Building the Geothermal Driller Workforce to Meet IRA Prevailing Wage w/ Apprenticeship Requirements

Moderator: Andrew Iliff / *HEET*

Speakers: Emily Engman / *Eide Bailly LLP*

Brock Yordy / *Geothermal Drillers Association*

Gregg Strede / *IUOE Local 478*

Ryan Dougherty / *GeoExchange*

THE CLIMATE ECONOMY

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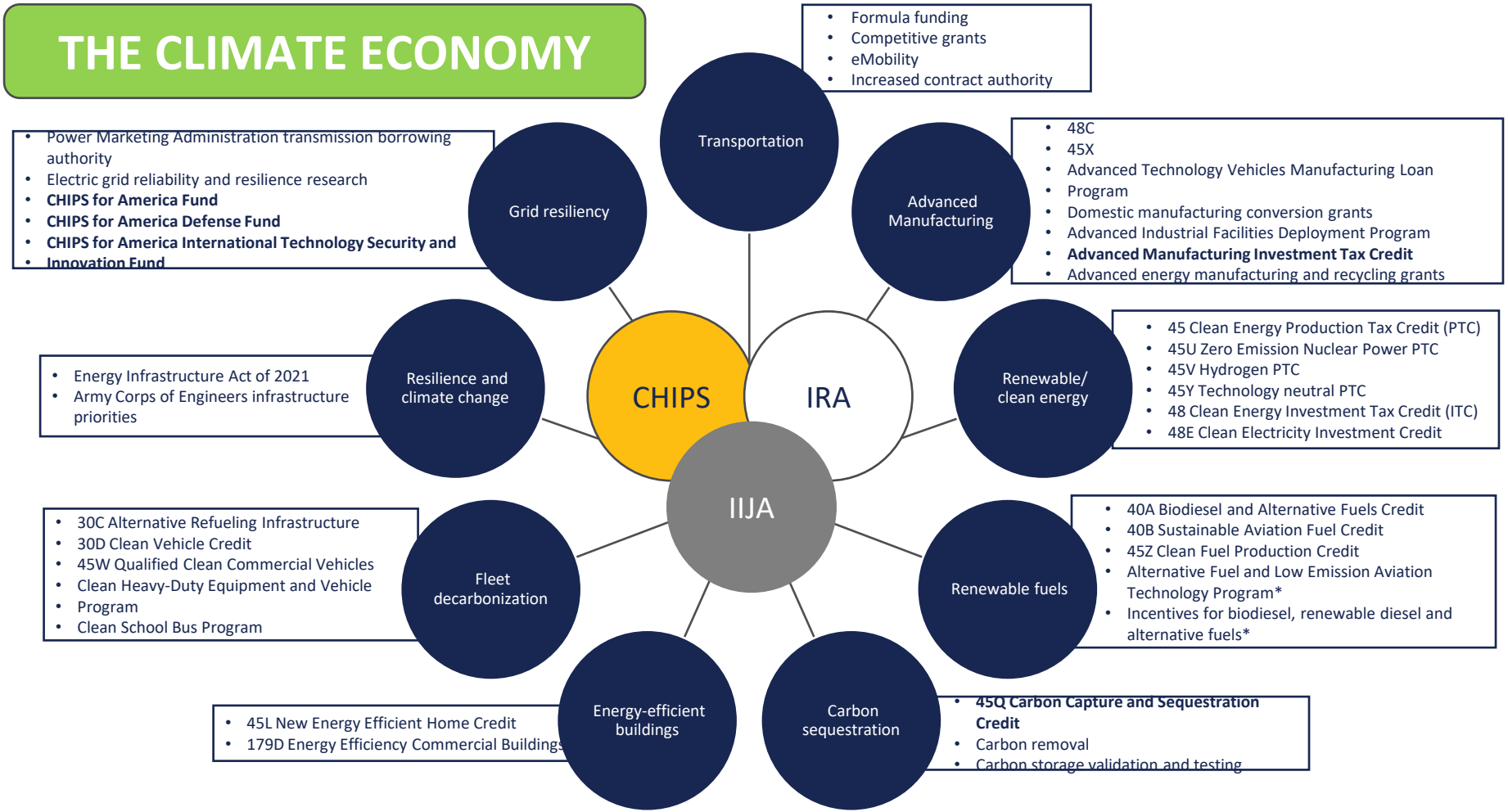


