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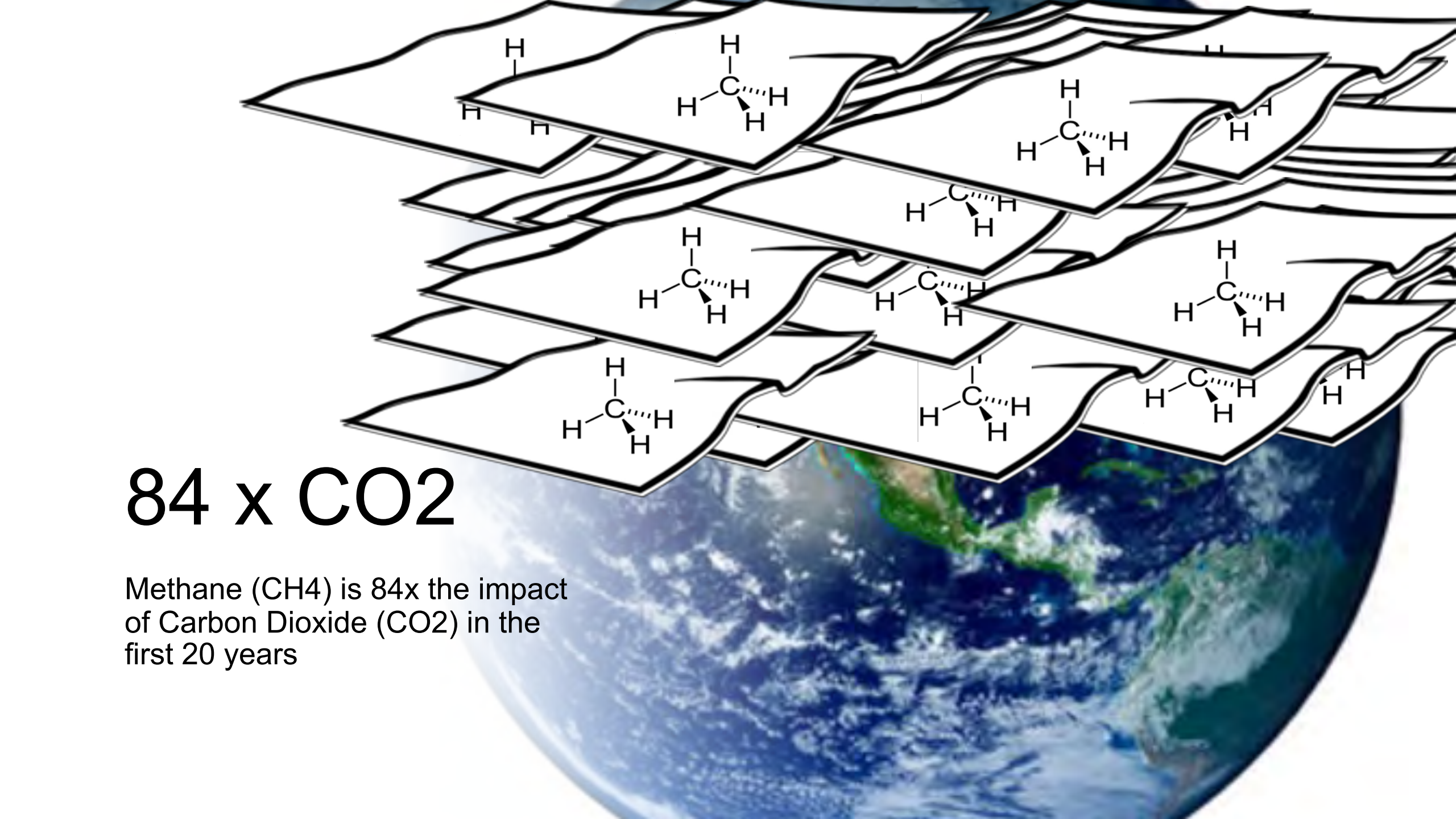
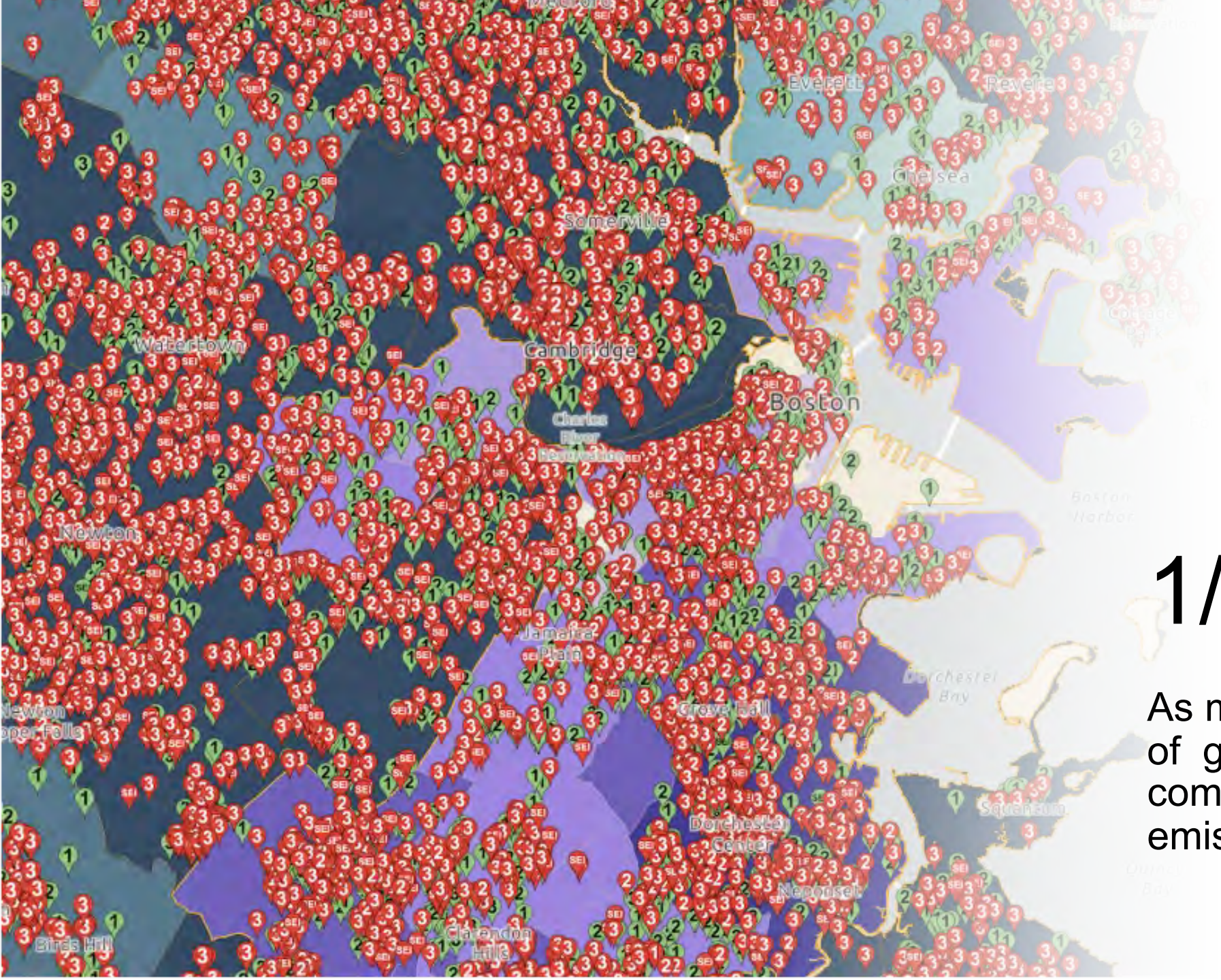
#THINK THERMAL, TOGETHER

