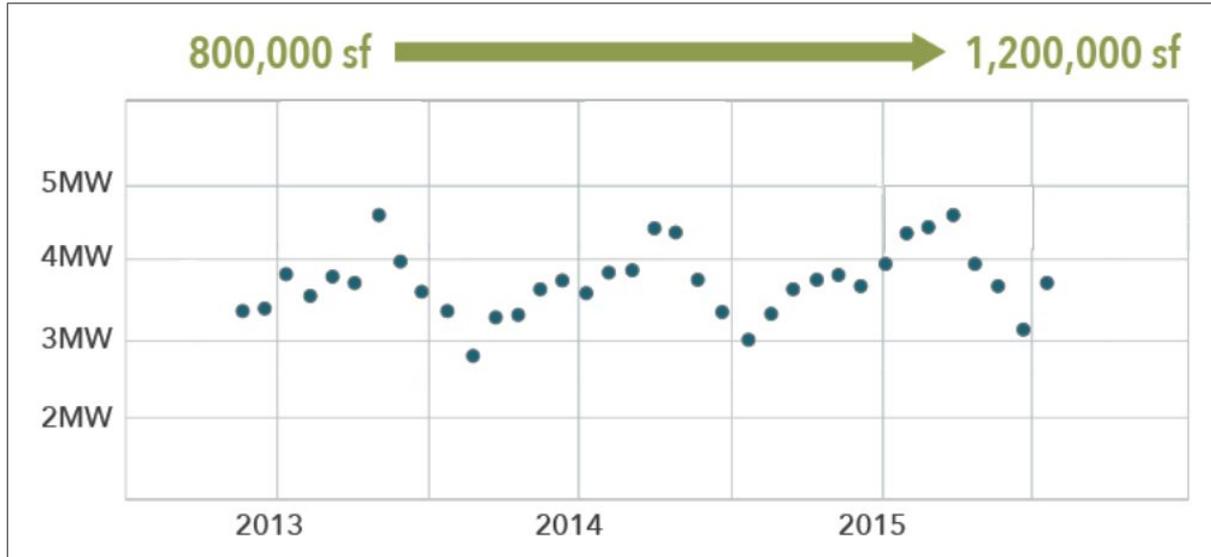
- CMU expanded five times since 2008, and is about to double.
- Each time, efficiency went up and cost to expand went down.
- Cost of system is \$7,400/ton. Additional cost is \$3,284/ton

## **SCALING COST CURVE**

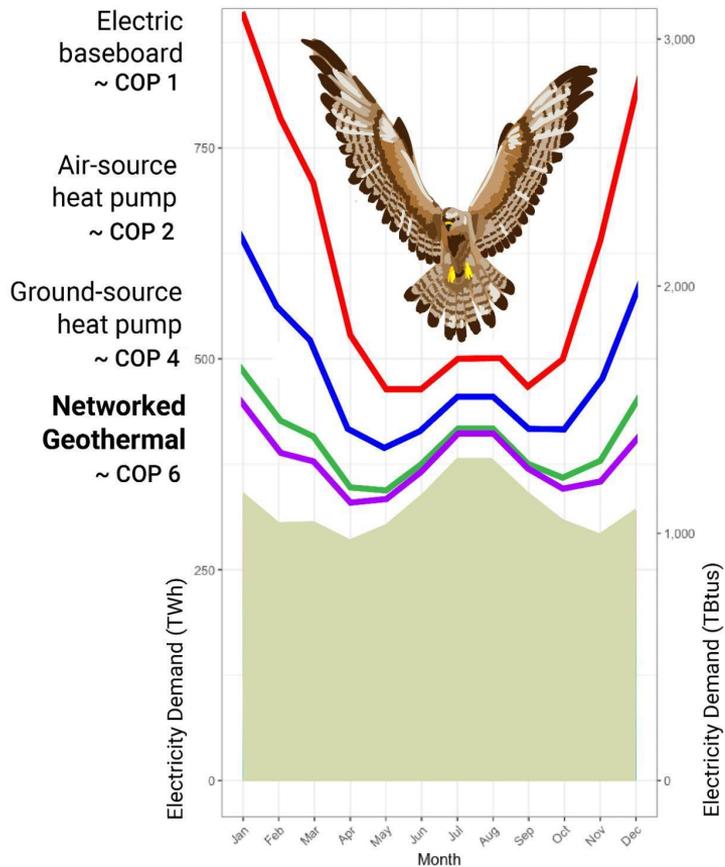
As networks grow, unit costs drop on a per customer or per ton basis. Fixed assets such as a monitoring system don't scale. Operating energy and peak load requirements drop with increasing scale and thus stability.