ENERGY CREDITS

INFLATION REDUCTION ACT OF 2022 – CLEAN ENERGY ROADMAP

Clean electricity & reducing carbon emissions

Extending/modifying existing credits
- 45 – Production tax credit (PTC)
- 48 – Energy credit (ITC)
- 45Q – carbon capture

New credits
- 48 – increase ITC for solar in low-income communities
- 45U – Zero emission nuclear power PTC

Clean fuels

Extending/modifying existing credits
- 40, 40A, 6426, 6427 – biodiesel, alternative fuels
- 40(b)(6) – second generation biofuel

New credits
- 40B/6426/6427 – sustainable aviation fuel blender credit
- 45V – PTC – clean hydrogen

Manufacturing & energy security

Extending/modifying existing credits
- 48C – Advanced energy project credit – new credit allocation
- 179D Energy efficient commercial buildings

New credits
- 45X – Advanced manufacturing PTC

Clean energy incentives for individuals

Extending/modifying existing credits
- 25C – Nonbusiness energy (extend/increase/modify)
- 25D – Residential energy efficient property
- 45L – New energy efficient homes

Clean vehicles

Extending/modifying existing credits
- 30C – Alternative fuel refueling property
- 30D – Clean vehicles credit

New credits
- 25E – Used clean vehicles
- 45W – Commercial vehicles

Clean electricity and transportation

Below new incentives generally effective 1/1/2025
- 45Y – Clean Electricity PTC
- 48E - Clean Electricity ITC
- 45Z – Clean Fuel PTC
- Cost recovery for qualified facilities, property, and storage

Superfund excise tax

New tax
- 4611 – Reinstate hazardous superfund financing rate on crude oil and petroleum products

INFLATION REDUCTION ACT – MONETIZING CREDITS

- Section 6417: Direct Pay
- Eligible for 1st 5 years:
  - 45V Clean Hydrogen
  - 45X Advanced Manufacturing Production
  - 45Q Carbon Oxide Sequestration
- Eligible Entities:
  - Tax-exempt
  - State or political subdivision
  - TN Valley Authority
  - Tribal Government
  - Alaska Native corporation
  - Rural Electrical Co-ops
  - Certain Partnerships and S Corporations

- Section 6418: Transferability
  - Everyone not listed in 6417
  - Transfer for Cash, cannot be resold
  - Proceeds not includable as income or expense
  - Risk on Transferee
  - Consideration for tax insurance instrument

ENERGY CREDITS

Clean Energy Investment Tax Credit (Section 48)

Investment in equipment that produces energy from alternative sources:

- Solar
- Wind
- Geothermal+
- Fuel Cells
- Microturbines
- Combined heat and power systems
- Equipment that recovers waste energy
- Energy storage

ENERGY CREDITS

Clean Electricity Investment Tax Credit (Section 48E)

Investment in equipment that:

- Produces clean electricity
- Greenhouse Gas Emissions rate < 0
- Technology neutral

Investment in energy storage technology:

- Electrical
- Thermal
- Hydrogen

**Placed in service post 12/31/2024.*

ENERGY CREDITS

Clean Energy Investment Tax Credit (Section 48)

Credit Percentage

- Basic credit = 6%
- If wage rules met = 30%
- If domestic content = + 10%
- In energy community = + 10%
- Environmental Justice Allocation = +10-20%

