Accelerating Thermal Energy Network Adoption

Recommendations & Resources for New York State Municipalities

Sustainable Westchester

Pace Energy and Climate Center
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Table of Contents

1. Executive Summary

Sustainable Westchester's ("SW") Municipal Thermal Energy Network Accelerator Program ("MTEN-A") was an initiative funded by the New York Community Trust, with key project collaborators including the Pace Energy and Climate Center ("PECC") as a co-facilitator and the International Ground Source Heat Pump Association ("IGSHPA") as a presenting partner. The project ran from April 2025 to March 2026, seeking to engage a subset of Westchester County municipal staff and leaders to explore opportunities for advancing thermal energy networks at the local scale. This recommendation packet provides a comprehensive summary of the project's findings, as well as actionable next steps, tools, and resources to aid New York State municipalities in these efforts.

Through monthly virtual workshops, individual consultations with participants, and comprehensive research into prominent thermal energy network projects, Sustainable Westchester and the Pace Energy and Climate Center heard feedback about notable and recurrent barriers – including:

- Limitations on the funding and financing tools that municipalities can utilize;
- Minimal experience in managing a large-scale renewable energy project;
- High upfront costs associated with the design and implementation of thermal energy networks; and
- Uncertainty around the current regulatory environment for thermal energy networks in New York State.

This feedback directly informed the development of Sustainable Westchester and the Pace Energy and Climate Center's workshop curriculum and the content shared at the project's conclusion – including this Recommendation Packet and the accompanying resources, which include:

- **Funding and Financing Resource Guide for Thermal Energy Networks**
- **Thermal Energy Network Solution Providers**
- **Thermal Energy Network Case Studies**
- **Thermal Energy Network Ownership Models Guide**
- **Slide Decks and Recordings** from all 10 of our MTEN-A sessions
- **Guidance** on project planning, cost mitigation strategies, applicable codes & standards, waste heat transfer opportunities, and strategies to advance collaboration at the statewide level.

The remainder of Section 1 includes Acknowledgements that recognize key project collaborators, as well as terms and definitions that will be important to understand for those working through this resource. Section 2 provides additional background on the MTEN-A project, including barriers and findings that surfaced through our work with the program participants. Section 3 outlines resources made available to the participants as part of our project deliverables, and includes guidance on how they should be utilized. Section 4 details recommendations that are applicable to all program participants, as well as other municipalities and entities who may be exploring thermal energy networks for their communities. Section 5 intends to translate all these reflections and recommendations into clearly-defined next steps and near-term actions.

As readers work through this resource, please note that the thermal energy network space is rapidly-evolving. Some information may become outdated as time progresses – as well as new resources and opportunities that are not currently covered in this document.

For questions, up-to-date information, or recommended updates, please contact Sustainable Westchester and Pace Energy & Climate Center. We welcome the opportunity to discuss this work further and support municipalities and partners as they advance thermal energy network projects.

Acknowledgements

This report was authored, prepared, and edited by Lauren Kroell (Senior Program Manager, Sustainable Westchester) and Emma Lagle (Energy Policy Advisor & Regional Affairs Manager, Pace Energy & Climate Center).

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We also want to thank our project collaborators at the International Ground Source Heat Pump Association ("IGSHPA") for leading sessions about the CSA/ANSI/IGSHPA C-448 Standard and IGSHPA's training and certification offerings. As a leader in the ground source heat pump industry, we sincerely appreciate their participation in this project. In particular, we would like to recognize Jeff Hammond (Executive Director) for his ongoing support and collaboration.

We would also like to recognize our MTEN-A guest speakers and contributors for presenting to our participants about their work. These include:

- **Consolidated Edison:** David Orellano
- **Energy Improvement Corporation:** Susan Morth
- **Advance Albany County Alliance:** Dylan Turek
- **New York Power Authority:** Stephen Campbell, John Raudenbush, Ravi Shankar
- **Salas O'Brien:** Brian Urlaub
- **City of White Plains:** Judy Mezey
- **CHA Consulting:** Brendan Hall, Mitch DeWein, Saarthak Narsipur

Key Terms and Definitions

*The first instance in the recommendation packet of each of the below terms will be ***italicized in bold, orange text.***

Anchor building(s): a large building – or set of buildings – that could act as the foundation for a thermal energy network project. The "anchor" is the first customer of the thermal energy network, demonstrating buy-in for the project and providing centralized, consistent demand for heating and cooling that – if planned properly – could allow additional buildings to connect to its system in the future.

Borehole: holes drilled into the Earth that can be utilized to transfer heat to and from a building or ambient loop.

- **Borefield:** a collection of multiple boreholes

Ground source heat pump: a system that utilizes the ground, groundwater, or surface water as a heat source and/or sink.

- Also referred to in the industry as a *geothermal heat pump*.

Load balancing: the management and distribution of thermal energy across a networked system that accounts for load diversity among the connected buildings. By moving heat from where it is rejected to where it is needed, this process helps to maximize efficiency by reducing the need for additional energy generation.

Load diversity: a collection of buildings with different load profiles

Load profile: an estimate of or actual energy use for heating, cooling, and other needs (i.e. cooking, lighting, and electronics) over a period of time.

Offtakers: the term used to refer to customers that connect to the thermal energy network, but do not serve as a primary heat source or sink. This includes commercial, multifamily, institutional, and other facilities that would be connected to the thermal energy network, receiving heating and/or cooling from the system.

Thermal resource: a source through which thermal energy can be captured, utilized, and exchanged to provide heating or cooling to connected buildings.

- **Heat source:** refers to a resource that *supplies* heat to the thermal energy network, including heat that would otherwise be wasted, to heat the connected buildings.
    - Examples: excess heat from commercial and industrial processing; waste, wastewater, and sewage treatment facilities; data centers; buildings with large refrigeration systems (grocery stores, ice rinks).
- **Heat sink:** refers to a resource that absorbs heat *rejected* from the thermal energy network to cool the connected buildings.
    - Examples: water bodies
- **Waste heat transfer:** the act of utilizing excess heat for heating and cooling purposes by moving it through the thermal energy network system.
    - Common forms include:
        - **Surface water heat transfer:** the utilization of water bodies (i.e. lakes, rivers, ponds, oceans) as a thermal resource.
        - **Wastewater / sewage heat transfer:** the utilization of wastewater / sewage treatment systems as thermal resources.
        - **Waste heat capture:** refers to situations where the *thermal resource* is serving solely as a *heat source* (e.g. transferring excess heat from industrial processing to connected buildings).
- NOTE: Depending on the time of year, a thermal resource could act as a heat source *OR* sink. For example: geothermal boreholes could facilitate heating during the wintertime (when ground temperature is higher than ambient temperature) and cooling during the summertime (when ground temperature is lower than ambient temperature).

Thermal energy network (TEN): a system that provides hot water, space heating, and/or air conditioning to multiple buildings through a network of pipes. The system maximizes efficiency by capturing, reusing, and sharing thermal energy among connected buildings and thermal resources.

- Also referred to in the industry as *district energy systems, networked geothermal systems*, and *community heat pumps*.

Resource Repository

The table below includes easy-to-access links to resources cited throughout this document. These can be utilized as “further reading” to help municipalities learn more about thermal energy networks and how to mobilize them at the local scale.

Organization	Resource	Brief Description
Building Decarbonization Coalition	Clean Building Compass: Thermal Energy Networks	Online library containing a range of case studies, reports, and other resources about decarbonization topics – the link provided automatically applies a filter for all thermal energy network-related resources.
Building Decarbonization Coalition	Financing Thermal Energy Networks: A Reference Guide for Municipalities & Community Advocates	Guide to infrastructure financial tools, including step-by-step instructions on how to build a capital stack, and in-depth review of different financing options.
Building Decarbonization Coalition	Thermal Energy Networks Legislative Guidebook	Step-by-step guide for lawmakers and advocates to build thermal energy network legislation for their communities.
International Ground Source Heat Pump Association	Standards – CSA/ANSI/IGSHPA C-448	Bi-national standard covering minimum safety and environmental requirements for equipment & material selection, site survey, system design, installation, testing & verification, documentation, and commissioning & decommissioning of ground-source heat pumps, thermal energy storage systems and retrofits.
Vermont Community Thermal Networks	Toolkit: How to Develop a Thermal Energy Network	Step-by-step guide on how to plan thermal energy networks for your community.
Vermont Community Thermal Networks	Fact Sheets and Resources	Contains an array of resources (including one-to-two-pagers) on various aspects of thermal energy network planning, including: cost considerations, financing opportunities, ownership models, key benefits, basic technology information, strategies for heat capture and transfer, compatible HVAC systems, and more.

Pace Energy and Climate Center	Expanding Municipal Options for Thermal Energy Networks	Study exploring options for New York State municipalities to implement thermal energy networks in their communities – including legal and tax considerations, business models, utility functions, permitting considerations, and policy recommendations.
HEET	Gas-to-Geo Resource Hub	Includes various toolkits and open-source information on projects led by HEET to advance networked, community geothermal in the state of Massachusetts (as a means of transitioning off of gas networks). Key resources include: • Community Charrettes: early-stage planning and discussions about networked geothermal potential • Kickstart Massachusetts: HEET-led project to fund early stage feasibility studies • Networked Geothermal Toolkit • Gas to Geo Wiki: platform to share and access information on networked geothermal systems • Learning from the Ground Up: research group studying networked geothermal projects

International Ground Source Heat Pump Association (IGSHPA)	Training & Certification	Overview of IGSHPA's various training and certification offerings, including:
		• *Free* Geo 101 Course
		• Certifications for the following professionals:
		  ○ Design Professionals
		  ○ Inspectors/Project Managers
		  ○ Installers
		  ○ Service Techs
		  ○ Developers/Government/Utilities
		
		The Events & Training calendar is a helpful resource for those seeking continued learning and certification opportunities.

International Ground Source Heat Pump Association (IGSHPA)	Project Database	Database of case studies for commercial and residential geothermal/ground source heat pump projects.

New York Geothermal Energy Organization (NY-GEO)	NY-GEO.org	NY-GEO's websites contains a number of helpful, geothermal-related resources, including: • Webinar and conference recordings (under the "Events" tab); • Lunch & Learn recordings / slide decks; • Weekly newsletters; • Geothermal tax incentives and credit resources; • Geothermal publications; • And more!
New York State Energy Research & Development Authority (NYSERDA)	Large-Scale Thermal Projects	Summary of projects that received funding from NYSERDA under PON 4614 (Community Heat Pump Systems).
New York State Energy Research and Development Authority (NYSERDA), RMI, Building Energy Exchange (BE-Ex), and Urban Land Institute	Retrofit Playbook for Large Buildings	The Retrofit Playbook for Large Buildings offers a living library of case studies, technical resources, and best practices to support high quality, low carbon retrofits.

