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PRESENTER NAME: **Johnny Fry (Celsius Energy) / Erick Bosworth (Eversource)**

ORGANIZATION NAME: **Celsius Energy**

PROJECT NAME: **Eversource Networked Geothermal Project**

PROJECT LOCATION: **Framingham, MA**


EVERSOURCE
CELSIUS ENERGY
RHWhite
CONSTRUCTION & SERVICE SOLUTIONS
100 YEARS
Framingham Networked Geothermal Project
Nation's First Utility-Run Thermal Energy Network
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Project Description - 500 words or less

Committed to advancing New England's clean energy future, Eversource Energy is leading a groundbreaking geothermal pilot project in Framingham, Massachusetts. This initiative aims to test the feasibility of utility-operated, community-scale geothermal networks to affordably heat and cool homes and businesses. If successful, the project could accelerate our nation's shift to renewable energy, offering a blueprint for utility companies nationwide to provide clean energy through geothermal solutions to all communities.

The project aligns with a broader push by Massachusetts authorities to explore alternatives to fossil fuels for building heating. In June 2021, Massachusetts Attorney General Maura Healey requested the DPU to investigate the future of natural gas companies, encouraging regulators to explore renewable energy alternatives like building electrification and geothermal networks. This investigation coincided with the approval of the Eversource geothermal pilot.

The pilot covers a section of Framingham with a one-mile loop of main pipes and 88 geothermal boreholes in 3 borefields. Serving 36 buildings — including a community college, four commercial buildings, 10 multifamily, and 22 single-family homes — the system will benefit 140 utility customers. The conditioned space serviced by the system amounts to approximately 1.78 million cubic feet, with a planned heating and cooling capacity of 375 tons. This configuration will offer valuable insights into the relationship between borefield design and conditioned space, helping to establish metrics for future projects.

As the first project of its kind in the U.S., Eversource approached this groundbreaking initiative with a focus on building customer support for an unfamiliar concept. The project had to navigate the challenges of a dense urban environment, balance system load, and minimize construction impacts, all while seeking opportunities to reduce installation and operational costs and ensure long-term sustainability. Thanks to strong community and regulatory backing, detailed planning, traditional and innovative geothermal and digital solutions, the system began delivering energy to its first customers in August 2024.

Ultimately, Eversource's Framingham geothermal pilot will provide critical data on the feasibility, cost-effectiveness, and scalability of geothermal networks. If successful, the Eversource Framingham Networked Geothermal pilot could set the stage for wider adoption of utility operated networked geothermal systems in other cities, becoming a model for transitioning to more sustainable, community-based energy solutions in urban and suburban environments.

FRAMINGHAM, MA

Introduction

The Background:

- Diverse community with varied heating sources
  - Natural gas, electric resistance, delivered oil
- SFH and MFHs lack centralized cooling sources
  - Rely on electric window units
- Current and future energy affordability and carbon emissions are major concerns

The Need:

- Demonstrate New England's vision of a clean energy future
  - Customer acceptance (comfort & satisfaction)
  - Environmental benefits (decarbonization)
  - Cost savings (energy consumption & efficiency)
  - Installation & operating costs
  - Alignment with existing public utility workforce

The first utility-operated geothermal network in the U.S. - providing a sustainable heating and cooling solution.