Basis Considerations

- Unit of Property
- Indirect costs
- Interconnected property
- Incremental costs
- Dual use property
- Tax-exempt bonds & grants

PREVAILING WAGE

PREVAILING WAGE

- Defined by Davis Bacon
- Wage rates determined by the Department of Labor
- Risk maintained by Taxpayer
- Exceptions:
  - One Megawatt Exception
  - Beginning of Construction Exception
- Penalties

DOCUMENTATION

- Name & ID Number
- WH Exemptions
- Work Classification
- Hours worked
- Rate of Pay, Wage & Fringe Benefits
- Gross Amounts Earned
- Deductions
- Net Wages Paid

APPRENTICESHIP

REGISTERED APPRENTICESHIP PROGRAM

COMPLIANCE:

- Participation Requirement
  - 1 in 4 laborers
- Labor Hours Requirement
  - 10%-15%
- Ratio Requirement
- Good Faith Effort
  - Failure to respond within 5 days
  - Denied Requests
- Apprenticeship Cure Provision
  - $50 x labor hours needed
  - $500 x labor hours needed (intentional disregard)

The Construction Employment Field

8.25 million employees – Generate $1.65 trillion worth of business annually.

1 in 5 construction workers are older than 55 years

1 in 4 drillers are over 58 years.

1.15 million workers out of 8.25 Million operate in an industry that requires drilling

= 14.3 % of the Construction Workforce

Actual Drillers < 15,000 Individuals

First-in-Nation Geothermal Drilling Technician Tutorial:

- Classroom & Field
- 80-hr curriculum
- 7 graduates, all J40

heet

Career Expectations for New to the Industry Candidates

- Safe place to work.
  - Physically
  - Mentally
  - Finically
- Onboarding and Training Plan.
  - Company SOP
  - Safety Programs
- Milestones.
- Leadership.
- Engagement at all levels.
- Family Sustaining Wage.

Drilling Company Requirements

Full Company Buy In

Company Core Values

- Culture
- Vision
- Roles & Responsibilities
- Milestones

On-Boarding

- Continuing Education
- Coach & Mentors
- Safety Program
- Standard Operating Procedures

OPERATING ENGINEERS LOCAL 478

APPRENTICESHIP TRAINING & SKILL IMPROVEMENT FUND

Who We Are

Local 478 Apprenticeship Training & Skill Improvement programs represent the union's commitment to lifelong learning and superior training in both the operation and repair of heavy construction equipment

LOCAL 478
Operating Engineers
Building Connecticut

BUILDING CONNECTICUT

Local 478 is proud to provide a highly skilled workforce in the state of Connecticut for over 113 years.

Our commitment to the education and health and safety of our membership has established our reputation as a premier organization with a willingness to adapt to the ever-changing needs of our industry

What We Have To Offer

LEARNING OPPORTUNITIES
Both supervised classroom and on-the-job training.

SKILL IMPROVEMENT
Enhancing skills and knowledge to meet and exceed the challenges of Connecticut's workplace and labor market.

Many pathways and partnerships for trade related **LICENSING & CERTIFICATIONS**

Our Courses Include...

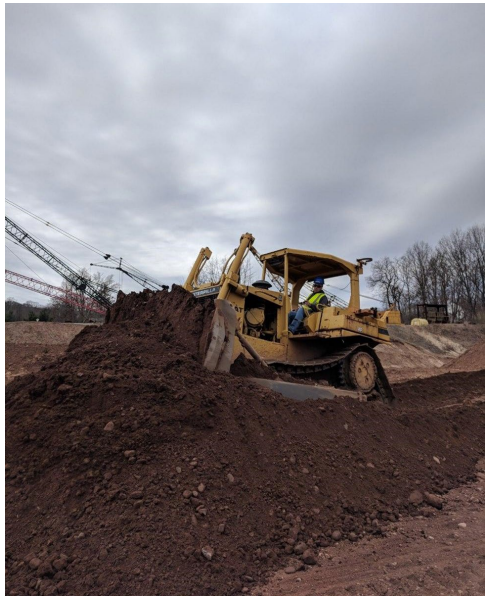
Health & Safety

- OSHA 10 & 30
- MSHA 24 Hour New Miner
- HAZMAT 40 Hour & 8 Hour Refresher
- Asbestos Supervisor & Refresher