2. Background: Municipal Thermal Energy Network Accelerator

Launched in April 2025, the Municipal Thermal Energy Network Accelerator ("MTEN-A") was established to support municipalities as they explore opportunities for advancing ***thermal energy network*** ("TEN") projects in their communities. This initiative was developed in recognition of the barriers that municipalities face when it comes to implementing large-scale renewable energy technologies. Core goals for the program included: fostering a broader understanding of thermal energy networks as a form of efficient heating and cooling; outlining relevant legal, regulatory, zoning, planning, and permitting considerations; and identifying opportunities to motivate progress for active and prospective projects.

The core project collaborators included:

- Sustainable Westchester ("SW") as the project lead;
- Pace Energy and Climate Center ("PECC") as a co-facilitator, focused on providing legal expertise;
- International Ground Source Heat Pump Association ("IGSHPA") as a presenting partner.

The project collaborators worked to plan, develop, and conduct monthly sessions on a variety of topics related to thermal energy networks. Individual check-ins with each of the participating municipalities were also offered to identify locally-relevant priorities and solutions to address key implementation barriers.

Key participants in the MTEN-A program included staff from:

- The City of Yonkers;
- The City of Peekskill;
- The City of Mount Vernon;
- The Village of Port Chester;
- The City of White Plains;
- SUNY Purchase College;
- Westchester County.

Please note that although the program participants were limited to Westchester County, we have adapted this Recommendation Packet (and the accompanying resources) to maximize applicability to all New York State municipalities.

Monthly Sessions

Virtual sessions took place across a 12-month schedule, typically on the 3rd or 4th Monday of each month and running approximately 60 to 90 minutes in length. Sustainable Westchester and the Pace Energy and Climate Center collaborated on the development and presentation of the content, with each session focusing on a notable subtopic related to thermal energy networks.

Sustainable Westchester and the Pace Energy and Climate Center formulated a working curriculum at the inception of the project, subject to change based on participant availability and interests. The topics covered throughout these sessions included:

- *Hosted by Sustainable Westchester and the Pace Energy and Climate Center*:
    - Session #1: Introduction to thermal energy networks, including progress to date on adoption in New York State;
    - Session #2: State and local laws – focusing on the current regulatory framework (or lack thereof) for municipal ownership and operation of thermal energy networks in New York State;
    - Session #3: Business and ownership models for thermal energy networks, including those that may involve unique stakeholders or arrangements;
    - Sessions #4-5: Financing and funding for thermal energy network projects (two-part session);
    - Session #6: Best practices for the early stages of project planning;
    - Session #7: Community planning, permitting, and zoning considerations;
- *Hosted by IGSHPA*:
    - Session #8: Introduction to the C-448 Standard for the design and installation of ***ground source heat pumps*** (which includes a new section on thermal energy networks); and
    - Session #9: Training and certification opportunities for municipal officials that are currently (or will become) involved with thermal energy network and/or ground source heat pump projects.

A close-out session took place in the program's 12th month to hear feedback, discuss key learnings, and evaluate next steps for the participating municipalities.

Slide decks, and resources for further reading will be made available on Sustainable Westchester's website. *If you are experiencing access issues, please contact Sustainable Westchester.*

Municipal 1-on-1s

Throughout the program, Sustainable Westchester and the Pace Energy and Climate Center offered 1-on-1s (up to one per month) with each municipality to address specific questions and challenges identified over the course of the program.

Sustainable Westchester and the Pace Energy and Climate Center also allocated two months (July and December) of the MTEN-A program to ***focus solely on hosting 1-on-1s with each municipality***, in recognition of their demanding schedules and limited time capacity outside of pre-scheduled, monthly workshops.

Notable feedback and barriers identified during these 1-on-1s are highlighted in the bullet points below:

Key Findings:

- Many of the municipalities we spoke with were interested in, or actively in the process of, pursuing or updating their **comprehensive plans**, and had an interest in exploring ways to tie in climate resilience and energy-related initiatives.
- Several municipalities were also monitoring **new, comprehensive development projects** – often located in downtown cores or waterfront areas – that could serve as an opportunity to integrate thermal energy network planning.
- Municipalities, and particularly planning departments, recognize that **local and statewide clean energy and climate policies** (e.g. municipal Climate Action Plans, the New York State All-Electric Buildings Act) can enhance the visibility of innovative solutions, including thermal energy networks.

Barriers:

- **Lack of clarity on the current state of funding and financing opportunities for municipalities:** Many municipal participants expressed feeling that "the time had passed" for leveraging funding opportunities that would be critical to facilitating thermal energy network projects, including key federal (EPA

Climate Pollution Reduction Grant, residential tax credits) and state (PON 4614, PON 5614) supports.

- **Municipal limits on accessing funding supported by the Systems Benefit Charge:** Although there is funding available through the New York State Energy Research and Development Authority ("NYSERDA") and the public utilities for *assessing the feasibility of* and *implementing* thermal energy networks, properties intending to connect to the thermal energy network would have to meet relevant eligibility guidelines – which often include paying into the Systems Benefits Charge ("SBC"). This is a requirement of both the FlexTech program (New York State Energy Research and Development Authority [NYSERDA], n.d.-c) *and* utility incentives for clean heating and cooling technologies (New York State Public Service Commission [NYS PSC], 2025) – which, currently, are the main rebate-based financial support mechanisms for thermal energy network projects.
- **Difficulties with identifying how planned developments can align with a thermal energy network project:** Even if a municipality was able to point to proposed development or infrastructure projects that *could* work for a thermal energy network, they often expressed that it was too late in the process to change course (particularly if a project was already in the design stage, or would need to begin construction in the coming months).
- **Cost increases throughout the planning and design process:** Some municipalities with prior experience in managing ground source heat pump proposals reported seeing an unexpected jump in estimated costs during the planning phase. One municipality reported a $10 million increase at the completion of its feasibility study, when compared to the initial cost estimate given by the solution provider. Although this can result from a variety of factors that are outside of the solution provider's control – including market shocks, equipment costs, inflation, and workforce constraints – it can be hard for the municipality to move forward if the project does not make fiscal sense.

This feedback directly informed the development of this Recommendation Packet, and the accompanying resources, to ensure the project outcomes would align with the needs highlighted by our participants. Section 3 will highlight the resources specifically developed by Sustainable Westchester and its partners, while Sections 4 and 5 outline actionable recommendations on how municipalities can start – and motivate progress on – a thermal energy network project.

3. Project Deliverables and Resources

One of Sustainable Westchester's key reasons for incepting the MTEN-A project was to expand the resources, technical support, and knowledge-sharing opportunities available to municipalities that are investigating community and neighborhood-scale decarbonization models. A recurring theme of the monthly sessions and 1-on-1s was that municipalities are, by and large, *eager* to position themselves as regional sustainability leaders – but when it comes to more technically-complex solutions, there is still limited awareness of how they can be facilitated at scale.

As such, the deliverables for this project include a set of resources that can be used by municipalities in Westchester – and throughout New York State – to support their evaluation and exploration of thermal energy network opportunities.

Funding Resource Guide for TENs

One key barrier for municipalities (and other public institutions) that want to adopt clean energy technologies is the question of how to fund, finance, and pay for these projects *without* overutilizing public resources – namely, taxpayer-funded dollars.

This was corroborated through the feedback received during our 1-on-1 sessions with the municipalities, and applies not just to thermal energy networks, but a range of energy-related projects. These concerns persist even for the most time-sensitive and critical facility needs, such as improving building envelopes (e.g. insulation, window and door replacements) and replacing outdated heating systems. In its conversations with stakeholders, Sustainable Westchester and the Pace Energy and Climate Center routinely heard these comments in relation to the concept of *deferred maintenance* – highlighting how challenges with undertaking even the most essential building repairs and upgrades (due to budget constraints and/or resource limitations) makes the process of funding large-scale renewable energy projects seem even more daunting.

Noting this as a prominent barrier for municipalities, Sustainable Westchester and the Pace Energy and Climate Center compiled a **Funding and Financing Resource Guide for Thermal Energy Networks,** which details a range of grant, financing, and rebate opportunities for projects of this nature.

How to Use This Resource:

- A table of contents is listed on the first page, which highlights all the funding and financing opportunities identified by Sustainable Westchester and the Pace Energy and Climate Center (*as of August 2026*). Readers can jump to certain sections by clicking on the relevant header in the table of contents.
- Where possible, each section includes:
    - A summary of the program or funding / financing opportunity;
    - Guidance on how it could be used for a thermal energy network project (if not immediately clear);
    - Key requirements and eligibility guidelines;
    - Amount of available funding for supported projects;
    - Tips and best practices on how to navigate the funding / financing opportunity; and
    - Key contact information and/or program representatives.

We recognize that there are still prominent challenges for municipalities when it comes to financing and funding these projects, even with the resources highlighted in this guide. **These barriers are expanded on in greater detail below – along with potential solutions and remediation strategies.** Sustainable Westchester and the Pace Energy and Climate Center have also raised these concerns when coordinating with key stakeholders and decisionmakers about changes that could motivate continued growth for thermal energy network adoption in New York State. *Sustainable Westchester and the Pace Energy and Climate Center are committed to continued work with our municipal partners* in advancing these discussions, so we can collectively reduce financial burdens for municipalities that are eager to implement these projects.

- Currently, the primary funding streams for thermal energy network projects – including NYSERDA's Flexible Technical Assistance Program ("FlexTech"), utility incentives, and grant opportunities – can cover a meaningful portion of the costs associated with the *feasibility* and *construction* stages of a thermal energy network project. However, these do not (currently) cover the costs associated with the *design and engineering* of a thermal energy network – which can be significant.
    - **Potential Solution(s):** Some projects have been able to secure funding through New York State Budget appropriations, such as a thermal

energy network project in Jamestown, NY (UpgradeNY, 2025). Municipalities may want to consider collaborating with community-based organizations to advocate for similar funding streams. Another strategy could be to highlight a need for more consistent funding cycles – similar to what was facilitated through NYSERDA's PON 5614, which distributed funding for the design stage of thermal energy network projects across three funding rounds (NYSERDA, n.d.-f).