Carsey Policy Hour 2025



84 x CO2

Methane (CH4) is 84x the impact of Carbon Dioxide (CO2) in the first 20 years

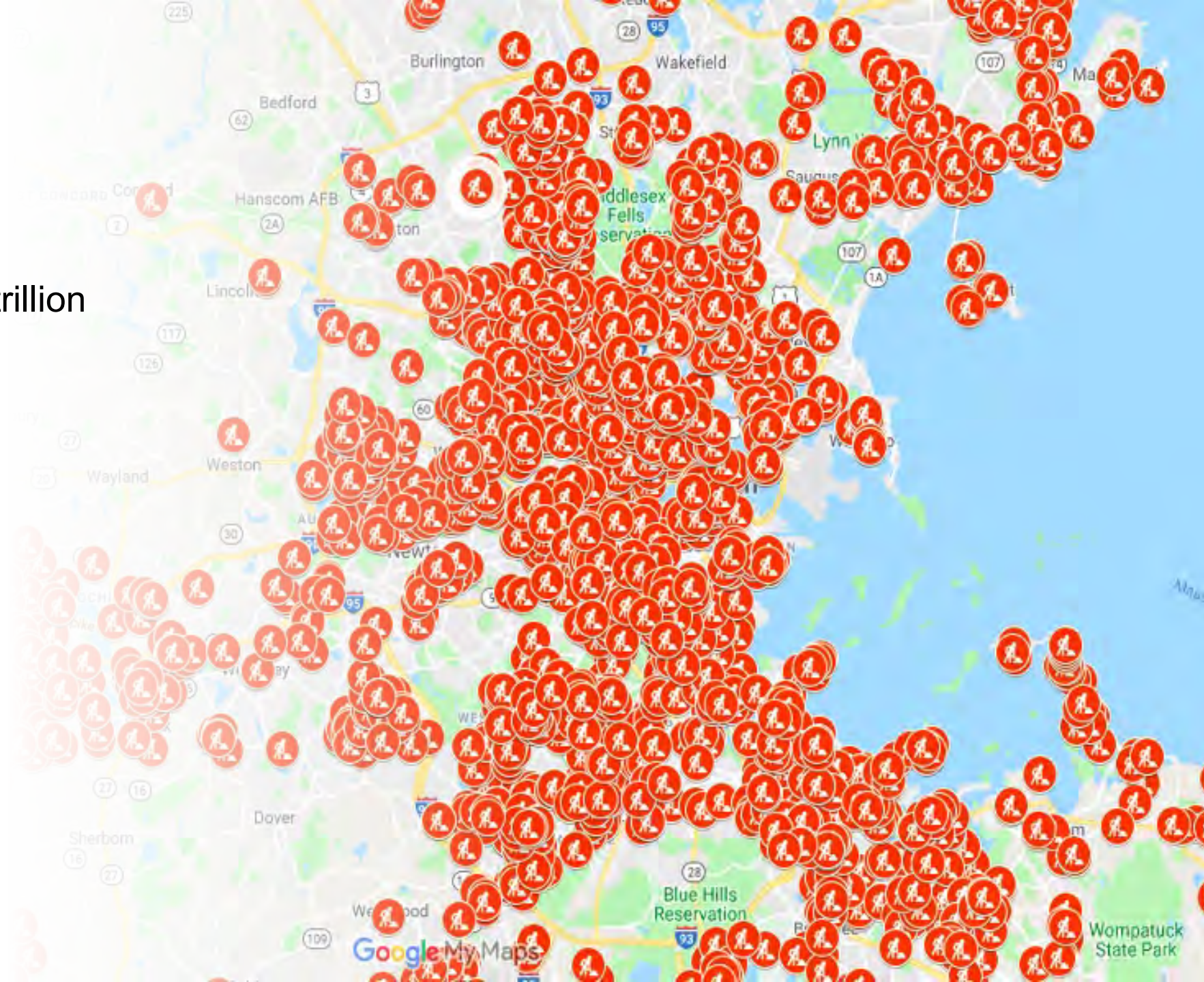


1/3

As much as one-third of global warming today comes from methane emissions of all kinds

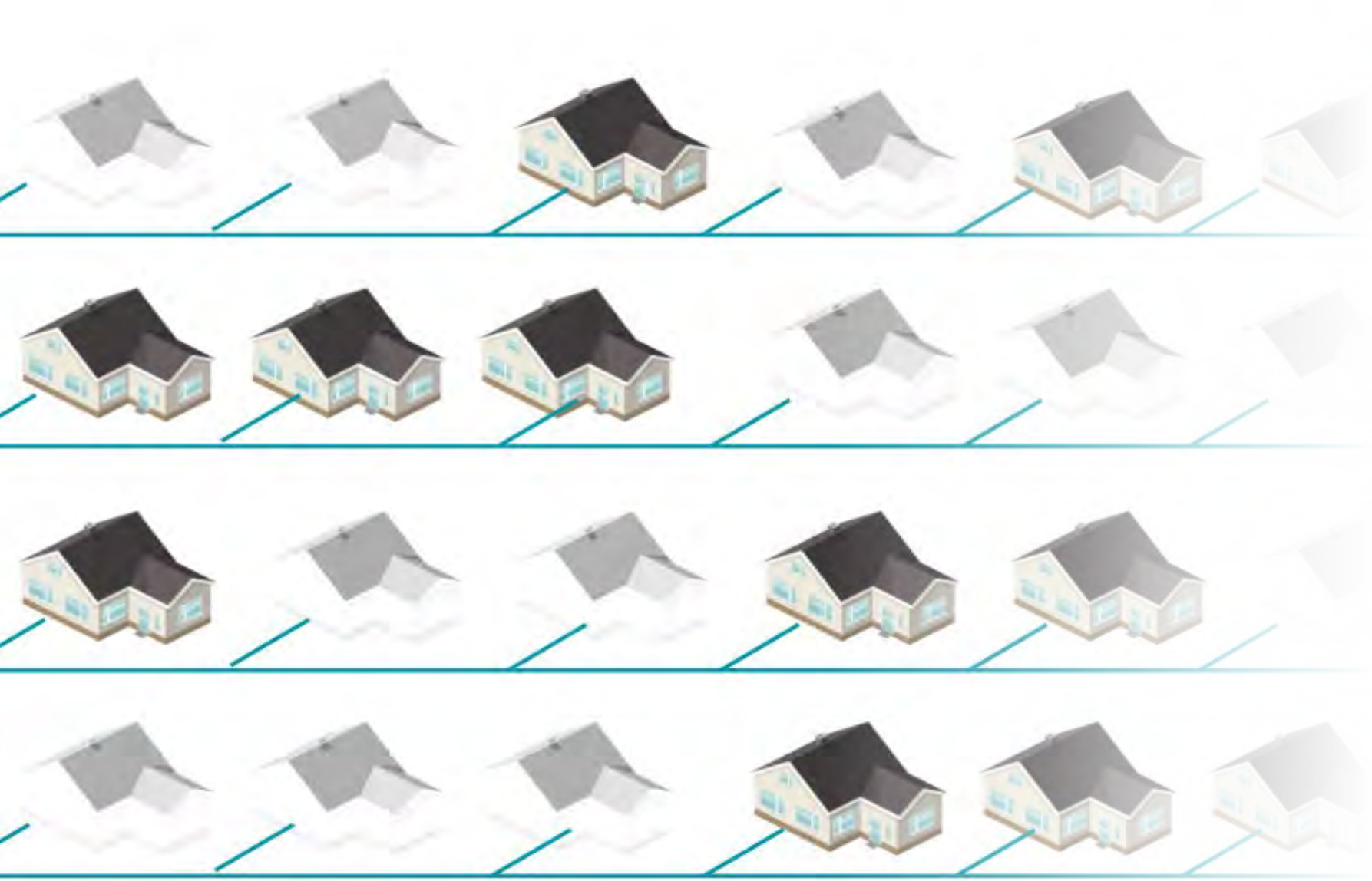
$1.4 trillion

The U.S. will invest $1.4 trillion in new gas infrastructure between now and 2050



$2.5 Trillion

US grid mod costs for by 2035, raising energy costs



27%

In 2020, 27% of all households reported difficulty paying energy bills or kept their homes at unsafe temperatures because of energy costs.

4.1million

The natural gas industry supports 4.1 million U.S. jobs (according to the gas industry!)

The Question

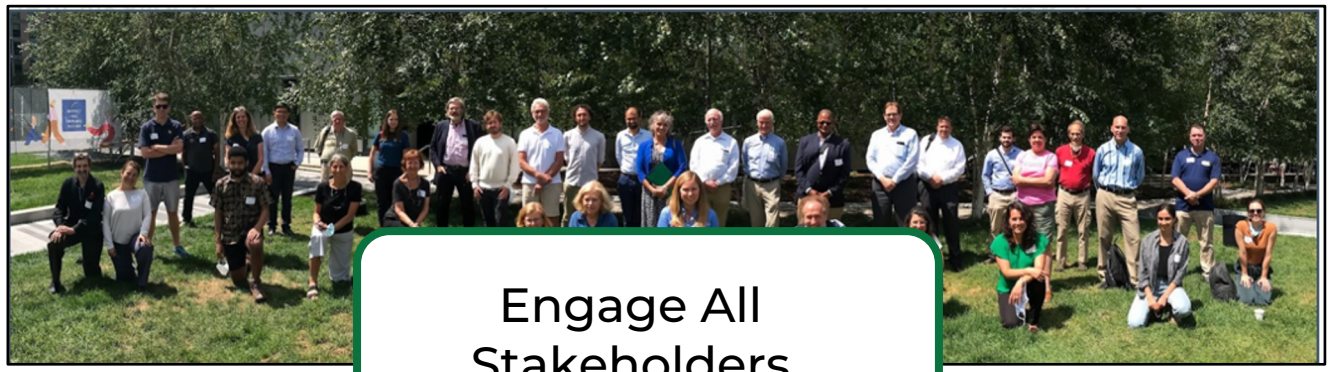
How do we keep ourselves comfortable –

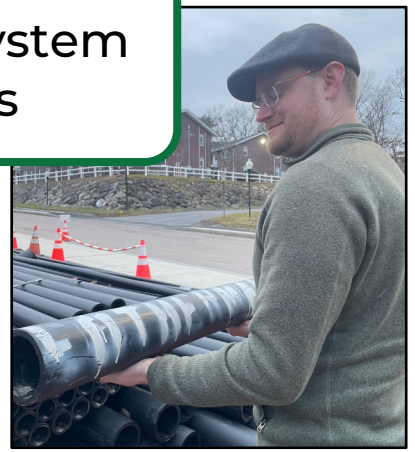
Affordably AND

Reliably AND

Safely AND

Sustainably?