MACHINE OPERATION

EARTHMOVING
- Dozer
- Excavator
- Loader

CRANES
- Tower
- Luffer
- Lattice Boom
- Hydraulic



CDL

Registered FMCSA Training Location

CLASS A

CLASS B

DOT HAZMAT

HEAVY EQUIPMENT MECHANICS

MECHANICS

- Hydraulic
- Diesel
- Electrical Systems
- Gas Systems
- MACS Mobile Air Conditioning

WELDING

- Lincoln Electric Educational Partnership

GAS OPERATOR QUALIFICATION

ENERGY WORLDNET

NORTHEAST GAS ASSOCIATION

State of Connecticut
Registered Apprenticeship Programs

HEAVY EQUIPMENT OPERATOR

4-year 6,000 Hour

HEAVY EQUIPMENT MECHANIC

4-year 8,000 Hour

CRANE OPERATOR

3-year 6,000 Hour

GEOTHERMAL & WELL DRILLING OPERATOR

An addition to our 4-year Heavy Equipment Operator Apprenticeship Program. Course outline will include:

Stage 1
- Safety
- CDL ELDT
- HAZMAT
- Drilling Fundamentals
- Basic Equipment Skills

Stage 2
- Geothermal & Other Well Types
- Soil Exploration/Geology
- HAZMAT Recertification I
- Use of Grade Instruments & Plans

Stage 3
- Equipment Skills II
- HAZMAT Recertification II
- Rigging & Signal Training

Stage 4
- Mechanical Systems
- Equipment Skills II
- HAZMAT Recertification III
- State of CT Well Drilling License Completion

Local 478 is committed to building and maintaining a diverse workforce that supports the economic growth and stability of our employers, the union and our communities.

CONTACT US

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Learn More About Our Programs

Heavy Equipment Operators

Heavy Equipment Mechanics

@local478training

(Source: Eversource)

A NATIONAL NETWORK OF GEOTHERMAL DRILLING CENTERS OF EXCELLENCE

GEOTHERMAL MARKET CAPACITY COALITION:

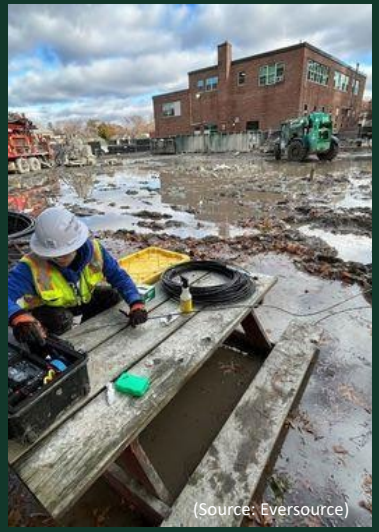
Supporting an Equitable Transition to Clean Energy

TABLE OF CONTENTS

(Source: Eversource)

EXECUTIVE SUMMARY

- Geothermal energy networks and GSHPs integral in US shift to sustainable energy (MIT, US DOE)
- Critical labor & supply chain shortages interfering with US deployment
- Industry adaptation is crucial to meet unprecedented scale and speed of deployment.