- As highlighted in Section 2, although there is funding available from NYSERDA and the public utilities for *assessing the feasibility of* and *implementing* thermal energy networks, municipal buildings that are on public power supply – i.e. the New York Power Authority ("NYPA") – do *not* pay into the Systems Benefits Charge ("SBC"), which is a common requirement to be eligible for such incentives.
    - **Potential solution:** Sustainable Westchester and the Pace Energy and Climate Center have tried to identify resources that 1. do not require the property owner to pay into the SBC *and / or* 2. clearly state eligibility for municipal properties. *Where possible, this information is highlighted under each opportunity listed in the* **Funding and Financing Resource Guide for Thermal Energy Networks**.
- Many grant and funding opportunities are only open for specific periods of time, which requires substantial coordination from the municipality and/or other stakeholders that want to leverage them.
    - **Potential solution:** Sustainable Westchester and the Pace Energy and Climate Center can provide additional assistance to municipalities that have questions about how to "prepare" for these funding opportunities (beyond the details included in any relevant "Tips and Best Practices" listed under each opportunity in the **Funding and Financing Guide**). Additionally, increased funding for pilot and proof-of-concept projects – such as the Utility Thermal Energy Network and Jobs Act ("UTENJA") (Governor of New York's Press Office, 2022) and the Sustainable Future Program (Governor of New York's Press Office, 2025) – indicates that New York State is *actively investing in thermal energy network opportunities*. Municipalities are in a unique position to "make the case" to legislators and relevant state agencies – including NYPA and NYSERDA – for projects that they are interested in pursuing, but would not be able to see to completion without additional support. For more

ideas, read through the recommendations in the Continued Collaboration and Knowledge-Sharing subsection of Section 4.

Solution Providers and Summary of PON 4614 Projects

Identifying qualified solution providers can be a challenge, particularly for projects involving technologies that are not commonly-adopted at the state and local scale. This includes thermal energy networks, which despite having a long-term footprint in Europe (Munćan et al., 2024) – and gaining traction in countries like Canada (Canada Infrastructure Bank, 2023) – do not yet have the same level of prevalence in New York State. Historically, district heating and cooling systems in New York State have utilized fossil-fuel, non-renewable power generation. These include Consolidated Edison's ("Con Edison") district steam system in New York City – which is actively evaluating decarbonization strategies (Urban Green Council, 2025) – and municipally-based utilities, such as those in the Cities of Jamestown (Jamestown Board of Public Utilities, n.d.) and Rochester (Rochester District Heating Cooperative, n.d.). Given their public-facing nature, municipalities may also be subject to certain bidding, procurement, and contracting standards that can create complexities for solution providers who lack experience with similar projects and processes.

As such, Sustainable Westchester and the Pace Energy and Climate Center have constructed a list of **Thermal Energy Network Solution Providers**, highlighting a range of firms and businesses with existing, in-house expertise in these technologies. To address the aforementioned barriers, we have also sought to identify providers that are experienced in working with municipalities – as well as specific types of ***thermal resources*** (e.g., data centers, wastewater treatment facilities, geothermal), based on the interests highlighted by our MTEN-A participants. This helps to reduce the time that municipalities would otherwise put into researching providers, and supplies an initial list that can be leveraged for the distribution of any Requests for Information ("RFI"), Requests for Qualifications ("RFQL"), or Requests for Proposals ("RFP").

How to Use This Resource:

The **first tab of the spreadsheet – "Solution Providers & Services"** – lists an array of thermal energy network providers, many of which were pulled from a resource

distributed by NYSERDA as part of its Large-Scale Thermal program.

Solution Providers & Services Tab (Tab #1)	
Column(s)	**Description of Information**
A	Company Name
B-N	Identifies the specific services and technologies offered by the solution provider.
O	Additional services offered by the provider (if any).
P-T	Contact information, including names, emails, phone numbers, websites, and alternative contacts (if any). *If you're having trouble getting a response from the listed contact, please contact Sustainable Westchester or Pace Energy and Climate Center.*
U	Identifies whether or not the provider worked on a project under NYSERDA's PON 4614 program (NYSERDA, n.d.-g). If they did, details about their project can be found in the second tab of this spreadsheet, "PON 4614 Project Details".
V	Identifies whether or not the provider currently works in New York State. Sustainable Westchester and the Pace Energy and Climate Center have included the full list of providers that were originally identified by NYSERDA's Large-Scale Thermal team, which includes some that have worked on notable projects in areas outside of New York State.
W	Highlights the building types and sectors the solution provider has experience developing proposals and / or designs for. ("Government" is one of the types that may be listed, which encompassess municipally-owned properties.)
X	Highlights the types of ***thermal resources*** that the solution provider has experience with (including, but not limited to: geothermal / ground source heat pumps; ***waste heat transfer*** – i.e. via waste and sewage water treatment facilities, surface water; and heat recovery heat pumps).

The **second tab – "PON 4614 Project Details" –** highlights a range of projects that received funding through NYSERDA's PON 4614, Community Heat Pump Systems. This PON awarded funding for the feasibility, design, and construction stages of large-scale heat pump projects – *the program ran until 2023* (NYSERDA, n.d.-g).

PON 4614 Project Details (Tab #2)	
Column(s)	**Description of Information**
A-B	Name of the project, location and/or main project stakeholder (i.e. developer, property owner).
C	Identifies the company that worked on the project.
D	Identifies what category of funding the project received, which include one (or a combination) of the following: • Category A: Feasibility (funding for a feasibility study) • Category B: Design (funding for a design study) • Category C: Construction (funding for project implementation, installation, and construction)
E-F	Highlight the level of municipal involvement in the project (beyond general responsibilities associated with permitting, code, and / or zoning oversight).
G-K	Highlights relevant project details – including whether the project is new construction vs. existing, ownership of the building(s) in the project (single- or multi-ownership), building type, and links to additional project info.
L	Highlights the thermal resources evaluated and/or incorporated into the project (similar to Column X in the "Solution Providers & Services" tab).
M-O	Any publicly-available information about the project's status and / or additional details to be aware of.

The **third tab – "Advocates and Allies"** – highlights organizations that support the implementation and advancement of thermal energy networks at state and/or national levels (similar to the work done by Sustainable Westchester and the Pace Energy and Climate Center, who are also included in this list). In addition to contact information, Sustainable Westchester and the Pace Energy and Climate Center have included a selection of key resources from these entities in Column J of this tab.

Case Studies

A common request from the MTEN-A participants was to gather information on thermal energy network case studies – where possible, highlighting projects that are located in New York State and/or share characteristics with projects they would be interested in leading or supporting.

Sustainable Westchester and the Pace Energy and Climate Center have gathered extensive information on a total of **24** thermal energy network case studies, which are summarized in our **Thermal Energy Network Case Studies** resource. These are in addition to (or build further on) the PON 4614 project summaries in the second tab of the **Thermal Energy Network Solution Providers** spreadsheet.

How to Use This Resource

Where possible, Sustainable Westchester and the Pace Energy and Climate Center have tried to gather a range of relevant details about the technical components, ownership structure, operational status, challenges, and lessons learned for each case study. The case studies include the following details, listed in a side-by-side table format:

- Thermal resources employed
- Building type(s) – sectors and characteristics (residential, multifamily, office, school…)
- Single-owner campus or multi-ownership
- New construction vs. existing
- System / campus size and expansion capacity
- Network system characteristics, including (where available):
    - Pipe / loop configuration
    - 4th vs. 5th generation
- Additional projects: solar, building envelope / retrofits
- Cost and funding sources
- Timeframe
- Stakeholders and solution providers
- Ownership and maintenance / operational structure
- Year project became fully operational
- ***Borehole*** number and depth
- Challenges

- Lessons learned and project benefits
- Links to sources and additional case study information
- Key contacts (if available)

Ownership Models Guide

Thermal energy networks are known for having high upfront costs associated with system planning, design, and construction – as is the case with most large-scale infrastructure projects. As such, a variety of ownership models have been evaluated (and implemented) to facilitate these projects, particularly for systems that involve multiple stakeholders and property owners.

Session #3 of the MTEN-A program was dedicated to exploring different ownership structures that could be (or have been) utilized in the development of a thermal energy network project. The slides for that session are available on Sustainable Westchester's website.

Additionally, Sustainable Westchester and the Pace Energy and Climate Center have put together an **Ownership Models Guide** that summarizes the key types of ownership models. Each model includes information on:

- General structure;
- Key actors / stakeholders;
- Level of state oversight / regulation;
- Associated benefits and risks.

CSA/ANSI/IGSHPA C-448 Standard: Overview & Implementation Guidance

Although ground source heat pumps and other thermal energy technologies are not new to the United States (or New York State), their application in the form of a *networked* system is still relatively nascent to the region – particularly when it comes to adoption by municipalities. In addition to raising awareness about thermal energy networks, this project sought to help municipalities ensure that these technologies are being installed in accordance with industry standards.

We were lucky enough to have one of our core project collaborators be the **International Ground Source Heat Pump Association ("IGSHPA")**, which – among many other accomplishments – led efforts to develop the new CSA / ANSI / IGSHPA C448 Series:25 Standard for the Design and installation of ground source heat pump systems for commercial and residential buildings (International Ground Source Heat Pump Association [IGSHPA], n.d.-b). This updated Standard – released in 2025 – outlines clear guidelines and best practices for implementing ground source heat pump technologies in residential and commercial buildings (CSA Group, 2025). As such, it can play an important role in regulating the design and installation of these systems, as well as providing confidence for consumers and property owners that these jobs are being done the right way.

IGSHPA provided an overview of the CSA / ANSI / IGSHPA C448 Standard for Session #8 of the MTEN-A program – the slide deck can be found on the Sustainable Westchester website. The presentation includes information about the Standard's contents, key updates from previous editions, and information on how municipalities can access the Standard themselves.

Key information worth noting about the Standard:

- New York is an International Code Council ("ICC") state, which uses the International Mechanical Code ("IMC") and International Residential Code ("IRC"). Although the ICC *does* reference the C448 Standard in certain sections, it may not cover *all* of the design and installation recommendations outlined in the full C448 Standard.
- The Standard is used to inform key training, certification, and accreditation programs – including those detailed in the **IGSHPA Certification and Training Opportunities** subsection of this document.

Code Implementation: Guidance for Municipalities

Municipalities seeking to incorporate the CSA / ANSI / IGSHPA C448 Standard into local practice should consider both administrative and legal pathways for implementation. At a baseline, the Standard can be used immediately as a best practice reference to inform project review, procurement, and inspection of ground source heat pump and thermal energy network systems. However, municipalities may also wish to pursue more formal integration through local code adoption or policy requirements.

