



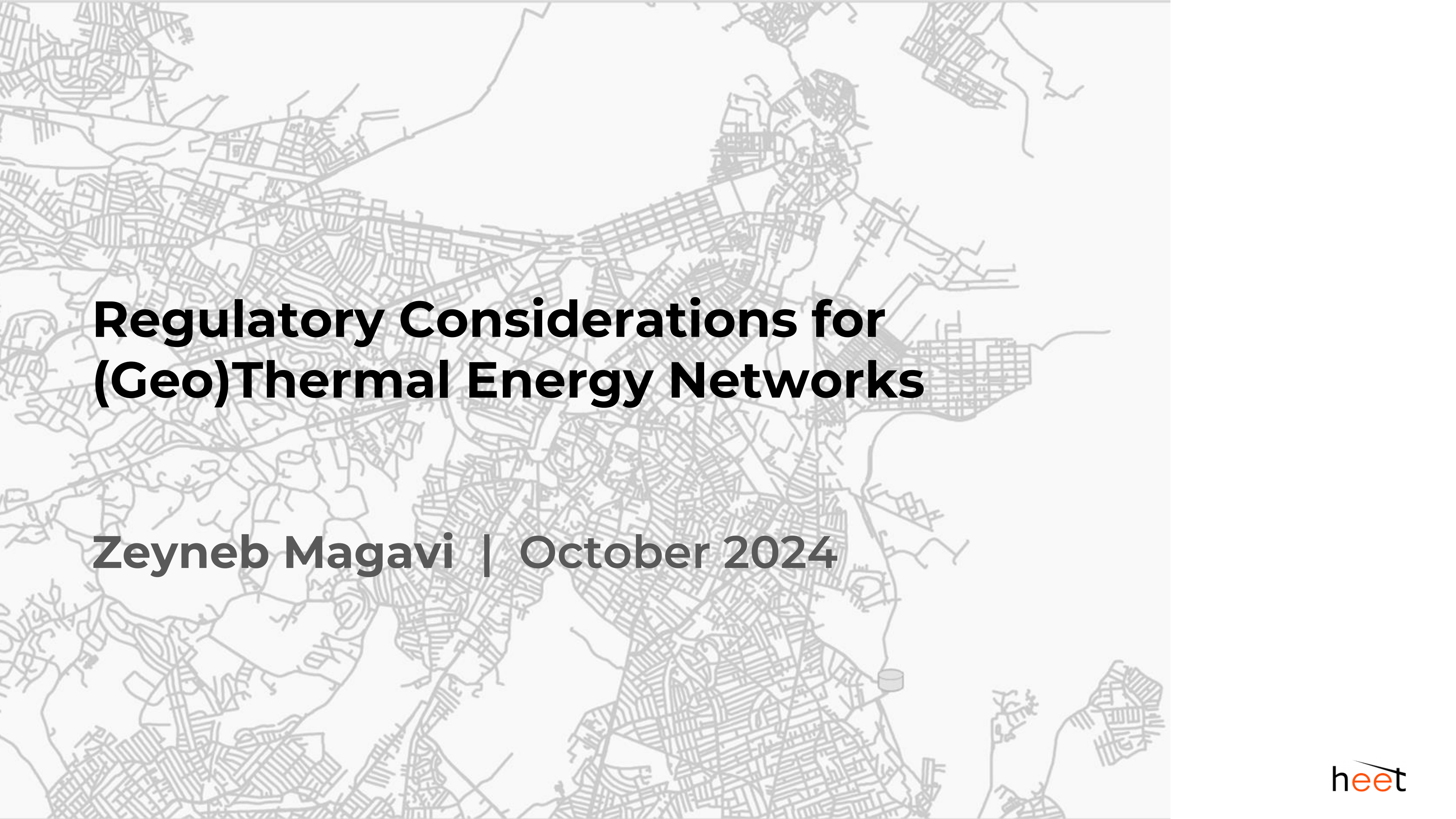
NY - GEO 2024
October 22 -23 | BROOKLYN, NY



Building the Regulatory Standard for Thermal Energy Networks

Moderator: Laurie Kokkinides / *NYS Department of Public Service*

Panel:
Zeyneb Magavi / *HEET*
William Akley / *Advisor to HEET*
Alex Buell / *Con Edison*
Cole Burgess / *NYSEG & RG&E*

A light gray background map showing a dense urban street grid. The map is centered on a city area with a prominent grid pattern, surrounded by more irregular street layouts and some green spaces. The map is rendered in a minimalist, line-art style.

Regulatory Considerations for (Geo)Thermal Energy Networks

Zeyneb Magavi | October 2024

DEMONSTRATION

First project in the ground - a learning experience for all

Ratepayer cost low.

Begin the process of:

- Education
- Definitions
- Data gathering
- Collecting possible approaches

DEVELOPMENT

Increasing projects coming down the learning/cost curve while gathering data needed to inform fair deployment decision making and ratemaking

Ratepayer cost 'fair' but not linked to capital cost yet.

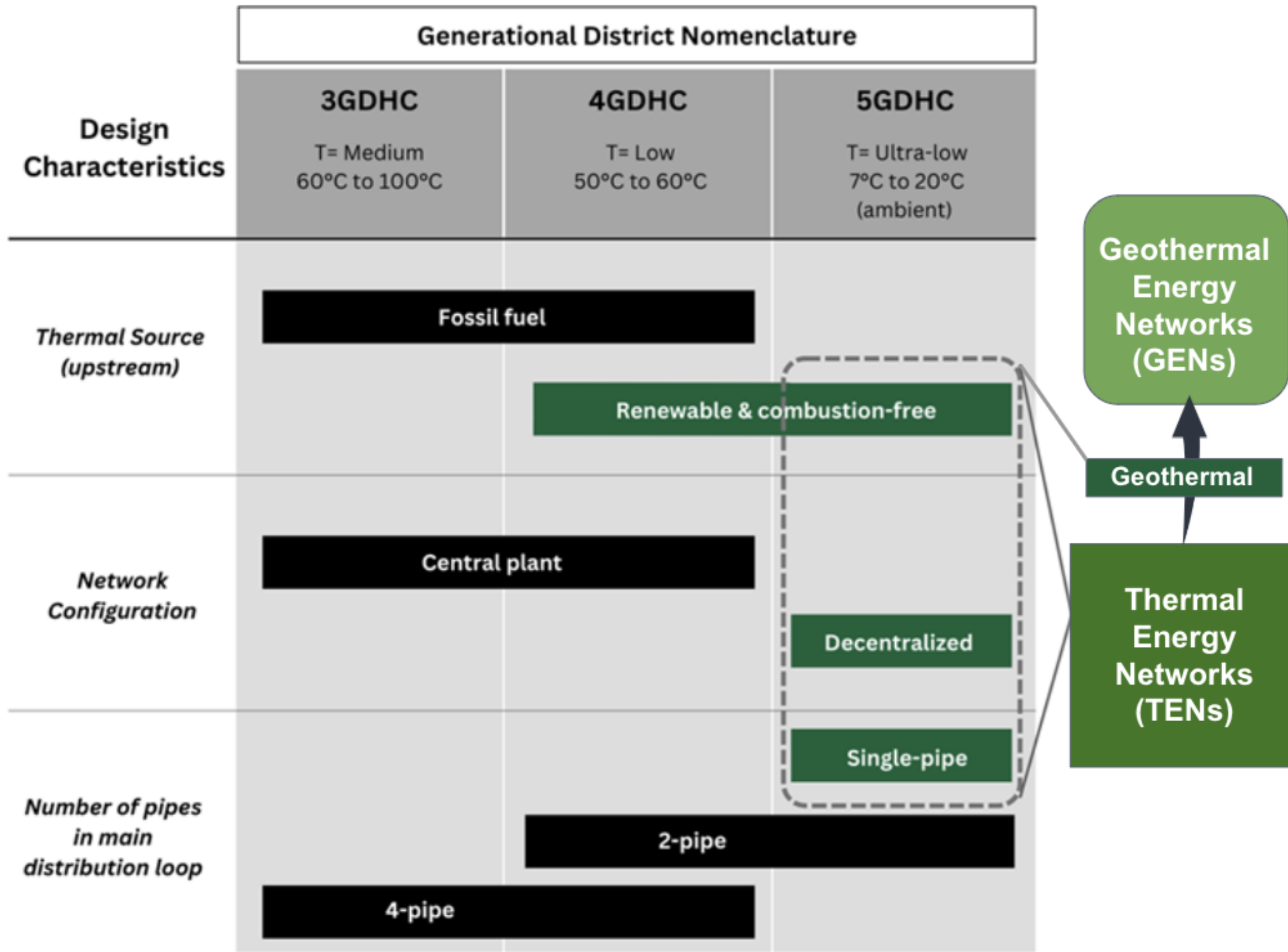
- Intense data gathering
- Test possible approaches and models

DEPLOYMENT

A stage of significant scaling with guidelines and guardrails with fixed:

- Ownership structure
- Financing model
- Ratemaking process
- Approval process

Proposed regulatory stages for new utility infrastructure



Clear Nomenclature is needed to ensure the intent is linked to the outcome.