Engage All Stakeholders

MOVES AT SPEED OF TRUST

Identify System Levers

Innovate & Iterate to Align

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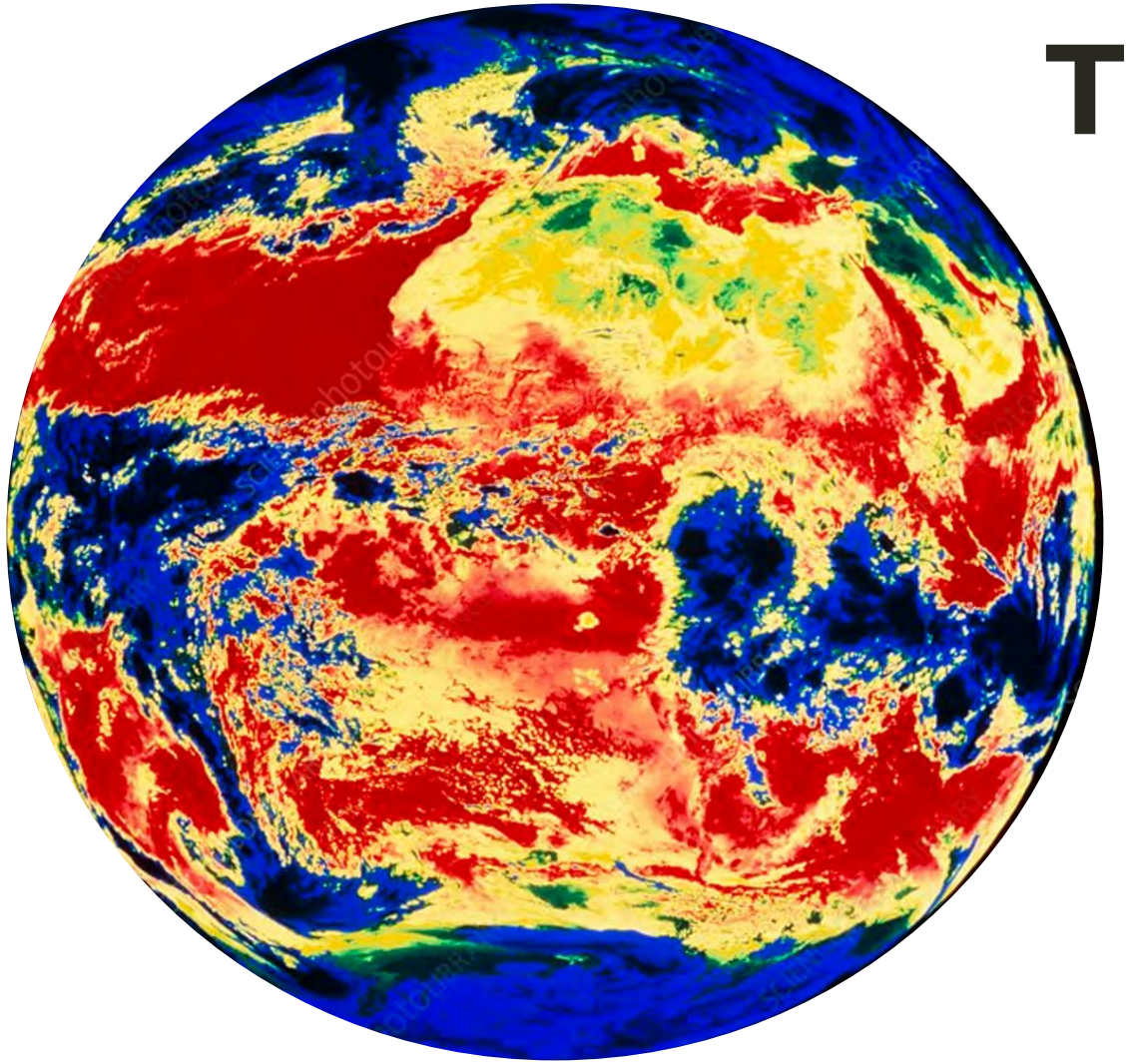
APPROACH

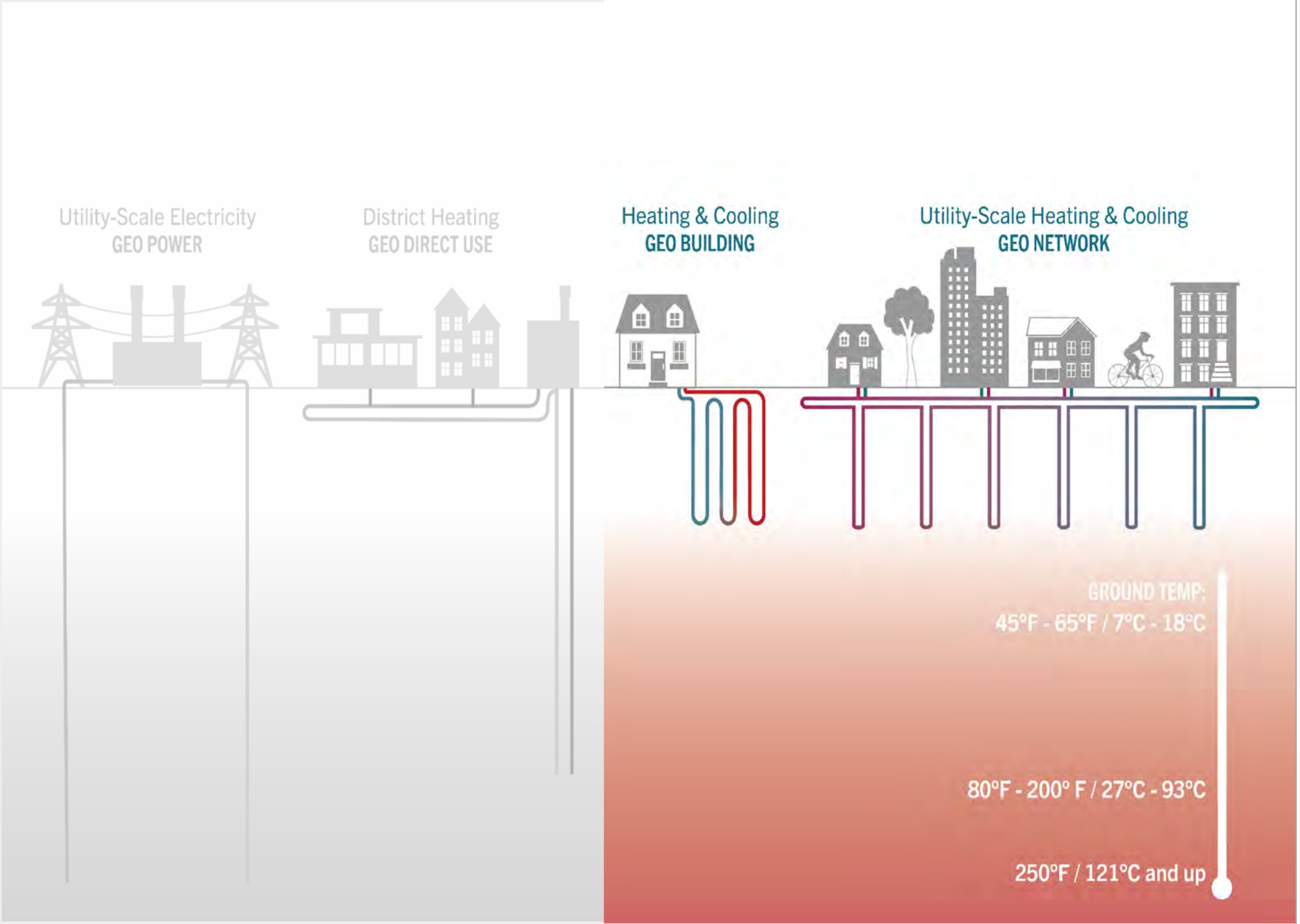
To design and drive good solutions to hard problems we must first bring people together to build trust, then identify the key challenges and opportunities, and then innovate until we have a solution that allows us all to move forward to a better future together!



THINK THERMAL ?