New York State municipalities are required to adopt and enforce the New York State Uniform Fire Prevention and Building Code ("Uniform Code"), which establishes minimum statewide standards and is updated on a recurring cycle of approximately every five years pursuant to New York Executive Law § 373. The most recent edition of the Uniform Code took effect on December 31, 2025. As a general matter, local governments are not permitted to adopt standards that are less stringent than the Uniform Code, but may adopt more stringent provisions or requirements that supplement it, consistent with New York Executive Law § 379(1) and (4).

Where a municipality determines that additional requirements related to ground source heat pump systems or thermal energy networks are appropriate, it may consider adopting local provisions that incorporate or reference elements of the C448 Standard. This could include requirements related to system design parameters, borefield installation practices, or verification and inspection protocols.

Under New York law, municipalities that adopt provisions more stringent than the Uniform Code are required to petition the State Fire Prevention and Building Code Council ("Code Council") within 30 days of adoption for a determination that the local standard is more stringent, as set forth in New York Executive Law § 379(1). The Code Council will review the submission and determine whether the local provision may remain in effect. Municipalities may also petition the Council following updates to the Uniform Code to determine whether existing local provisions remain valid under the revised statewide standards, consistent with New York Executive Law § 379(3).

Additionally, municipalities may adopt local requirements to address gaps in the Uniform Code where unique local conditions or emerging technologies, such as thermal energy networks, are not fully addressed. In such cases, the Code Council is responsible for evaluating how those provisions compare to the Uniform Code under the same statutory framework.

In practice, municipalities may wish to consider a tiered approach to implementation:

- **Near-term**: Utilize the C448 Standard as guidance in procurement documents (e.g., RFPs), project specifications, and internal review processes.

- **Mid-term**: Incorporate Standard-aligned requirements into local policies, permitting conditions, or design guidelines.
- **Long-term**: Evaluate whether to formally adopt more stringent local code provisions, and if so, pursue the required petition to the Code Council.

This discussion is intended to provide general information on potential implementation pathways. It reflects a reasonable interpretation of the applicable statutory framework but does not constitute legal advice. Municipalities are encouraged to consult with their local counsel and coordinate directly with the Code Council to confirm procedural requirements and applicability for any specific code adoption or amendment.

IGSHPA Certification and Training Opportunities

In addition to its presentation on the C448 Standard, IGSHPA also led a presentation on its Training & Certification programs – which help consumers ensure they are choosing qualified providers for their ground source heat pump and/or thermal energy network project.

IGSHPA's Training and Certification offerings cover the whole lifecycle of a ground source heat pump project – which include designing, installing, inspecting, and servicing the system and its equipment. A full overview of their Training and Certification opportunities can be found on IGSHPA's website (IGSHPA, n.d.-d).

The Session #9 slide deck, which focuses on these training and certification opportunities, is available on the Sustainable Westchester website. As part of the MTEN-A program, the project collaborators opted to focus on two training opportunities that could be particularly relevant to municipal staff – specifically:

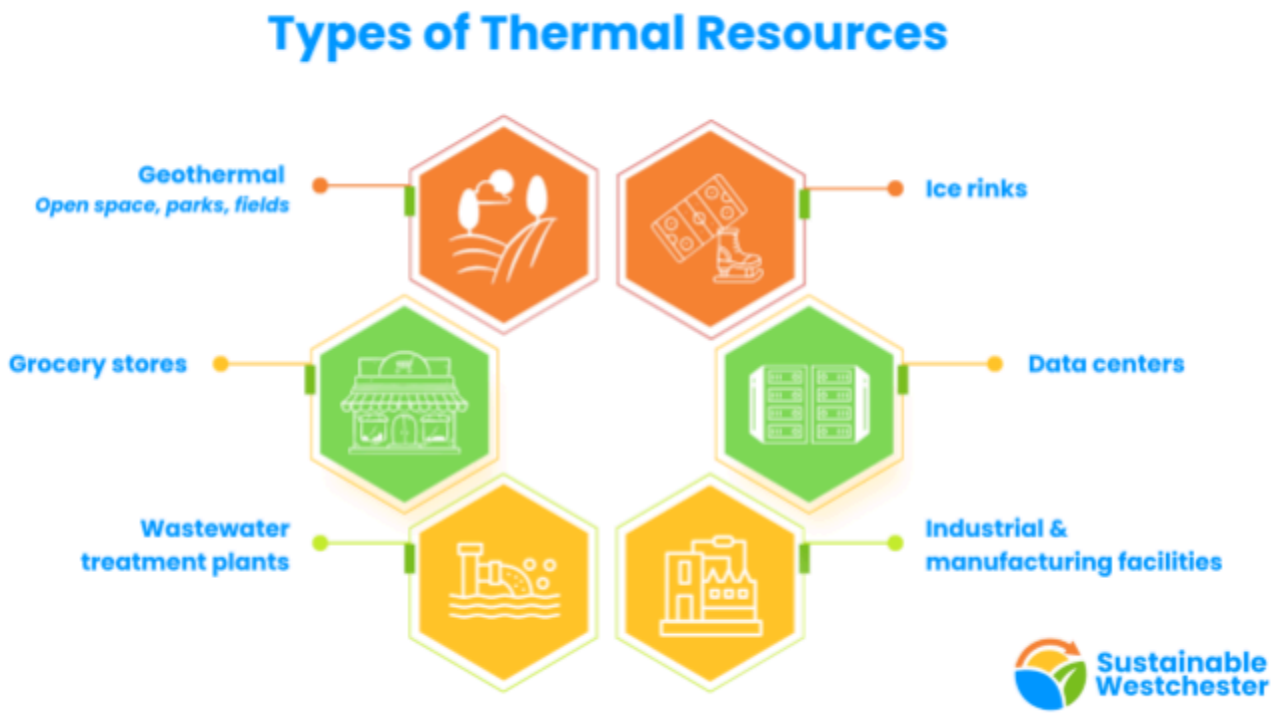
- **System Verification and Inspection:** could apply to staff engineers and/or building departments that would be responsible for inspecting ground source heat pump systems installed in their municipality. Course information is available here (IGSHPA, n.d.-d).
- **Selecting a Ground Source Heat Pump Team:** provides guidance on RFI, RFQL, and RFP development, selecting a suitable solution provider, and key "steps" to consider for a ground source heat pump project. Course information is available here (IGSHPA, n.d.-d).

4. General Recommendations for Municipalities Exploring TEN Implementation

Explore Locally-Based Thermal Resource and Anchor Building Opportunities

Thermal Resource Evaluation

Early on in the planning process, municipalities and other stakeholders should evaluate what thermal resources could be utilized as ***heat sources*** or ***heat sinks*** – which serve to either *provide heat* to the connected buildings or *enable heat rejection* for cooling-dominant buildings, respectively. These can act either as a supplemental resource or even serve as the entire medium for heating and cooling the networked buildings. A graphic that demonstrates certain types of thermal resources can be found below.



Types of Thermal Resources.
Source: Developed by author (Sustainable Westchester).

These resources have significant potential to improve the thermal energy network's overall efficiency. For example – the U.S. Department of Energy estimates that annually, approximately 350 GWh of thermal energy (in the form of hot water) is flushed down the drain in the United States, an amount of energy equivalent to heating more than 7 million Olympic-sized swimming pools (Smith & Henze, 2021). These numbers highlight a truly immense opportunity for highly-efficient, networked heating and cooling via ***wastewater heat transfer*** – which, inherently, involves the utilization of publicly-available resources. The exploration of wastewater heat transfer has been of particular interest to *municipally-based* thermal energy network projects, including the National Grid UTENJA project in Syracuse, New York (National Grid, n.d.) and a district heating conversion project in Jamestown, New York (NYSERDA, n.d.-b). A later section of this recommendation packet will dive deeper into the topic of **Waste Heat Transfer**, since this was highlighted by our MTEN-A participants as a topic of special interest.

One of the key benefits of a thermal energy network system is that it can promote ***load balancing*** among a mix of building types with different heating and cooling needs (also known as ***load profiles***). For example, an office building that needs to cool its space could transfer the heat it removes to a multifamily building that needs heating for its tenants. This ensures that the heat is being used effectively and efficiently – since excess heat from large buildings is traditionally vented out, resulting in significant losses of otherwise-usable heat.

By providing a consistent, recoverable thermal input, waste heat resources can significantly enhance load-balancing capabilities. This approach improves overall system efficiency and supports more stable performance throughout the year, while reducing the need for supplemental energy sources. As such, in addition to identifying "bigger" thermal resources (examples of which are detailed in the graphic at the beginning of this subsection), early project planning should incorporate considerations for capturing a range of building types in the proposed network.

Taking these steps at the "starting point" of a thermal energy network project can provide some initial insight into its feasibility. If there aren't adequate thermal resources or diverse building types in the area where a thermal energy network is being scoped, it could be harder to justify the project's cost-effectiveness and potential to maximize energy efficiency.

Municipalities should also consider the long-term economic value of capturing waste heat – including avoided energy costs, reduced exposure to volatile fuel markets, and the potential to support sustainable cost-recovery or utility revenue models.

