

Thermal Energy Network Case Studies (MTEN-A)

Table of Contents

Syracuse, NY (UTENJA).....	2
Haverstraw, NY (UTENJA).....	6
Mount Vernon, NY (UTENJA).....	10
Troy, NY (UTENJA).....	13
Ithaca, NY (UTENJA).....	17
Chelsea, Manhattan, NYC (UTENJA).....	21
LCOR – 1515 Surf Avenue.....	25
Sheridan Hollow.....	28
Village of Hastings-on-Hudson, NY.....	31
Skidmore College.....	35
Arverne East.....	38
New Haven, CT.....	41
Jamestown, NY.....	44
SUNY University at Albany and ETEC Building.....	47
Cornell AgriTech.....	51
SUNY ESF.....	54
Eastchester Gardens and Jackson Developments (NYCHA).....	58
St. Patrick’s Cathedral, Manhattan.....	62
Syracuse 15th Ward / East Adams.....	66
Pratt Landing.....	69
False Creek, Vancouver.....	72
West Union, Iowa.....	76
Framingham, Massachusetts.....	81
The Heights St. Paul.....	85

Syracuse, NY (UTENJA)

Syracuse - National Grid UTENJA Pilot Project	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Metropolitan Wastewater Treatment Plant: • Treated effluent is discharged to Onondaga Lake - project's goal is to capture thermal energy that would otherwise be wasted, by diverting treated effluent to an Energy Center that will process it through a heat exchanger • Can capture 10,000 - 40,000 MWh of thermal energy from the treated effluent (based on pilot system configuration → full-scale system buildout) Had evaluated geothermal borefield as the primary thermal resource, but the wastewater treatment plant provided "superior thermal characteristics" while avoiding siting, permitting, and environmental complexities of borefield development
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	New construction: • County aquarium • Mixed-use residential and commercial (multifamily housing, office/commercial spaces) • Affordable housing • Market-rate multifamily
Single-owner campus or multi-ownership	Multiple property types and owners
New construction vs. existing	New construction
System/campus size and expansion capacity	Total: 13 buildings serving 1,300 customers • Planning for phased expansion: ○ Phase 1: 2028 ○ Phase 2: 2030

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Two-pipe ambient loop distribution system • Aquarium to receive <u>direct supply</u> heating hot water and chilled water from a utility-owned modular heat recovery chiller (means different billing structure for the aquarium) • Opportunity to compare the <u>primary 2-pipe system</u> with a <u>4-pipe system</u> (combines primary system w/ direct supply Aquarium system)
Additional projects: solar, building envelope/retrofits	Backup diesel generators in the event that the system has an outage
Cost and funding sources	Total estimated construction costs: \$126.4m Cost to date, as of 9/2025: \$4.38m • Consulting, engineering, legal, overheads
Timeframe	• Design filed in July 2025 • Phase 1: construction in 2027 - October 2028 • Phase 2: construction estimated to be completed by 2030
Stakeholders & Solution Providers	• Onondaga County • Onondaga County Department of Water Environment Protection • National Grid
Ownership and maintenance/operational structure	3rd party ownership of thermal resource: Onondaga County (Metro Wastewater Treatment Plant) • National Grid notes alignment w/ the current utility structure - distributors and suppliers of energy, not generators of it Service to be provided by National Grid during the pilot period • Can be transferred to third party or explore alternative heating/cooling arrangements based on the termination/withdrawal option selected by customer(s) - per UTENJA guidelines
Year project became fully operational	N/A - design completed, awaiting review by Department of Public Service / Public Service Commission
Borehole number and depth	N/A (wastewater heat transfer system, no boreholes)