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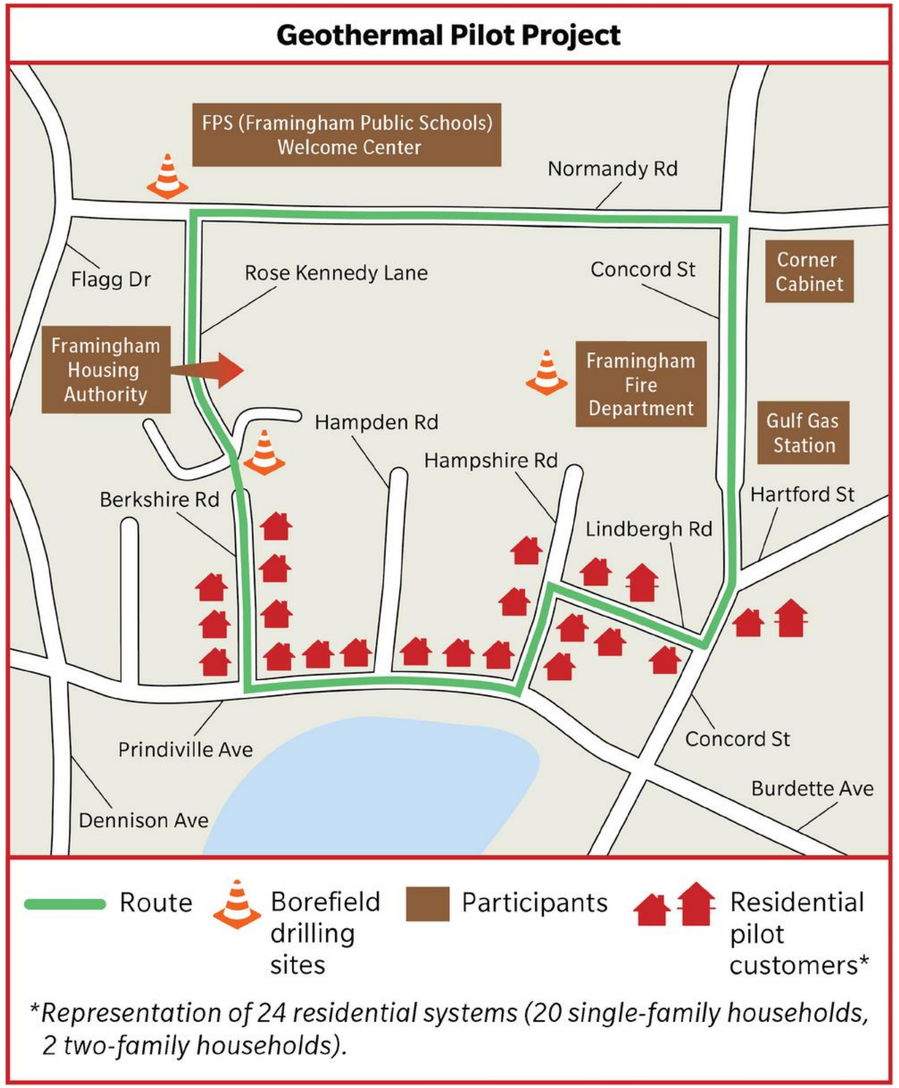
FRAMINGHAM, MA

The Project

Network Geothermal Solution:

- 1-mile ambient loop
- 37 buildings
- 140 utility customers
- 3 Geothermal Borefields (90 bores):
  - Normandy Rd (35)
  - Fire Station (33)
  - Rose Kennedy (20)
- 1 Central Pumping station
  - Normandy Rd.



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Project Collaborators

EVERSOURCE

FRAMINGHAM MASSACHUSETTS

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CDM Smith

RHWhite CONSTRUCTION & SERVICE SOLUTIONS 100 YEARS

CELSIUS ENERGY

MIDWEST GEOTHERMAL IGSHPA Certified Installers

NREL NATIONAL RENEWABLE ENERGY LABORATORY

MassDEP Department of Environmental Protection

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Project Challenges

#1

Getting customers on board

#2

Dense urban environment

#3

Construction impact

#4

Load Balancing

#5

Reduce installation & operational costs while ensuring long-term sustainability

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CHALLENGE #1

Getting Customers on Board

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EXTENSIVE COMUNITY OUTREACH

- Eversource community education
- Connecting with stakeholders
- Borefield location & negotiation

COST DISTRIBUTION VIA CUSTOMER BASE

Permission from regulators to charge customers at large to cover all the costs associated