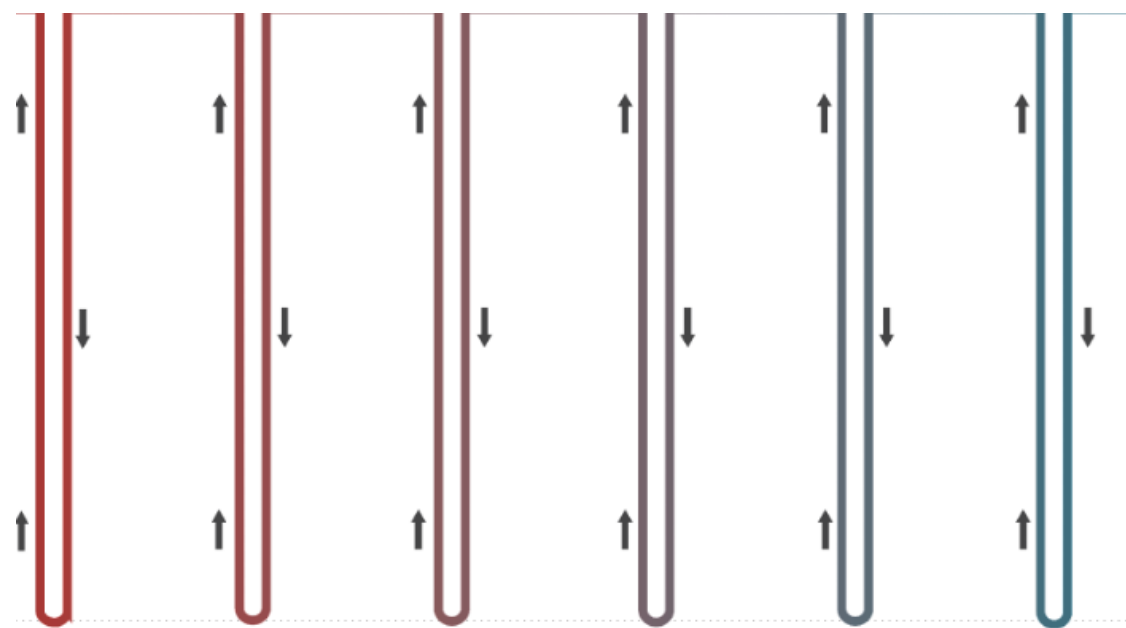
BUILDINGS :
(GROUND SOURCE HEAT PUMP)

Each component of a GeoThermal Energy Network, connected makes the whole but may have separate:



UTILITY INFRASTRUCTURE:
(THERMAL ENERGY NETWORK)

Business models
Owners
Financing models
Cost curves
Regulatory needs
etc...



ENERGY RESOURCE:

GEO THERMAL ENERGY:

- BEDROCK
- LAKES, RIVERS, PONDS

WASTE THERMAL ENERGY:

- WASTEWATER EXCHANGE
- INDUSTRIAL WASTE HEAT
- ETC...

- ✓ 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

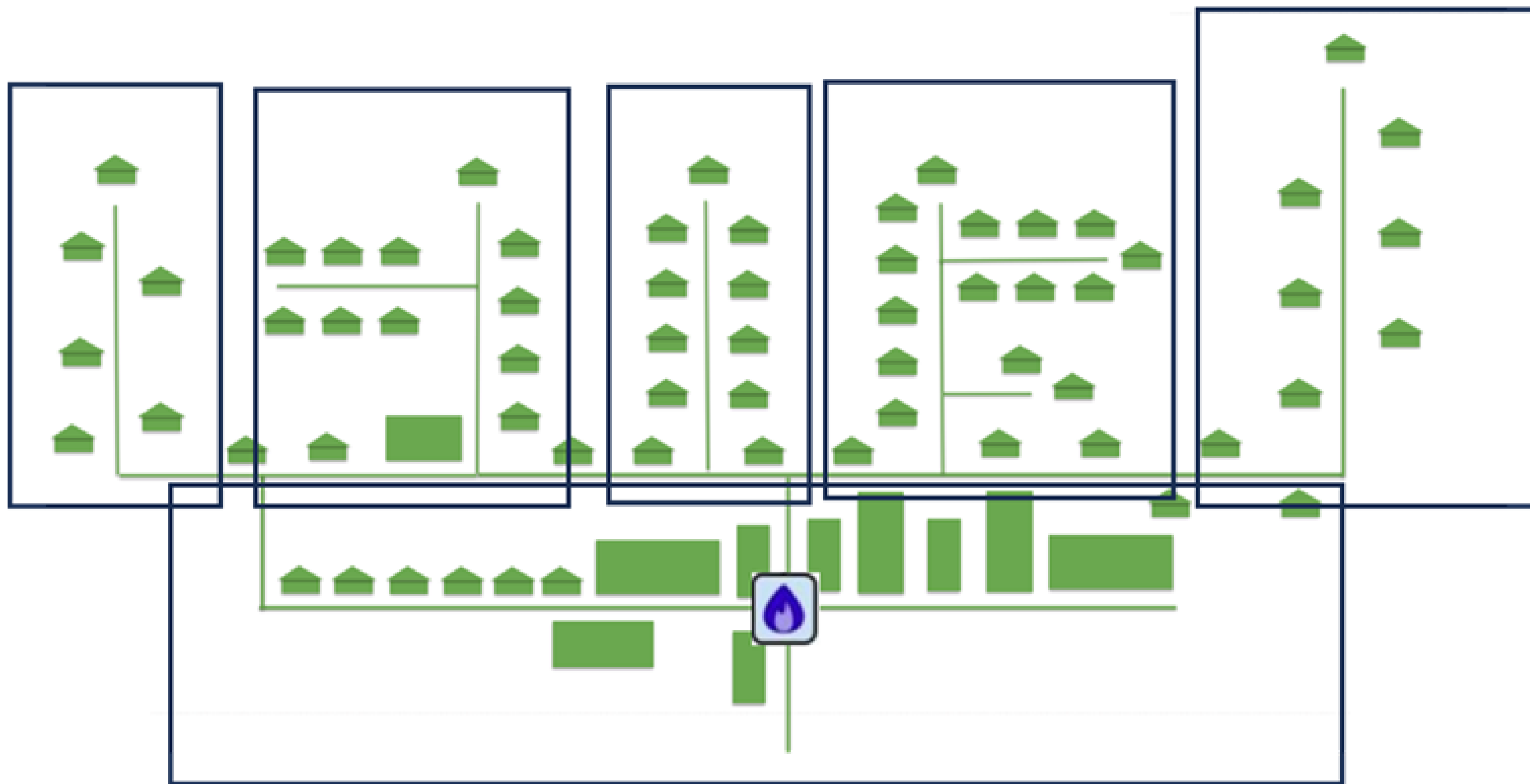


These benefits are achievable.

Which ones will we prioritize ?

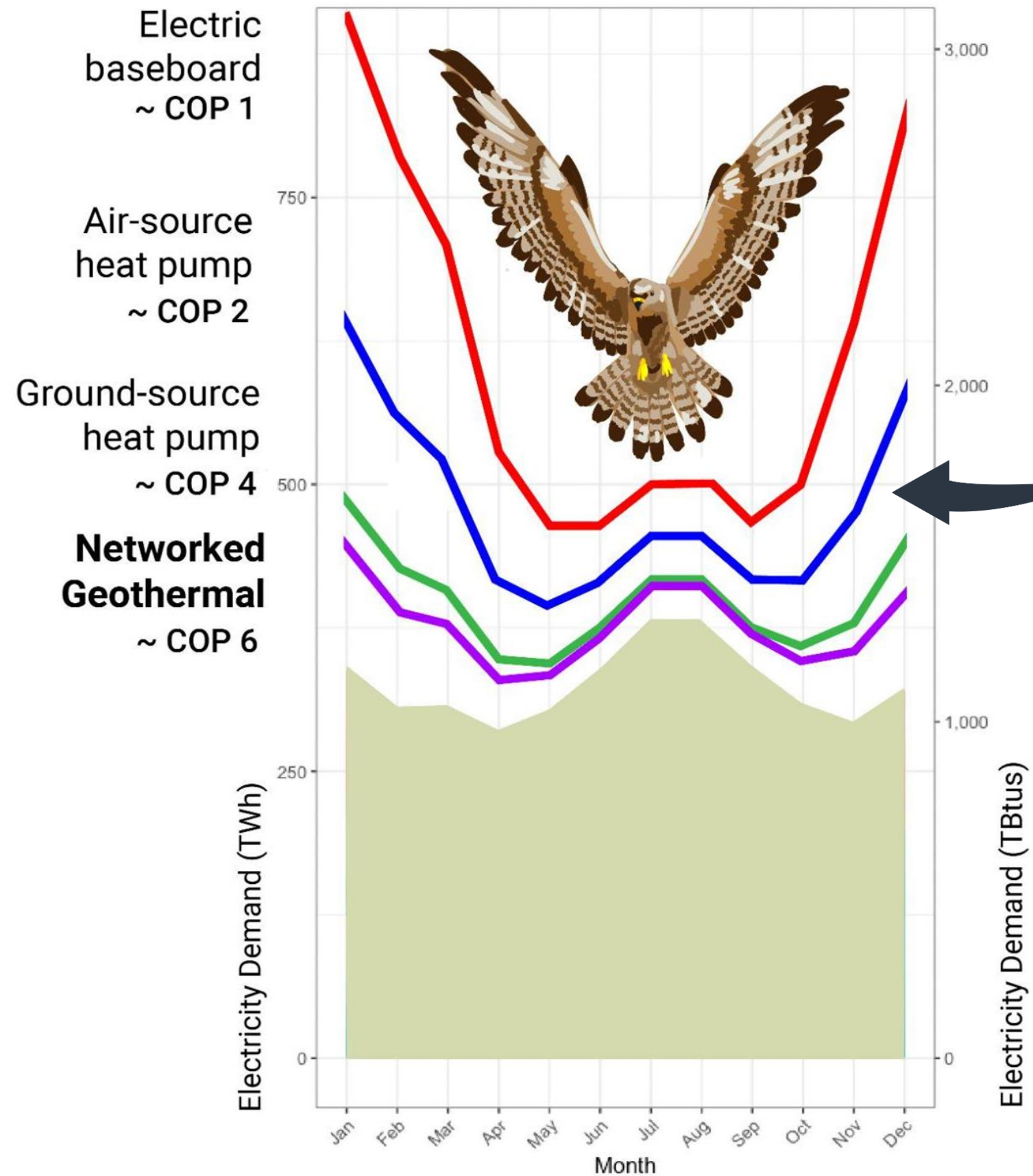
AND

Will we monetize them ?