(Source: Eversource)

The **Geothermal Market Capacity Coalition** (GMCC) aligns industry stakeholders to:

- Relieve supply chain, labor, and capacity shortages inhibiting growth
- Establish regional Geothermal Drilling Centers of Excellence (Geo-CoEs)
  - Train geothermal drillers
  - Supply drill rigs needed to produce ground heat exchangers
  - House knowledge and resources
- Thereby enable rapid, sustainable growth of GSHP sector and geothermal energy networks

(Source: Eversource)

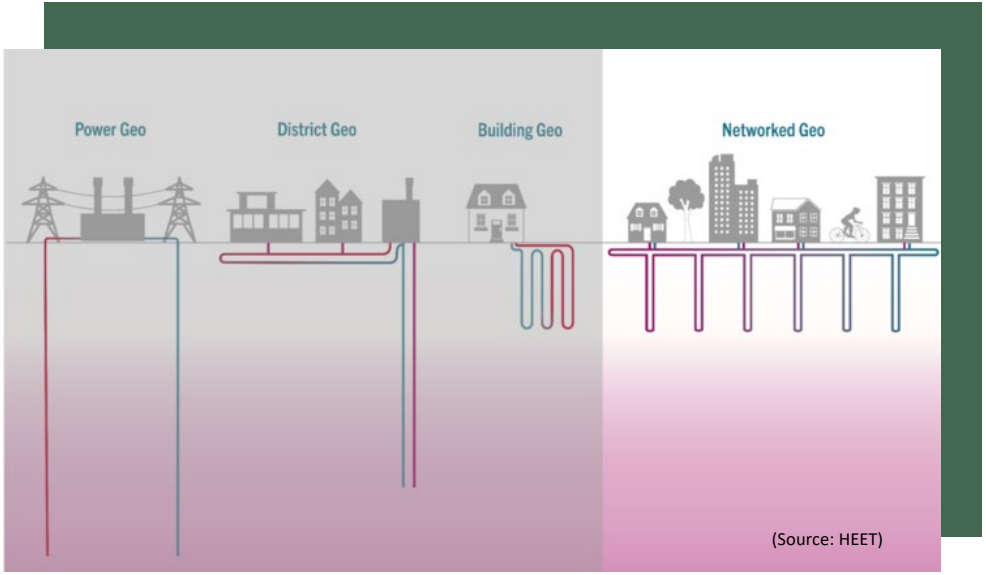
VALUE PROPOSITION

- Electrifying building heating & cooling is critical to: 1) meet national GHG reduction targets, 2) reduce US reliance on fossil fuels
- Geothermal technologies can offset potentially overwhelming grid loads resulting from increased building cooling demands

Geothermal technologies:

- Harness earth's constant underground temperature
- Most efficient path toward electrification of both heating and cooling
- GSHPs have coefficients of performance (COP) over twice those of ASHPs
- GSHPs excel in extreme weather conditions

GSHPs demand less electricity during hottest/coldest days AND components are buried out of harm's way



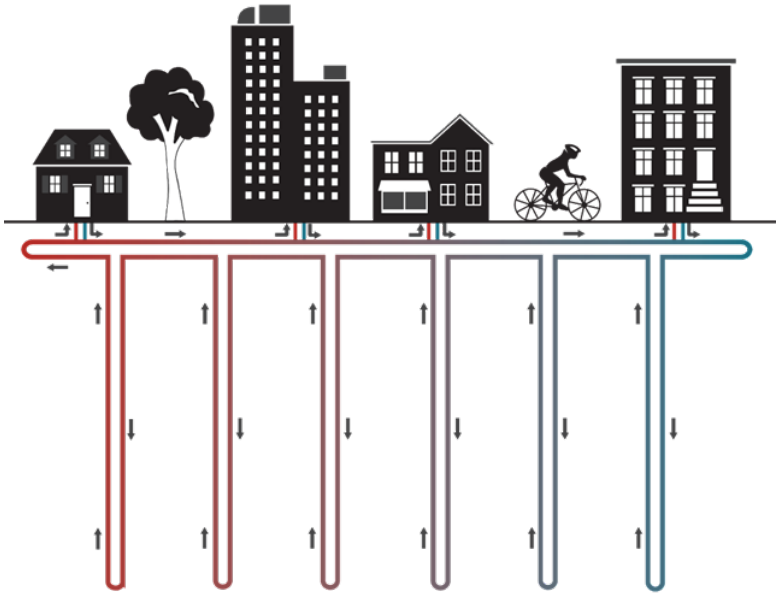
VALUE PROPOSITION (continued)