# CO MESA UNIVERSITY

Colorado Mesa University  
Building Electricity Usage  
over period of growth



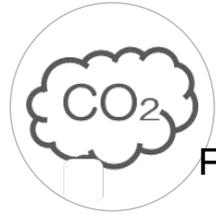
Courtesy of The Grey Edge Group©, Xcel Energy & Colorado Mesa University



## ELECTRIC GRID IMPACTS

The efficiency of the building technology directly impacts the electric grid, determining electric affordability and decarbonization feasibility.

**CO2E SAVED**  
7.34 MMTs



**FEWER TRANSMISSION LINES**  
38% reduction



**LESS GENERATION NEEDED**  
13% reduction



**FUEL COST SAVINGS**  
\$19 Billion/year



**CHEAPER WHOLE SALE ELECTRICITY**  
12% reduction



**GRID DECARB & GHP**

↓ 2.14 TWh (3%)

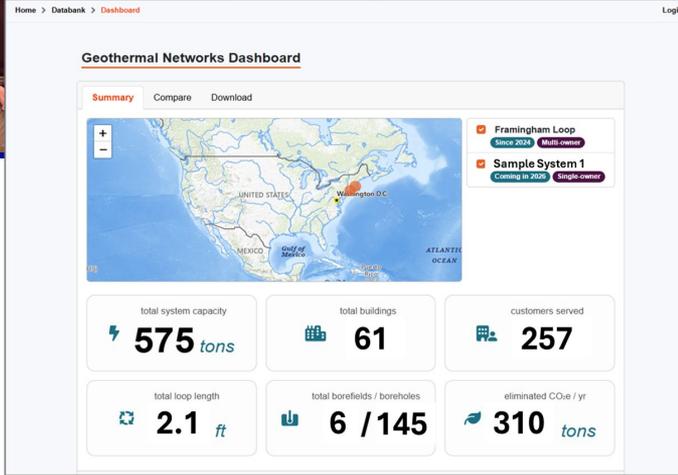
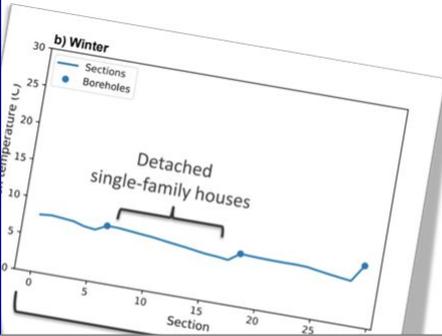


**ELECTRIC FUTURE & GHP**

↓ 34.29 TWh (36%)

## **ELECTRIC GRID IMPACTS**

The efficiency of the building technology directly impacts the electric grid, determining electric affordability and decarbonization feasibility. The grid savings moving from ASHP to GSHP total 1.5 Trillion NPV by 2050 in all electrification - a legal MA scenario.



## LeGUP Research Team

HEET assembled the Learning from the Groud Up research team from across the country to study the first projects thoroughly and independently.. With the intention of maximizing learning and optimization and informing policy.