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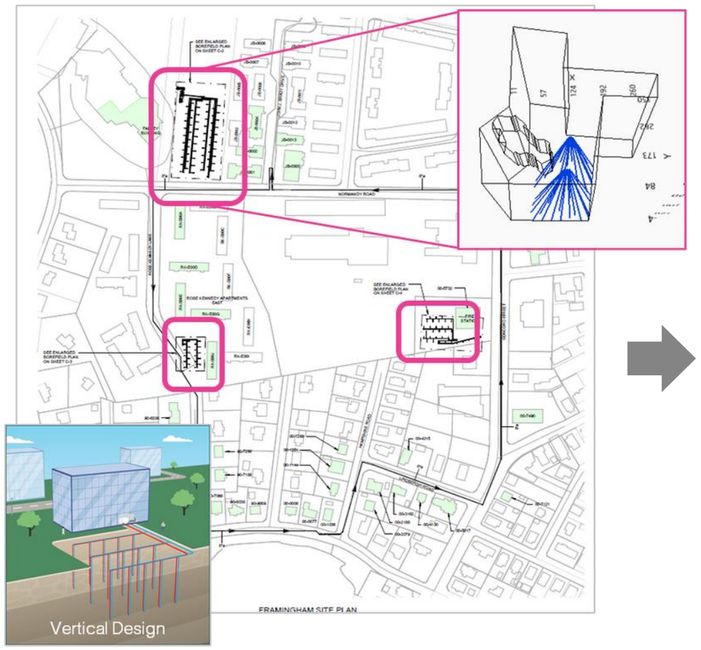
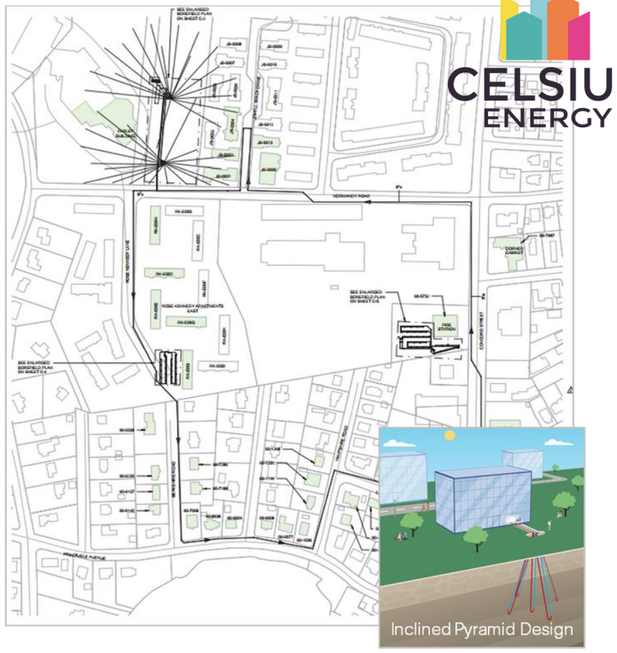
CHALLENGE #2

Dense Urban Environment

Solution: Tackling space challenge through a combination of **vertical** + Celsius Energy's **pyramid geothermal solution** to meet project needs.





SIGNIFICANT FOOTPRINT REDUCTION

Footprint reduction: -90%

35 bores in **~4 parking spaces**

INCREASED EFFICIENCY

Bore count reduction: -42% (60 vertical to 35 inclined bore conversion)

Utilizing space under existing buildings

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CHALLENGE #2

Dense Urban Environment

MassBay Community College's Request:

Continuous use of college parking lot during construction.
(largest borefield location)

Solution:

Vertical		Pyramid
100% Construction Occupied	→	40% Construction 60% Parking use

INNOVATION IN DESIGN & DRILLING →

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CHALLENGE #3

Construction Impact

Retrofitting aging infrastructure for 140 customers without disrupting their heating and cooling services.

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SEEMELESS IN-UNIT CONVERSIONS

Temporary A/C units kept residences cool during the conversion process.

Conversions completed without resident relocation.