“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 December 2024



All Geothermal Technologies provide STABLE non-intermittent energy

Ambient Geothermal is the Anywhere Geo

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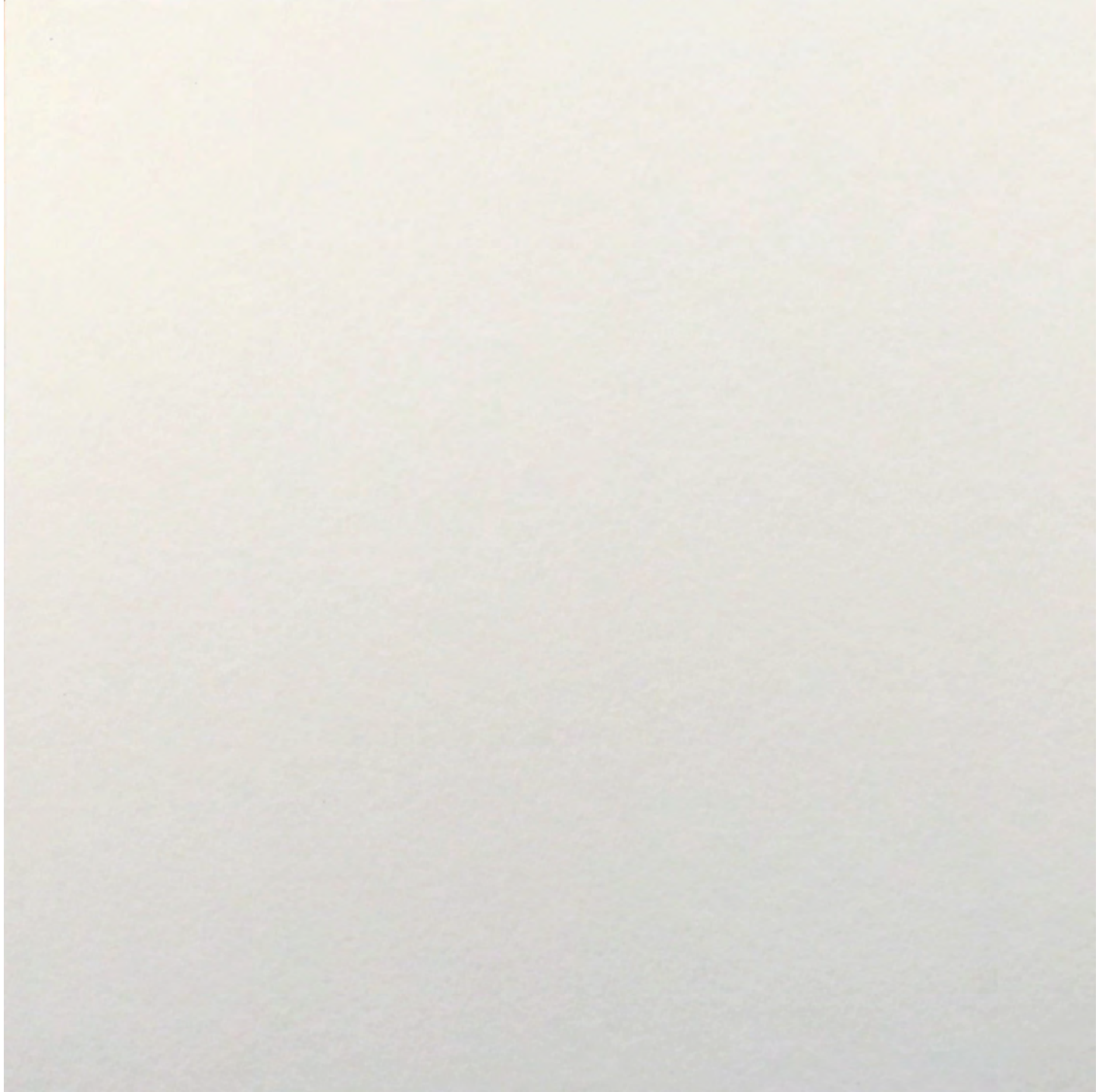
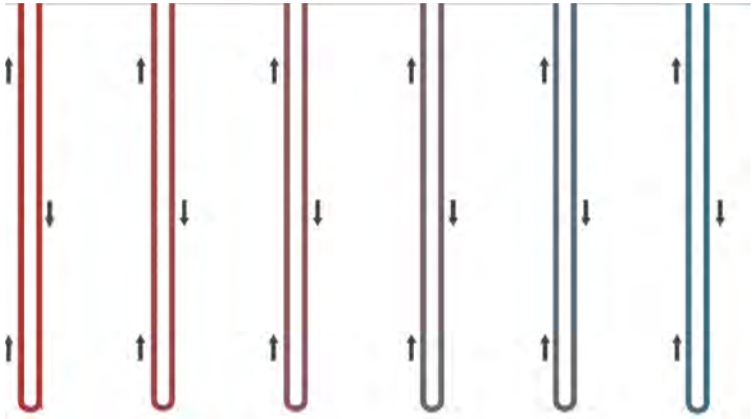


BUILDINGS :
(GEOTHERMAL HEAT PUMP)

DISTRIBUTION SYSTEM:
(THERMAL ENERGY NETWORK)



THERMAL ENERGY RESOURCES

GEOTHERMAL BOREHOLES
WASTEWATER EXCHANGE
INDUSTRIAL WASTE HEAT
LAKES, RIVERS, PONDS
A MILLION OTHER THERMAL OPPORTUNITIES . . .

A FIFTH GENERATION DESIGN: The Geothermal Network:

Each component is OLD TECH.

Together they are NEW TECH.

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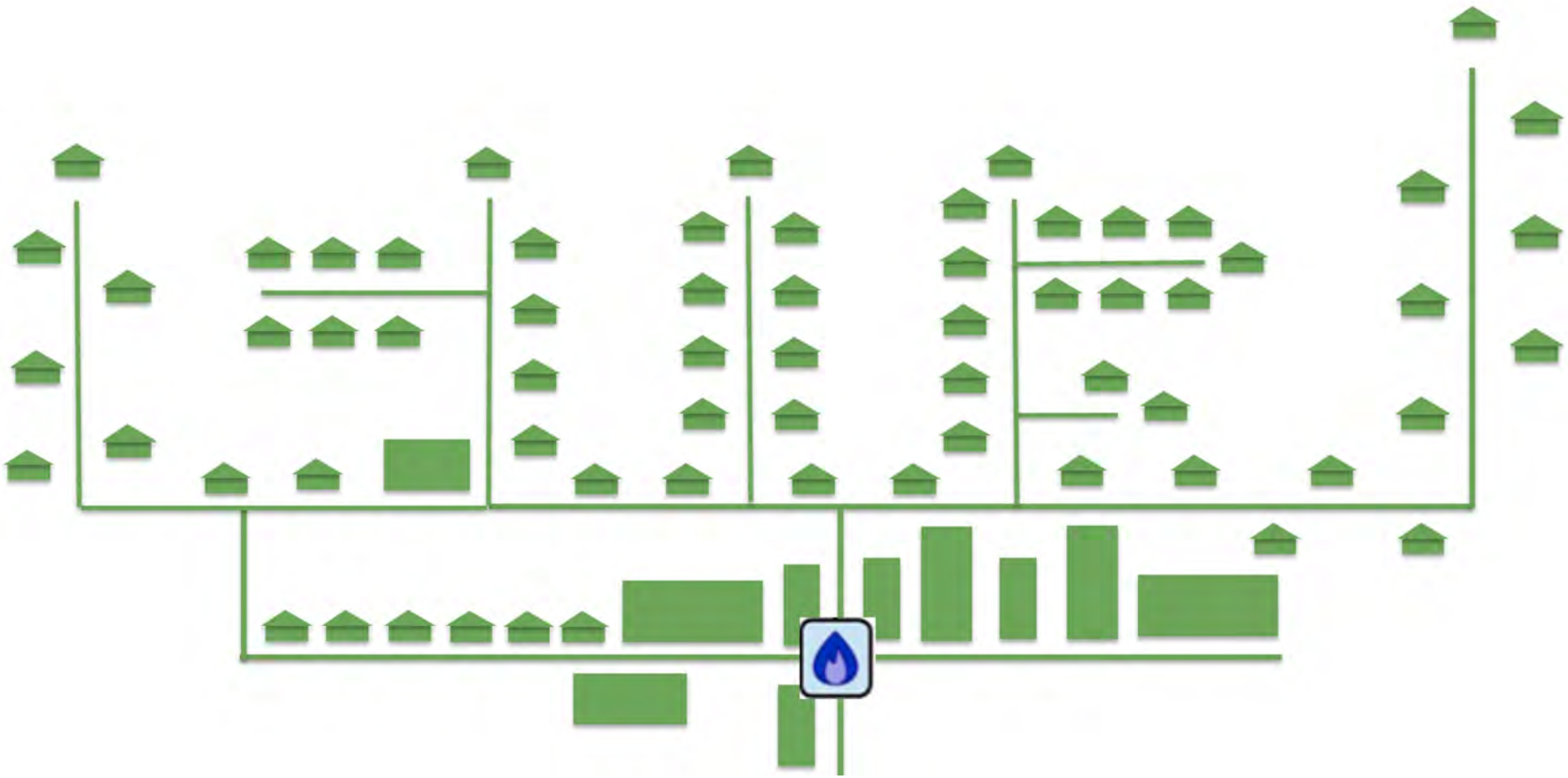

The single pipe ambient loop design HEET supports can grow flexibly; both in extent and in number of customers
AND can adapt to a changing climate