Key recommendations for municipal consideration include the following:

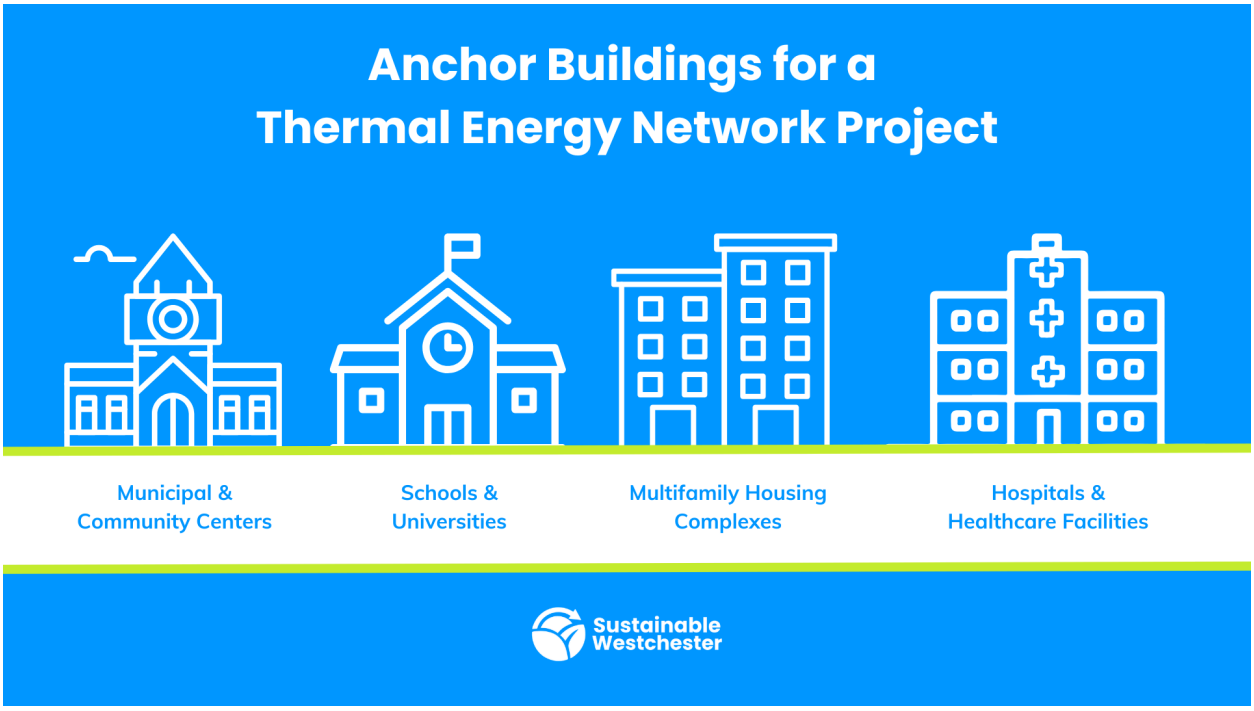
- ***Understand the range of thermal resources that exist, and learn about how they can be utilized*:** Session #6 of the MTEN-A program focused on outlining a range of thermal resource types – these slides can be found on the Sustainable Westchester website. Vermont Community Thermal Network's ("VCTN") "Moving Heat" fact sheet is another great summary of how *waste heat* can be harnessed in a thermal energy network (Vermont Community Thermal Networks [VCTN], n.d.-c).
- ***Identify what thermal resources exist in the municipal boundary*:** Mapping out what thermal resources are *currently* available can help to guide initial thoughts on where a project could be sited – since the connected buildings would have to be in relatively close proximity to the thermal resource. VCTN estimates this distance should be about ¼ mile (VCTN, n.d.-c), though the municipality should consult with a qualified solution provider before making a final determination.
    - Municipalities are encouraged to use geospatial mapping tools and infrastructure datasets (e.g., wastewater flow data, building energy demand profiles, industrial heat mapping) to systematically identify, quantify, and prioritize potential waste heat resources.
- Simultaneously, municipalities should ***consider the ownership structure for the thermal resources being assessed***, which could be publicly-owned (e.g., municipally-owned land, wastewater treatment plants, public pools or ice rinks) or privately-owned (e.g., data centers, grocery stores, industrial and manufacturing facilities). This distinction will directly influence partnership structures, access agreements, and long-term system governance.
- ***Thermal energy network deployment should be strategically aligned with planned sewer, water, and roadway capital projects*** to minimize excavation costs, enable co-installation of thermal infrastructure, and prepare for potential thermal energy network system expansion.

Anchor Buildings

Having potential ***anchor buildings*** in mind can also support the early development of a thermal energy network project. Anchor buildings can include a large building, or set of buildings, that would serve as the project's starting point – and eventually, enable future system expansion. These are generally properties that *pose favorable conditions* for facilitating a thermal energy network. Examples include buildings that:

- Already have high on-site energy loads and/or district-style heating and cooling systems (i.e., multi-building complexes);
- Are in close proximity to potential thermal resources – anchor buildings may be identified *before, alongside,* or *as a result of* the municipality's assessment of thermal resource availability;
- Have aging HVAC systems that are "more compatible" with thermal energy technologies– including those detailed in Vermont Community Thermal Network's Compatible HVAC Systems guide (VCTN, n.d.-a);
- Qualify for higher grant, incentive, rebate, and general funding opportunities, thereby lowering the upfront costs – these are detailed in the **Evaluate Opportune Building Types and Cost Share Pathways** subsection of this document.

Examples of potential "anchor buildings" are detailed in the below graphic, and were also highlighted during Session #6 of the MTEN-A program.



Types of anchor buildings.
Source: Developed by author (Sustainable Westchester).

Key recommendations for (and benefits of) identifying anchor buildings include:

- ***Demonstrating project buy-in and benefits*:** Support from multiple stakeholders (e.g., municipal government, utility providers, property owners, developers, and community-based organizations) indicates a shared, local commitment to advancing decarbonization efforts, which can be easier to facilitate when the focus is on a particular building, project, and/or vision for the community. Starting the project with an anchor building can also act as a "proof of concept" and learning opportunity – as such, *key findings and lessons learned* should be gathered throughout the planning and implementation process.
- ***Timeline alignment*:** In evaluating potential anchors, municipalities may choose to focus on buildings that fit a more near-term timeframe for implementation. This could include already-planned development projects, or municipally-owned buildings with pressing infrastructure needs.
- ***Enables scalability*:** Rather than "starting big", commencing with an initial project can serve as the focal point for a larger, networked system.

Apply Comprehensive Planning Principles to TEN Opportunity Assessments

Municipalities are generally familiar with the process of comprehensive planning, which is an opportunity for community members, planning experts, and public officials to collectively develop a long-term plan and vision for the community (Westchester County, 2025). Many of these principles align with what have been identified as successful strategies for planning a thermal energy network project, particularly for those that involve public resources and varied stakeholders. These include, but are not limited to:

1. Setting clear timelines, progress points, and measurable outcomes;
2. Demonstrating and defining the municipality's commitment to advancing climate-forward solutions; and
3. Developing a process for stakeholder outreach, engagement and input – to ensure the project aligns with local priorities and is equity-minded.

A more in-depth overview of these strategies for success will be detailed in the **Planning Best Practices** subpart of this section.

Motivated and sustainability-minded communities could even integrate thermal energy networks and other large-scale renewable energy projects *into* the municipal-wide comprehensive planning process, if it is underway or in need of updating. One of the critical benefits of this approach is the role it can play in **informing the development of local planning and zoning policies.** Given how New York State law notes that comprehensive plans "should provide the backbone for local zoning law" (New York State Department of State [NYSDOS], Division of Local Government Services, 2008), similar approaches to thermal energy network planning could serve to inform and define zoning standards for municipally-led or -supported projects. This is especially important for projects more likely to undergo comprehensive environmental reviews, such as those involving ground source heat pumps and surface- or waste-water heat transfer.

- For further guidance and insight, the Pace Energy and Climate Center's report on Expanding Municipal Options for Thermal Energy Networks outlines a *Risk-Based Permitting Regime for Geothermal and Thermal Energy Networks* (Hart, Lagle & David, 2025). Although this is intended to guide the permitting

and approval of projects proposed by *private* property owners and developers, this also highlights initial considerations for municipalities that are seeking "best practices" on how to propel these projects themselves.

Workshop-Style Approaches to Decarbonization Planning

It is clear from the case studies evaluated through this project – as well as discussions with our municipal participants – that even with these initial guidelines, municipally-led thermal energy network projects can be among the most complex to ideate and implement. They have to be responsive to public input while attempting to coordinate multiple stakeholders who often possess diverse, and sometimes conflicting, priorities and interests.

As such, one approach we recommend is to undertake a **workshop-style approach to community-scale decarbonization.** This approach is very similar in form to a traditional comprehensive planning process, which municipalities typically engage in to inventory current resources and build a framework for future economic development, planning, and land use. This also offers an alternative to immediately commissioning a feasibility study, which can involve significant upfront expenses (unless offset by incentives or grant funding) and requires a clearly defined project vision, which should be developed only after careful initial planning. Workshop-style approaches have been utilized to explore thermal energy network potential in other regions – a notable and recent example includes the City of New Haven (Connecticut Department of Energy & Environmental Protection, 2024), which received funding from the U.S Environmental Protection Agency to support the implementation of a networked geothermal project at its Union Station (United States Environmental Protection Agency [U.S. EPA], n.d.-a).

Key recommendations for municipalities that want to implement a workshop-style approach include:

- ***Engage with other municipalities*** that have facilitated some form of *community-guided comprehensive planning* (i.e., involving extensive public outreach, engagement, and input)
    - Session #7 of the MTEN-A project included a presentation from the City of White Plains on its comprehensive planning process, which was completed in 2024. The Comprehensive Plan highlights a range of decarbonization-related goals for the City – including potential

regulatory and code reforms, and enhancing energy efficiency at municipal buildings (City of White Plains, 2024).
    - Explore initiatives happening in other states, including:
        - Workshop-style approaches to decarbonization planning, spearheaded Community Decarbonization Partners ("CBP") and Vermont Community Thermal Networks ("VCTN");
        - HEET's Kickstart Massachusetts project (HEET, n.d.);
- ***Plan ahead to identify relevant funding and financing opportunities*** for comprehensive planning efforts that could incorporate a community decarbonization workshop:
    - This could include the resources detailed in our **Funding and Financing for Thermal Energy Networks** guide – including the Downtown Revitalization Initiative, New York Forward, and Consolidated Funding Application (Local Waterfront Revitalization Program, Smart Growth Community Planning Program);
- If organizing a workshop: ***ensure to invite a range of stakeholders*** – including community based organizations, environmental committees, local elected officials, developers, and stakeholders associated with key thermal resources and/or anchor buildings.

Planning Best Practices: Learnings from Solution Providers

Sessions #6 and #7 of the MTEN-A project focused on key planning considerations for thermal energy networks – based on learnings gleaned from operational systems and ongoing pilots and proofs-of-concept throughout New York State. In the lead-up to this session, Sustainable Westchester and the Pace Energy and Climate Center spoke with **multiple solution providers** that have experience working on thermal energy network projects. Each solution provider was asked to share their recommendations as to how stakeholders can motivate a project to move from early development (feasibility and planning) to implementation stages.

The following "best practices" serve as a list of **key recommendations** borne out of these discussions:

- ***Establish goals & priorities*** for the project, and ***bring them to the table early on*** in the planning process.
    - Prioritize developing the intended project scope and assessing the needs and values of key stakeholders (including municipal residents).

This can help to ensure alignment between the project stakeholders and the solution provider(s) involved.