‘Scaleable & Adaptable’ ?

Single pipe systems can most easily expand, interconnect and adapt.



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

A recent U.S. DOE
report predicts a 34%
load reduction for
Massachusetts by
shifting from air-source
to ground-source heat
pumps

(and more than 1.6
trillion net present value
savings nationally)

‘Benefits
Electric grid’ ?

Geothermal
boreholes drive
outcomes
listed.

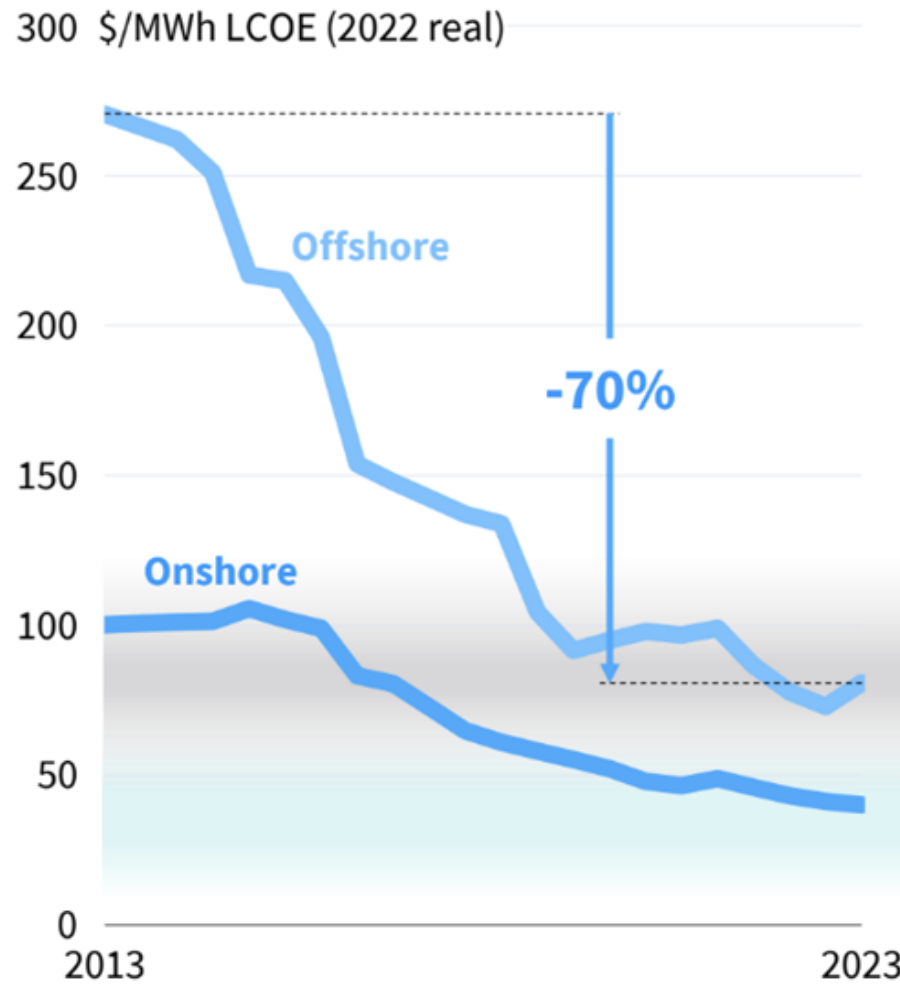
AND do we
monetize this
through
regulatory
mechanisms.

At what scale?

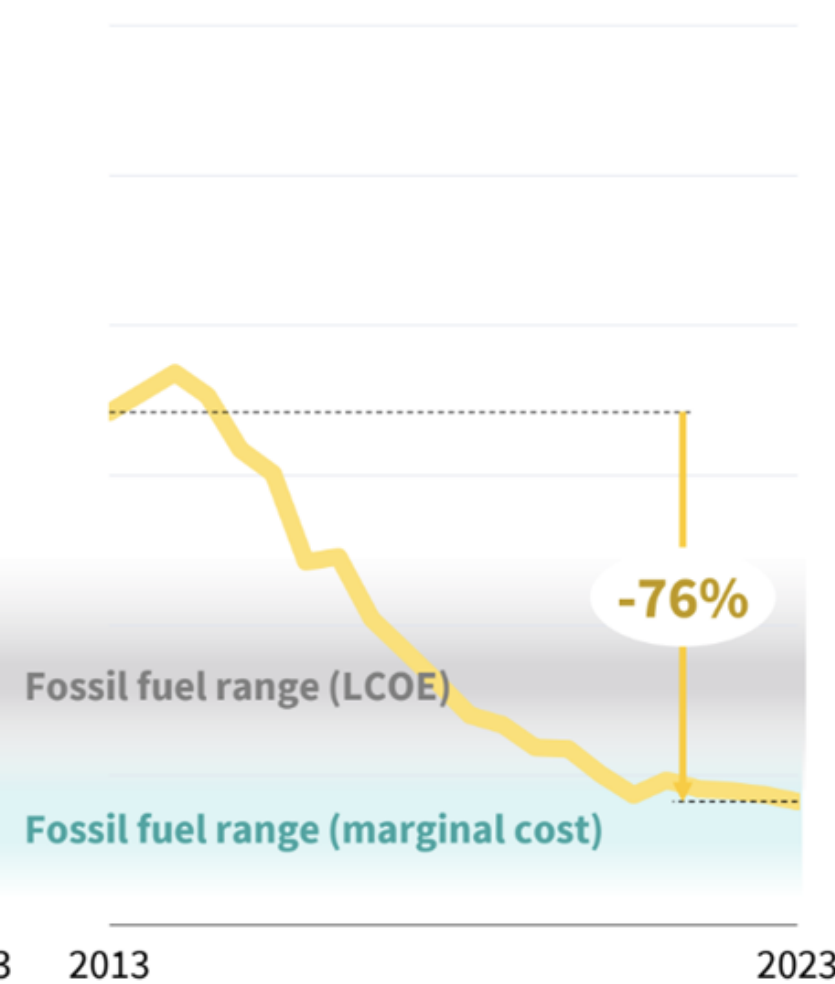
Cleantech costs have fallen rapidly

Clean technology costs fall by around 20% for every doubling of deployment — Wright's Law

