BUILDINGENERGY NYC

Breaking Ground on Geothermal & Thermal Energy Networks: A Pathway for Urban Areas

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Curated by Sara Bayer (MAP) and Amalia Cuadra (EN-POWER GROUP)

Northeast Sustainable Energy Association (NESEA)
September 15, 2022

ABOUT

BRIGHTCORE

WE LEAD WITH OUR INTELLECTUAL CAPITAL AND TECHNICAL EXPERTISE

WE INVEST OUR FINANCIAL CAPITAL TO TRANSITION YOUR BUILDINGS TO CLEAN ENERGY

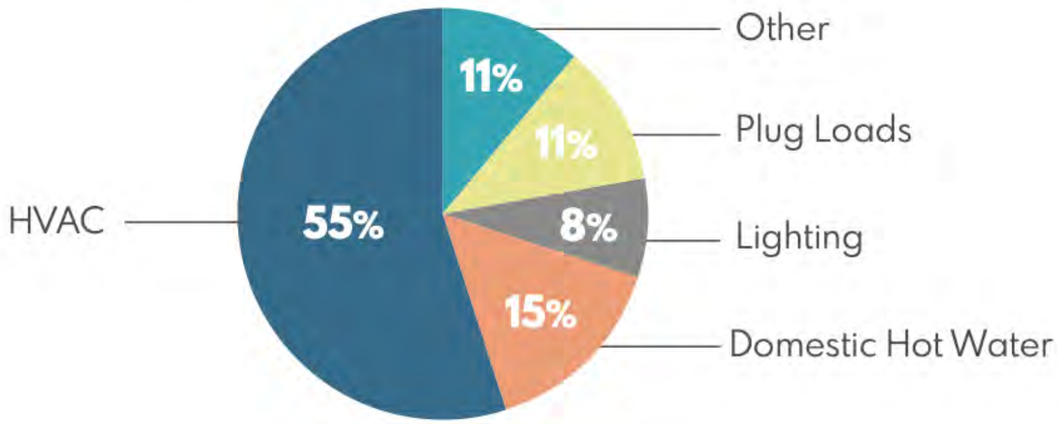
We provide building owners with immediate cost savings and revenue potential without the need for any capital investment

Brightcore
BUILDING ENERGY PERFORMANCE™

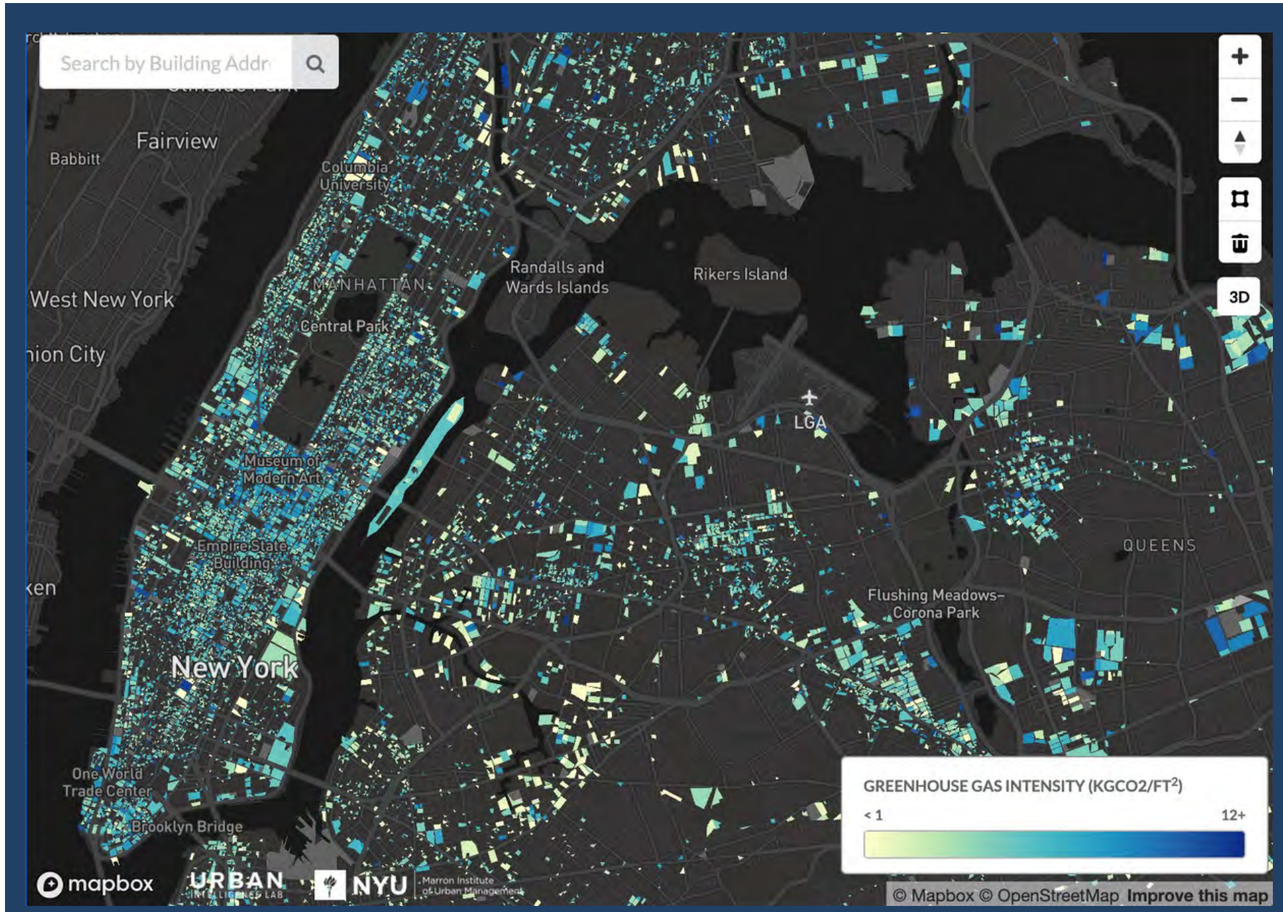
MOMENTUM FOR

RENEWABLE HEATING & COOLING

GHG EMISSION FROM LARGE BUILDINGS IN NYC



Cities are increasing regulatory pressure to reduce carbon emissions from urban buildings.



Heating and cooling is the largest element of energy use and greenhouse gas emissions in buildings and a key focus in climate laws.

BUILDING ELECTRIFICATION AND REGULATORY REQUIREMENTS

NEW FEDERAL FUNDING

IRA Bill and DOE is increasing funding opportunities

STRONG UTILITY AND STATE INCENTIVES

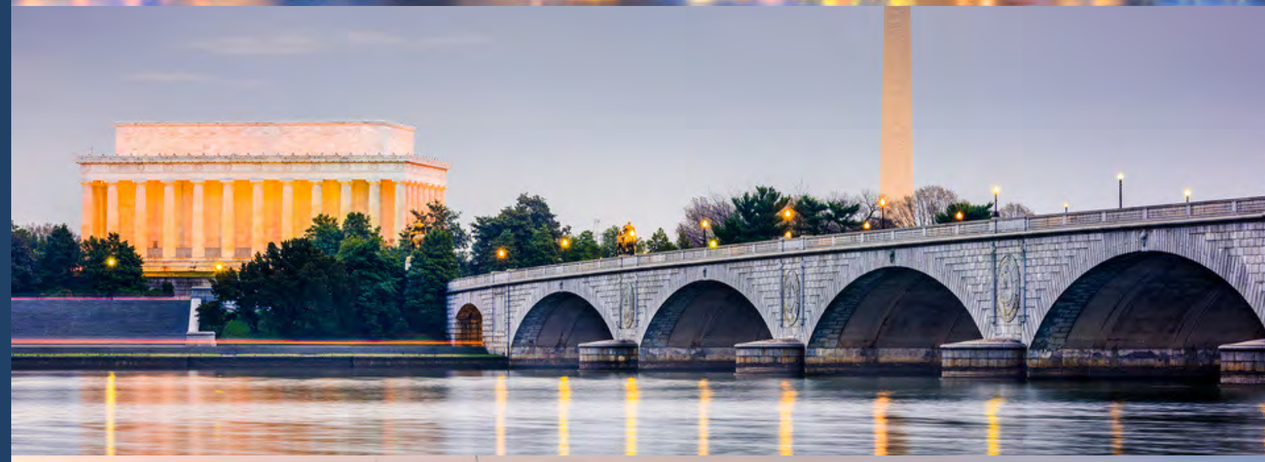
Robust geothermal incentives combined with aging fossil fuel infrastructure

HEIGHTENED REGULATORY REQUIREMENTS

NYC Local Law 97, Boston BERDO 2.0, and Washington DC are accelerating decarbonization

LARGE BUILDINGS (+40,000 SQ. FT.)

All of these cities are specifically targeting large building GHG emissions



The ability to "pre-heat" or "pre-cool" the system from the earth's 55 degree ambient temperature dramatically reduces system demand compared to conditioning peak outside air temperatures.

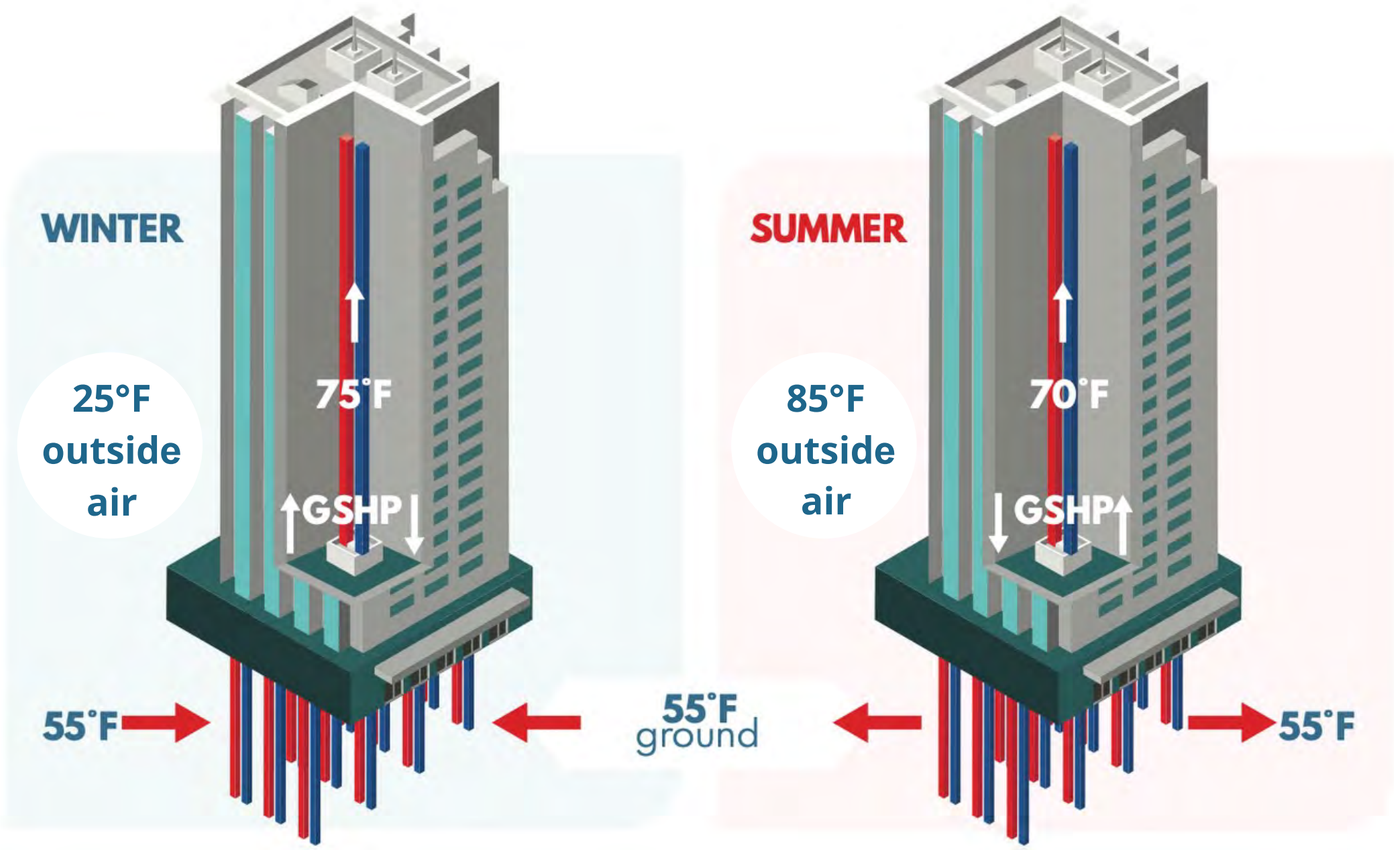
1 unit of electricity

4 units of "free" energy from the earth

5 units of heating or cooling delivered into the building

Geothermal solutions provide efficiencies more than 400%, while traditional fossil fuel systems are limited to 78-90%.