*Human Networks:*

LeGUP Research Consortium



**MA** - 2021, 2022, 2024, **2025**

**MN** - 2021, 2024, **2025**

**NY** - 2022, **2025**

**CO** - 2023, 2024

**WA** - 2024, 2025

**MD** - 2024

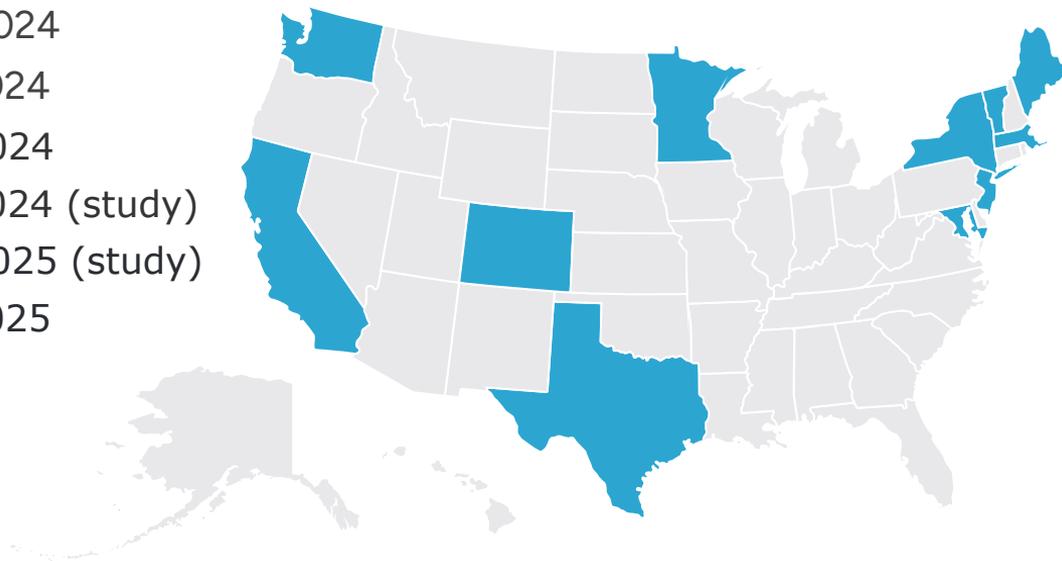
**VT** - 2024

**CA** - 2024

**NJ** - 2024 (study)

**ME** - 2025 (study)

**TX** - 2025



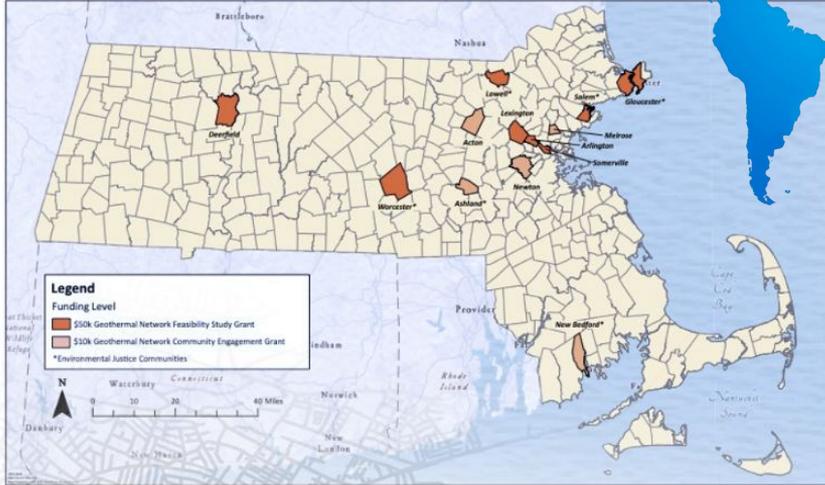
## LEGISLATION

Pictured are the states that have passed legislation. Many more are currently considering. Regulation follows.

*Human Networks:*

Advocacy Network (BDC & HEET)  
Regulator Network (HEET)

*New State Energy Office Network  
in formation with CESA*



## PROJECT PIPELINE

The small shift from individual geothermal heat pump to networked geothermal utility has rapidly unlocked a groundswell of projects, from the MA beginnings to global expansion of TENS/GENs.





## DEMONSTRATED

- ✓ High Safety & Security
- ✓ Emissions Free
- ✓ Reliable & Resilient
- ✓ Scalable & Adaptable
- ✓ Workforce Transition
- ✓ Ethical Distribution
- ✓ Affordable for consumer
- ✓ Economic & Market Compatible
- ✓ Speed & Scale needed



**#ThinkThermal**



**Want Geo Service?**

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