Challenges	• Need to determine permitting requirements - and whether Onondaga County Department of Water Environment Protection ("WEP") will need to modify existing permit to allow exchange of thermal energy with wastewater effluent that's discharged to Onondaga Lake • Hard to align to project development process implemented by UTENJA since customer enrollment won't be finalized for some time ◦ Hard to keep customers engaged if they're only signing a "letter of intent" without a guarantee that the system will be implemented • Energy Center siting: difficult due to existing contamination & environmental remediation needs in previously-assessed areas ◦ Potential for cost increases, decreased performance if piping needs to be redirected → limited options for alternative Energy Center sites
Lessons learned and project benefits	• Phasing the project to correspond with peak effluent flow from the wastewater treatment plant, allow for comprehensive data collection on performance, and inform best practices for system expansions in the future • History of minimal shutdowns at the wastewater treatment plant cited as crucial in ensuring uninterrupted service and optimized system performance • New construction are most suitable building types for thermal energy network development - also important when considering compliance with CLCPA and All Electric Buildings Act • Benefits of wastewater effluent: ◦ Not subject to thermal drift over time ◦ Reduces the need to install borefields on undisturbed land ◦ Replicability for cities w/ wastewater treatment plants • Can compare performance of one of the connected buildings w/ a replicate building served by a standalone geothermal system - TEN vs. standalone geothermal
Links to Case Study Info	UTENJA Docket: Matter 22-M-0429 National Grid: Syracuse Wastewater Thermal Energy Network

Key Contacts (if available)

*For introductions to CHA Consulting please contact Sustainable Westchester



Metropolitan Syracuse Wastewater Treatment Plant.

Source: National Grid, UTENJA Stage 2 Syracuse Design Filing ([link](#))

Haverstraw, NY (UTENJA)

Haverstraw, NY (Utility Thermal Energy Network Pilot Project)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• Ground source heat pump – geothermal boreholes • Wastewater heat recovery (JRSB, wastewater lift station) • Water body (Hudson River)
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Residential single-family homes • Municipal buildings - existing buildings (post office, library) • Commercial buildings • Elementary school • Nonprofits: houses of worship
Single-owner campus or multi-ownership	Multiple property types and owners
New construction vs. existing	Mix of new construction (single-family homes, mixed-use facilities) and existing buildings (single-family homes, municipal buildings, church, school)
System/campus size and expansion capacity	84 buildings consisting of 450 distinct customers (apartment units, office tenants) • West Loop: up to 30 buildings • East Loop: up to 54 buildings • Building with the potential to interconnect the two loops into a larger UTEN system
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Two single-pipe ambient-temp loop systems: one for a residential zone that includes new construction, one serving the municipal core near village hall • Each loop encircles 2-3 blocks • 5th generation: ○ Distributed heat pumps ○ Helps to leverage diversity of thermal loads and sources, minimizes thermal energy resources and system infrastructure ○ Enables a more flexible expansion in the future

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Additional projects: solar, building envelope/retrofits	Design and installation for ground source heat pump systems in connected buildings, plus additional HVAC upgrades Potential for energy-efficient building envelope improvements
Cost and funding sources	East Loop pilot: \$68 million West Loop pilot: \$50 million Includes installation, incentives, marketing, pilot administration, costs for the five-year pilot, contingency
Timeframe	Since this is a UTENJA project, it is following the implementation schedule – Stage 2 (design) has been completed as of July 2025, awaiting approval to move to Stages 3 and 4 (construction, implementation, customer enrollment)
Stakeholders & Solution Providers	<u>Orange and Rockland (O&R)</u> : will own, operate, and manage the thermal energy network during the pilot period <u>City of Haverstraw</u> : stakeholder, owner of connected buildings Additional stakeholders: - Developer → managing new construction development project (Chair Factory), which is planning for connection to the East Loop - Joint Regional Sewerage Board (JRSB) → thermal resource owner (wastewater treatment plant) Solution providers: - Salas O'Brien
Ownership and maintenance/operational structure	Ownership, operation, and maintenance will fall under O&R (and subcontractors for inspection, maintenance needs) until the completion of the pilot period – then will explore opportunities for continuing service under the utility, transferring ownership, or returning customers back to prior systems Customers can choose to stay on the system or go back to previous/alternative systems
Year project became fully operational	N/A - in development