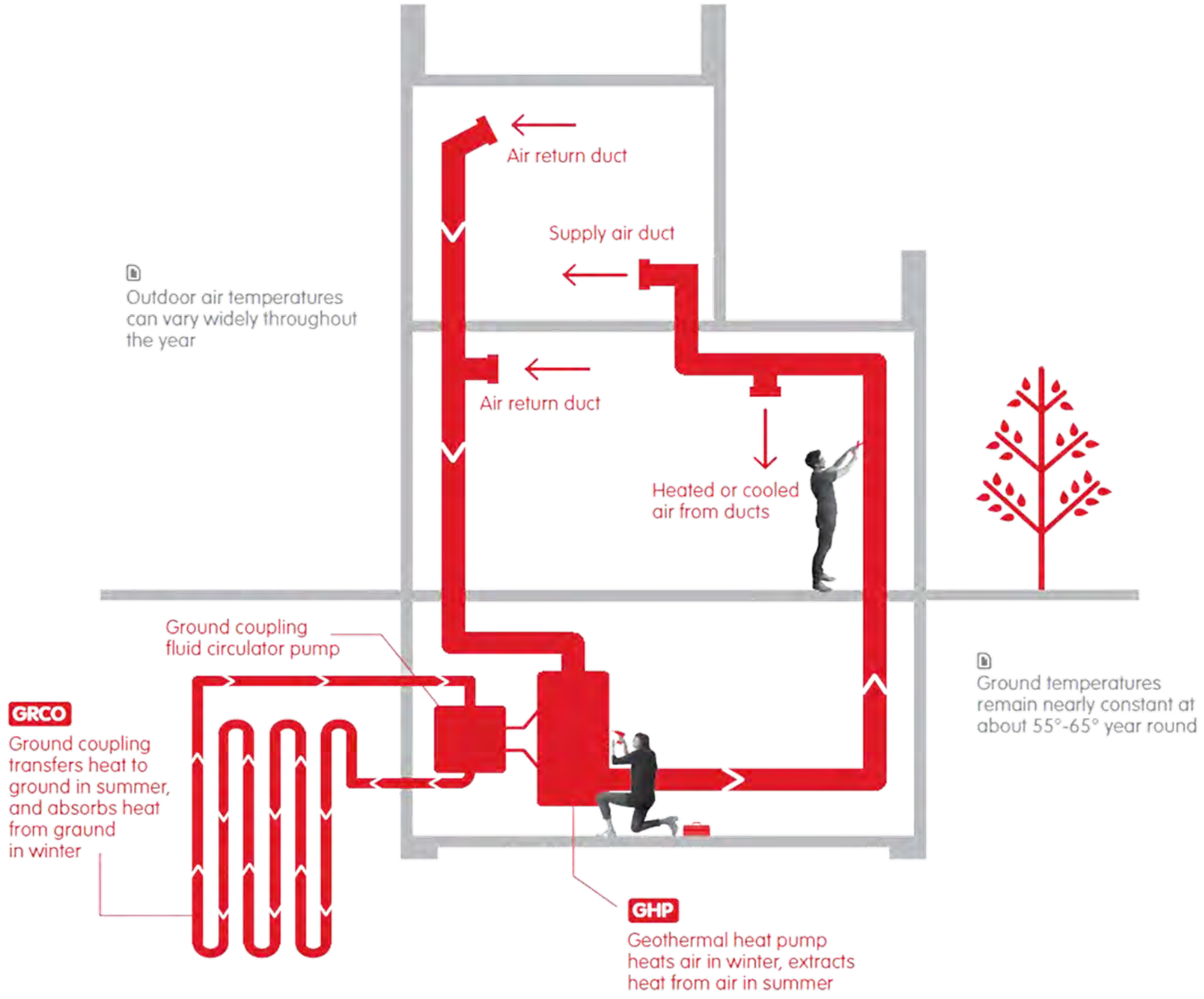
BASICS OF MODERN CLOSED-LOOP
GEOTHERMAL SYSTEMS



BASICS OF MODERN CLOSED-LOOP

WATER SOURCE HEAT PUMPS & AMBIENT TEMPERATURE NETWORKS

- Water-to-water and water-to-air heat pumps leverage the ambient temperature loop to provide the most efficient heating and cooling
- Buildings with opposing loads can benefit from each other's energy use when connected to an ambient temperature network
- Ambient temperature loops can also source energy from closed-loop geothermal, waste-water heat recovery, CSO, and surface water



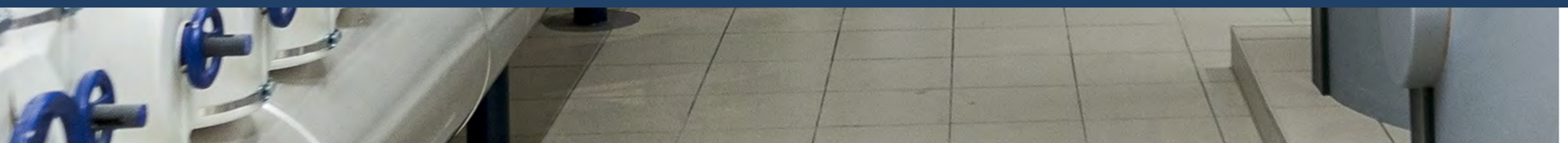
ADVANTAGES OF THERMAL ENERGY SYSTEMS

FINANCIAL BENEFITS

- ✓ 30% - 40% lower operational expenses from less outdoor equipment
- ✓ Federal, State, local, & utility tax credits and cash incentives
- ✓ Helps future-proof for building code & other regulatory updates

BUILDING PERFORMANCE & SUSTAINABILITY

- ✓ Efficient HVAC equipment lowers the carbon footprint
- ✓ Potential to reduce the amount of refrigerant needed in the heat pump system
- ✓ Thermal energy sources are more resilient to large temperature variations (polar vortex and heat waves)



COST FEASIBILITY WITH
INCENTIVES & FINANCING

INCENTIVES: LOWERING COSTS AND FUTURE PENALTIES

- The federal investment tax credit applies to both the ground technology and building mechanical equipment
- State and local district heating and cooling opportunities
- Avoided cost of LL97, BERDO, and other local govt penalties

FINANCING: SUPPORTING UPFRONT OR LONG-TERM PAYMENT

- State or city financing tools and loans (e.g. NYC's PACE)
- Private and utility "As a Service" funding models

MYTH

Geothermal systems don’t work in urban areas

FACT

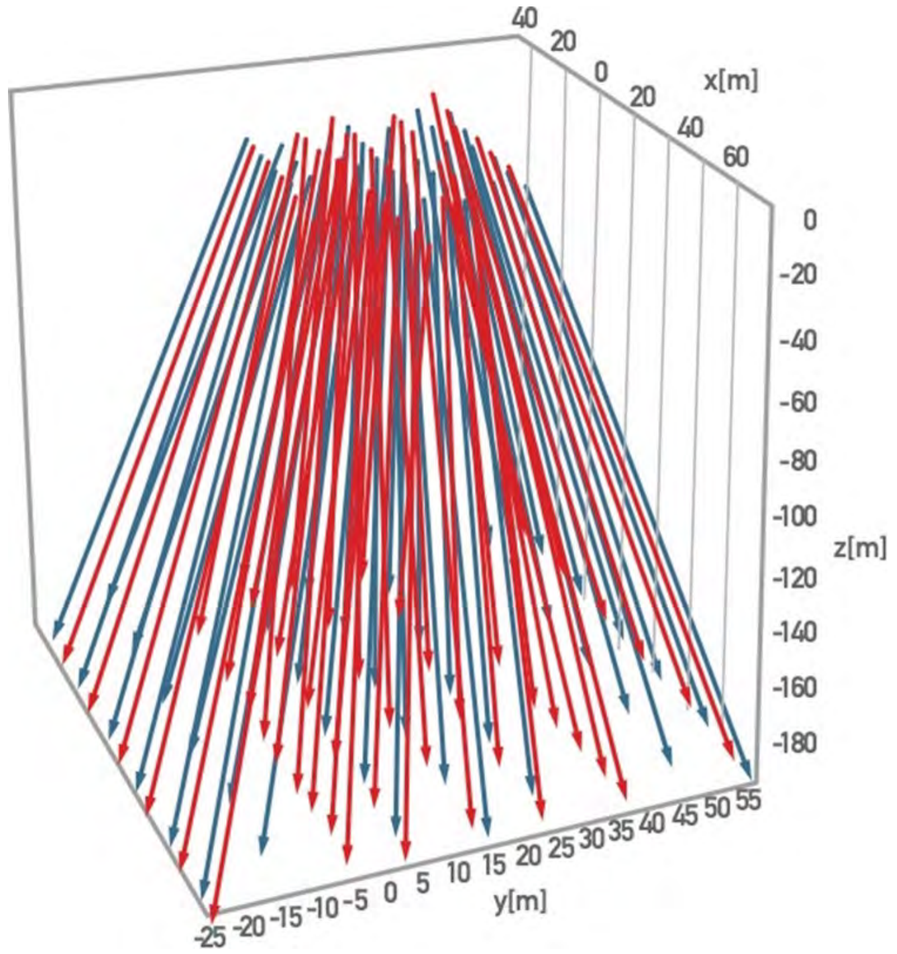
There are a few geothermal systems in urban areas, especially New York City.

Closed-loop ground source systems are typical installations for urban environments and are good considerations for new construction.

TECHNOLOGICAL INNOVATION

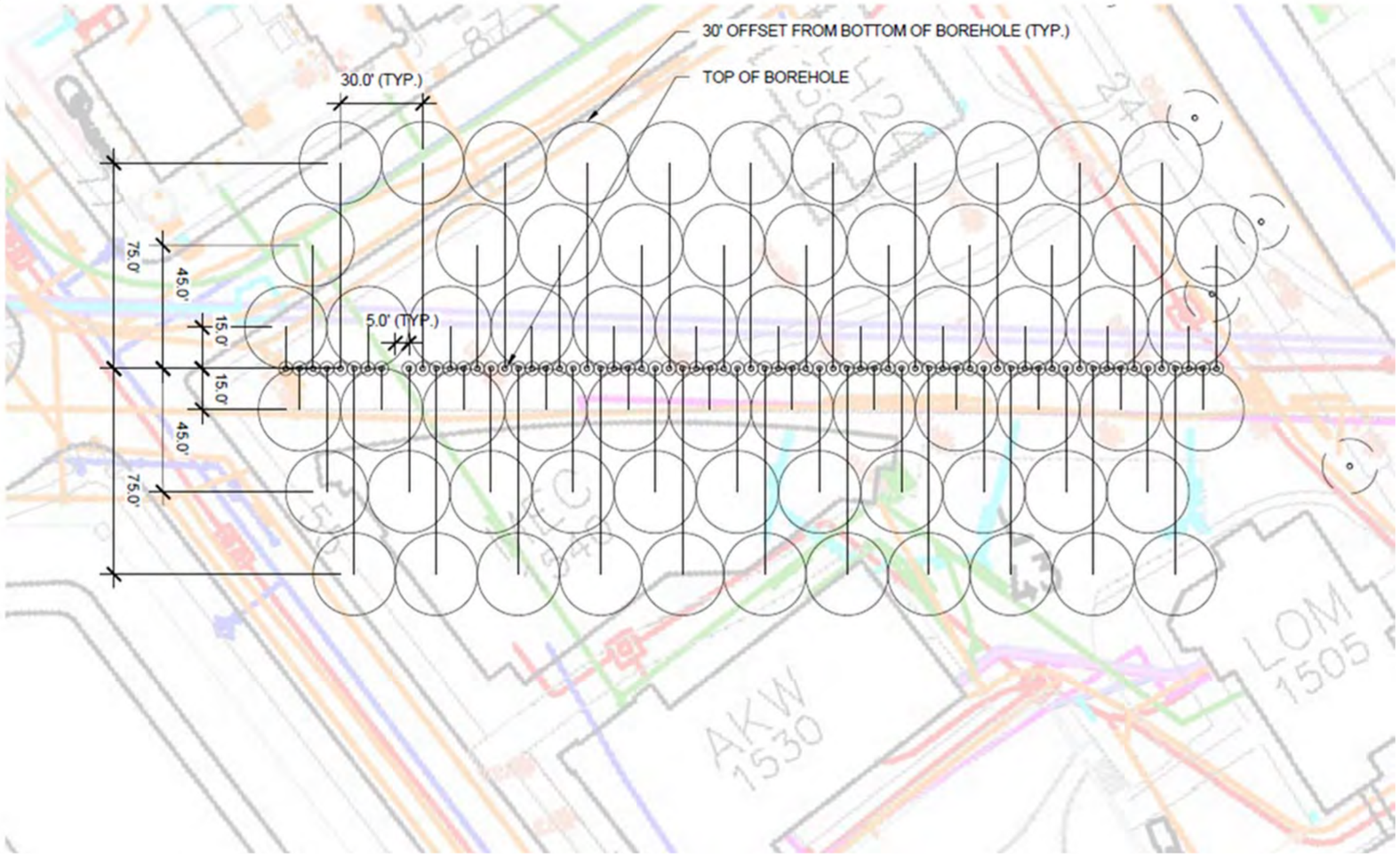
INCLINED BOREHOLES

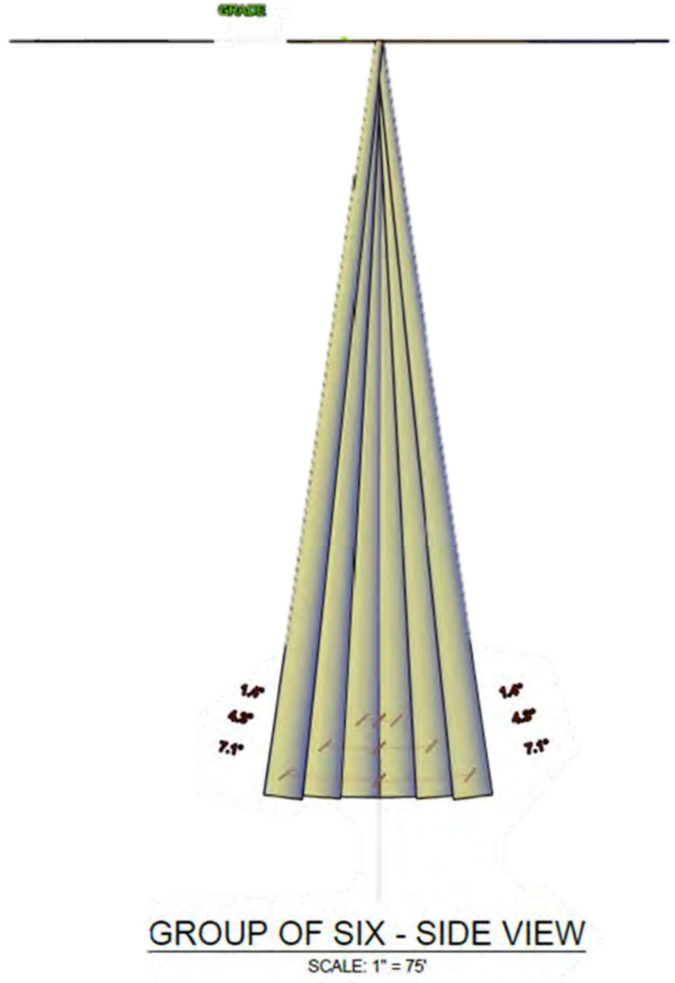
- There’s available drilling technology that is capable of drilling at very precise, straight inclined angles.
- These inclined boreholes can be drilled in a small surface area and extend to contact an overall greater thermal mass.
- Boreholes can extend from drilling area to the building or property footprint boundaries.