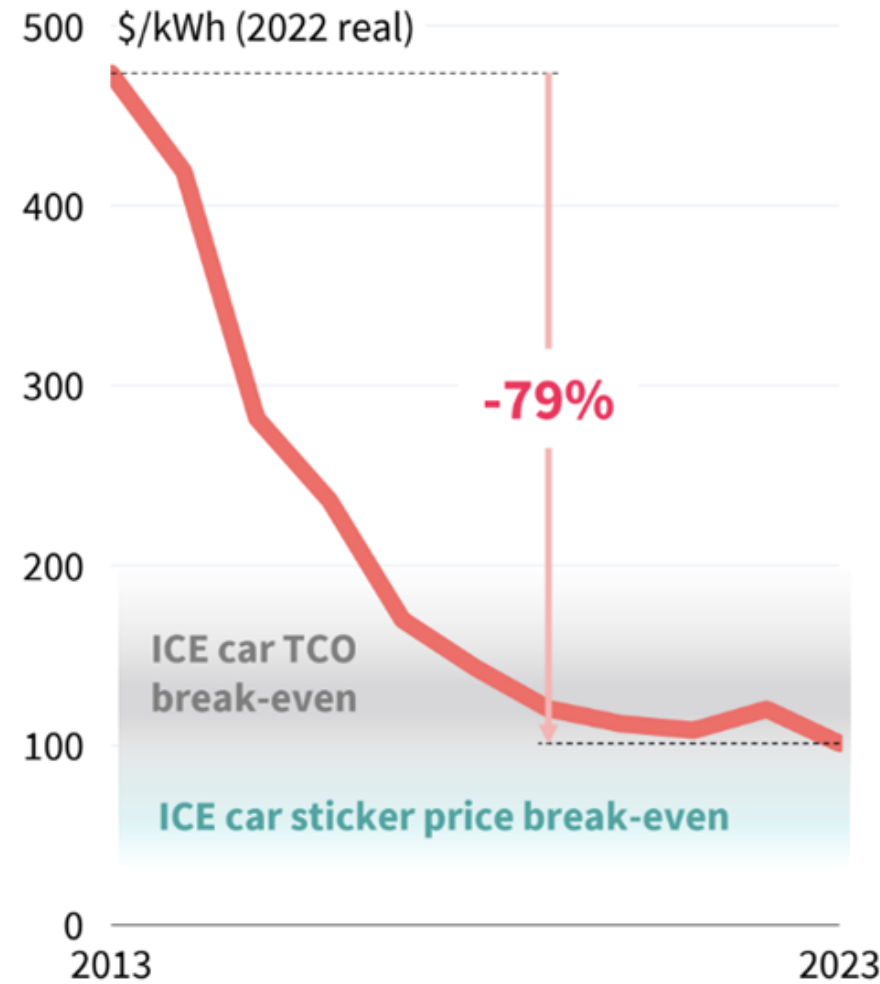
Wind



Solar



Battery costs



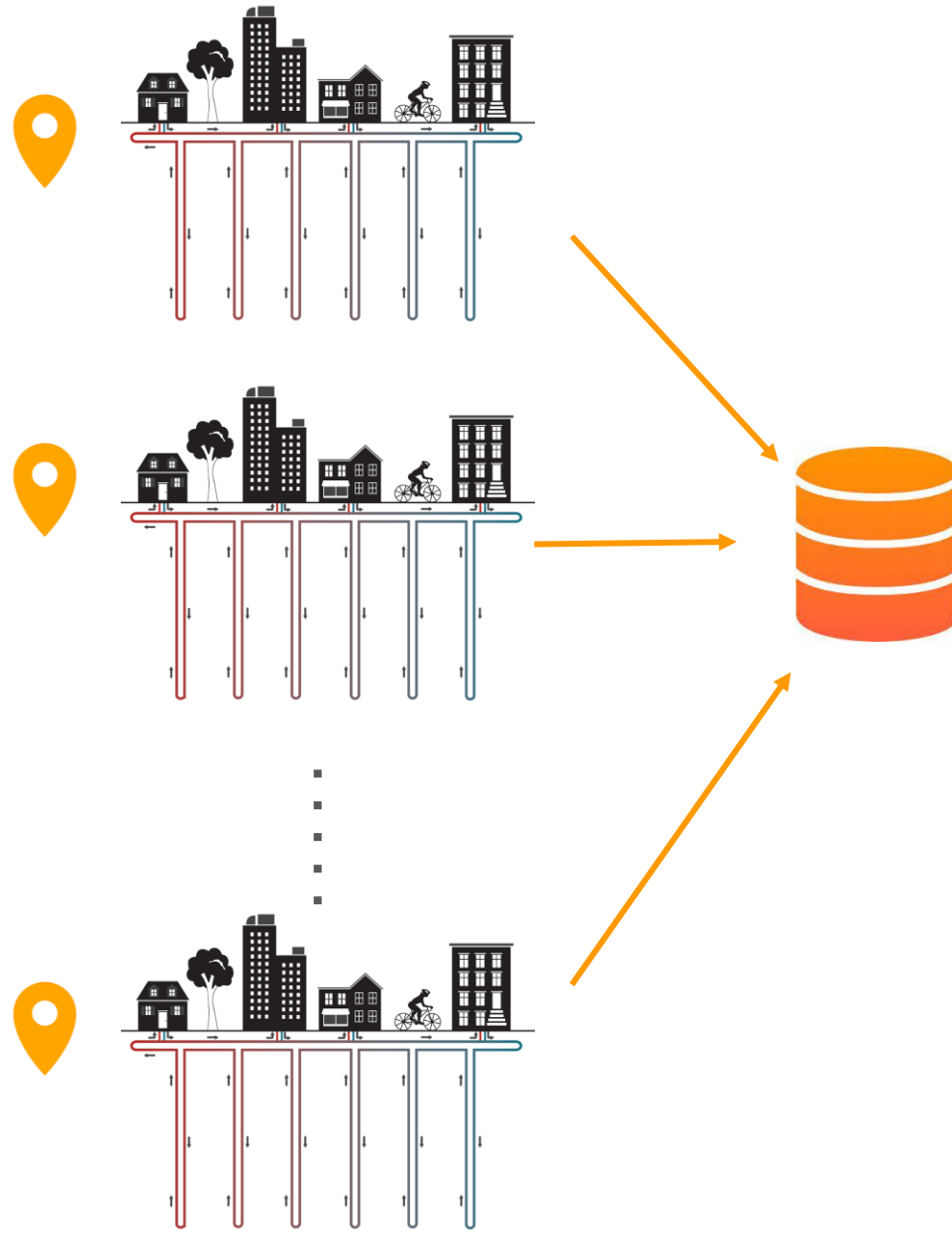
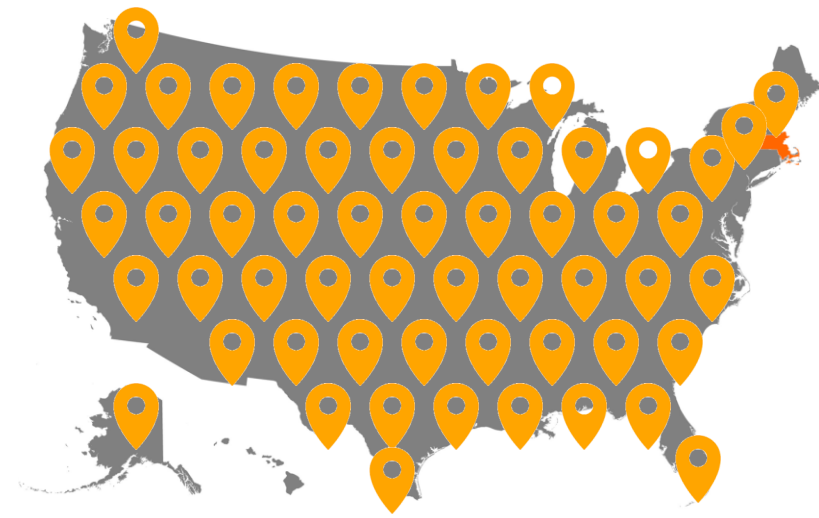
RMI Source: BNEF, RMI ranges.

12

Will Geothermal Energy Networks follow Wright's Law?

So far, possibly!

Colorado Mesa University:
Cost/ton is approx. \$7,400 but additional cost/ton is \$3,284



GENDataBank

Relational database with user interface for cross-comparison

Maryland legislation requires utilities submit standard data set - delivering value to rate payers

What A public data bank of geothermal energy networks (GENs)

Why to inform and facilitate rapid learning and optimization, enabling societal-scale building decarbonization

Techno-economic model can help to answer questions like...

Is it worthwhile to spend more money upfront to improve system performance?

How much will system operators need to charge customers to recover costs on a specific design?

How will customer monthly bills change?

What happens if we AVOID front loading of level nominal payment - possibly use real annuity?

NREL has developed HEET's LeGUp **techno-economic** model for geothermal networks

THANK YOU



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NY Geo Panel –
Building the
Regulatory
Standard for
Thermal Energy
Networks

Bill Akley, *Advisor to HEET*

NY Geo Panel – Building the Regulatory Standard for Thermal Energy Networks

The Building Blocks

- Accelerated Learning – leveraging ongoing activity, advancing technology/efficiencies, gathering data
- Understand thresholds to advancing and scaling
 - Consistency with applicable laws/policies/precedent
 - Reasonableness of size, scale & scope in relation to likely benefits to be achieved
 - Adequacy of performance metrics & evaluation plans
 - Resources and capabilities
 - Bill impact to customer
- Site Selection/Engagement
- Importance of Integrated Planning

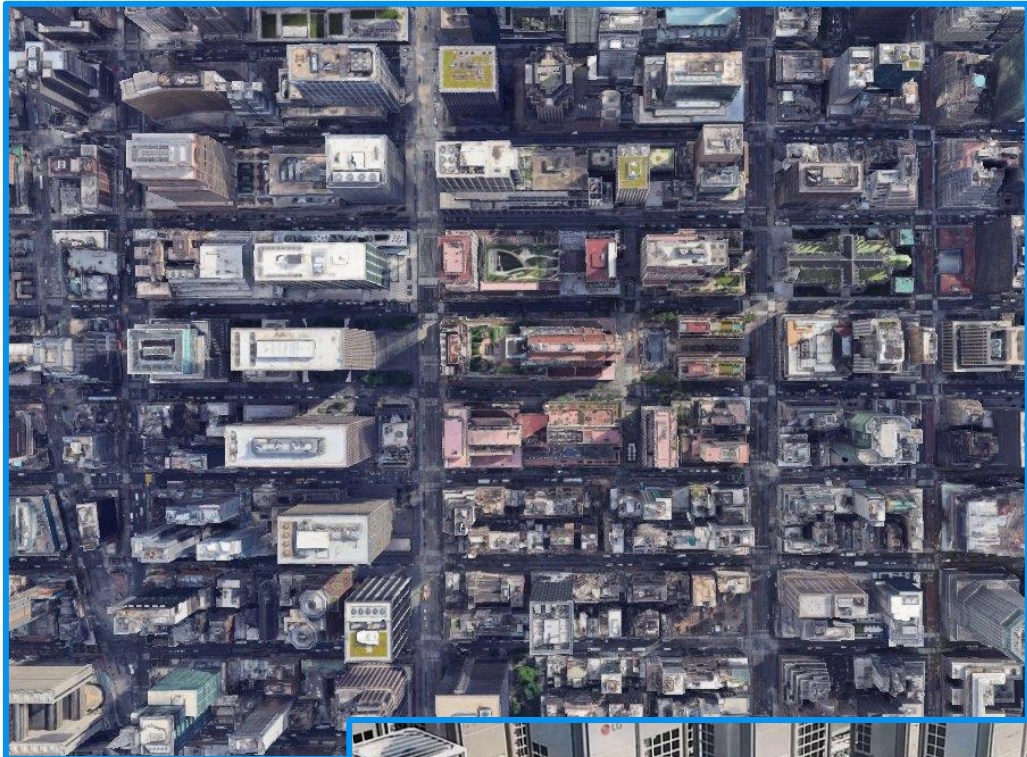
NY-GEO Brooklyn 2024: Building Regulatory Standards for Thermal Energy Networks



Alex Buell, Con Edison

Potential benefits of UTEN decarbonization in Con Edison territory

Optimization of limited space



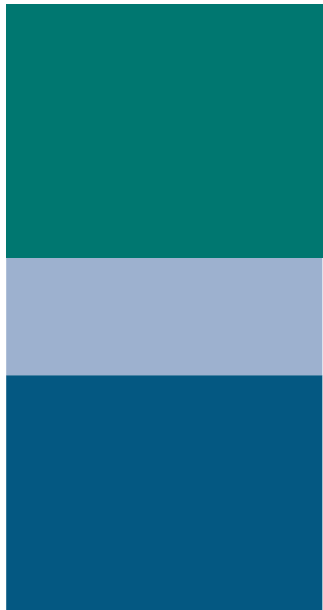
Customer upfront cost reduction



Lower electric system costs

Early estimate

- UTEN network
- Customer upgrades & equipment
- Electricity sector



UTEN system

Air Source Heat Pump

Utility Thermal Energy Networks and Jobs Act (UTENJA)