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Borehole number and depth	West Loop borefield: 72 boreholes across two borefields, 850 ft in depth • Located under Village parking lots East Loop borefield: 128 boreholes across five borefields, 850 ft in depth • Located in green spaces, parking areas adjacent to new Chair Factory development
Challenges	• Coordination challenges when working with new development projects – due to the uncertainty associated with the Pilot’s approval ◦ O&R has had to provide funding to the developer to design a geothermal system as an alternative to air source heat pumps • Underestimated project costs – used generalized rather than comprehensive/granular cost estimates
Lessons learned and project benefits	• Close collaboration with participating community officials, stakeholders is essential for developing a community UTEN system • Able to preserve architectural character of historic buildings by reducing/eliminating outdoor equipment • Free HVAC and design for residential customers helped to generate buy-in • Prioritize data collection early on and schedule follow-ups/meetings to gather data in a timely manner
Links to Case Study Info	UTENJA Docket: Matter 22-M-0429 Orange & Rockland: Haverstraw Utility Thermal Energy Network Pilot
Key Contacts (if available)	No publicly-available contacts

Figure 1- Layout of Haverstraw Pilot (source of base map Google Earth)



Layout of the Haverstraw UTENJA pilot.

Source: Orange & Rockland Utilities, UTENJA Stage 2 Haverstraw Design Filing ([link](#))

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Mount Vernon, NY (UTENJA)

Mount Vernon, NY (Utility Thermal Energy Network Pilot Project)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps - geothermal boreholes
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Single-family and small multi-family residential • Houses of worship: churches • Healthcare facility • Municipal building: recreation center, fire station • Multifamily buildings
Single-owner campus or multi-ownership	Single-owner (utility), connecting multiple building types w/ varied owners
New construction vs. existing	Mostly existing buildings, one new construction building (Energy Center - to house municipal office space and system infrastructure)
System/campus size and expansion capacity	Proposing to connect 42 existing buildings, one new mixed-use energy center • 1-4 residential: 26 buildings • 3 houses of worship • 1 healthcare facility • 2 municipal buildings • 10 multifamily buildings
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Two-pipe ambient loop system (originally proposed as a single-pipe, ambient loop system) • Changed to ensure that all customers would receive the same supply temperatures Area includes leak-prone pipe in need of replacement
Additional projects: solar, building envelope/retrofits	Energy efficiency, HVAC upgrades for connected customers
Cost and funding sources	Total estimated cost: \$192 million (including contingency)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

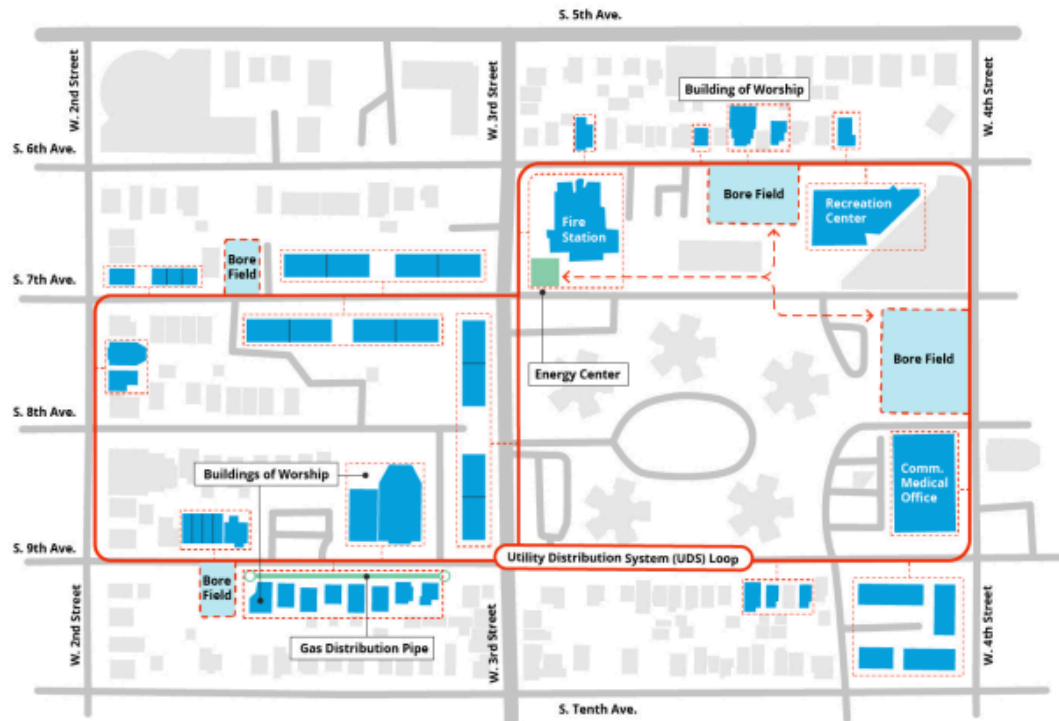
Timeframe	Estimating completion of construction in 2028– pilot will be operational for five years (until 2033)
Stakeholders & Solution Providers	ConEdison: leading the project under UTENJA, will own, operate, and maintain during the pilot period City of Mount Vernon: primary stakeholder
Ownership and maintenance/operational structure	Ownership, operation, and maintenance will fall under ConEd until the completion of the pilot period (2033) – then will explore opportunities for continuing service under the utility, transferring ownership, or returning customers back to prior systems
Year project became fully operational	N/A - design completed, awaiting review by Department of Public Service / Public Service Commission
Borehole number and depth	127 boreholes across 4 bore fields 850 ft depth
Challenges	Significant cost escalation: due to higher than anticipated retrofit costs for connected buildings, pipe reconfiguration, extensive backup systems, removal of one of the main borefields, and construction of a new Energy Center to house TEN equipment
Lessons learned and project benefits	- Importance of conducting early site assessments, to get a sense of retrofit needs - Coordinating with the local community is hugely important to drive participation and inform design – affordability as a major priority for the municipality and customers alike
Links to Case Study Info	UTENJA Docket: Matter 22-M-0429 ConEdison: Mount Vernon Thermal Energy Network
Key Contacts (if available)	ConEdison TENS team: TenPilotProjects@coned.com