TECHNOLOGICAL INNOVATION

INCLINED BOREHOLES





GROUP OF SIX - SIDE VIEW

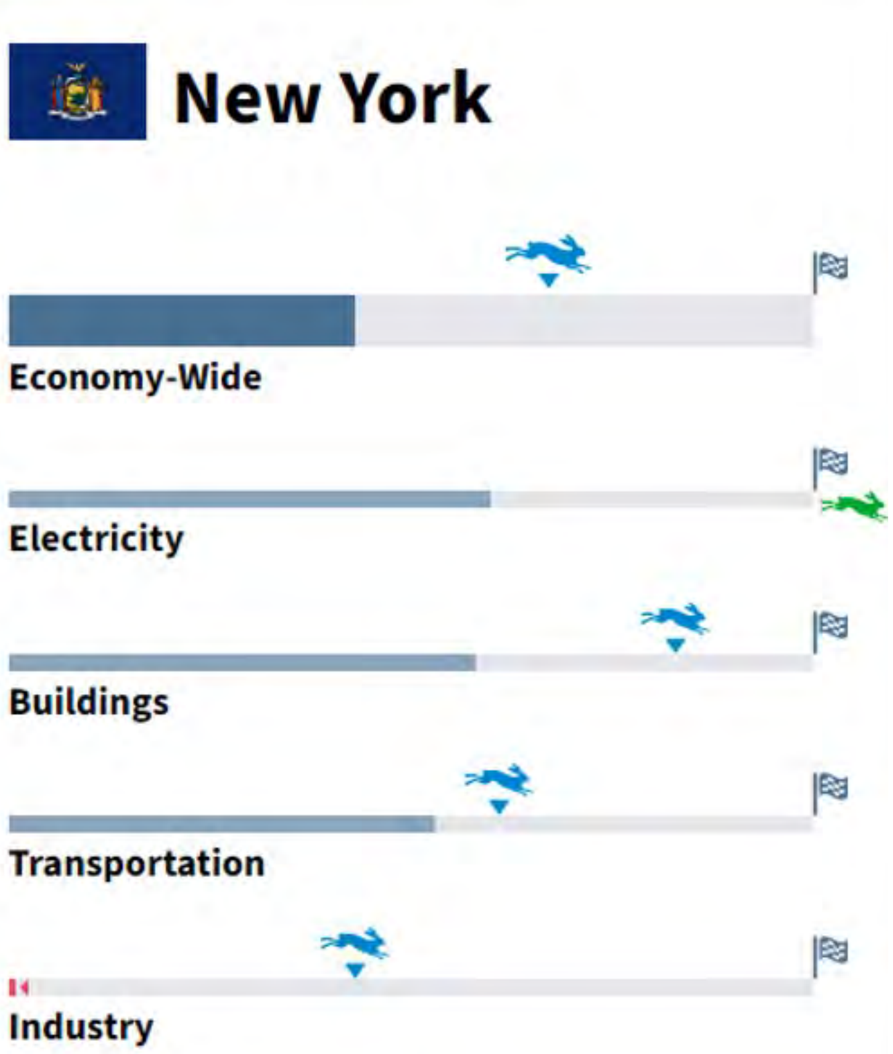
SCALE: 1" = 75'

LOOKING FORWARD:

EXPANDING GROUND SOURCE SYSTEMS

- IRA ITC is only available for ground source systems
- Technologies to install these systems are available today
- Public and private financial opportunities are available to accelerate the deployment of thermal energy systems
- States have a strict timeline to meet climate goals and to leverage thermal systems to drive Resource Efficient Decarbonization (RED)

NYS CLIMATE SCORECARD



Source: https://statescorecard.rmi.org/ny

BUILDINGENERGY NYC

Thermal Energy Networks

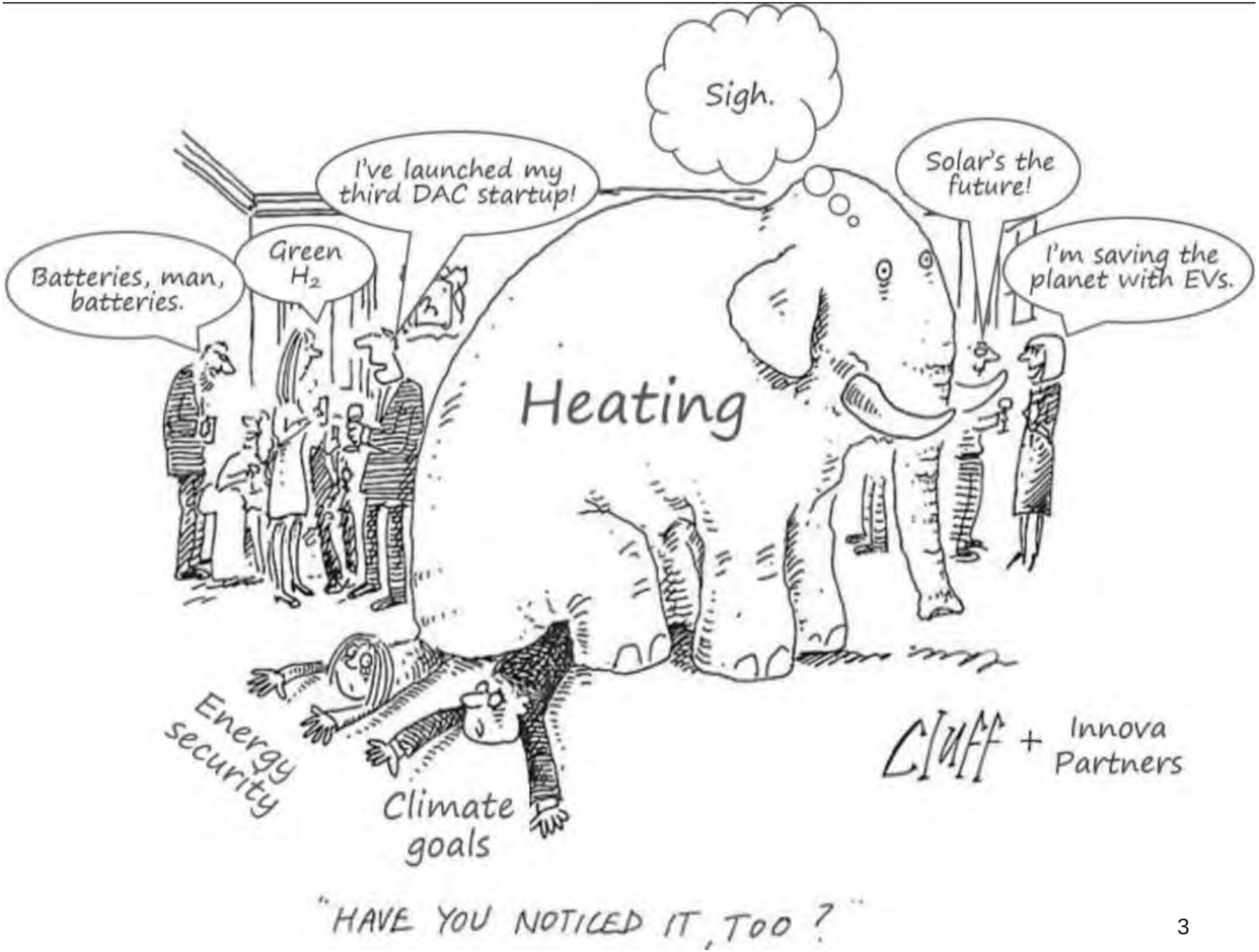
The state of play and paths forward

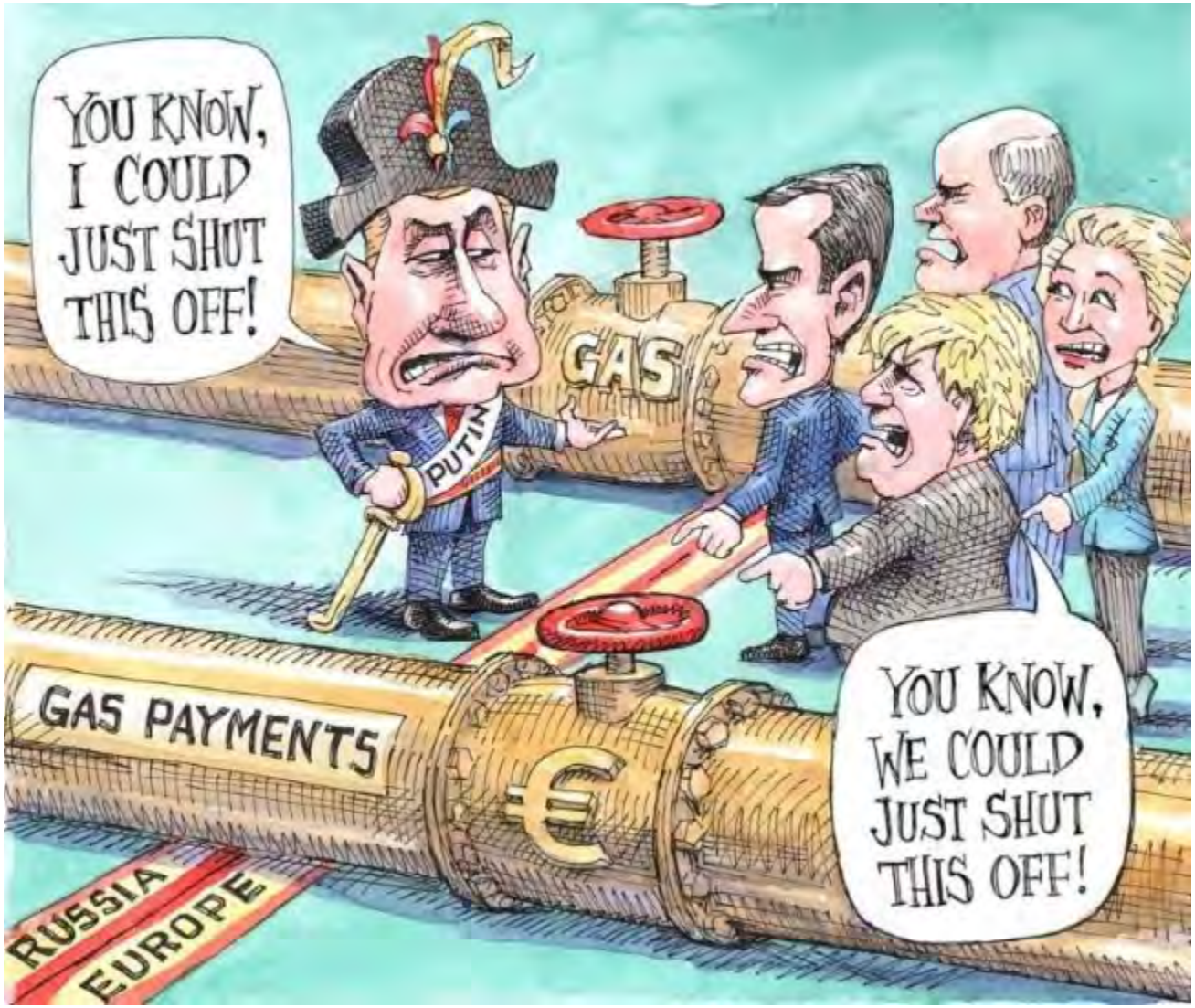
Jared Rodriguez, Emergent Urban Concepts

Northeast Sustainable Energy Association (NESEA)
September 15, 2022

We NEED Scale to Solve the Climate Emergency

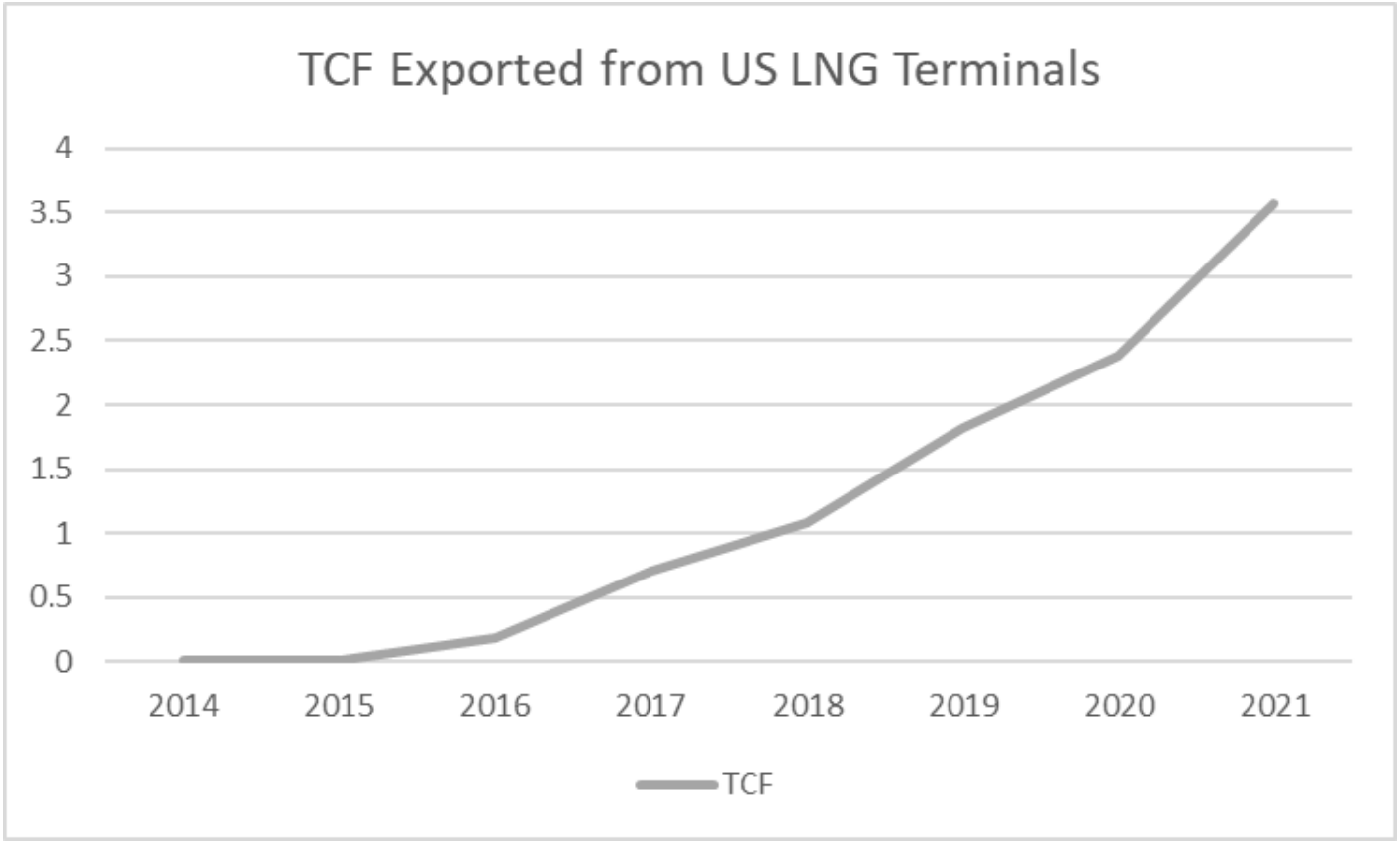
Developing Thermal Energy Networks (TENs) is rapidly emerging as a key approach to scaling building decarbonization, moving away from a “building-by-building” and toward a “community-by-community” or “neighborhood-by-neighborhood” approach.