Permits utilities to own and operate thermal energy networks in their service territories, beginning with proposing and building 1-5 pilot projects

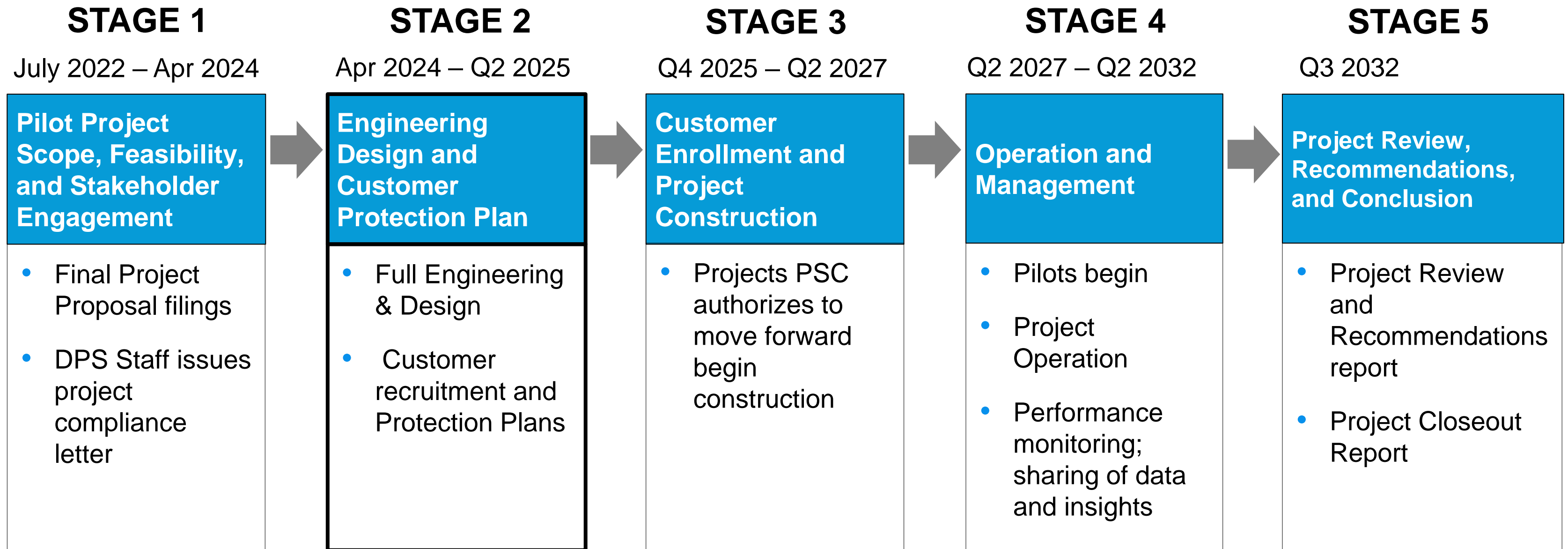
Statewide Objectives of UTEN Systems

- *Emissions reduction:* Meaningfully contribute to State electrification goals
- *Cost mitigation:* Electrify efficiently to reduce total costs where possible
- *Equity:* Increase access of efficient electrification benefits to disadvantaged communities and/or low-income customers
- *Just transition:* Provide opportunity for transition of gas workforces

Statewide Pilot goals

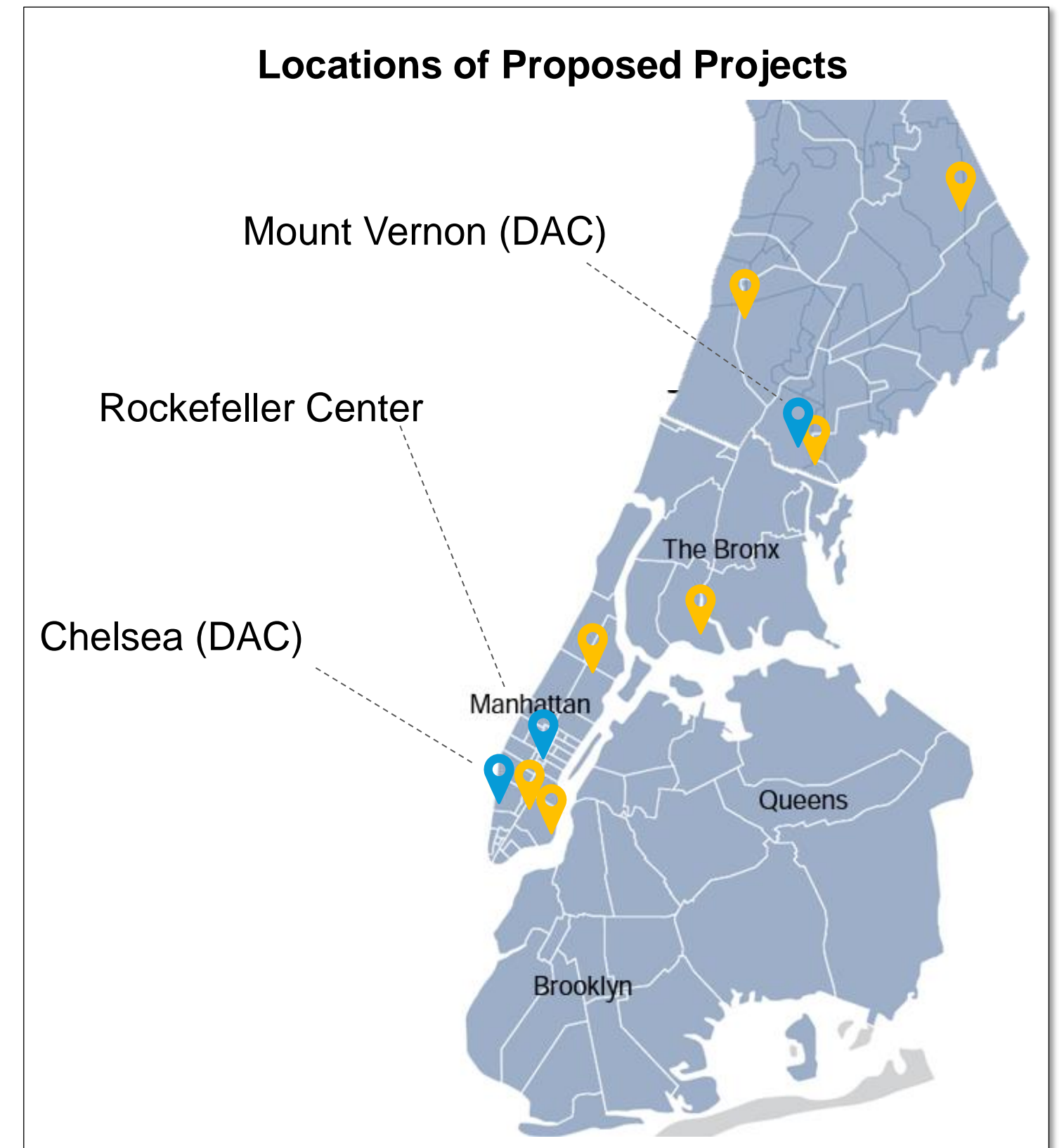
- Inform the Public Service Commission's decisions on the various ownership, market, and rate structures for thermal energy networks

Phased Approach to Pilot Project Approval Timeline



Con Edison pilot approach

- Reviewed 10 RFI submissions and previous Con Edison studies
- Pilot selection considerations:
 - Timeline & feasibility
 - At least 2 benefitting disadvantaged communities
 - Contribution to testing range of use cases and configurations for dense and light urban environments
 - Thermal sources (geothermal, excess heat sources)
 - Building type, size, height, layout, and age
 - Customer types (residential, multifamily, medium and large commercial)
 - Neighborhood density (light urban, urban, dense urban)
 - Future expansion potential
 - Non Pipe Alternative potential



DAC: Disadvantaged Community

Mount Vernon Pilot

Highlights

Disadvantaged Community

Two connected district geothermal loops

Over 100 boreholes

Up to 76 buildings

Residential, churches, fire station, medical offices and recreational center

Heating, cooling & hot water

Retirement of up to 500' section of leak-prone gas pipe

Rate design varies by customer class

\$76.2M



Chelsea Pilot

Highlights

Disadvantaged Community

Waste heat from commercial office building with data center

4 New York City Housing Authority (NYCHA) buildings

Heating, cooling, & hot water

Proximity to added thermal resources, including Hudson River, for potential expansion