- Ambient temp
- Geothermal or other thermal storage
- Single Pipe

First-in-Nation Gas Utility Geothermal Network

Eversource Gas Framingham MA project

- 135 Customers
- Mixed-Use
- 1 mile loop in street
- Retrofits provided
- Bills & Electric Grid load predicted to be lowered

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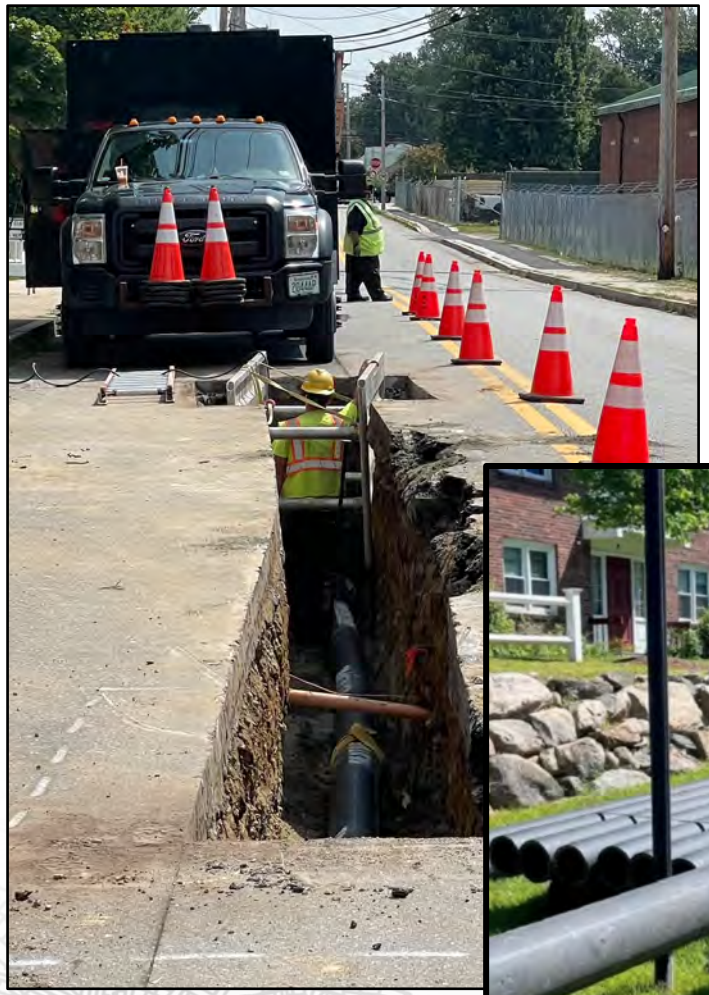
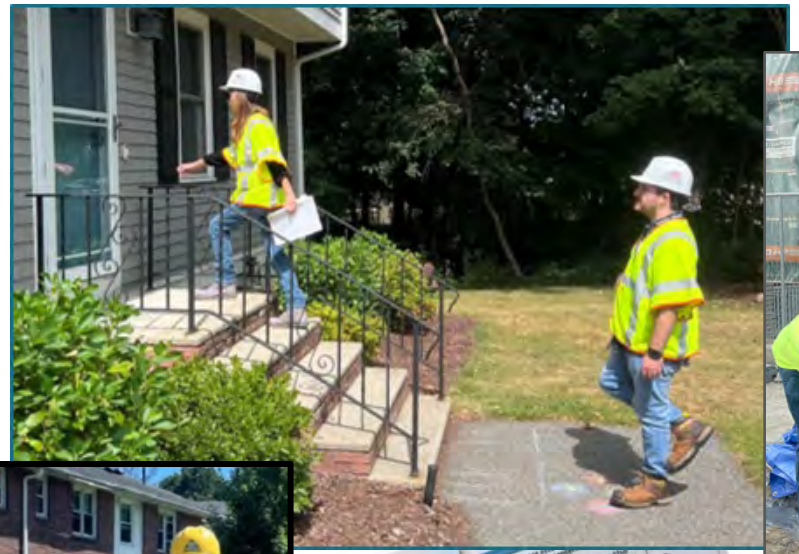
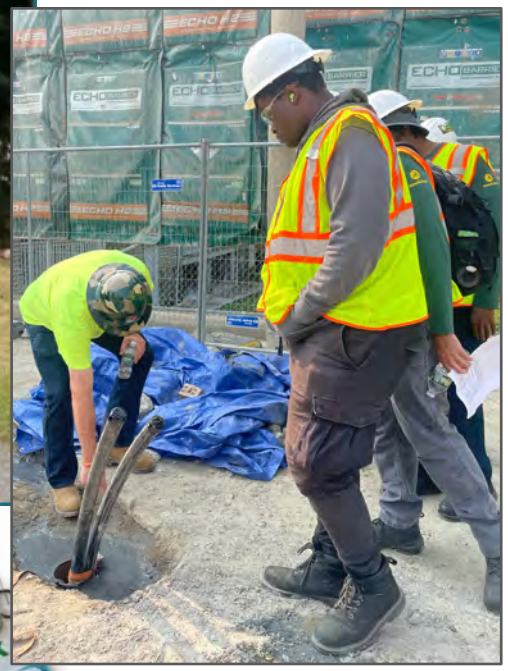
There are a lot of jobs in Geo . . .







This technology creates jobs in sales, in marketing, in construction, in management, in plumbing, in electric, and in drilling too.

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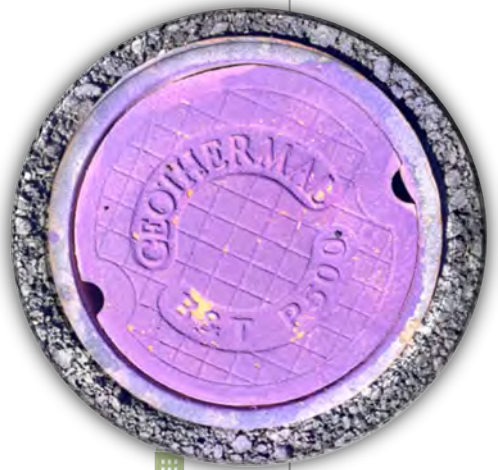
HEET/GDA Geothermal Driller Tech Tutorial



WORKFORCE DEVELOPMENT:

Geothermal Drilling Technician Tutorial:

Classroom & Field
80-hr curriculum
7 graduates

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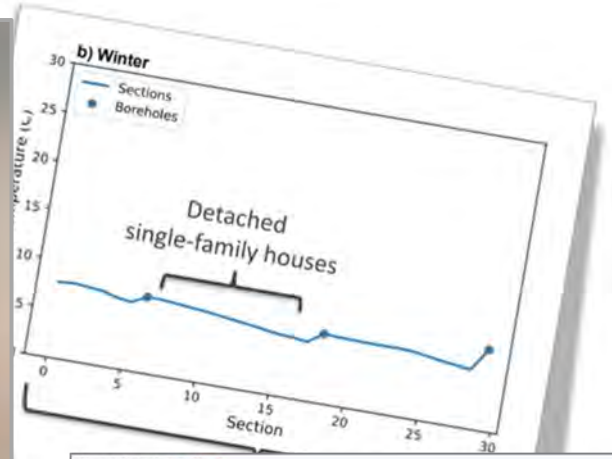
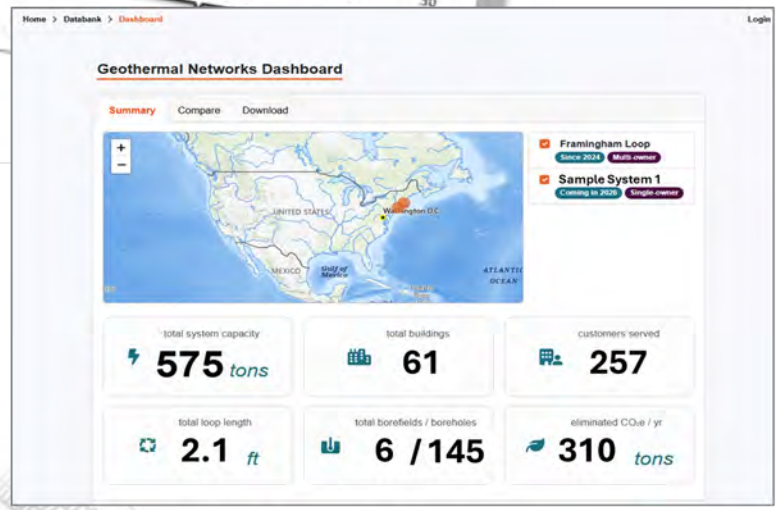
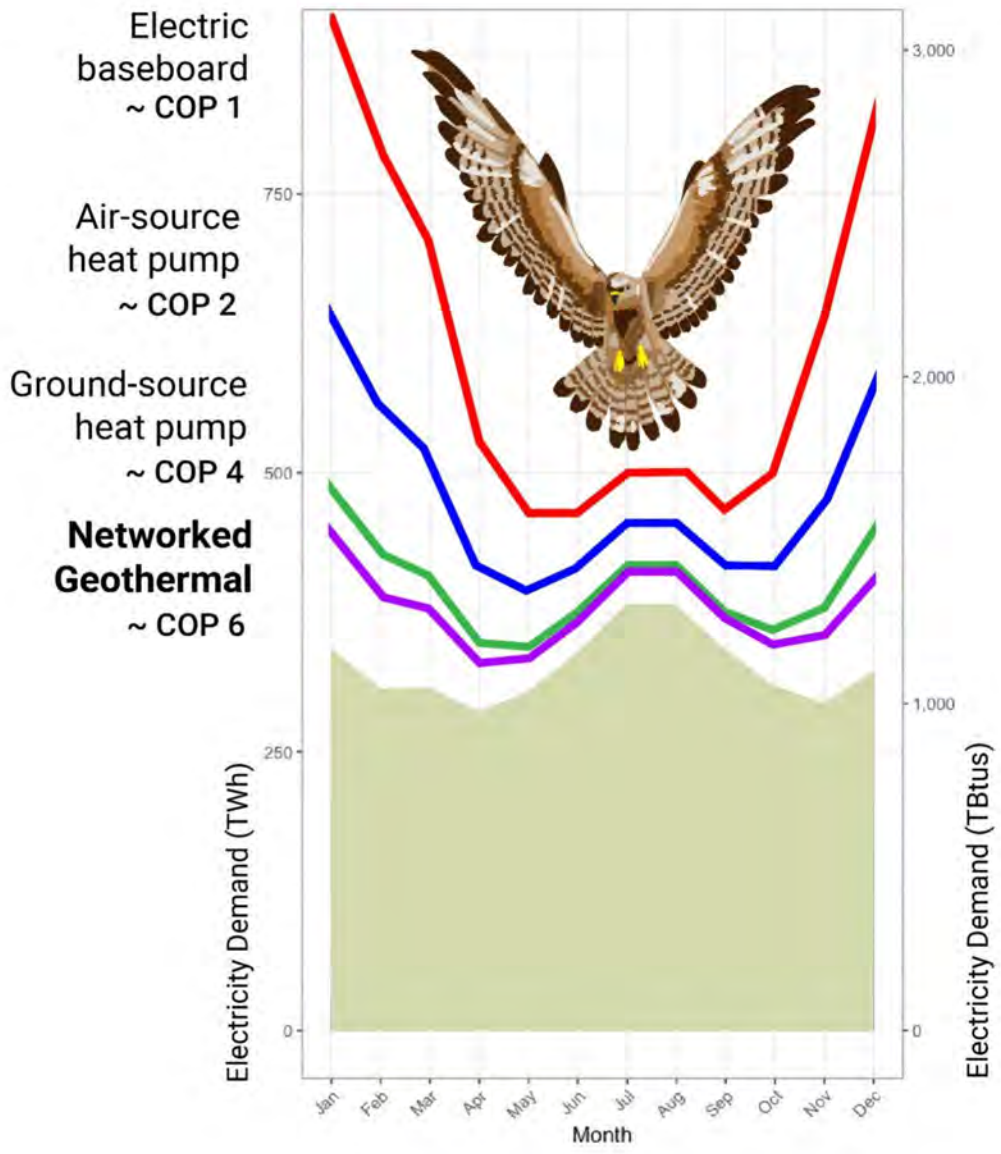
HEET's Geothermal Network Research Team







The Falcon Curve Showing future U.S. Building Electric Use

The efficiency of the technology matters at scale and drives grid impacts and integrated cost impacts.

Buonocore, J. J., Salimifard, P., Magavi, Z., & Allen, J. G. (2022). Inefficient Building Electrification Will Require Massive Buildout of Renewable Energy and Seasonal Energy Storage. ***Scientific Reports***, ***12***(1), 11931–11931. https://doi.org/10.1038/s41598-022-15628-2

- ☑ High Safety & Security
- ☑ 100% Combustion-Free
- ☑ Reliable & Resilient
- ☑ Scalable & Adaptable
- ☑ Workforce just transition
- ☑ Equitable access
- ☑ Affordable for consumer
- ☑ Economic for utility
- ☑ Speed & Scale needed
- ☑ Benefits Electric Grid
- ☑ Reduces Water Use

Projects in the U.S. have demonstrated that each of these needs or benefits is possible to achieve – depending of course on location, design, and policy.

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ALIGNMENT WORKS:

Thanks to [redacted] meeting many people's needs Scientists, Utilities, Workers, Climate advocates, and the general public all came together to pass laws to build geothermal networks!

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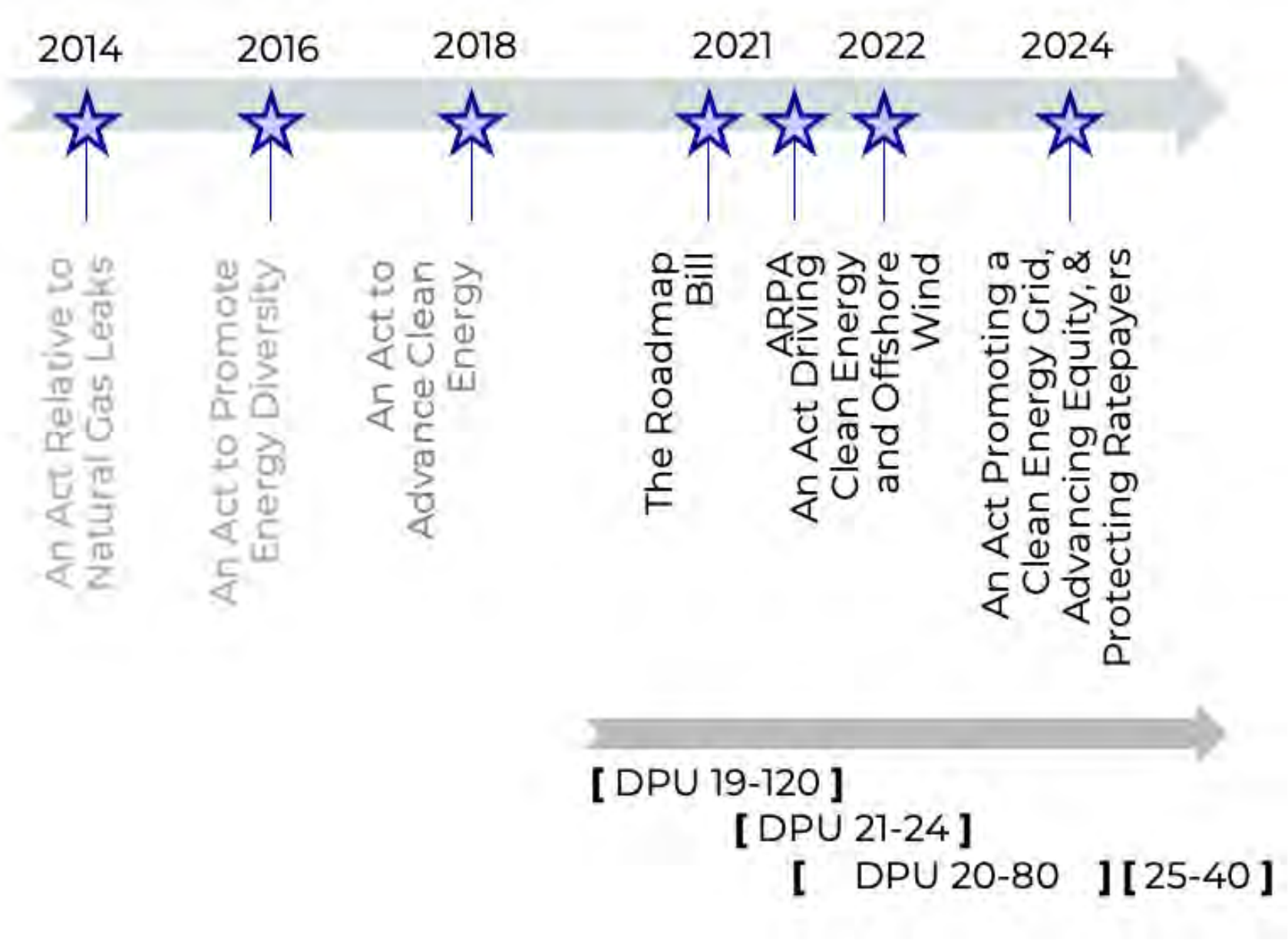

Relevant Massachusetts Legislative & Regulatory Action

Additionally:

Clean Heat Commission
&
GSEP Working Group
&
NPA Working Group
&
More!