Sigh.
I've launched my third DAC startup!
Solar's the future!
I'm saving the planet with EVs.
Batteries, man, batteries.
Green H_2
Heating
Energy security
Climate goals
CIUFF + Innova Partners
"HAVE YOU NOTICED IT, TOO?"


YOU KNOW, I COULD JUST SHUT THIS OFF!
PUTIN
GAS
GAS PAYMENTS
RUSSIA
EUROPE
YOU KNOW, WE COULD JUST SHUT THIS OFF!

NG is not a North American Commodity Anymore

Cheap natural gas is no longer a guarantee

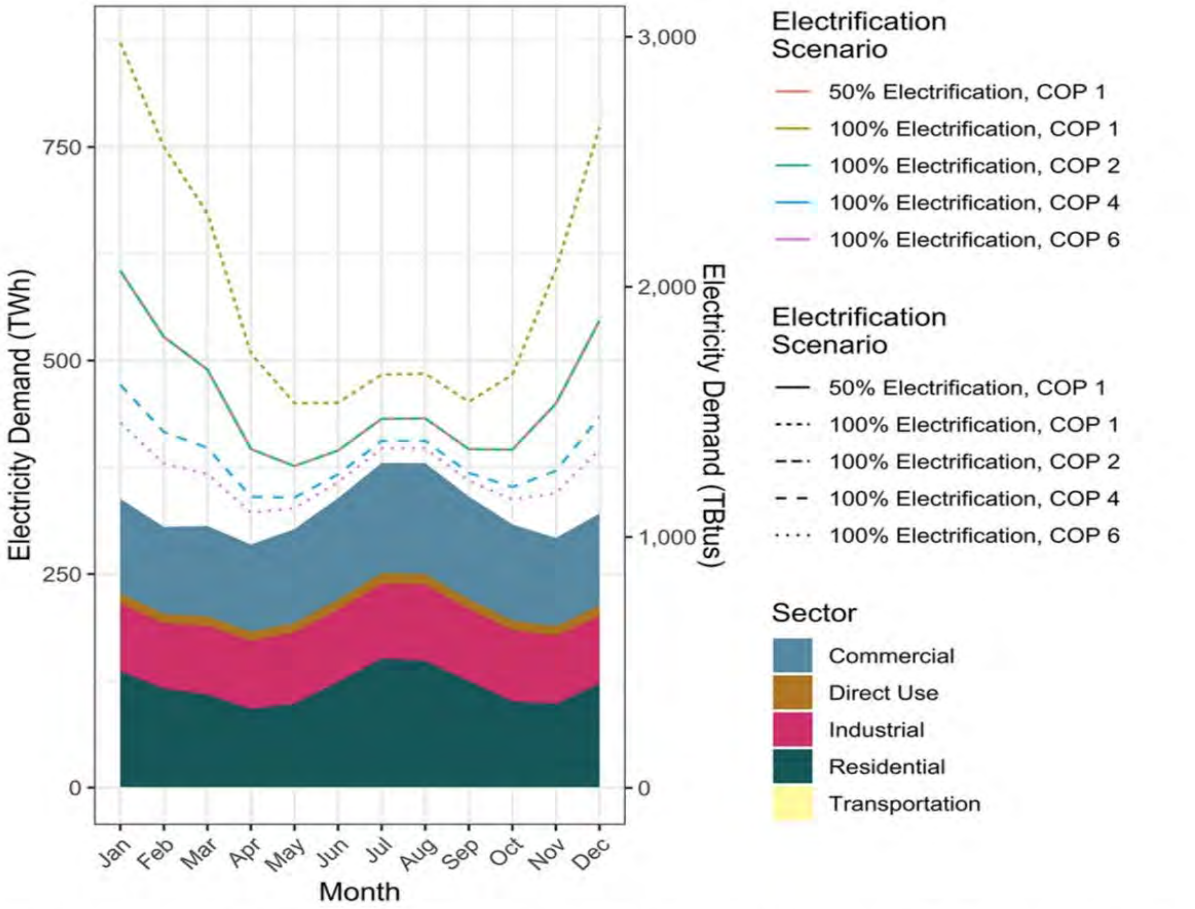


ASHPs during low temps: ASHPs alone can't get us there

This is getting better

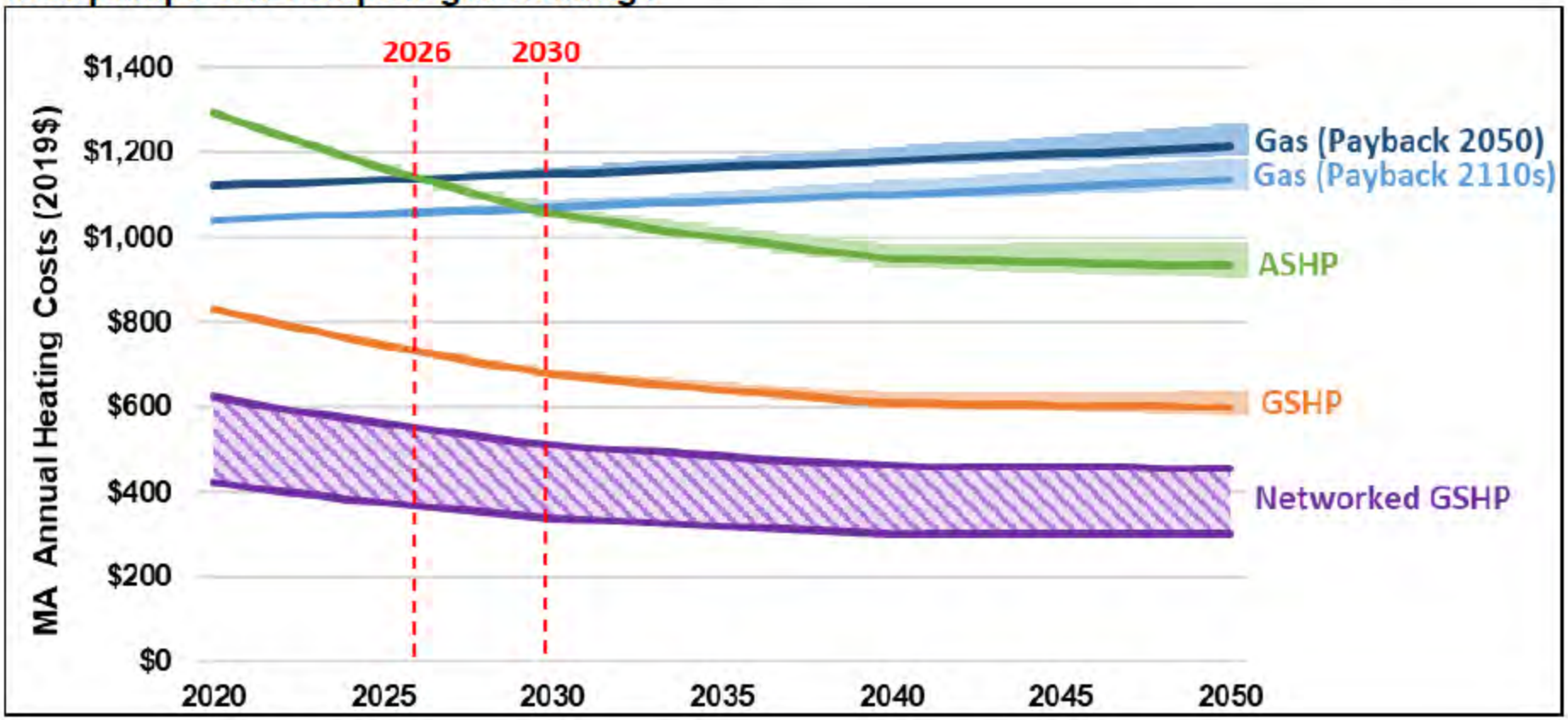
ASHPs during low temps: ASHPs alone can't get us there

This is not demand



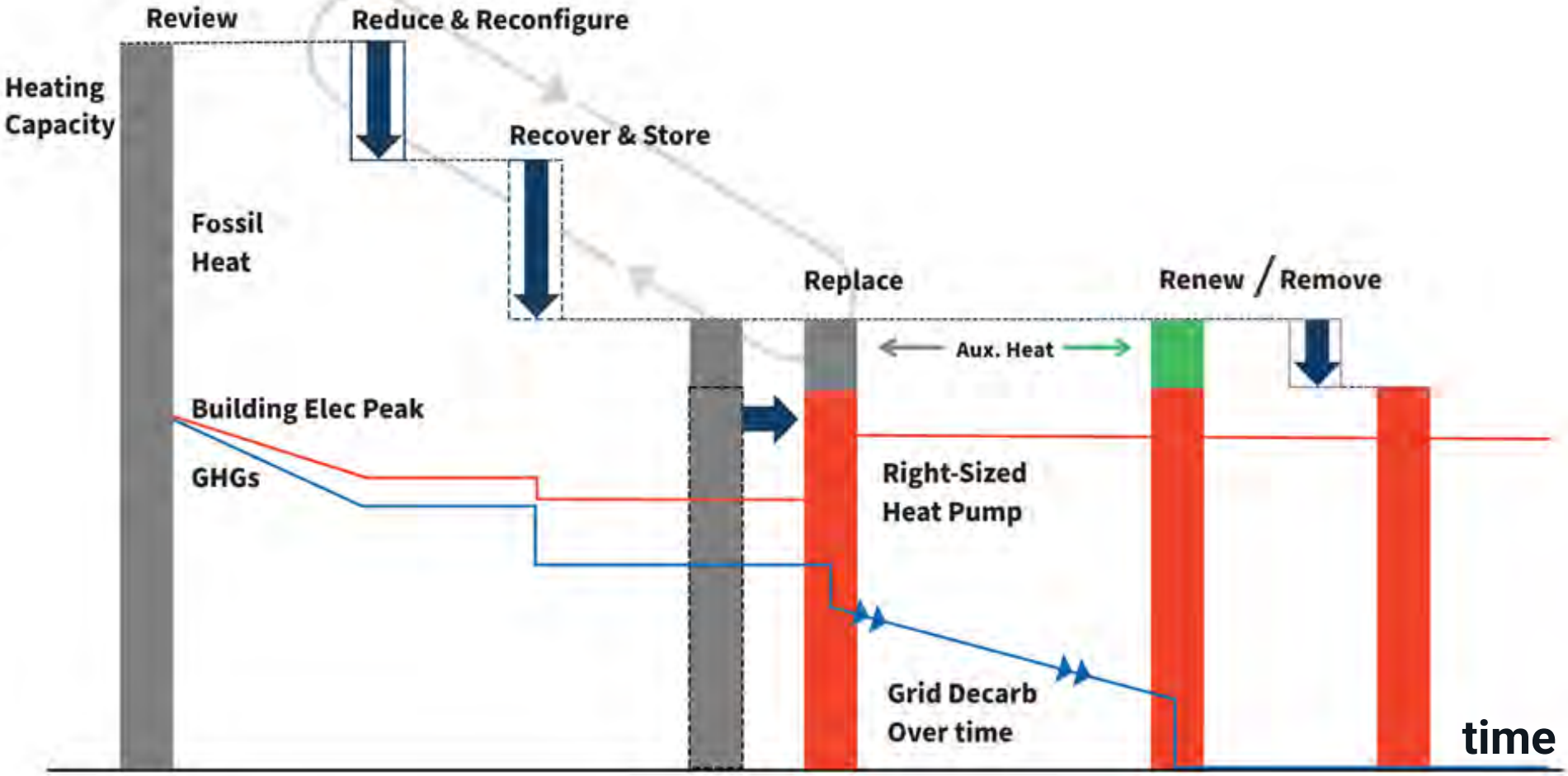
Current monthly total electricity demand by sector from March 2010 to February 2020, and projected changes to total building energy demand under different building electrification scenarios using technology with varying COPs. Solid area represents current demand, different electrification scenarios are represented using both color and line style.

Figure ES-1. Inflection points for an average-sized Massachusetts home: When do electric heat pumps out-compete gas heating?