**Sustainable
Westchester**



**Pace Energy and
Climate Center**
ELISABETH HAUB SCHOOL OF LAW



Layout of the Mount Vernon pilot site.

Source: Con Edison, UTENJA Stage 2 Mount Vernon Design Filing ([link](#))

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Troy, NY (UTENJA)

Troy, NY (Utility Thermal Energy Network Pilot Project)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps – geothermal borefield (sited at Riverfront Park) Air-to-water heat pumps as supplemental heating load
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Mixed-use buildings (multifamily residential, commercial) • Commercial buildings: offices, performance spaces
Single-owner campus or multi-ownership	Multiple property types and owners
New construction vs. existing	Existing buildings
System/campus size and expansion capacity	6 buildings to be connected • 68 residential and 33 commercial customers • Serving 264,000 sq ft of space
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Vertical closed-loop geothermal borefield • Connected to the utility distribution system (UDS) via two manifold vaults • Peak heating load: 6,500 MBH (thousand BTUs per hour) • Peak cooling load: 550 tons Energy Center to house key system infrastructure, including: • Distribution pumps • Two air-to-water heat pumps at Energy Center as supplemental heating (since connected buildings are heating-dominant) • Data and controls system

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Additional projects: solar, building envelope/retrofits	Various retrofits to connected buildings, including indoor air quality improvements; removal of previous HVAC and domestic hot water equipment; electrical work • Some being done by property owners, some included in National Grid's proposed cost recovery strategy
Cost and funding sources	Total development, design construction, operations, and maintenance costs estimated at \$90.91 million • Construction costs increased from initial estimate due to scope, schedule changes (as well as inclusion of borefield cost, redesign of Energy Center, addition of air source heat pump at Energy Center)
Timeframe	• Partial design submitted in July 2025, final design submitted in December 2025 ◦ Awaiting approval by Department of Public Service / Public Service Commission • Aiming to commence construction in 2027 • Place in service by fall 2028
Stakeholders & Solution Providers	Stakeholders: • <u>City of Troy</u>: owner of land where borefield / Energy Center will be sited • <u>Troy LDC</u>: project support, leasing land from City of Troy to sublease to National Grid • <u>National Grid</u>: will construct, own, operate, maintain borefield and Energy Center Solution providers: • CHA Consulting • Siemens Energy (involved in the original project, pre-UTENJA)
Ownership and maintenance/operational structure	<u>Original ownership/maintenance structure</u> (~2023) envisioned partnering with a Local Development Corporation (LDC) • Can help access additional financing pathways, allow more effective project management (i.e. contracting with utilities, working with private landowners) • Troy Local Development Corporation: would've owned production – i.e. the borefield