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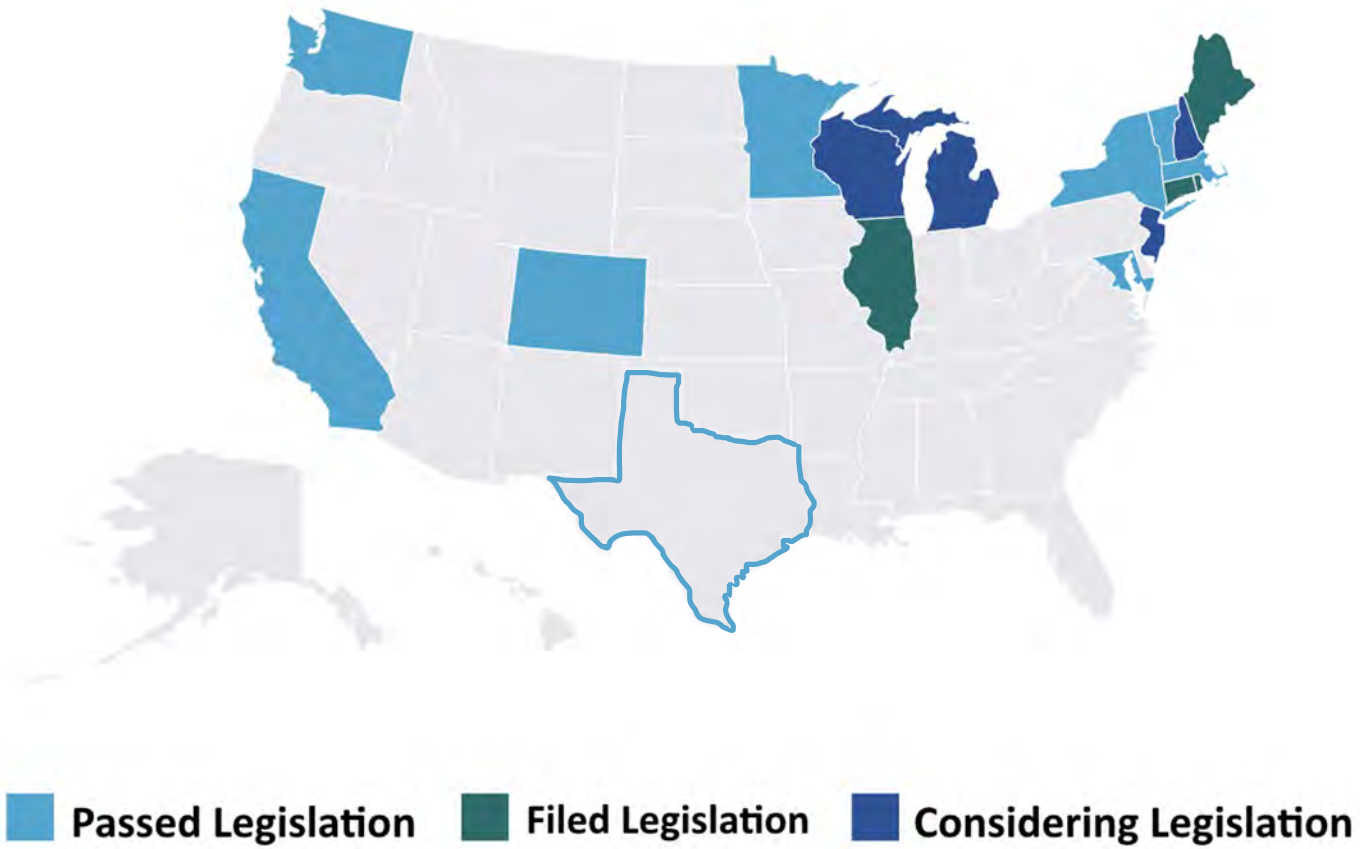
Gas to Geo Legislation in U.S.



MA - An Act Driving Clean Energy (2021-2022)

MN - Natural Gas Innovation Act (2021) + 7 TENs bills in 2024

NY - Utility Thermal Network & Jobs Act (2022)

CO - Thermal Energy Act (2023)

WA - Promoting the Establishment of Thermal Energy Networks (2024) (2025)

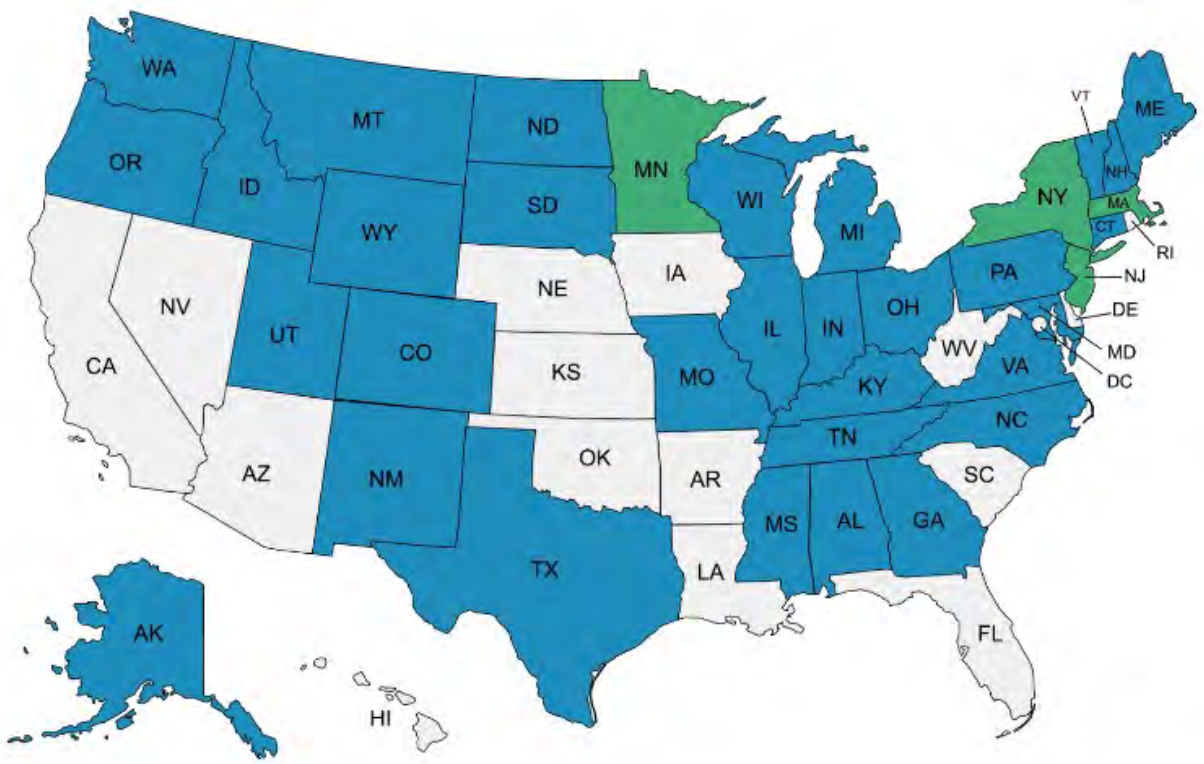
MD - WARMTH Act (2024)

VT - Act relating to Thermal Energy Networks (2024)

CA - Gas corporations: ceasing service: priority neighborhood decarbonization zones (2024)

TX – pending governor's signature (2025)

U.S. Gas Utilities in Utility Networked Geothermal Coalition



Gas Utility Pilots

Utility Coalition

FORTIS BC
AVANGRID
nationalgrid
National Fuel
spire
AVISTA
PGW
Xcel Energy
CenterPoint Energy
Southern Company Gas
conEdison
BGE
An Exelon Company
NiSource
Consumers Energy
Count on Us
Liberty
PSE
PUGET SOUND ENERGY
Unitil
Washington Gas
CASCADE NATURAL GAS
NW Natural
New Jersey Natural Gas
CMS ENERGY
Nicor Gas
ENBRIDGE
VGS
RICHMOND GAS WORKS
EVERSOURCE ENERGY
BDC
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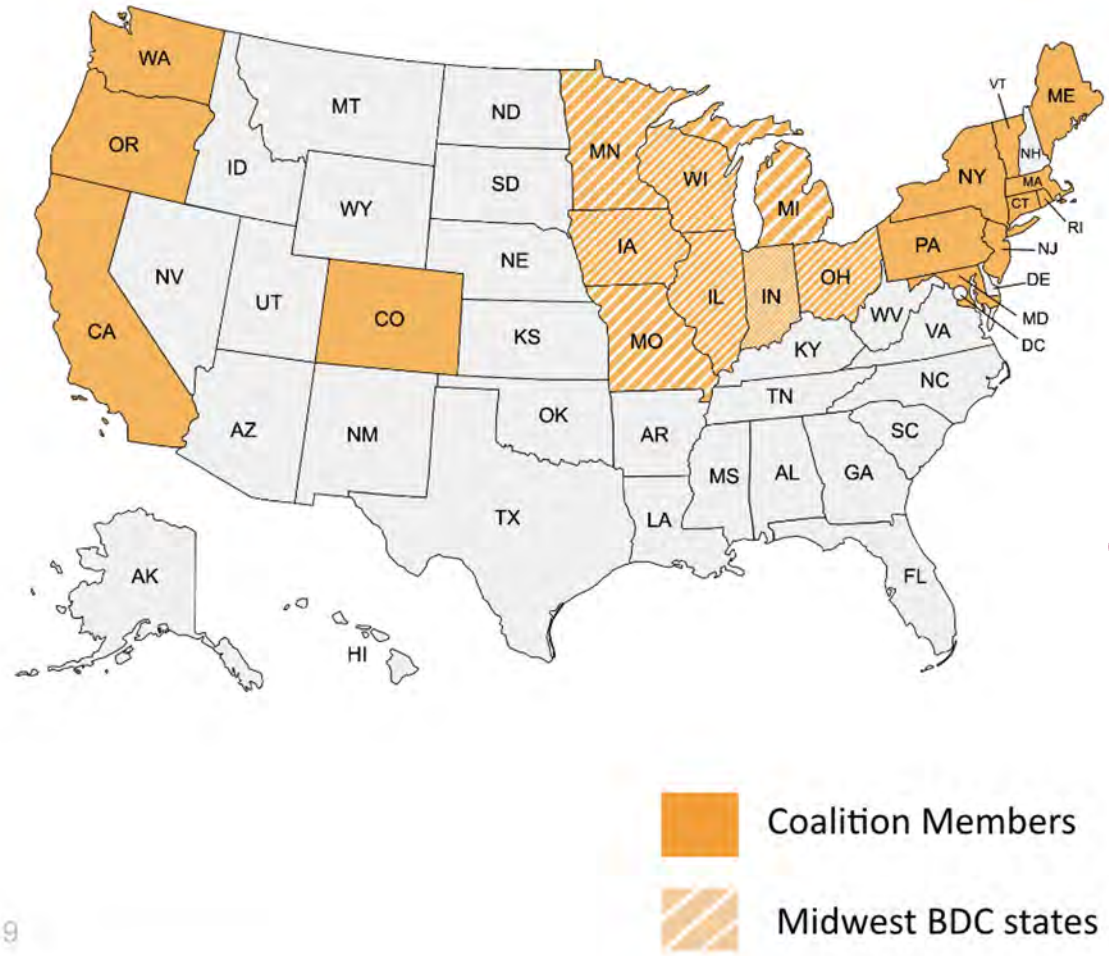
Advocacy Network