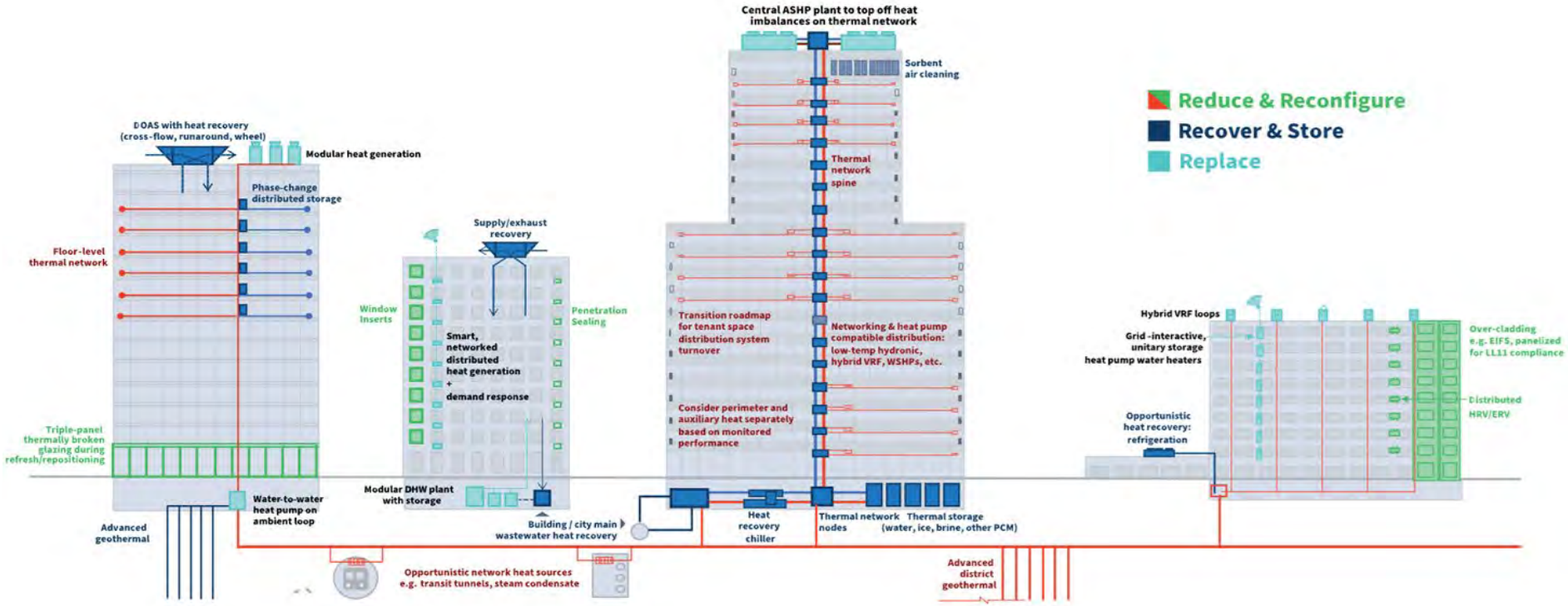


Inflection Point: When Heating with Gas Costs More
January 2021–White Paper
Applied Economics Clinic

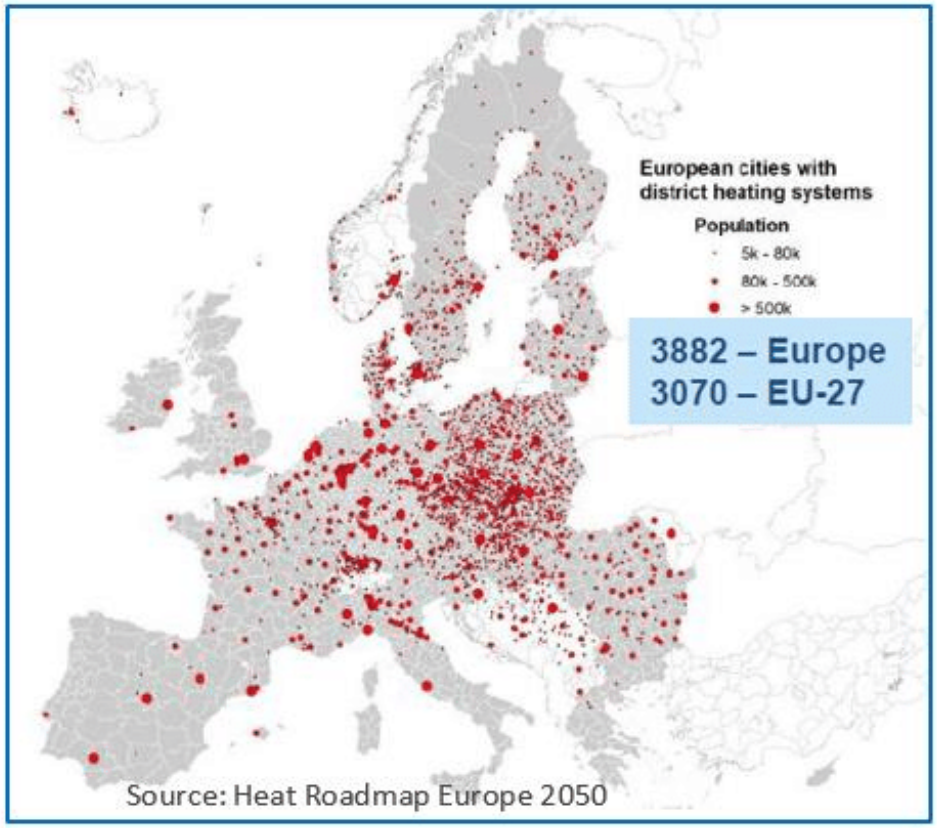
Resource Efficient Decarbonization (RED): an incremental methodology and integrated design process combined with strategic capital planning creates a path towards carbon neutral buildings.



Resource Efficient Decarbonization (RED): an incremental methodology and integrated design process combined with strategic capital planning creates a path towards carbon neutral buildings.

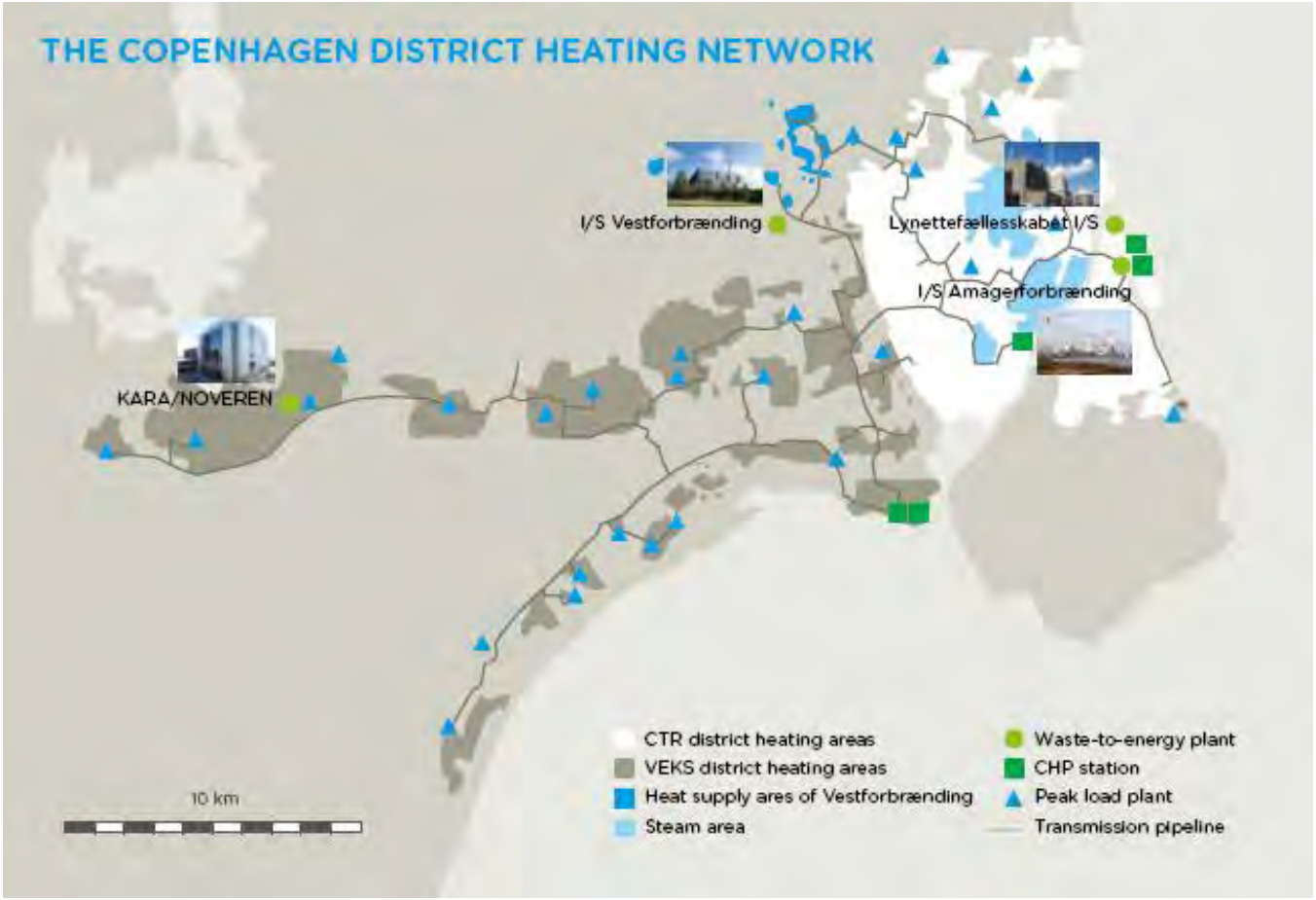


Proven energy model that is prevalent around the world



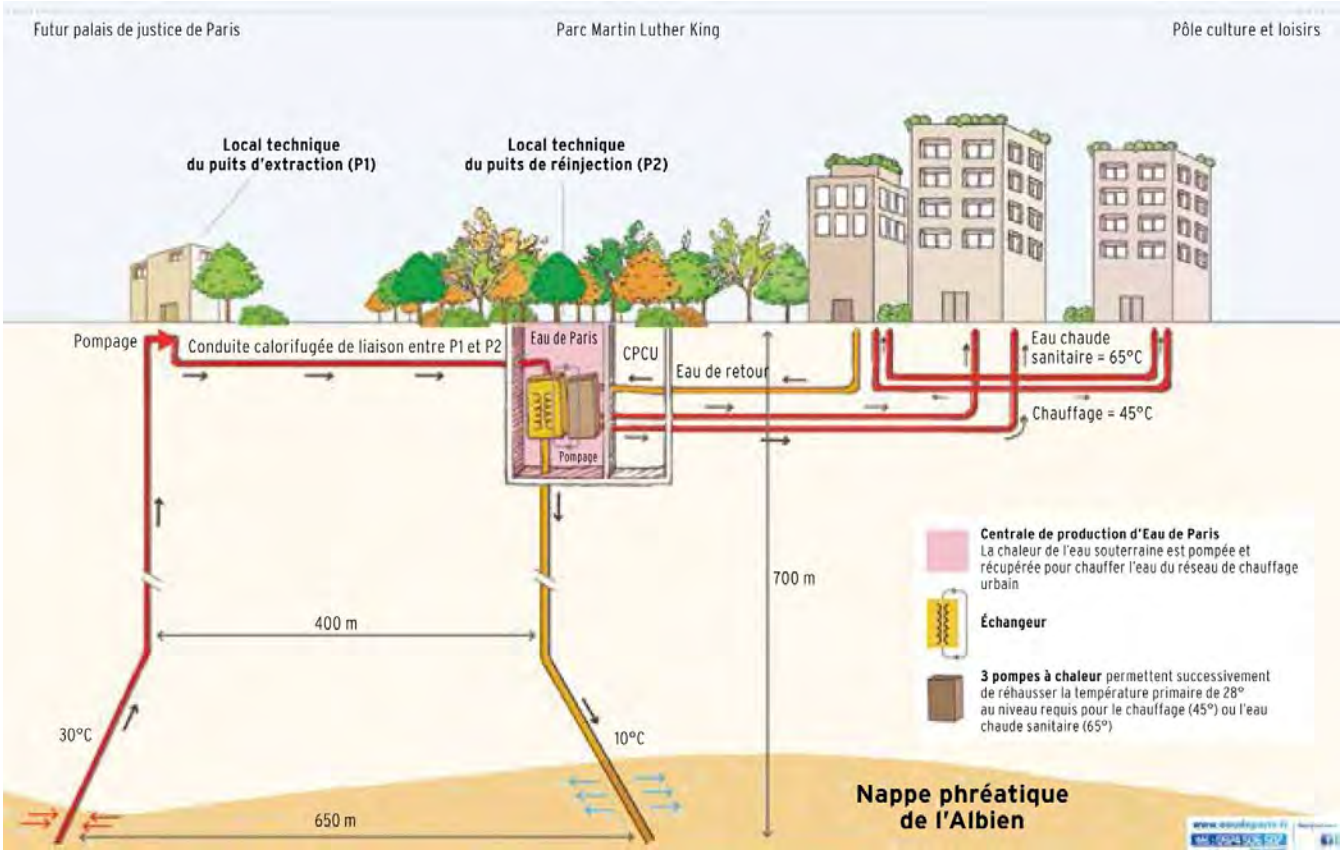
- “Shared infrastructure” model that has been implemented and refined over 150+ years
- Scalable model with further growth potential due to geopolitical considerations

Copenhagen



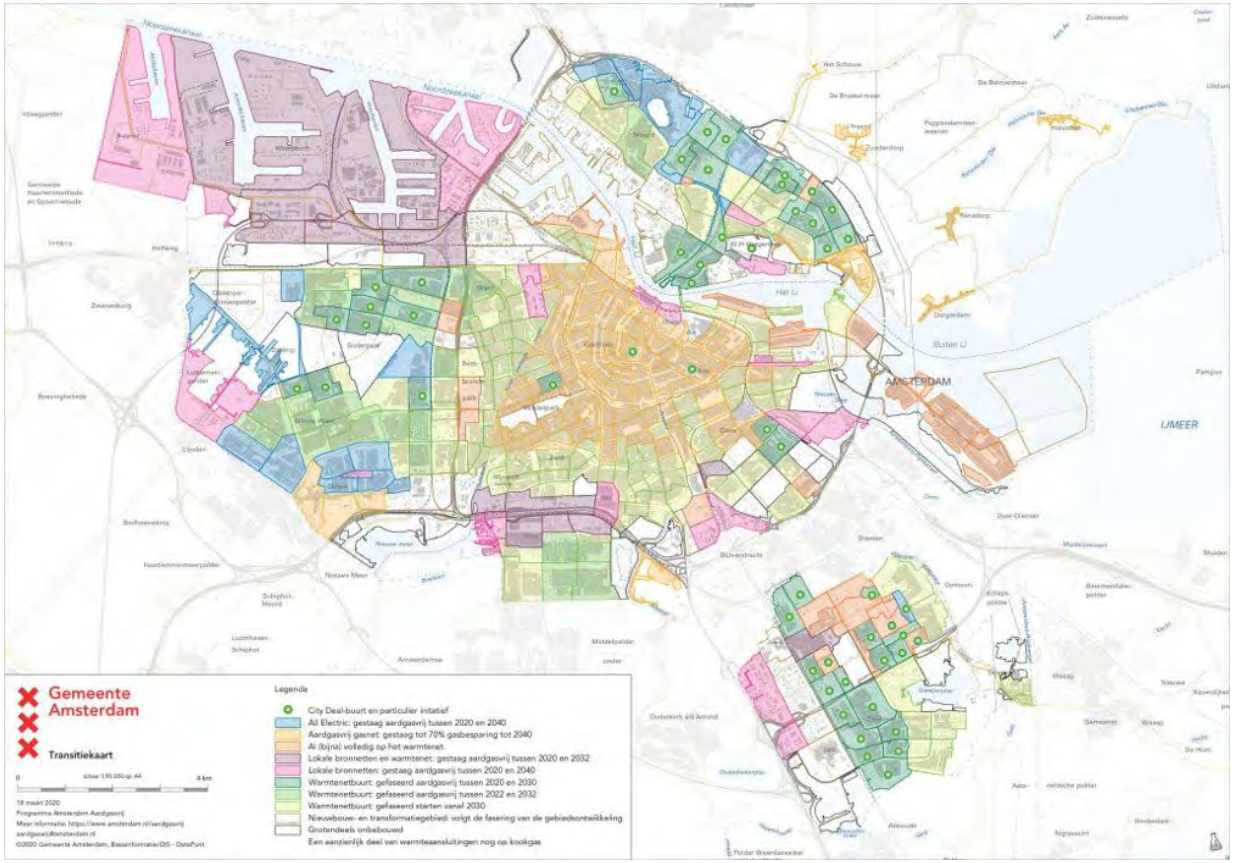
- Incorporates a diversity of heat sources and multiple interconnected networks across a large region
- Design experts on key European projects are also contracted in New York State projects