- Successful projects have typically benefitted from ***identifying a strong, central advocate, establishing clear leadership roles, and being responsive to public input***. These strategies help to motivate continued progress and ensure that the project's mission, values, and goals are shared ones.
    - Division of roles: in addition to roles associated with core project planning (i.e. oversight and management), identifying the level of risk and control that each entity will be taking on – such as who will own and/or finance the system – can help set clear expectations.
    - Public participation in the planning process: Meaningful and iterative community engagement is critical in ensuring public buy-in and support.
- ***Identify a strong anchor building from the get-go,*** as this can help keep the project on track by fostering agreement on one "main building" to focus on – particularly if the project's scope has to be limited due to funding or capacity constraints.
    - This can maintain project momentum by identifying a "node" that can be scaled upon.
    - Key points of consideration for site selection include proximity to thermal resources (wastewater treatment plants, water bodies, data centers), new construction projects, and/or municipally-owned properties (or properties sited on public land.)
- Where possible, explore how to ***align the project with concurrent infrastructure upgrades*** – including anything that involves excavation (i.e. sewer line replacements), which could reduce drilling costs for projects that are evaluating ground source heat pump opportunities.
    - Comprehensive and community-level planning initiatives can play a critical role in this.
- The thermal energy network's ***infrastructure should be designed with future expansion in mind***, to make it easier for additional buildings to connect later. For example: if the initial system is scheduled for 2028 completion, but a nearby affordable housing project is planned for 2030, the thermal energy network should be engineered to accommodate future piping needs and increased load requirements. A qualified solution provider should be able to accommodate this approach.

Evaluate Opportune Building Types and Cost Share Pathways

Certain building types can be eligible for more significant funding through NYSERDA's Flexible Technical Assistance program. This can help to inform the planning process by identifying which buildings could be a good starting point for a thermal energy network, particularly if the early stage costs – such as a feasibility study – can be reduced or eliminated entirely.

The following building types are eligible for a higher state-funded cost share through NYSERDA's FlexTech program. *If municipalities would like to receive additional guidance on how to navigate the FlexTech program*, **Sustainable Westchester can:**

- Introduce municipal staff to NYSERDA FlexTech team members;
- Evaluate the potential cost share (if any);
- Identify qualified solution providers to conduct a thermal energy network feasibility study through FlexTech;
- Provide an overview of the FlexTech program structure.

***School Districts*:** School districts listed on NYSERDA's FlexTech Documents and Resources page, (specifically, the "Priority Districts List"), or those located in a NYSERDA-designated Disadvantaged Community, can qualify for a **100% state-funded cost share** through the FlexTech program (NYSERDA, n.d.-c). SW has successfully supported other schools in navigating the FlexTech program so that they can utilize this significant funding opportunity, and can share best practices from our experiences to date.

Affordable Housing: Affordable multifamily buildings can be eligible for a **75% state-funded cost share** through the FlexTech program. NYSERDA's definition of affordable multifamily buildings requires *at least 25% of the units to be occupied by households earning no more than 80% of the area or state median income* (NYSERDA, n.d.-a). Additional eligibility guidelines, and acceptable forms of affordability verification, can be found on the FlexTech Documents and Resources page under the "Affordable Multifamily Document Library" section.

- Certain NYSERDA- and utility-managed programs offer expanded funding to support affordable housing projects – including the Small Affordable Multifamily Energy Studies Offering (NYSERDA, n.d.-i) and the Owner's Representative Services program (NYSERDA, n.d.-h).

- There are multiple projects that have investigated the applicability of thermal energy networks for affordable housing – **see the NYCHA and New Haven case studies in the Thermal Energy Networks Case Studies Resource** as examples. SW has previously connected developers with one another to share "best practices" for the adoption of clean energy technologies and would be happy to facilitate similar connections for other municipalities, if it would be helpful or relevant.

Municipal Buildings: Municipal buildings were identified as "low-hanging fruit" for thermal energy networks, but it is worth noting that any buildings on a municipal utility or public power (i.e., NYPA) supply will not be able to qualify for the FlexTech program (as highlighted in Sections 2 and 3 of this document). However, if the municipality is focused on identifying opportunities for a municipally-owned network that would incorporate its own building stock, the Consolidated Funding Application could serve as a potential funding source – in particular, the Strategic Planning & Feasibility Studies offering from Empire State Development (Empire State Development [ESD], n.d.).

District-Scale and Multi-Building Studies: In *parallel* with, or following, initial single-building analyses, the municipality may also consider evaluating clusters of buildings or district-scale opportunities. This approach can better position the municipality to assess the feasibility of networked systems and identify scalable project pathways. Where feasible, the municipality may consider prioritizing municipally-owned building clusters located in close proximity to one another to evaluate shared system opportunities and reduce per-building infrastructure costs.

Highlight Waste Heat Transfer Opportunities

Waste heat transfer has been a "hot topic" in New York State when it comes to evaluating thermal energy network opportunities, since it can maximize efficiency by identifying ways to capture or expel excess heat. Several participants in the MTEN-A program highlighted an interest in learning more about these technologies – with a focus on wastewater heat transfer, since it poses an intriguing collaboration opportunity for municipal and county governments.

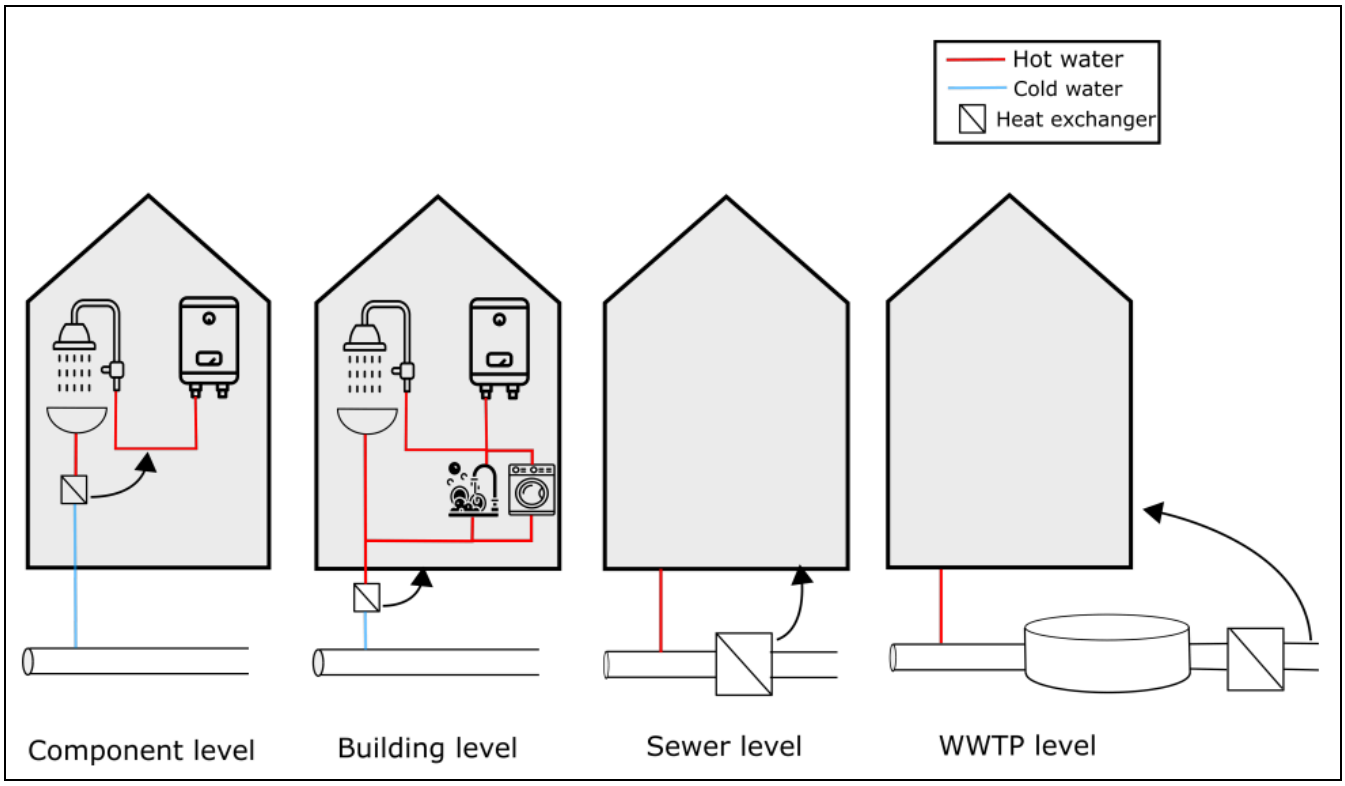
In areas throughout New York State, key waste heat resources – e.g., wastewater treatment plants – are typically owned and operated by county governments or

statutorily-formed public authorities. Local municipalities will generally still possess some maintenance and extension authority over local sewer infrastructure. As such, successful project implementation will require intergovernmental coordination, which could include agreements on system access, cost-sharing, operations and maintenance responsibilities, and long-term ownership or revenue structures.

Technology options vary depending on the *amount of heat* to be transferred and the *types of buildings* that would receive heating and/or cooling services. The graphic below shows a variety of applications that can be used to facilitate wastewater heat recovery and transfer – which could be at the component level (i.e. produced after certain activities, such as showering), building level, sewer level (i.e. from sewer pipes), or system level (i.e. from the wastewater treatment plant itself) (Nagpal et al, 2021). These varying scales of heat recovery will influence system design decisions, including whether a centralized energy center or a distributed network of heat exchange systems is most appropriate.

In addition to other metrics evaluated during the feasibility stage of a thermal energy network project, wastewater heat transfer systems should investigate:

- Wastewater flow rate (normally measured in gallons per day);
- Temperature variations and thermal dynamics;
- Pipe diameter and access – which could align with planned upgrades to sewer infrastructure;
- Regulatory and permitting requirements, including constraints related to wastewater discharge temperatures, environmental compliance, and potential modifications to existing sewer infrastructure.



Possible modes of wastewater heat recovery and transfer.

Source: "Heat Recovery from Wastewater—A Review of Available Resource," by H. Nagpal, M.K. Murali, & A. McNabola, 2021, *Water, 13(9), 1274*, p. 3 (https://doi.org/10.3390/w13091274).
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Given the MTEN-A participants' collective interest in learning more about waste heat transfer, the project collaborators will highlight resources, learning opportunities, and **key recommendations** that could aid a comprehensive analysis of these technologies:

- Although it was covered quite comprehensively during Session #7 of the Accelerator project, SW recommends ***reading into the Syracuse UTENJA project*** as a strong case study for wastewater energy transfer. The solution provider working on this project, CHA Consulting, outlined a variety of relevant learnings about the technology itself, as well as planning, zoning, permitting, and regulatory considerations.
- ***Evaluate how planned upgrades to county-owned infrastructure could align with local planning efforts***, thereby enhancing coordination between county and municipal governments. This has been a guiding principle for the Syracuse UTENJA project, which plans to connect a variety of new

construction projects to the proposed thermal energy network system through a phased approach . Additional details about the project can be found in National Grid's Stage 2 filing for the Syracuse pilot project under Case 22-M-0429 (National Grid, 2025), or in our **Thermal Energy Network Case Studies** resource.