Rates include payment for thermal energy resource

\$92.5M



Rockefeller Center Pilot

Highlights

Waste heat from Rockefeller Center Central Plant

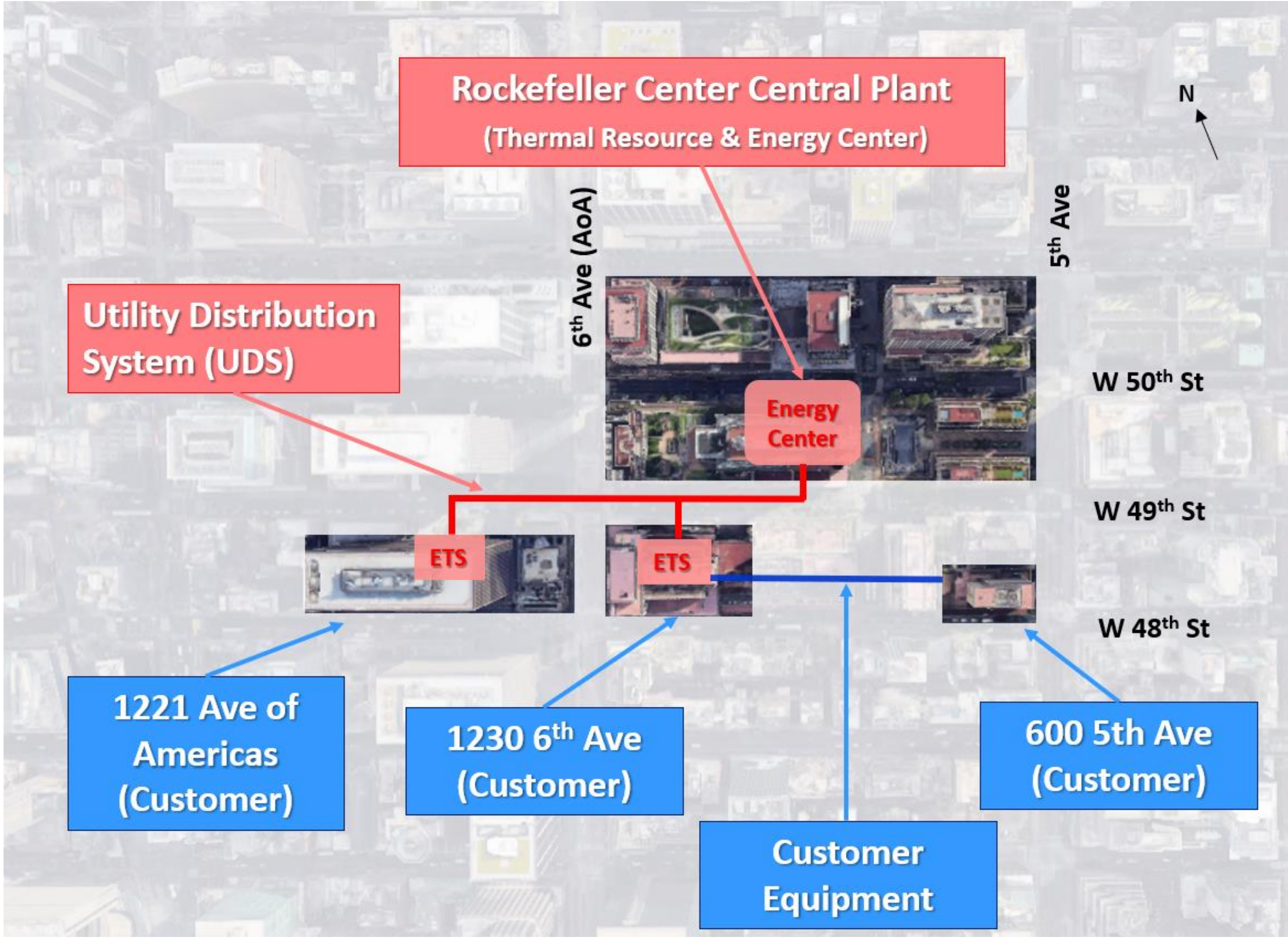
Variety of waste heat sources: chilled water system, steam condensate, ice plants

3 large commercial office buildings in Midtown Manhattan

Building heating converted to large scale WSHPs

Creation of “marketplace” to exchange waste heat energy between independent building owners

\$86.6M



Some pilot success factors to date



- **Meet customers where they are:** naturally cautious about going through building upgrades and utilizing new systems
 - Upfront cost assistance (especially DACs)
 - Assurance around system performance and UTEN bills, including for tenants
 - Post-pilot protections
 - Community and stakeholder engagement

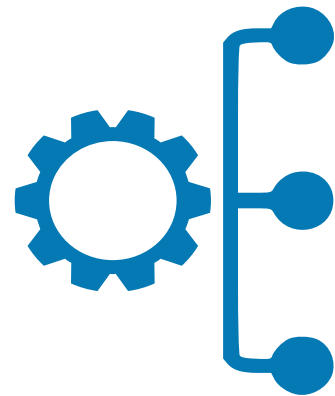


- **Recognize scale of effort:** highly complex projects with interlocking design, engineering, construction, customer, financial and regulatory issues
 - Dedicated project team
 - Systematic gathering and sharing of best practices
 - Engagement of utility's full resources (20+ different organizations)

What will be needed to scale post-pilot



- Rigorous fact base grounded in pilot learnings and data
 - Cost/benefit analysis of networks at scale (societal value, customer economics)
 - Customer learnings
 - Prioritization (use cases, configurations, types of locations)



- Thoughtful regulatory framework
 - Criteria and processes to create / expand PSC-regulated networks
 - Flexibility for UTEN to be deployed wherever it's the right decarbonization tool for the job
 - Electric peak reduction / Non Wires Solution
 - Non Pipe Alternatives
 - Steam system efficiency / expansion



- Continued cross-industry engagement

NYSEG & RG&E Utility Thermal Energy Networks (UTENs)

10/22/24



Agenda

01 Introduction to New York Avangrid Companies

02 Legislative & Regulatory Framework

03 NYSEG & RG&E Proposals

04 Collaboration

05 Concurrent Industry Activity

06 Considerations

NYSEG & RG&E Companies Introduction



New York State Electric & Gas (NYSEG)

- Combination utility: electric, gas, and thermal (proposed)
- 2.7 million people served
- 905,005 electricity customers
- 271,547 natural gas customers
- 42 Counties served