POWER 100%

Acadia Center

MOTHERS OUT FRONT Massachusetts

DC.MD.NoVA INTERFAITH Power & Light Our religious response to climate change.

VERMONT COMMUNITY GEOTHERMAL ALLIANCE

slipstream

New Jersey Conservation FOUNDATION

100% Renewable Tomorrow

PennFuture

Midwest Building Decarbonization Coalition

GAS TRANSITION ALLIES

Sightline INSTITUTE

SIERRA CLUB MAINE CHAPTER

YAMPA VALLEY SUSTAINABILITY COUNCIL

BDC

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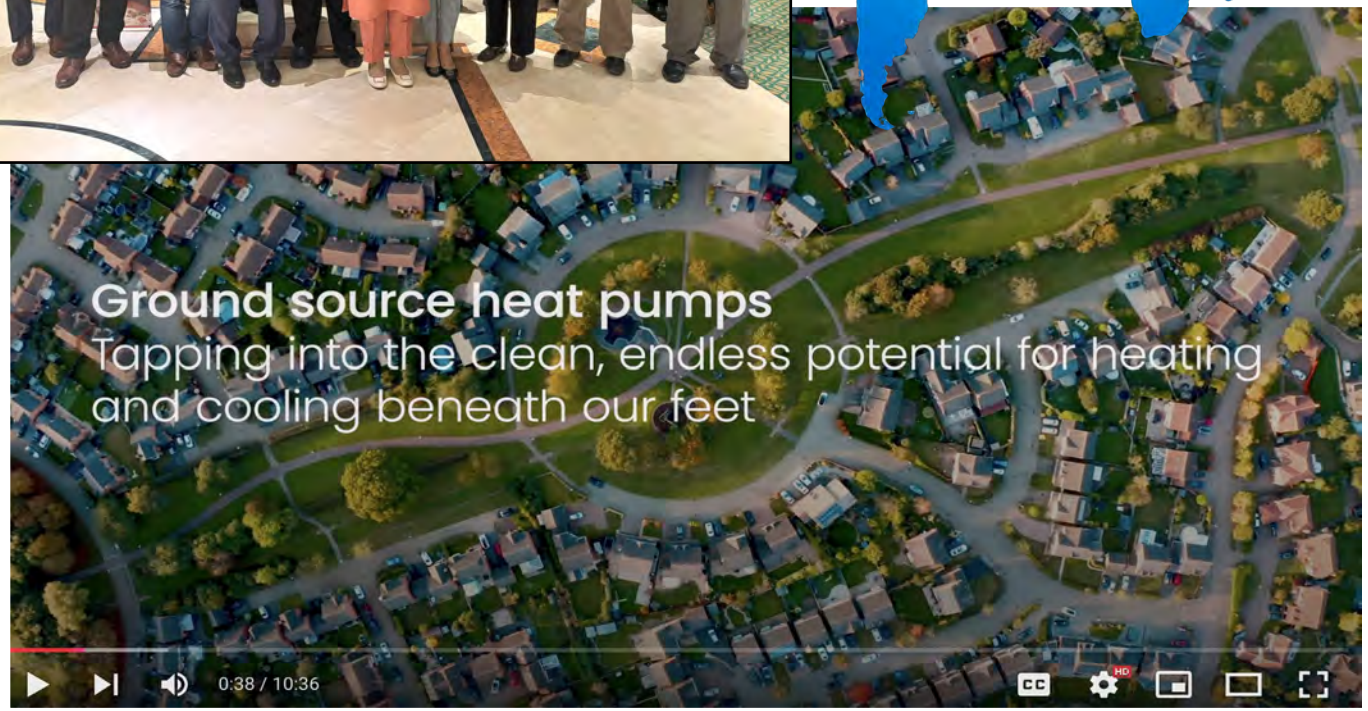

https://www.youtube.com/watch?v=mvOoBL-et7U

The IFC (World Bank) has initiated Geothermal Networks in Turkiye, Pakistan, Kyrgyzstan, Tajikistan, Uzbekistan, and Jordan at the 10,000 building scale.

Turkiye: https://lnkd.in/d4JD4eF3
Kyrgyzstan: https://lnkd.in/dAh68e6y
Pakistan: https://lnkd.in/e3_bE-5B
Jordan: https://lnkd.in/dDDCU9AN

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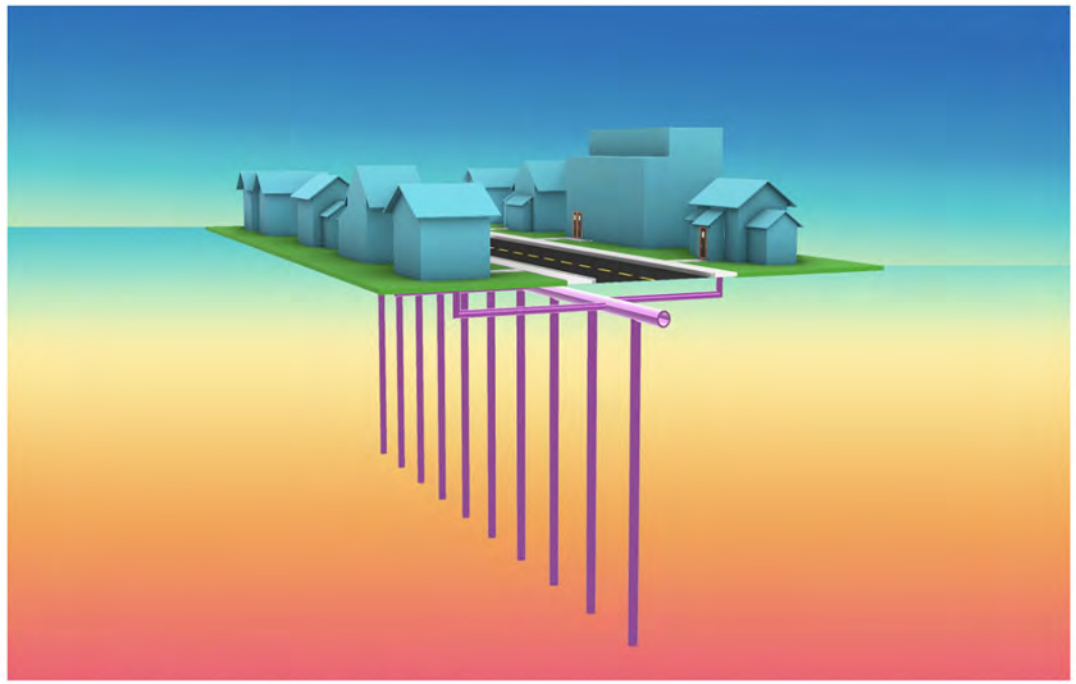

[Rendering: Anara Magavi/HEET]

10 climate tech innovations that give us hope for 2024

FAST COMPANY

Why does Thinking Thermal with Geothermal Networks give us hope?

1. They tap ignored but ubiquitous energy resources

2. They are new yet ready now

3. They multi-solve our electric grid challenges, water shortages, security concerns, health and more.

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#ThinkThermalTogether