Utility-led geothermal network installations:

- Quickly move many consumers to CE at once
- Spread cost among all ratepayers
- Ensure low-income consumers not left behind

Transitioning to thermal technologies will:

- Combat climate change
- Enhance public health
- Increase US energy independence
- Establish dependable and secure source of heating and cooling.



(Source: HEET)

We must now address *demand* and *regional capacity* to deploy GSHPs

APPROACH: Geothermal Drilling Centers of Excellence


(Source: HEET)

Committed to facilitating equitable transition away from fossil fuels. How?

Nationwide network of Geo-CoEs to help industry meet GSHP demand

Objectives of a CoE:

- Provide comprehensive training and development programs
  - + ‘Field Technician’ Intensive
  - + Gas to geo transition training
  - + Wraparound supports
  - + Startup capital
- Develop drill rig leasing & other financing programs to overcome barriers to growth
- Catalyze US manufacturing capacity and innovation of geothermal equipment, including drilling technologies
- Seek opportunities to drive sustainable growth and innovation across the industry

INTENDED ASSETS OF A GEO-COE




Physical Assets

- Workspace & labs
- Field test sites
- Fleet of Drill Rigs

Knowledge Assets

- Tech & Engineering
- Skills Training
- Regulatory & Policy

Financial Assets

- Federal/State Grants
- Venture Capital
- Private Foundations

Relationship Assets

- Industry Connections
- Social Capital

STAKEHOLDERS AFFECTED

Natural Gas Utilities	Electric Utilities	Gas Utilities	Municipally Owned Utilities
Start Ups & Early Stage Companies	Feasibility Study & Engineering Firms	Design Engineering Firms	Construction Firms
Geothermal HVAC & Heat Pump Installers	Investors	Academia/ Researchers	Regulators
State Governments	Local Governments & Communities	Environmental Justice Communities	Nonprofits & Climate Organizations

PHASE 1 ROLLOUT: NORTHEAST GEOTHERMAL DRILLING CENTER OF EXCELLENCE

- Northeast Geo-CoE will model future centers
- Consolidates relationships amongst industry actors: companies installing GSHPs, local drilling companies, utilities deploying geothermal energy networks, e.g.
- GMCC will ensure responsible and beneficial employment and community engagement practices specifically aligned to region

Exploratory activities include:

- workshops to identify gaps, solutions and workforce constraints
- educational events with partner community and labor organizations
- use of case studies from other states integrating workforce and unions
- local assessment of schools interested in future training opportunities

NORTHEAST GEOTHERMAL DRILLING COE (continued)


(Source: HEET)

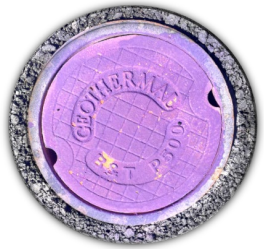
Establishing Mobile Thermal Exchanger Manufacturing Platforms for GSHPs

Geo-CoE will create mobile platforms consisting of thermal exchange manufacturing equipment—drill rig, grout, looping—and trained personnel

- Addresses Northeast shortage of 1) qualified geothermal drillers and
  2) specialized drill rigs
- Can be deployed to drill thermal exchangers where needed
- Help standardize and scale manufacturing of boreholes / thermal exchangers

GOALS OF NORTHEAST GEO-COE

1. **Increase Northeast production capacity of GSHPs** 3- to 5-fold by 2028, supporting U.S. and state emissions reduction goals
2. **Improve local availability of fair wage jobs** and **promote diversity, equity and inclusion** by increasing the participation of women and underrepresented minorities in the GSHP manufacturing and drilling workforce and small business ownership
3. **Create minimum 100 construction, technology, or clean energy jobs** throughout the GSHP and networked geothermal workspace
4. **Increase GSHP and networked geothermal installations** by improving access to capital for deployment to communities and utilities