Paris



- Wastewater energy extraction and thermal distribution to buildings
- Connection points and scalability between different generations of networks

Amsterdam



- Regionally-planned network with interconnection and expansion potential
- Various interconnected systems; multiple heat sources including industrial waste heat

Vancouver

- False Creek, Vancouver
- First large, shared system in North America to draw from municipal wastewater
- District energy: "Neighborhood Energy Utility (NEU)“
- Serving 20M SF+ mixed-use buildings

Washington State

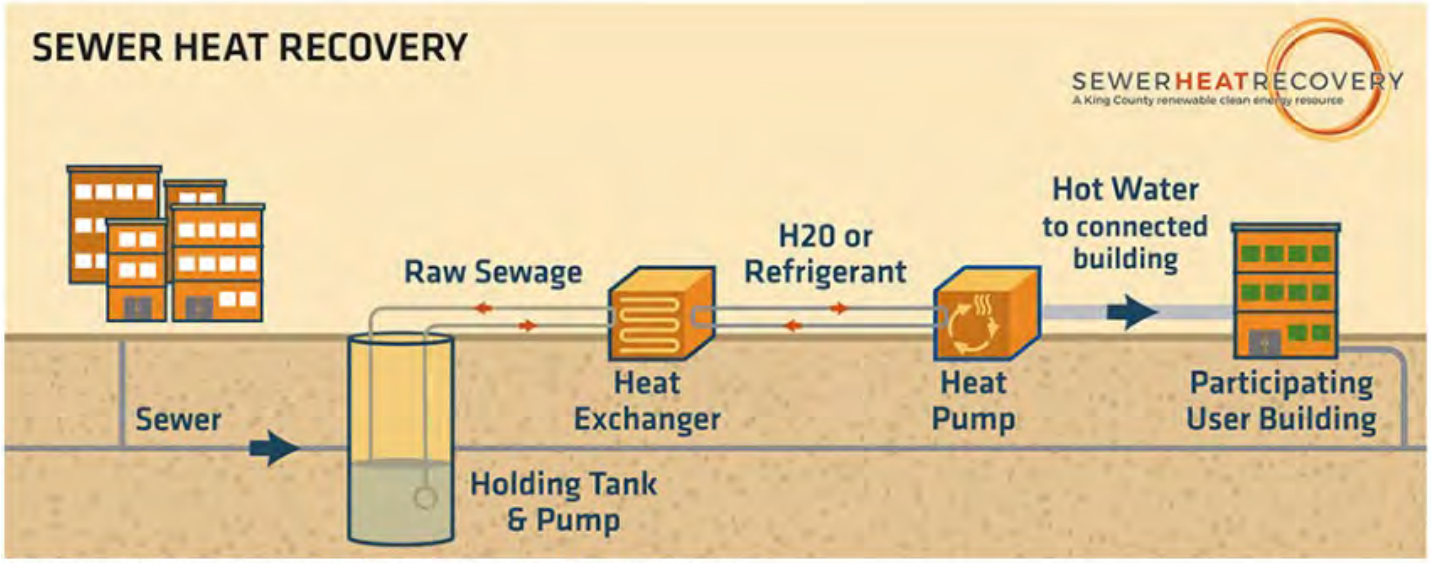


Illustration of process is an example. Technology requirements will vary.

King County Sewer District

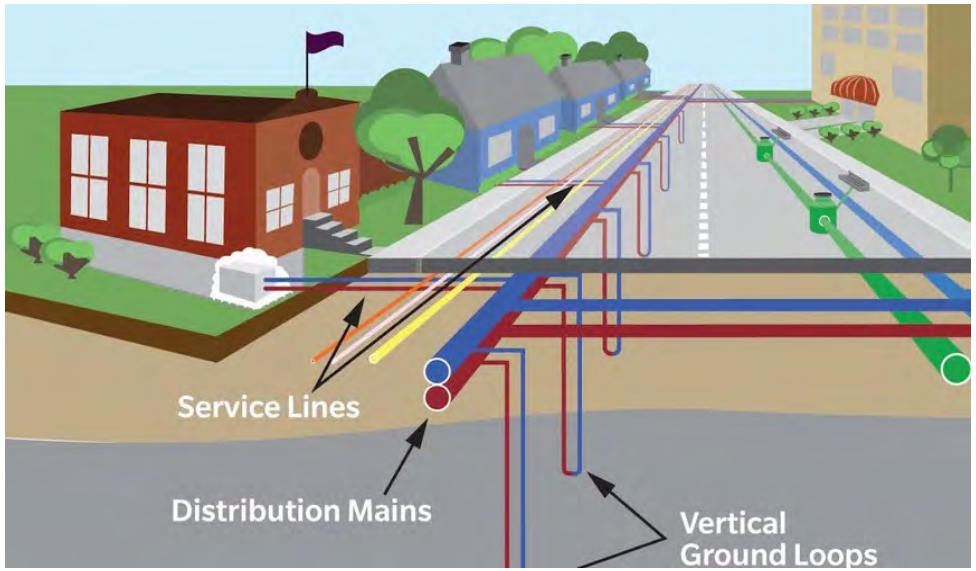
- Legislation allows private access to heat in sewer pipe through heat exchange
- Municipal tie-in with sewer infrastructure

- **Sewer heat treated as a commodity the municipality can sell; license fees paid to access sewer infrastructure**
- **New revenue source extracted from existing infrastructure; increases "utilization" of existing fixed assets**

King County Council legislation link

Agreement for Sale and Use of Thermal Energy from King County Wastewater – template

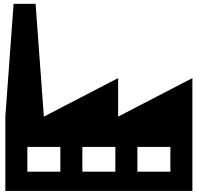
Massachusetts



- "Geogrid": shared bore fields and lateral pipe in public ROWs
- All systems + heat production owned by the utility
- Block-by-block network approach
- Eversource, National Grid, Muni Gas Utilities, HEET, etc.
- Organic or planned growth/expansion dictated by gas infrastructure retirement and leak prone pipe

What this could mean for Cold Climate Regions

Opportunity to develop a clean energy delivery pathway "from the ground up," while emulating an established, scalable utility model and existing institutions for community-scale implementation



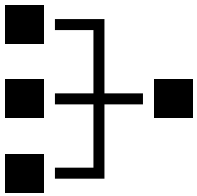
Thermal Generation

> Emphasis on technology-neutral clean thermal energy

> Heating / cooling media is the commodity (like electricity or natural gas)

> Short-term: utilities can play a larger role to fulfill the generation gap when the market is still nascent

> Long-term: market for thermal energy can emulate the NYS electricity market (NYISO model, open market via bids / RFPs)



Thermal Distribution

> Utilities receive the commodity (hot water) and are responsible for distributing the thermal energy to their customers

> Obligation to receive and pay for the commodity at market rates

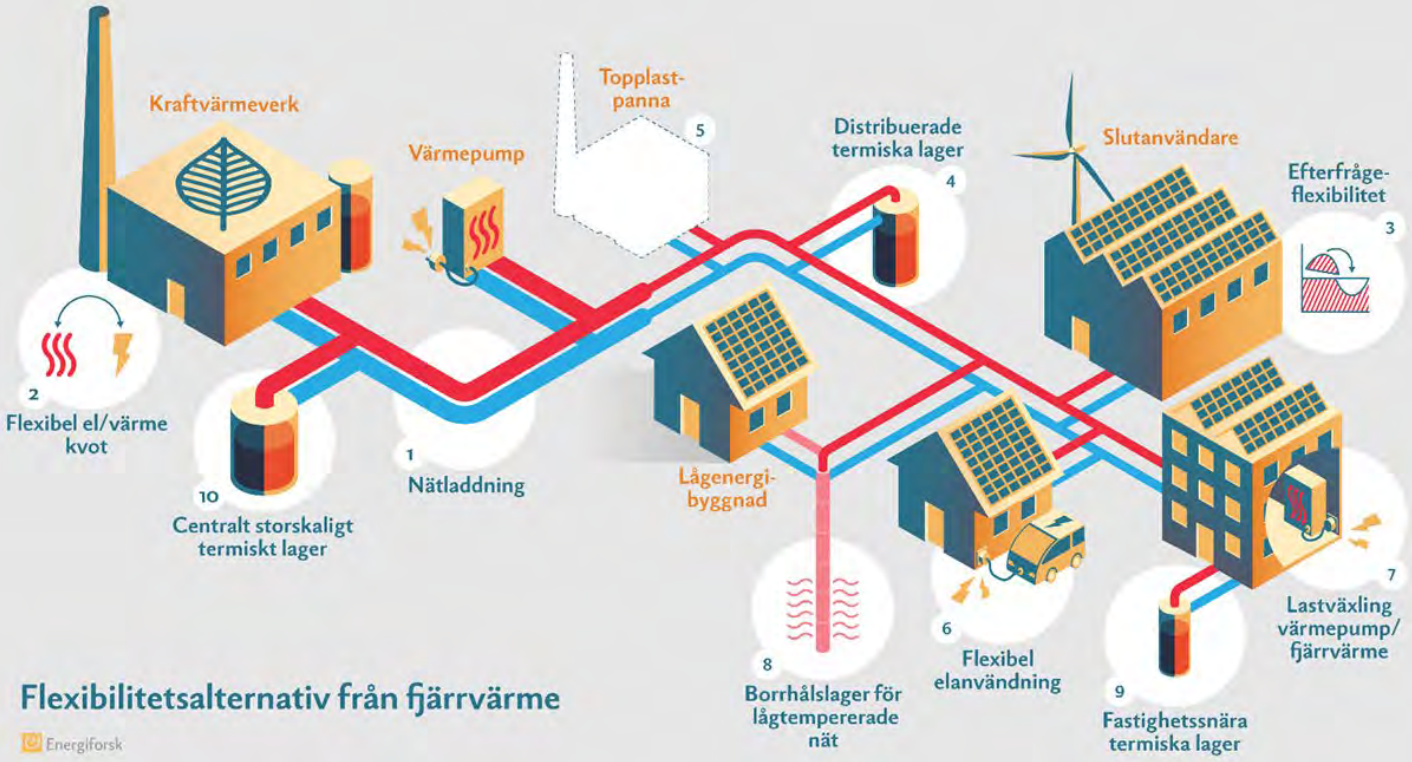

Kraftvärmeverk
Värmepump
Topplast-
panna
5
Distribuerade
termiska lager
4
Slutanvändare
Efterfråge-
flexibilitet
3
2
Flexibel el/värme
kvot
10
Centralt storskaligt
termiskt lager
1
Nätladdning
Lågenergi-
byggnad
8
Borrhålslager för
lågtempererade
nät
6
Flexibel
elanvändning
9
Fastighetssnära
termiska lager
7
Lastväxling
värmepump/
fjärrvärme
Flexibilitetsalternativ från fjärrvärme
Energiforsk

image credit: U.S. Dept. of Energy, Geothermal Technology Office

Coalition Members May Include

- State and Local Regulators
- Policymakers and Other Officials
- Other Governmental Bodies (City, County, State)
- Economic and Industrial Development Agencies and Organizations
- Public and Private Regulated Utilities
- Activist or Community Based Organizations
- Solution Providers and Manufacturers
- Trade Unions
- Trade Organizations

Next Steps in Your Community

1. **Engage Thermal Development Team**
2. **Identify Coalition Members, Structure and Form the Coalition**
3. **Develop a Thermal Access Agreement and Authorize the Coalition to Perform**
4. Identify thermal supply sources and thermal supply deals
5. Identify and Secure a Project Pipeline through Customer Acquisition
6. Identify and Procure EPC, Maintenance and Billing Partners
7. Finance and Construct Thermal Nodes and Connections
8. Identify and Secure Partners for conveyance if applicable

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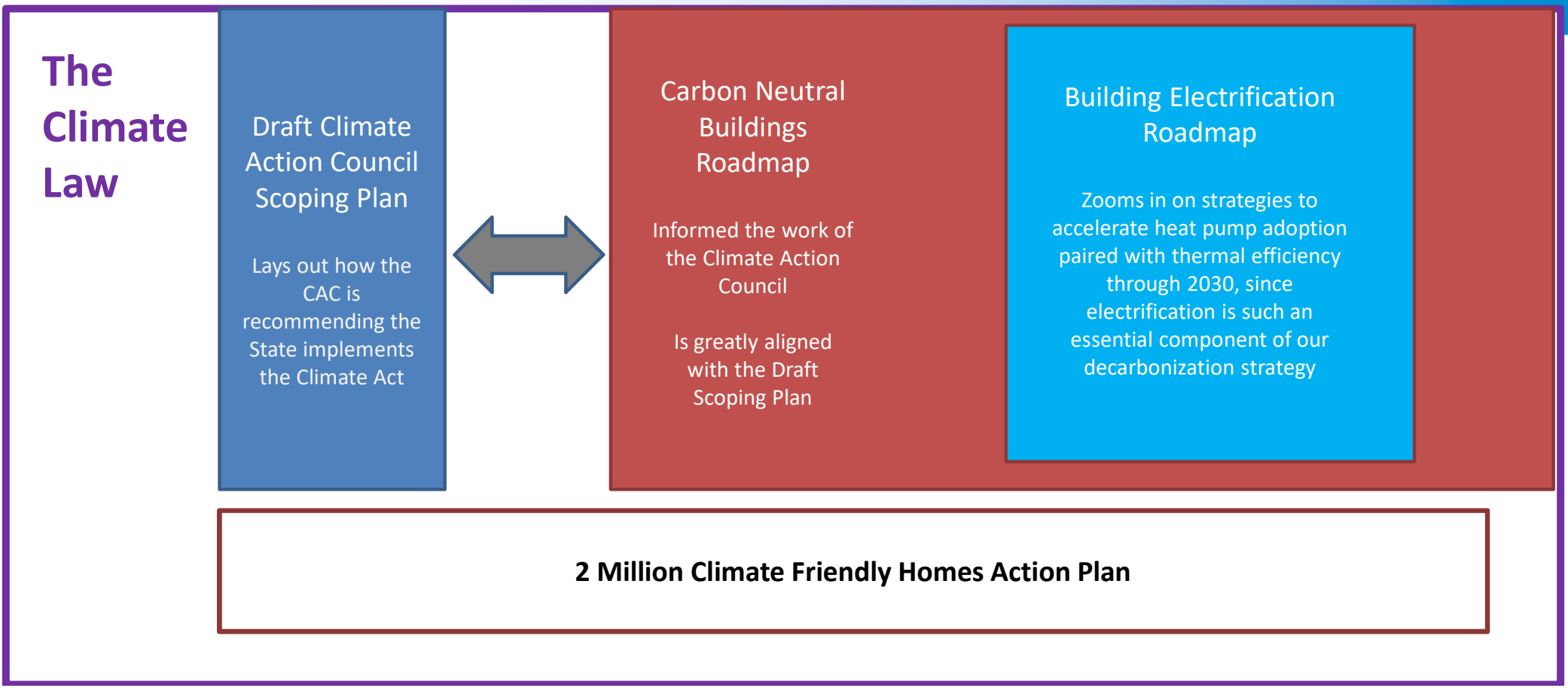
Breaking Ground on Geothermal & Thermal Energy Networks:
A Pathway for Urban Areas