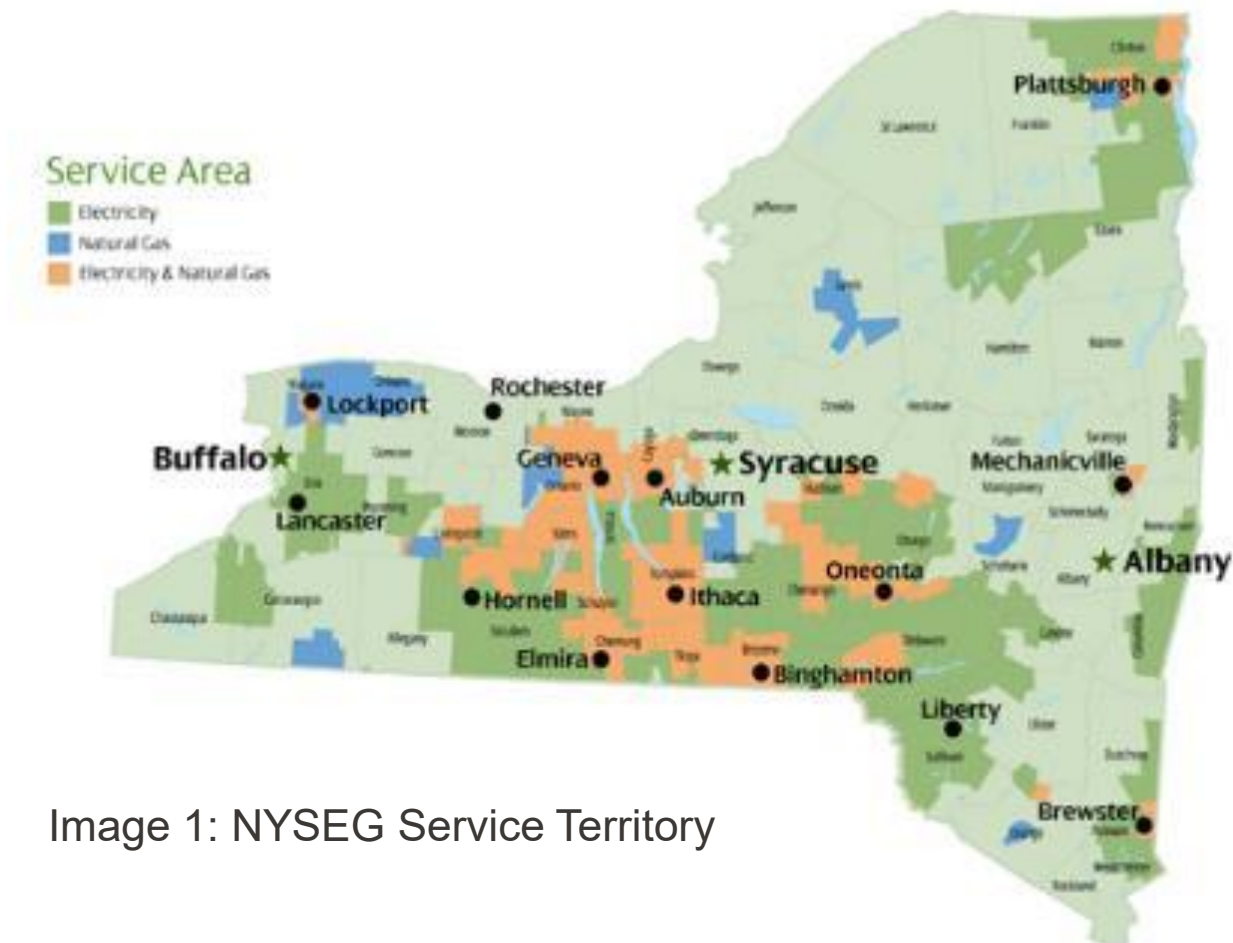


Image 1: NYSEG Service Territory

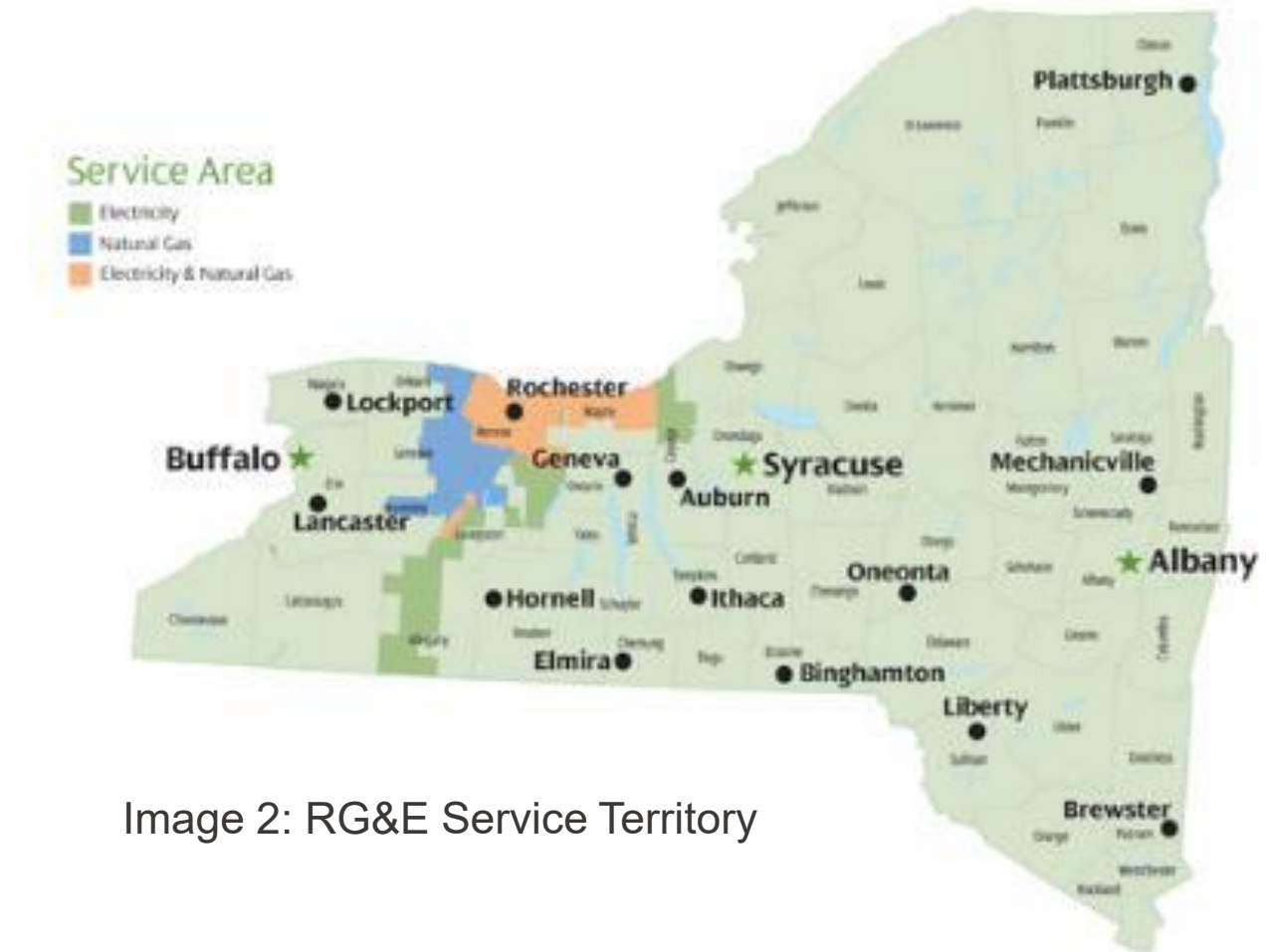


Image 2: RG&E Service Territory

Rochester Gas & Electric (RG&E)

- Combination utility: electric, gas, and thermal (proposed)
- 1 million people served
- 388,737 electricity customers
- 271,547 natural gas customers
- 9 Counties served

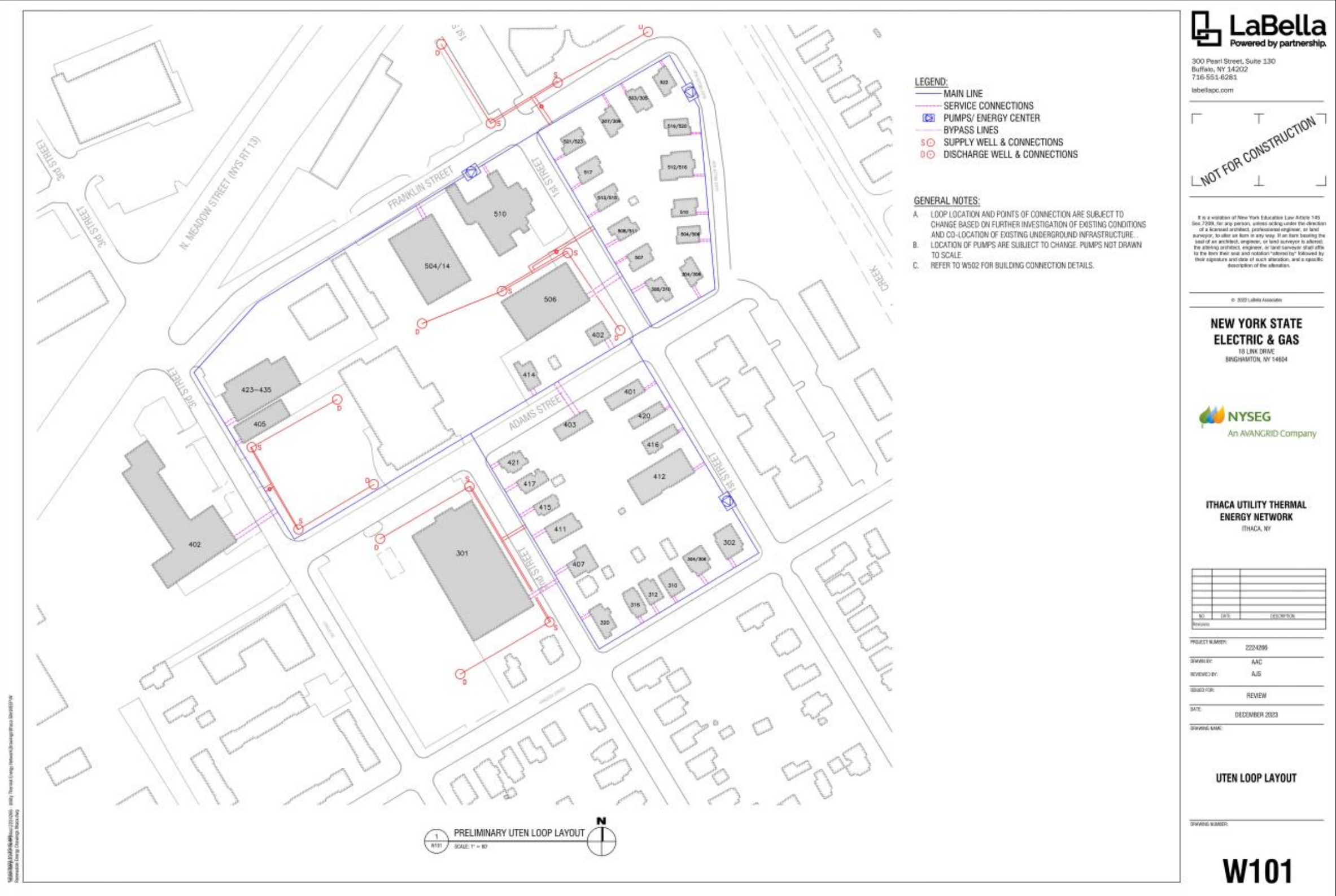


- “Require” or “Allow” or “Propose”
- Project Proposal Identification & Advancement Timing
- Resource Considerations

“Based on past Commission experience with pilot projects, a three-month timeframe is likely insufficient for the development of well considered, shovel-ready pilot projects that meets the intent of the Act, particularly given the new and complex nature of the projects at issue.”¹

“The Utilities are developing these pilot projects, which is a daunting undertaking.”²