NE GEO-COE WILL BE ESTABLISHED OVER THE NEXT 36 MONTHS, AT A COST OF $30 MILLION, AND WILL OPERATE IN MASSACHUSETTS, NEW YORK, AND CONNECTICUT WITH THE CAPACITY TO SERVE THE REGION.

APPROACH OF NE GEO-COE

PILOT 1: Optimize and standardize geothermal drilling workforce training COMPLETED SEPT 4-17

PILOT 2: Develop optimal specifications for Mobile Thermal Exchanger Manufacturing Platforms (M-TEMPs)

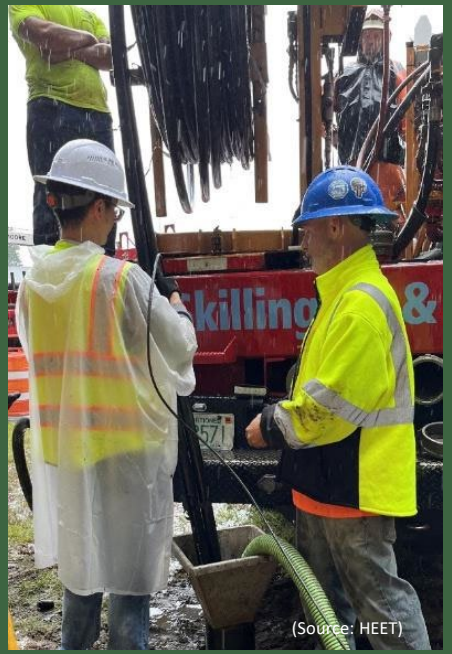
PILOT 3: Deploy an M-TEMP (in Westchester, NY)

Operationalize a Geothermal Drilling Center of Excellence for the Northeast

- Hire executive director and identify brick-and-mortar location in MA, CT or NY
- Establish training programs and standard procedures for drilling and geothermal exchanger production
- Increase access to equipment through supply chain innovation and improved financial tools
- Develop M-TEMP certification and support mechanisms
- Aim to deploy 60 additional M-TEMPs within the first 3 years of operation

Supports a 3-5x increase in GSHP deployment in the region

COMMUNITY BENEFITS PLAN



1. Expand training and job outreach to labor unions, technical high schools, community colleges in traditionally underserved communities
2. Prepare regional graduates for local jobs through classroom, soft skills, hands-on training, job counseling, and wraparound services
3. Work with stakeholder communities to develop workforce continuity and inclusion programming (e.g. veterans' groups, fossil fuel workers displaced by decarbonization)
4. Centralize and share resources to support town feasibility studies and local career planning within the growing GSHP marketplace

(Source: HEET)

PROJECT IMPACTS

GSHPs & geothermal energy networks:

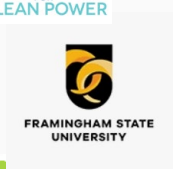
- flatten annual peak energy demands
- slash climate-warming emissions
- cut costs of electricity and grid buildout
- create secure, resilient energy infrastructure

To help realize these benefits, GEO-COEs will:

- Facilitate deployment of networked geothermal systems, starting in the Northeast in New York, Massachusetts and Connecticut
- Increase GSHP production capacity to support US and state emissions reduction goals
- Create construction, technology, or clean energy jobs in shallow geothermal industry
- Improve local fair wage jobs, small business ownership and increase participation of women and underrepresented minorities in manufacturing & drilling workforce
- Foster and promote cooperation, innovation and economic growth—model scaling and quality control as demand for geothermal energy networks grows

GMCC MEMBERSHIP

Lead Partners



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