Donovan Gordon
Director
Clean Heating & Cooling

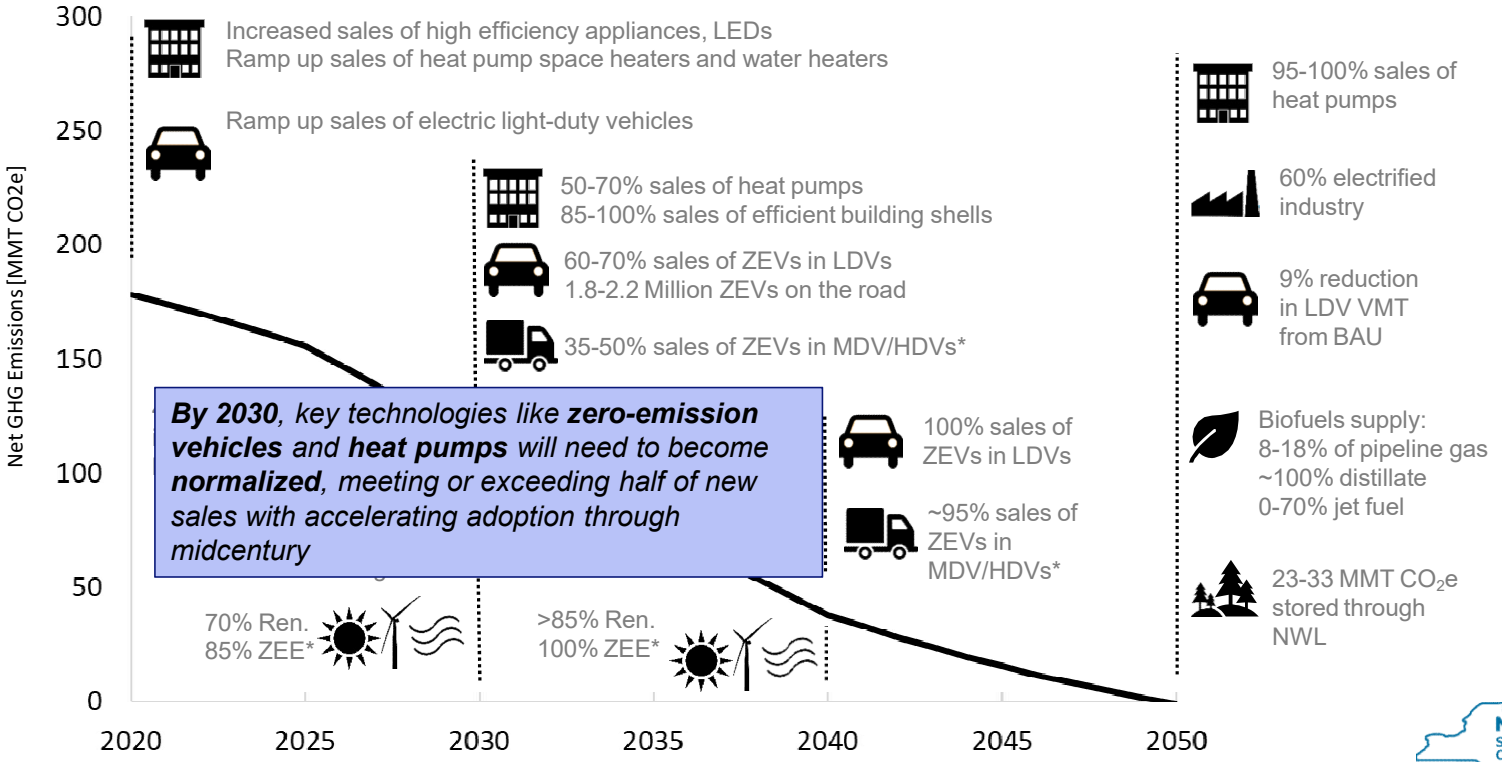
September 15, 2022

How the Big Policy Blocks Work Together



NYS Decarbonization Pathways

+ **Achievement of emissions reductions to meet state law requires action in all sectors**
+ **A 30-year transition demands that action begin now**



*Zero-Emissions Electricity (ZEE) includes wind, solar, large hydro, nuclear, CCS, and bioenergy; MDV includes buses

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"In order to decarbonize the State's building stock by mid-century, New York will have to quickly move beyond a building-by-building approach to a neighborhood-by-neighborhood approach, developing carbon neutral communities."

– NYSERDA Strategic Outlook (2022-2025)

Success would mean:

- Developing and maintaining new clean energy infrastructure for the next century
- Establishing a transition strategy for utilities to shift to being clean thermal energy providers
- Leveraging the unique position of municipalities and utilities to scale business models in partnership with existing market players
- Transforming the market and creating new clean, high-paying energy jobs

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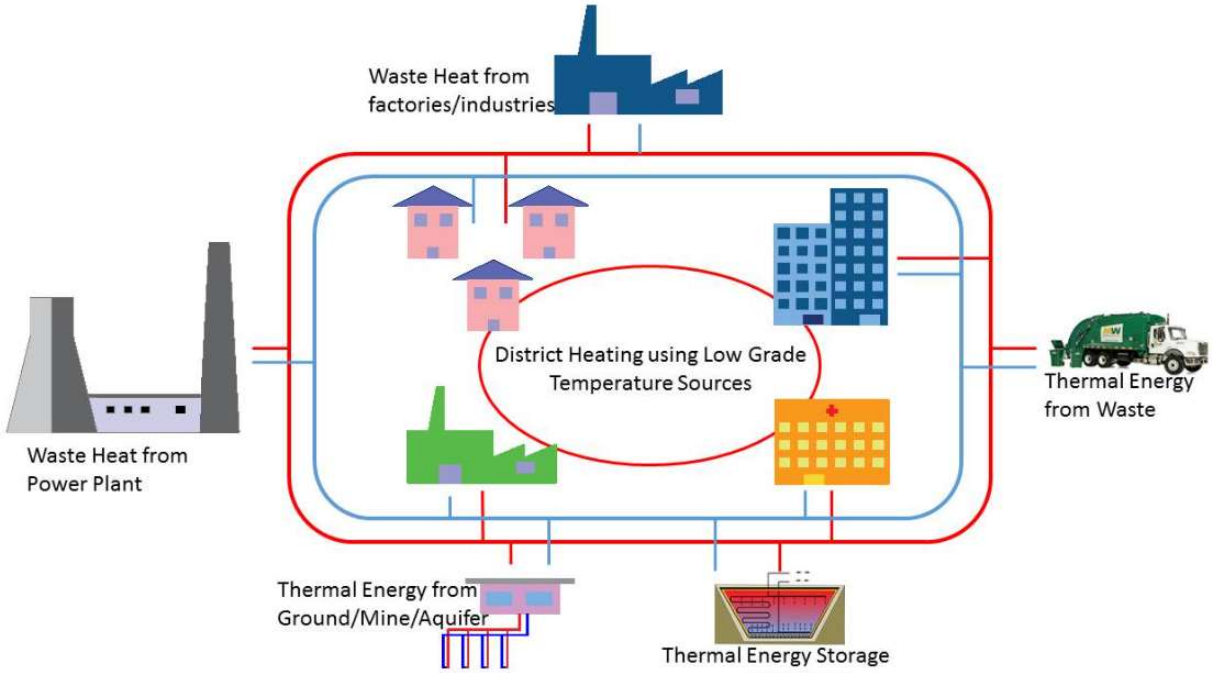
Thermal Energy Networks

Shared infrastructure network that circulates heating or cooling media to multiple buildings

1. Emphasis on technology-neutral clean thermal energy
2. Heating / cooling media = commodity
3. Network = distribution from Point A *(producer)* to Point B *(consumer)*
   - *Future state also enables prosumers*



Source: Prof. Hywel R Thomas, WP9 Smart Thermal Energy Grid

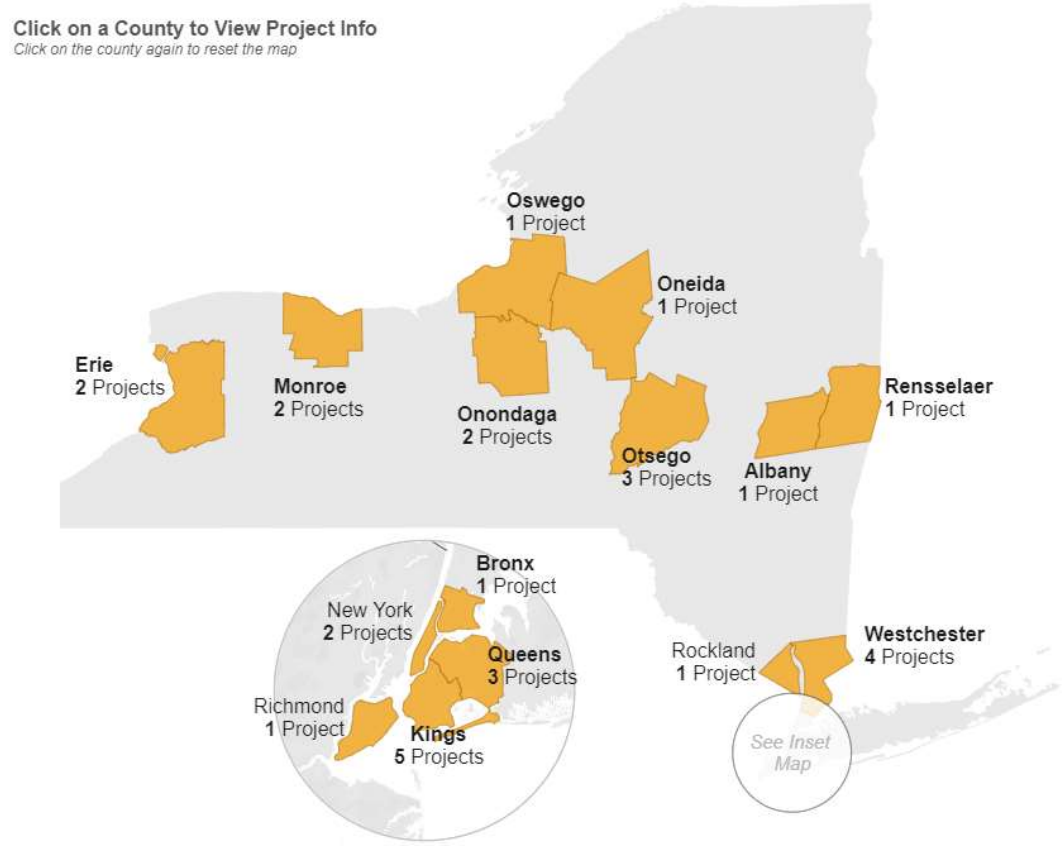
NEW YORK STATE OF OPPORTUNITY. NYSERDA

	1 G	2 G	3 G	4 G	5 G
Piping Configuration	Pipe acts only as source Only provides heating	Pipe acts only as source Only provides heating	Pipe acts only as source Only provides heating	Two different pipe loops (one loop as source, other loop as sink) Provides heating and cooling	Single “ambient temperature” pipe loop can simultaneously act as source or sink for various buildings, thus enabling “prosumers” Provides heating and cooling Can take discarded heat from one building and transport it for use in another building
Temperature of Supply Pipe	~400 °F	~250 °F	~190 °F	~140 °F for heating ~45 °F for cooling	~60 °F
Fluid in Supply Pipe	Steam	Pressurized Hot Water	Water	Water	Water

Can use this supply of high-grade-heat via an in-building radiator to directly achieve comfort space heating, benefit is simplified mechanical infrastructure within each end-use building

Need to use an in-building heat pump to boost this supply of low-grade heat in order to achieve comfort space heating, but achieve system benefits via lower “thermal leakage” heat loss during distribution (narrower “delta T” between water in the distribution pipe and abutting soils of the trench)

NYSERDA Community Heat Pump Systems (PON 4614)



- Initiative included in Heat Pumps Phase 2 Investment Plan (filed May 15, 2020)
- **4 project categories**

  A) Scoping study, B) Detailed design study, C) Construction, D) Guidebooks
- **40+ active projects**
- First round initiated in Feb ‘21, with additional rounds scheduled through ‘22 (adding rounds through 2023)
- **$15M original budget**

Graphic shows projects funded through Round 3. 13 additional projects awarded under Rounds 4 and 5.