ALTERNATIVE PIPING SOLUTION

MegaPress fittings resolved challenges associated with piping network welding under apartment buildings.

Removed welding hazards (fire watch, confined spaces, fumes. etc.)

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CHALLENGE #4

Load Balancing

Solution:

- Mixed-use community approach
- Building energy modeling is system foundation
- Comprehensive modeling: ground loop, transient & hydronic

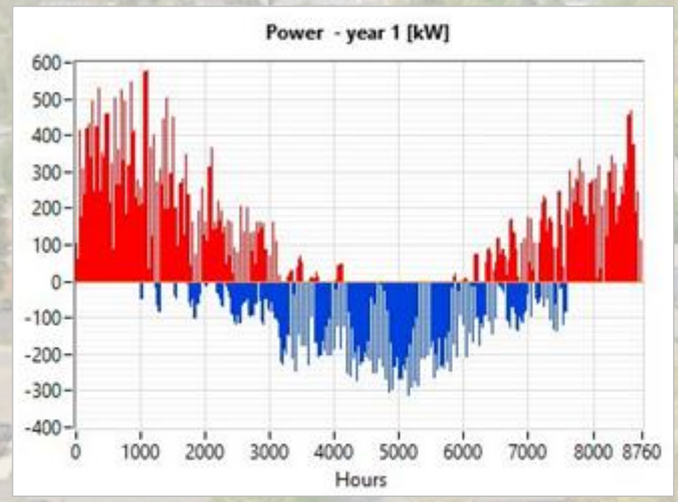
37 Buildings:

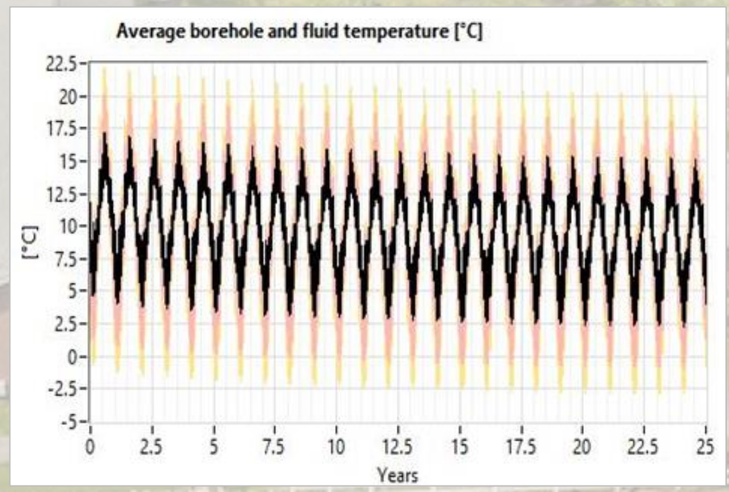
Single Homes: 22

Multifamily: 10

Commercial: 4

MassBay Community College





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CHALLENGE #5

Financial Considerations

Reduce installation & operational costs while ensuring long-term sustainability.