- Municipalities should evaluate waste heat resources not only for single-project feasibility, but also for their ***potential role in future system expansion and interconnection*** – including integration into larger district or regional thermal energy networks.
- It could be worthwhile to ***engage solution providers that have strong expertise in waste heat transfer systems.*** These can be identified by going through the "Thermal Resource Project Experience" column in our **Thermal Energy Network Solution Providers Resource**, to see which providers have prior experience working with these types of projects.
    - Solution providers with strong wastewater / sewage heat transfer expertise include (but are not limited to) CHA Consulting, Ramboll, Salas O'Brien, and SHARC Energy – if needed, Sustainable Westchester and the Pace Energy and Climate Center can make introductions to these solution providers.
- Resources for further reading & watching:
    - Energy from Wastewater – a digestible, 2-page resource developed by Vermont Community Thermal Networks, including significant case studies from Canada (VCTN, n.d.-b)
    - Surface Water and Wastewater Heat Exchange (DeWein et al, 2023) and Waste Heat Recovery & Thermal Storage for Buildings & Networks (Dougherty et al, 2025) – NY-GEO conference presentations on waste heat transfer and recovery options for thermal energy networks (including relevant case studies).
    - NYSERDA's Heat Recovery Program provides information on heat recovery demonstration projects, case studies, and relevant resources (NYSERDA, n.d.-e) – one of which includes the Energy Sources and Sinks Inventory Tool, which can help property owners and staff in their evaluation of energy recovery opportunities (Retrofit Playbook for Large Buildings, n.d.).

Identify Project Planning and Management Support Opportunities

The lack of familiarity and/or experience with managing large-scale renewable energy projects was noted as a barrier for multiple MTEN-A participants. Particularly in the case of networked geothermal and other types of thermal energy networks, many municipalities will be coming in with limited to no prior experience with managing such projects.

Sustainable Westchester and the Pace Energy and Climate Center recognize that even with initial guidance on how to prepare and plan for these projects – as covered during Sessions #6 and #7 of the MTEN-A project – additional technical support may be necessary to ensure that they are being implemented correctly and effectively.

Key recommendations and opportunities include:

- ***Engage in relevant training and certification offerings*:** IGSHPA's training and certification programs are a great way for municipal staff to gain more knowledge of and familiarity with ground source heat pump technologies. Session #9 of the MTEN-A program focused in particular on its System Verification and Inspection and Selecting a Ground Source Heat Pump Team courses, which could be of particular relevance to staff members that will be involved in these projects (IGSHPA, n.d.-d). The self-paced nature of these courses can be accommodating to staff who have limited time to dedicate several, consecutive days or weeks to completing a certification program.
    - **Additional Tip:** If your municipality is submitting grants to support the development and/or implementation of a thermal energy network project, ***consider budgeting for costs*** associated with purchasing 1. relevant standards (including the CSA/ANSI/IGSHPA C-448 Standard) AND 2. trainings and certification programs for key municipal staff. This may strengthen a grant application by showing a commitment to workforce development. Municipalities could even budget for IGSHPA membership so they can access discounts for these trainings. A Training Catalog that includes the costs associated with these programs is available on IGSHPA's website (IGSHPA, n.d.-c).

- ***Identify alternate support strategies*:** Some projects have explored the possibility of engaging out-of-state solution providers to review RFP and bid documents before they are released publicly, to ensure they include all relevant and important details. Municipalities may even want to consider executing a retainer agreement with a solution provider to conduct a technical review of any design or engineering proposals they receive.
    - A directory of IGSHPA members – including businesses located outside of New York – can be found on IGSHPA's website (IGSHPA, n.d.-a).
- ***Keep track of developing initiatives*:** As part of the Energy Efficiency and Building Electrification ("EE:BE") portfolio (which guides the implementation of state- and utility-funded energy programs from 2026-2030), NYSERDA will be expanding its Technical Services to support property owners in their decarbonization planning efforts. These expanded offerings aim to address barriers akin to those identified during the MTEN-A program: "*[u]ncertainty as to how to proceed, especially given competing priorities, including how to plan for efficient decarbonization, when to undertake improvements, how to phase upgrades over time, and how to integrate energy efficiency and potential electrification measures with other planned or needed capital work; the financial costs and savings and funding/financing needs associated with different efficiency, electrification and decarbonization options (compared to other priorities, etc.); and resourcing needs*" (NYSERDA, 2026).
    - Proposed funding for technical support will reportedly include "*incentives to design professionals and consultants to offset the design costs for strategic measures with a focus on efficient decarbonization* ***as well as complex designs that serve multiple buildings, such as thermal energy networks***" (NYSERDA, 2026).
    - Municipalities may want to consider keeping an eye out for more information on how these programs will be implemented.

Cost Mitigation Strategies

In light of a shared concern among participants about the high costs associated with thermal energy network projects, Sustainable Westchester and the Pace Energy and Climate Center assessed a variety of potential cost escalators – gathered through conversations with solution providers and independent research efforts:

- Overly-conservative and/or oversized designs: Many pilot projects have proposed extensive backup systems that drive up the total project cost and, in certain cases, go underutilized. This includes prominent projects – such as thermal energy network systems at Colorado Mesa University, West Union, and Whisper Valley – that reported minimal operation of installed backup systems (Oh & Beckers, 2023).
- Supply-demand mismatch: Despite a high demand for ground source, geothermal, and waste heat transfer technologies, workforce capacity (i.e., an adequate supply of installers and drillers) has been unable to keep up. This means that proposals often have additional contingencies built in that, ultimately, contribute to higher implementation costs.
- Retrofit needs for existing buildings: Even though there are comprehensive incentives available to support building envelope and other pre-electrification improvements, they are rarely able to cover total project costs. Historic or aging properties may also require health and safety upgrades – such as asbestos or mold abatement – that can be particularly cost-prohibitive, since there are fewer state and/or utility programs that can support these costs.

Pilot and state-funded projects present an opportunity to learn in real-time about these cost drivers, and effective strategies to address them. Examples of such projects include those that have received support from NYSERDA's PON 4614 and 5614 programs (NYSERDA, n.d.-g) and the Sustainable Future Program (Governor of New York's Press Office, 2025) – as well as those being developed through the UTENJA proceeding (Department of Public Service [DPS], 2024).

In Sustainable Westchester and the Pace Energy and Climate Center's review of these projects, some opportunities emerge as potential cost mitigation strategies – including the following **key recommendations:**

- Ensure that a ***range*** of potential technology options are being ***comprehensively and accurately*** assessed by the solution providers responsible for conducting the feasibility and early-stage planning studies.
    - Pilot/proof-of-concept site owners and stakeholders shared that certain solution providers proposed "safer", less energy-efficient technologies (such as electric boilers) without demonstrating that alternative systems (including ground source heat pumps and waste heat transfer) had been evaluated.

    - A report that assessed the PON 4614 feasibility studies noted instances where "rule of thumb" and simplified design approaches were utilized over customized, data-informed approaches. This can result in incomplete, inaccurate data, making it harder to fully assess the proposed technologies (NYSERDA, 2024).
- ***Consider where costs should fall in the planning process,*** rather than commit unnecessary capital expenditures in the early project stages.
    - Certain solution providers highlighted that a test ***borehole*** may not need to be done upfront, and could wait until the design stage of the project (rather than the feasibility stage).
    - In some cases, data from other sites in the thermal energy network project's vicinity could contribute valuable insights during the feasibility stage. This could include: a test borehole done at a site in a nearby neighborhood; site condition reports at nearby buildings; or a recently-completed capacity assessment for sites that could serve as a thermal resource (e.g., wastewater treatment plants).
- ***New construction properties*** are often considered the "best fit" for a thermal energy network project, since they can be designed with the system in mind, rather than having to design the system around the building. Under the All Electric Buildings Act ("AEBA") – which passed in 2023, though the start date has been delayed (Zanger, 2025) – most new construction buildings will also be *mandated* to install electric- and renewable energy-based heating, cooling, and hot water systems, as well as appliances (Manley, 2023). Particularly if enhanced incentives are launched to facilitate compliance with the AEBA, this could be an ideal opportunity to advocate for thermal energy networks.
    - Consider connecting with developers who *have* successfully completed new construction electrification projects: it is worth noting that among the NYSERDA Community Heat Pump System awardees, new construction, single-owner developments were among the most common to move forward with a thermal energy network project (NYSERDA, n.d.-g).
    - New construction thermal energy network projects could provide a pathway to explore the integration of municipal (and other publicly-owned) buildings into current – or future – networking opportunities. That being said, it is worth noting that these arrangements may not maximize community-level benefits, particularly if it is a privately-owned development.

Innovative Funding and Financing Approaches

Projects that have successfully moved into the design and implementation stages of a thermal energy network project often utilized creative strategies to account for the high upfront costs associated with these systems. Evaluating each approach's relative success and potential replicability could be a worthwhile exercise for municipalities to "think ahead" about how to fund a similar project.

A range of funding and financing strategies, and examples (where relevant), are outlined below.

***Combination of multiple grant, tax credit, and incentive opportunities*:** This approach has been one of the more commonly-utilized – if the "stars align", municipalities could see almost all upfront costs covered.