NEW YORK STATE OF OPPORTUNITY. NYSERDA

May 2022 program updates

- **Added $7.5M ($2.5M CEF + $5M RGGI) → new $22.5M total**
  - From CEF reforecast and repurposed RGGI funds
  - Additional $4.7M RGGI to be made available on 4/1/2023
- **Eligibility expanded to non-System Benefits Charge (SBC) payers**
  - Allow for affordable housing, State / City agency, Long Island projects
- **More emphasis on supporting**
  - Disadvantaged Communities (DACs), Environmental Justice Communities (EJCs), Low-to-Moderate Income (LMI) customers
- **Planning 4 additional rounds through 2023**

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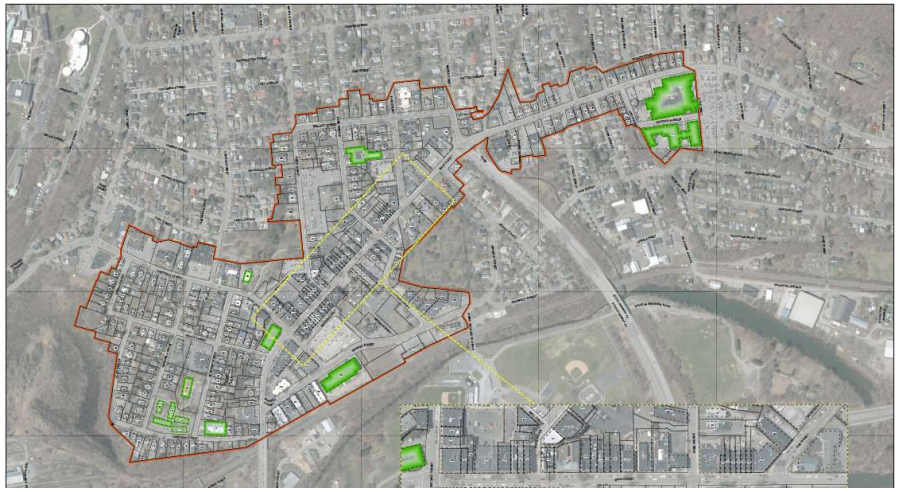
City of Troy

CHA and Siemens are developing 2 project phases in downtown Troy – *16 total buildings (new and existing)*

1. Phase 1A: Monument Square
   – about to start construction (C)
2. Phase 1B: Russell Sage College / Taylor Apartments
   – about to enter detailed design phase (B)

NEW YORK STATE OF OPPORTUNITY. NYSERDA



City of Oneonta Community Heat Pump System – Scoping Study Site

City of Oneonta

Ramboll is studying the feasibility of district systems (A's) at the following sites:

1. Downtown Oneonta – 316 existing buildings
2. SUNY Oneonta – 29 existing buildings
3. Oneonta Railyards – 5 new buildings

Oneonta Railyards Light Industrial Development Site

SUNY Oneonta – Campus-style District System

NEW YORK STATE OF OPPORTUNITY. NYSERDA

Spring Creek Towers
Category A Feasibility Study
NYSERDA PON 4614

Kings County

Technical Lead: Endurant Energy (formerly GI Energy)

Anticipated completion of study/availability of final report: November 2021

V1 6/2021

The Site & Beneficiaries

Spring Creek Towers is an existing multifamily residential complex in the Spring Creek section of Brooklyn with 46 buildings and is the nation's largest subsidized affordable housing complex serving approximately low- to moderate-income 15,000 residents. The site has an existing district hot water system and distribution piping infrastructure, and the hot water is produced by a natural gas-fired Combined Heat and Power (CHP) system. The complex of buildings features 5,881 apartments, collectively 8.2-million square feet, and will be analyzed to explore district-style heat pumps leveraging water-source thermal resources.

Potential Thermal Resources

The concept will explore using groundwater pumped by the Metropolitan Transportation Authority at a nearby subway station to depress the groundwater table and minimize groundwater infiltration into the subway tunnel (greywater flow is at least 2.5 million gallons per day).

Potential Configuration

Will explore 4G design, consisting of a central Thermal Building, which houses the heat pumps and from which hot water and chilled water will be distributed via conveyance pipes to the end-use buildings (simple radiators can be used in the end-use buildings). Benefits of this configuration include: opportunity to integrate with existing thermal infrastructure and use the heat pumps as the first-call (reserving the fossil fuel systems as supplement to meet extreme peaks or for systemwide redundancy for resilience); focusing the location where electric infrastructure upgrades are needed to meet the expanded electrification demand to occur at the Thermal Building (as opposed to at the end-use buildings) to minimize disruption to mission-focused activities during construction; and cost containment.

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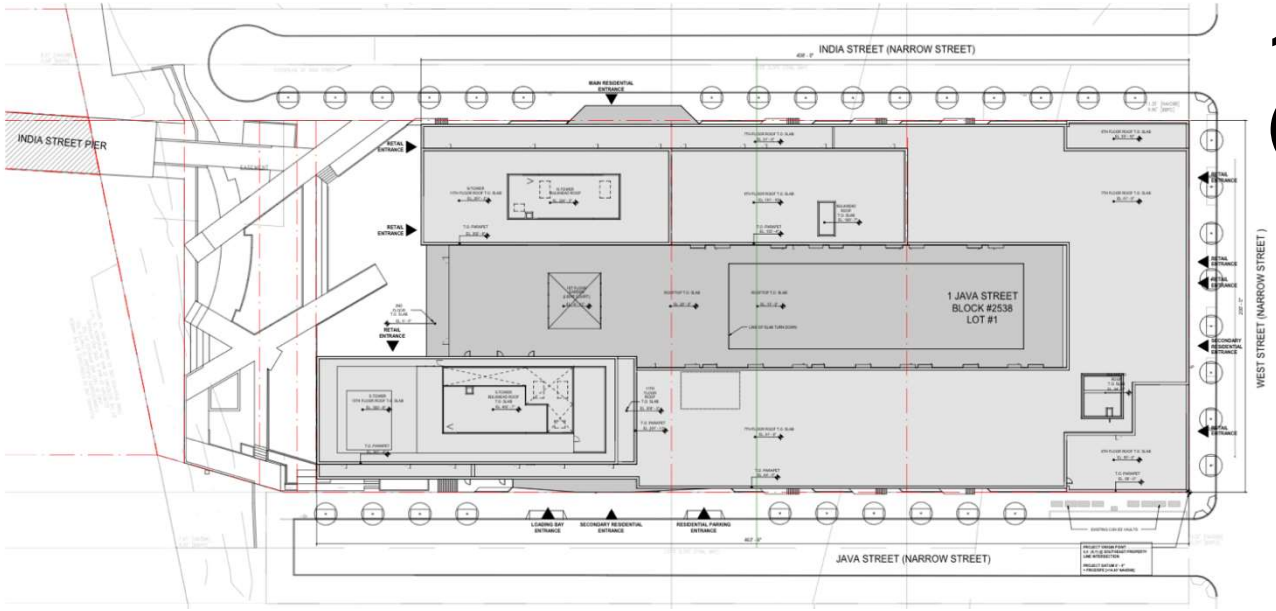


1 Java Street development (Brooklyn)

2 high-rise, mixed-use buildings with 30% affordable housing units

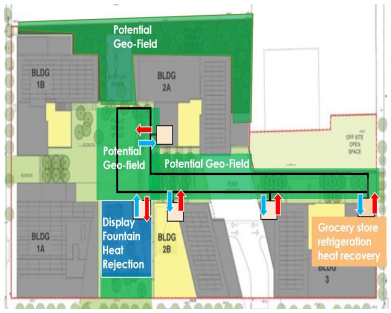
- 780,000 SF / 840 apartments
- ZBF Geothermal / LendLease
- Detailed design study complete (B), about to start construction (C)

The Peninsula
Category A Feasibility Study
NYSERDA PON 4614

Bronx County

Technical Lead: Endurant Energy
(formerly GI Energy)

Anticipated completion of study/availability of final report: October 2021



V1 6/2021

The Site & Beneficiaries

The Peninsula is a new construction, mixed-use development located in the Hunts Point section of The Bronx seeking to explore a district-style heat pump system to serve three buildings. The project at full-build out will consist of four residential buildings (totaling 740 units of affordable housing) and one 2-story light industrial facility. Calculations will be made on how to provide phase 2 and 3, which consist of three residential buildings, with low-carbon heating and cooling. Collectively they equal 630,000 square feet and will be analyzed to explore district-style heat pumps. The buildings have diverse occupancy patterns and thermal load profiles, consisting of multifamily-residential, a grocery store, health center, retail, community and commercial space, as well as underground parking. The analysis will quantify the peak of the composited thermal load and compare it to the sum of the individual peaks in order to assess the load-flattening benefits of aggregating into a district.

Potential Thermal Resources

The primary opportunity anticipated will leverage heat recovery heat pumps to distribute heat from one building to another. Supplemental thermal resources, could include ground-coupled boreholes, energy foundations (structural thermal piles), air-source heat pumps, sewage heat exchange and an ornamental water fountain used for heat rejection.

Potential Configuration

Will explore 4G design, consisting of a central Thermal Building that houses the heat pumps and from which hot water and chilled water will be distributed via conveyance pipes to the end-use buildings. (Simple radiators can be used in the end-use buildings). Benefits of this configuration include: the opportunity to integrate with other supplemental thermal infrastructure and use the heat pumps as the first-call (reserving more traditional electric systems as a supplement to meet extreme peaks), the ability to focus the location where electric infrastructure upgrades are needed to meet the expanded electrification demand to occur at the Thermal Building (as opposed to at the end-use buildings) to minimize disruption to mission-focused activities during construction, and cost containment.

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Portfolio with Variety of Learning Opportunities

Multiple Owners

CONSTRUCTION

- Two nodes at non-abutting redevelopment zones: City of Troy

FEASIBILITY

- Entire city: City of Oneonta
- Central core downtown: City of Syracuse
- A few adjacent blocks with low-rise buildings: City of Utica
- A handful of single-family homes in conjunction with a nearby commercial building: Northland Community c/o National Fuel Gas in Buffalo
- Rochester District Heating Cooperative
- Existing and new buildings at SUNY Oneonta owned by DASNY and SUNY
- Cluster of residential and commercial buildings in downtown Albany: Sheridan Hollow
- Office buildings in lower Manhattan using Hudson River for thermal resource: Brookfield Place
- Cluster of residential, office, and retail buildings in Ithaca Southside
- Mix of buildings in Southeast Albany using Hudson River for thermal resource
- Cluster of single-family homes in Ithaca

FEASIBILITY

- A few adjacent blocks with low-rise buildings and high-rise towers: Innovation Queens
- Redevelopment of industrial buildings at Oneonta Railyards
- Large cluster of residential buildings using surface water in Long Island City

Single Owner

DESIGN

- Campus lacking district thermal: The Children's Village in Dobbs Ferry

FEASIBILITY

- Campus with existing district steam: Rockefeller Center
- Campus with some existing district steam and some thermally-islanded buildings: Barnard College in Manhattan
- Campus with existing district steam in midst of conversion to hot water: University of Rochester
- Campus lacking district thermal: Phelps Hospital in Sleepy Hollow
- Campus looking at pilot (subset of buildings): Syracuse University, Wagner College in Staten Island
- Campus looking at numerous mini-districts (nodes): Pratt Institute in Brooklyn
- Campus looking to leverage MTA pumped water: Spring Creek Towers (formerly known as Starrett City) in Brooklyn
- Campus looking to leverage surface water body as thermal resource: Masonic Temple in New Rochelle
- Campus with existing steam: SUNY Oswego
- Campus with mix of existing systems including steam and WSHPs: Houghton College
- Campus in Niskayuna

CONSTRUCTION

- New mixed-use buildings: LendLease 1 Java St in Brooklyn
- New affordable housing, mixed-used: LCOR Coney Island

DESIGN

- New construction on campus with residential and office buildings: Watchtower Bible and Tract Society
- New mixed-use buildings: REDI One45 in Harlem
- Gut rehab mixed-use buildings repurposing large industrial tanks for thermal storage: Urban Village in Syracuse

FEASIBILITY

- New construction mixed-use buildings looking to leverage surface water body as thermal resource: Pratt Landing in New Rochelle
- New construction mixed-use buildings looking to leverage hybrid (ground source, air source, wastewater) as thermal resource: Gowanus Green in Brooklyn, The Peninsula in The Bronx, Fleet Financial in Queens
- Gut rehab mixed-use buildings looking to leverage surface water body as thermal resource: Silo City in Buffalo
- New construction using Flushing Bay as thermal resource: Willets Point in Queens

Existing

New Construction/Gut Rehab

Potential Impact – Rounds 1 through 5

- **39 project sites**
  - 20 upstate, 19 downstate (Westchester + NYC)
- **1,400 buildings**
- **26M sqft residential + 46.7M sqft other = 72.7M sqft total**
  - 60% of residential is LMI housing
- **Many sites include EJC organization and / or located in DAC region**

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Growing to scale

1. **Continue to attract competent solution providers**
2. **Validate system economies-of-scale and how to replicate as a market offering**
3. **Validate private market "sweet spots" and characterize market gaps**
4. ***Map marketplace roles and strategize overcoming market gaps***
5. ***Enlist others to embrace CTENs within their roles***

- **Significant interest from the market in developing CTENs**
  - 30+ firms through Round 5
  - Realized energy and cost savings
  - Diversity in scope, partnership, and engagement models
- **Need to keep up with market demand**
- **Develop solutions to address gap in developing large projects with multiple owners**

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The Utility Thermal Energy Network and Jobs Act

The Utility Thermal Energy Network and Jobs Act (A.10493/S.9422 - Joyner/Parker)

- Directs the Public Service Commission (PSC) to develop a regulatory structure for utility thermal energy networks for heating and cooling homes and launch pilot's systems in each utility territory.

PURPOSE:

- The purpose of the bill is to remove the legal barriers to utility development of thermal energy networks and require the public service commission to direct utilities to commence thermal energy network pilots in each major utility territory.
- This bill directs the public service commission to develop a regulatory structure for utility thermal energy networks that scales affordable and accessible building electrification, protects customers, ***and balances the role of incumbent monopoly utilities with other market and public actors.***
- This bill ensures the development of and access to well trained, highly skilled craft persons needed to support timely, reliable, high-quality thermal energy network projects and promotes good jobs for local residents in the expanding decarbonization sector.

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Utility Thermal Energy Network and Jobs Act

Regarding utilities:

The seven largest gas, electric, or combination gas and electric corporations shall propose thermal energy network pilot projects for the Commission to consider for approval.

- At least 1 and as many as 5 projects each
- At least 1 in a disadvantaged community
- If 4 or more proposed: at least 2 in disadvantaged communities
- Utilities shall coordinate with each other, NYSERDA, and consultants
- Shall include specific customer protection plans and shall be made publicly available and subject to a public comment period

Changes the definitions of both a gas and electric utility such that they may:

- Own, operate, and manage thermal energy networks
- Acquire and supply thermal energy
- Charge for the provision of thermal energy service
- Authorizes gas and electric utilities to sell and furnish thermal energy for heating or cooling and to lay appurtenances for thermal energy networks in public rights of way
- Authorizes gas utilities to provide thermal energy in areas where natural gas has become inadequate or insufficient to give reasonable service to consumers

Regarding Labor:

- Apply prevailing wage and direct entry apprenticeship and pre-apprenticeship requirements to thermal energy projects
- Any thermal energy network created shall demonstrate that the gas or electric corporation has entered into a labor peace agreement with a bona fide labor organization or jurisdiction that is actively engaged in representing gas and electric corporation employees

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Thank You

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