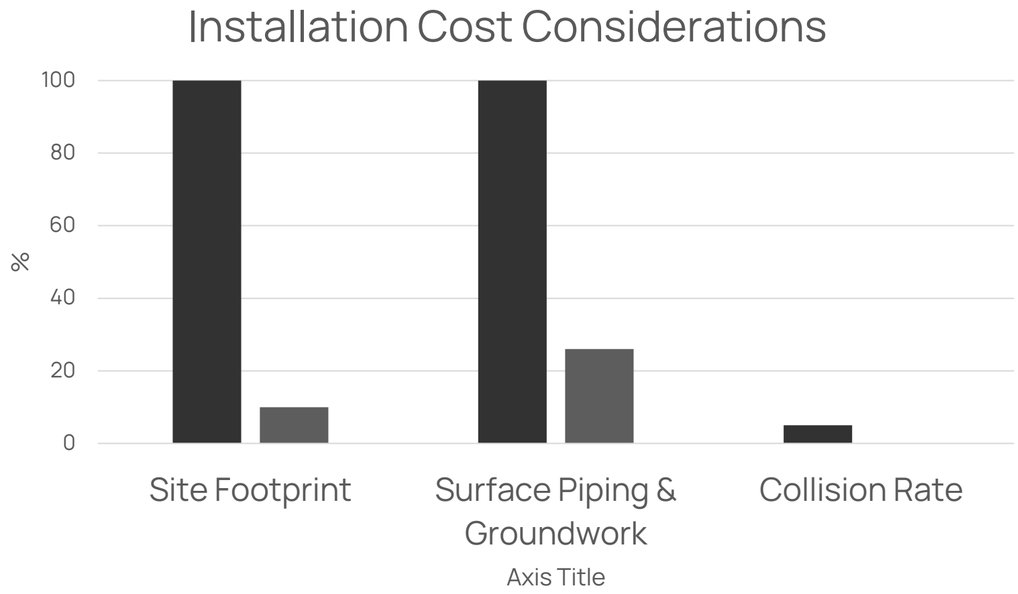
Solution:

Installation Cost Considerations:

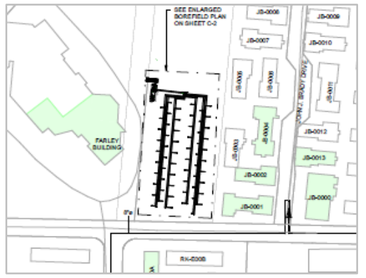
- -90% in site footprint reduction
- -74% in surface piping & related groundwork
- 0% collision rate on pyramid solution

Operational Cost Considerations:

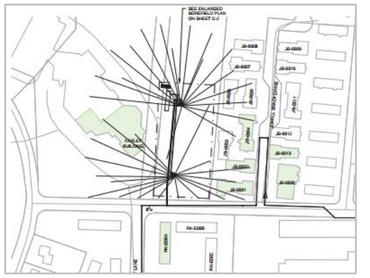
- Up to -20% on customer's average utility bill
- Estimated -75% energy usage for residents



■ Vertical (60 bores)



■ Pyramid (35 bores)



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Quality + Accessibility

Various measurements taken, using advanced and digitalized technologies, to ensure high-quality installation and system accessibility from anywhere.

QUALITY ASSURANCE

- Measured inclined bores (ensuring installation quality).
- Digital twin of GHX (confirming project delivery).

SYSTEM ACCESSIBILITY

- Performance monitoring.
- Remote access & controls.

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Key Project Benefits

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ENVIRONMENTAL IMPACT

~60% carbon emissions

Reduces reliance on fossil fuels

Aligns with Massachusetts' carbon-free future goals

COMMUNITY IMPACT

Geothermal for "environmental justice" community

Utility workforce/skillset transfer

Comfortable, affordable, equitable HVAC for all

SCALABILITY

Reduce cost per building conversion

Potential expansion to other neighborhoods & cities

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Future Vision

Solving technical, climate, equality challenges

SCALING THE NETWORK

Expansion:
Framingham Networked Geothermal Pilot Phase II

INDUSTRY-WIDE IMPACT

Gas to Geo: a model for utilities across the U.S.

Significant electricity reduction for building electrification conversions.

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Project Summary

NATION'S FIRST UTILITY-RUN THERMAL ENERGY NETWORK

SYSTEM

- 375 tons of heating and cooling load.
- 1-mile ambient geothermal loop (90 bores | 3 fields).
- Serving 37 buildings < >140 utility customers.

HIGHLIGHTS

- Focused stakeholder & community engagement.
- Geothermal access for "environmental justice" community.
- -90% construction footprint reduction via pyramid drilling.
- Installation & operational cost reductions.
- Enhanced system quality + accessibility through advanced drilling and digital monitoring solutions.
- ~60% reduction in carbon emissions.

PROJECT VISION

A decarbonization blueprint for future utility-run thermal networks nationwide.

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