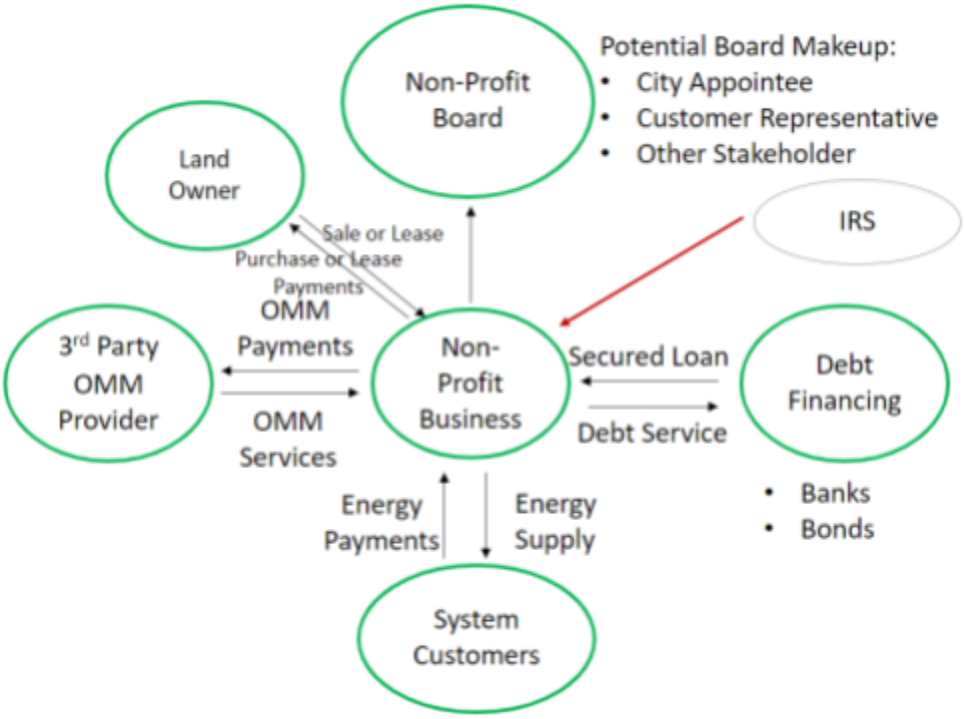
- Example: West Union, Iowa installed a networked geothermal system as part of its larger downtown revitalization project. The geothermal portion was fully covered by grant funding from the Department of Energy, Housing and Urban Development Community Development Block Grant, Environmental Protection Agency, and Main Street Iowa (Building Decarbonization Coalition [BDC], n.d.). The City of New Haven's Union Station project is a more recent example, and has been able to cover a majority of the upfront costs through grant funding and the Section 48 Investment Tax Credit (Shemkus, 2025). Both of these case studies are detailed further in the **Thermal Energy Networks Case Studies** resource.
- Potential limitations: Certain grant opportunities may require a municipally-funded cost share. Additionally, implementation costs have gone up with inflation, so fully-grant-funded projects may no longer be realistic. Extensive planning would be critical to ensuring that all funding opportunities align with the project timeline.

***Funding through legislation and budget allocations*:** For projects that are not able to clearly identify workable funding and financing pathways, one option could be to translate these into "asks" directed to elected officials (including State Assemblymembers and Senators). Engaging with advocacy groups and clearly communicating the municipal limitations that restrict the pursuit of "traditional" funding opportunities could help to maximize the chance of a successful outcome.

- Examples: The New York State Sustainable Future Program serves as a real-time example of this, representing a successful effort by the UpgradeNY coalition – a collaboration of environmental groups, unions, climate justice advocates, and building industry representatives – to realize budget-allocated funding for TEN projects at three SUNYs and the City of Jamestown. A document detailing the original budget request – the full $200 million of which was allocated in the FY2026 NYS Budget – is linked here for easy viewing (UpgradeNY, 2025).
- Potential limitations: This will require additional coordination and time invested by the City and relevant stakeholders. Additionally, unless resources have already been set aside to support thermal energy network and/or municipal decarbonization projects, there is no guarantee that the funding will be allocated (unlike a traditional grant or incentive pathway).

***Alternative ownership models with more flexible financing options*:** Although this pathway has fewer examples in the NYS context, it is one to keep an eye on – particularly for projects that involve multiple property and asset owners. Certain ownership models can unlock expanded financing options and reduce complexity for key incentives, such as the Section 48 Investment Tax Credit – since ownership would fall under a singular entity. The graphic below documents the structure of a Captive Non-Profit TEN as an example of an alternative ownership model.

- Example: Ever-Green Energy is a provider that has been a leader in this approach – with a key example including The Heights St. Paul district energy system (further detailed in the **Thermal Energy Network Case Studies** resource). Ever-Green provides the operations and management services, and is incorporated under a parent company, District Energy St. Paul, which serves as the nonprofit utility service provider (Ever-Green Energy, n.d.).
- Potential limitations: As highlighted during the MTEN-A program, this is a (relatively) under-explored ownership model for NYS, which also means that there is not a clear framework for how it would be regulated. Additionally, though it would redirect its financial responsibilities to a 3rd party provider, this would also limit revenue opportunities for the municipality.



Captive Non-profit Model for Thermal Energy Network ownership.
Source: Developed by author (Pace Energy and Climate Center).

As an additional resource, we recommend perusing the Building Decarbonization Coalition's ("BDC") resource on Financing Thermal Energy Networks: A Reference Guide for Municipalities & Community Advocates. This highlights a variety of potential financing tools that can be used to reduce initial capital barriers for TEN projects (BDC, 2026).

Continued Collaboration and Knowledge-Sharing

Sustainable Westchester and the Pace Energy and Climate Center recognize that there is still a lot to learn about – and make happen – in order to scale up thermal energy network adoption at the municipal level. Many of the barriers we heard about – including (but not limited to) financial limitations and uncertainties, lack of familiarity with the implementation process, and undefined regulatory implications – remain after the closeout of this program, even if it has contributed to raising greater awareness about these ongoing challenges.

Many of the necessary changes will, inevitably, need to involve state-level and legislative input – an approach that has contributed to the advancement of thermal energy networks through:

- Utility-scale projects under the UTENJA proceeding – which were facilitated through state legislation (DPS, 2024), and
- SUNY projects – which were facilitated through the allocation of funding in the NYS FY2026 Budget process (Governor of New York's Press Office, 2025).

Continued, open dialogue between municipalities, state agencies, and state legislators will be essential in driving continued progress on thermal energy network implementation in New York State. Additionally, this could serve as an opportunity for municipalities to advocate for additional resources (including enhanced funding and technical assistance), regulatory changes, and other supports identified as critical to moving projects forward.

As such, Sustainable Westchester and the Pace Energy and Climate Center are highlighting the following **key recommendations** to foster increased dialogue and knowledge-sharing around municipal thermal energy networks:

- ***Join existing knowledge-sharing forums for municipal sustainability officials*:** SW's discussions with municipal leaders have revealed that there is not only an interest in, but initiatives *already in place* to establish regular check-ins and working groups for municipal sustainability officials in NYS. Participating in these discussions could help your municipality gather critical information about how other regions are advancing clean energy projects in their communities.

- An example includes the New York State Meeting of Sustainability Staff (MOSS) – visit the informational page to learn more about how to join (Erie County Climate Action, n.d.).
    - Email: nysmunicipalsustainability@gmail.com
- ***Work with other MTEN-A participants to establish a statewide thermal energy network working group*:** Sustainable Westchester and the Pace Energy and Climate Center have explored the possibility of supporting efforts to establish a statewide thermal energy network working group. Such a forum could bring together various stakeholders to address outstanding questions about implementing municipal thermal energy networks.
    - Goals could include:
        - Sharing feedback for the development of a regulatory framework for municipal thermal energy networks – ideally, with clear language on *exemptions from Department of Public Service/Public Service Commission regulatory oversight*. It is worth noting that exemptions for thermal energy networks currently only exist for certain small-scale systems – specifically, projects 1. Located on private property and under singular ownership (typical for campus-style environments, such as healthcare facilities or educational institutions) OR 2. Owned by an association of homeowners and/or building owners (NYS PSC, 2024);
        - Identifying needs to inform expanded funding, financing and technical assistance opportunities;
        - Highlighting lessons learned from ongoing pilot / proof of concept projects, including UTENJA and the SUNY projects.
    - Potential partners and stakeholders involved could include:
        - NYS agencies:
            - New York State Energy Research and Development Authority (“NYSERDA”)
            - New York Power Authority (“NYPA”)
            - The Dormitory Authority of the State of New York (“DASNY”)
        - Municipal staff and officials
        - NYS legislators and elected officials:
            - NYS Senators
            - NYS Assemblymembers

- Community-based organizations (CBOs) that are involved in thermal energy network-related advocacy – a non-exhaustive list could include:
    - Sustainable Westchester
    - Pace Energy and Climate Center
    - NY-GEO
    - UpgradeNY Coalition (incl. Building Decarbonization Coalition, New York League of Conservation Votes, ALIGN, AGREE, and more).

5. Near-Term Actions and Next Steps

Near-Term Actions

Based on the Recommendations outlined in Section 4 of this document, **near-term actions** for municipalities could include the following:

1. Integrate thermal energy network considerations into existing planning and development processes to better align future projects with long-term infrastructure opportunities. This could include:

- If there are plans to revisit an existing, or develop a new, comprehensive plan, *incorporate thermal energy network considerations into the comprehensive planning process and relevant zoning discussions*;
- *Coordinate with non-municipal stakeholders* (i.e., private developers and property owners) *early in the lifecycle of any newly-proposed projects* (i.e. site plan review, pre-development meetings) to assess network compatibility and reduce timing challenges; and
- *Evaluate thermal energy networks alongside all-electric building approaches* to assess relative performance, cost implications, and system impacts.

2. Identify and evaluate priority opportunities for near-term project development:

- *Engage potential anchor sites and partners* to evaluate available thermal resources and project feasibility;
- *Leverage existing data where possible*, including any capacity assessments, energy audits, geologic conditions reports, or other resources that could provide initial insight;
- *Initiate (or promote) FlexTech studies at individual buildings*, while assessing opportunities to evaluate the feasibility of multi-building or district-scale systems.

3. Account for a range of system design options, potential ownership structures, and technical assistance and resource opportunities to inform practical, scalable project approaches:

- *Consider alternative system strategies*, such as waste heat transfer, in areas where thermal resources are abundant or where underground infrastructure constraints may limit geothermal borefield development;
- *Connect with solution providers and stakeholders* that are actively involved in thermal energy network projects to identify replicable models and/or key lessons learned;
- *Ensure that initial plans are developed with future expansion potential in mind*: consider engaging additional property owners and stakeholders to gauge interest in future connection to the thermal energy network. It is also critical to ensure that solution providers are made aware of these priorities, so they can be incorporated into engineering and design plans.

Next Steps

- Consider a *workshop-style approach* to map out potential thermal resources and/or anchor buildings;
    - Once completed, *identify one to two priority sites or districts for further analysis* through the FlexTech program (or similar feasibility study pathways). This analysis should focus on opportunities that align with both near-term development timelines and long-term expansion potential.
- *Establish – or continue engaging in – dialogue with stakeholders* (e.g., other NYS municipalities, elected officials, community-based organizations and advocacy groups) to identify outstanding barriers and collaborate on pathways for mobilizing locally-owned thermal energy networks in New York State.

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