NYSEG Utility Thermal Energy Network Ithaca Pilot Proposal

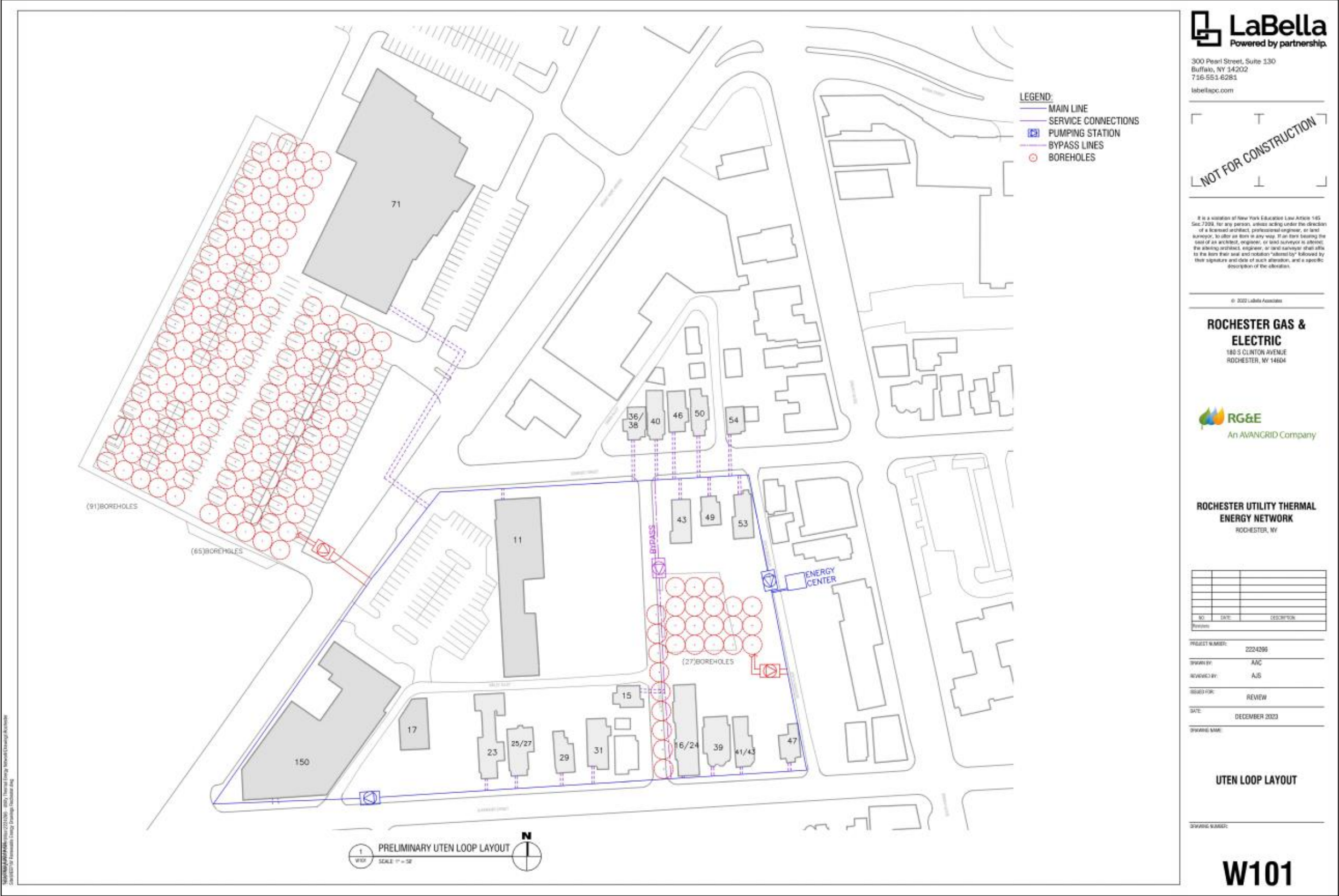


- Open Loop Geothermal System
- 8 Supply & 8 Discharge Wells Proposed
 - Additional Permitting
- 39 Proposed Buildings
 - 8 Non-Residential Buildings
 - 31 Residential Buildings
 - Project area is inclusive of a grouping of Housing Authority properties.
- \$51.7M Capital Cost Estimate
- Located in a Disadvantaged Community³



Image 3: NYSEG UTEN Proposal

RG&E Utility Thermal Energy Network Rochester Pilot Proposal



- Closed Loop Geothermal System
- 183 Wells Proposed
- 300 Foot Well Depth Proposed
- 21 Proposed Buildings
 - 4 Non-Residential
 - 17 Residential
- \$43.7M Capital Cost Estimate
- Located in a Disadvantaged Community



Image 4: RG&E UTEN Proposal



Technical Conferences

Proceeding on Motion of the Commission to Implement the Requirements of the Utility Thermal Energy Network and Jobs Act⁴ (Case Number: 22-M-0429)

- Future Date - District Energy System Technical Conference
- December 1, 2022 - UTEN Technical Conference: Thermal Energy Networks 101

In the Matter of Utility Thermal Energy Network **Performance Metrics**⁵ (Matter Master: 24-00515)

- September 30, 2024
- May 7, 2024
- April 25, 2024
- March 19, 2024

Matter of Utility Thermal Energy Network **Terms & Definitions**⁶ (Matter Master: 23-02117)

- November 9, 2023
- October 11, 2023

Industry Collaboration



- Customers
- Geothermal Drilling Companies
- HVAC Companies
- Utilities
 - 100+ Internal Departments may be engaged
 - Utility Networked Geothermal Collaboration (UNGC) - 28 Utilities

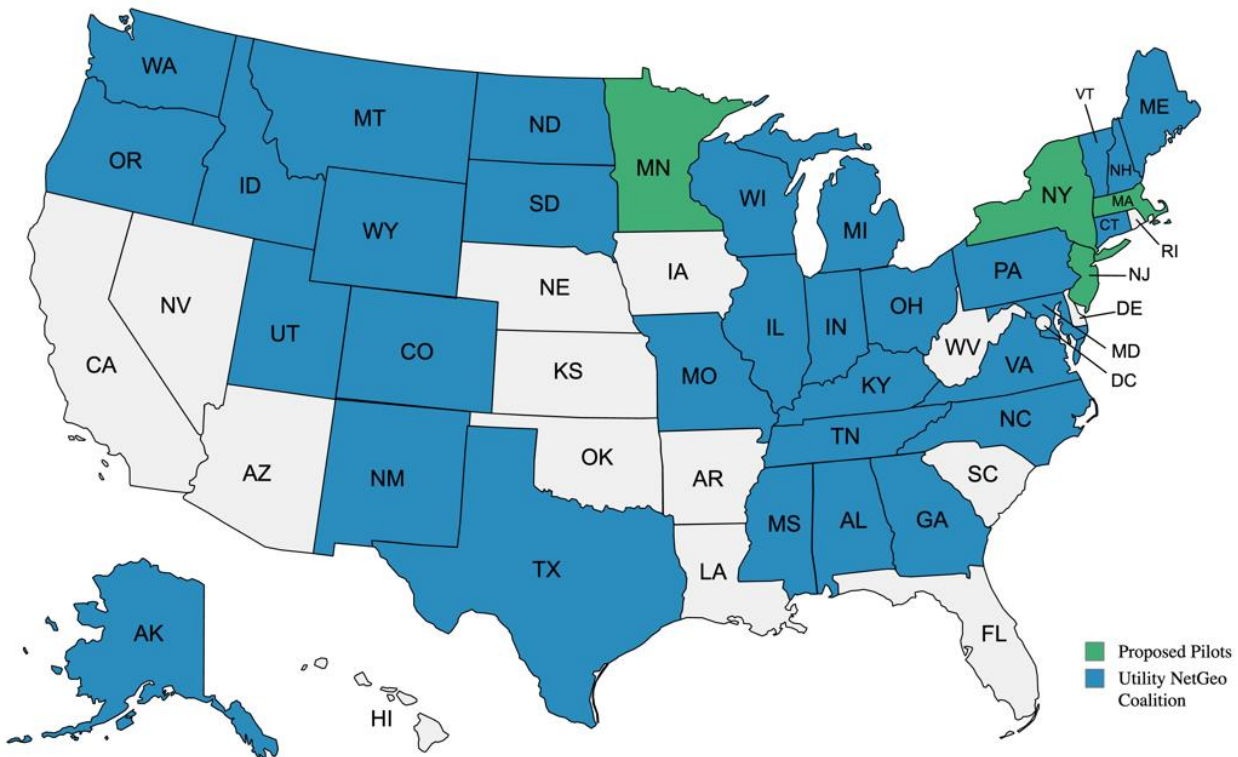


Image 5: Utility Networked Geothermal Overview



Image 6: Geothermal Header Pressure Testing – Customer System



Image 7: Geothermal Handhole - Eversource

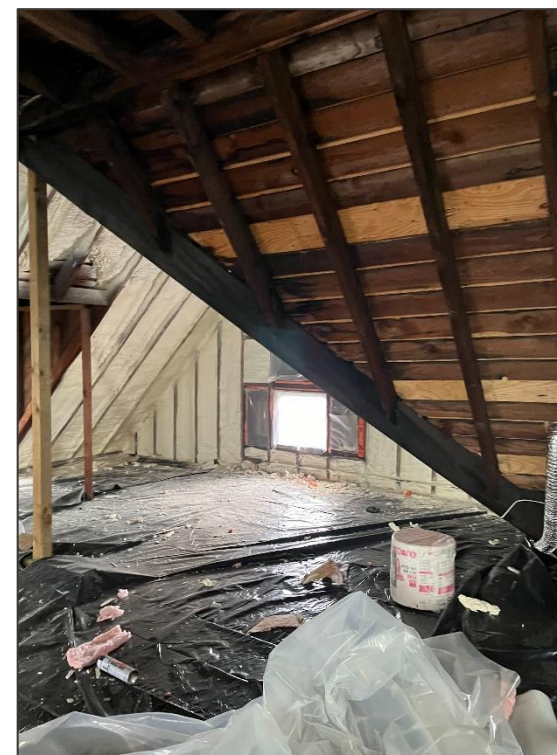


Image 8: Building Weatherization of Residential Home



Image 9: Geothermal Drilling for Residential Home



Image 10: Eversource - Thermal Distribution Main



Workforce Development

- International Ground Source Heat Pump Association (IGHSPA)
- NYSERDA

Investment Tax Credit Section 48⁷

Utility Energy Efficiency Programs & State Incentive & Grant Programs

- Building Weatherization Improvements



Uncertainty

- Caveats during discussions - “Proposed” or “Potential”
- Five Years and then what?
 - **Initial Utility Thermal Energy Network Rules**⁸
 - Terms in a **Customer Agreement** are specific to the Pilot duration



1. Case Number: 22-M-0429 *Order on Developing Thermal Energy Networks Pursuant to the Utility Thermal Energy Network and Jobs Act* (Issued September 15, 2022) page 13
2. Case Number: 22-M-0429 *Order Adopting Initial Utility Thermal Energy Network Rules* (Issued July 18, 2024) page 3
3. Climate Justice Working Group final 'disadvantaged communities' criteria approved and adopted on March 27, 2023.
<https://climate.ny.gov/resources/disadvantaged-communities-criteria/>
4. Case Number: 22-M-0429 *Proceeding on Motion of the Commission to Implement the Requirements of the Utility Thermal Energy Network and Jobs Act*. <https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=68607&MNO=22-M-0429>
5. Matter Master: 24-00515 *In the Matter of Utility Thermal Energy Network Performance Metrics*
<https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=73006&MNO=24-00515>
6. Matter Master: 23-02117 *Matter of Utility Thermal Energy Network Terms & Definitions*
<https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=71833&MNO=23-02117>
7. 26 USC 48: Energy credit [https://uscode.house.gov/view.xhtml?req=\(title:26%20section:48%20edition:prelim\)](https://uscode.house.gov/view.xhtml?req=(title:26%20section:48%20edition:prelim))
8. Case Number: 22-M-0429 *Order Adopting Initial Utility Thermal Energy Network Rules* (Issued July 18, 2024)





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Questions?

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