	○ Partnered w/ Siemens Energy for public-private partnership model (Design, Build, Own, Operate, Maintain = DBOOM) ○ Operating outside of City control ● National Grid: would've owned delivery ○ Would've served as an "offtaker" of TLDC & maintained existing relationship with customers - utility delivery, billing, infrastructure maintenance, customer service ● City of Troy would've leased subterranean rights to TLDC based on share of revenue (own, control public land) <u>UTENJA ownership/maintenance structure</u> (as of April 2026) transfers ownership to National Grid (utility-owned thermal energy network) ● Reduces risk, disruption of operations and maintenance – rather than contracting out to a third party firm ● Enables access to federal investment tax credit ● <u>National Grid</u> to finance and undertake construction, operation, and maintenance of borefield as subtenant of Troy LDC ○ National Grid to own equipment, geothermal facilities (Energy Center) ● <u>Troy LDC and City of Troy</u> to support with permitting assistance, construction facilitation, and future customer enrollment efforts. ○ Troy LDC to lease land for energy center & borefield from City of Troy – land will then be subleased to National Grid (enables revenue for the municipality, use of public property for community benefit)
Year project became fully operational	N/A - design completed, awaiting review by Department of Public Service / Public Service Commission
Borehole number and depth	200 boreholes, 650 ft deep
Challenges	● Complexities associated with structure a third-party ownership model: more risk involved, LDC unable to provide a financing mechanism without its own means of being able to finance the borefield

Lessons learned and project benefits	• Retrofitting historic buildings: important to <u>coordinate early</u> with relevant agencies, planning boards to align design with preservation requirements • Third party ownership models may be more beneficial in cases where the thermal resource already exists – such as in the Syracuse pilot – or if the owner could develop its own financing plan based on construction costs, anticipated profit
Links to Case Study Info	UTENJA Docket: Matter 22-M-0429
Key Contacts (if available)	*For introductions to CHA Consulting and Troy project stakeholders, please contact Sustainable Westchester and Pace Energy and Climate Center



Rendering of the Energy Center, to house equipment for the thermal energy network system.

Source: National Grid, UTENJA Stage 2 Troy Design Filing ([link](#))

Ithaca, NY (UTENJA)

Ithaca, NY (Utility Thermal Energy Network Pilot Project)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• Groundwater geothermal testing • Open-loop groundwater • Sewer/canal heat exchange • Underground aquifer (beneath City of Ithaca)
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Single-family residential • Commercial buildings • Multifamily residential • Nonprofit: house of worship
Single-owner campus or multi-ownership	Multiple property types and owners; system owned by utility (NYSEG)
New construction vs. existing	Existing buildings
System/campus size and expansion capacity	45 buildings with 72 connected customers: • 34 residential buildings • 14 commercial buildings • 2 apartment buildings • 1 church No plans stated re: system expansion
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Open loop design: • Reduces number and footprint of boreholes needed to meet thermal demand, and minimizes dependence on balancing the annual thermal loads of connected buildings

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Additional projects: solar, building envelope/retrofits	• Electric panel upgrades for customers • HVAC modifications and replacements: including air-to-water heat pumps, geothermal heat pumps • Dedicated heat pump water heaters (HPWHs) will be installed in participating buildings
Cost and funding sources	Total pilot project costs: \$52.48 million • Including project development, construction, operation and maintenance, potential decommissioning
Timeframe	• 2022: initial proposal filed by NSEG • 2023: final proposal filed by NYSEG • April 2024: Department of Public Service approved the project to proceed to design and customer protection planning • 2024-2025: well testing • Late 2025: design completed; awaiting approval by DPS to move into customer enrollment and construction • 2027: Aiming to begin construction and customer conversions, begin operation for first 5 connected customers in October • 2028: remaining customers connected to the system, 5-year pilot period begins
Stakeholders & Solution Providers	<u>New York State Electric and Gas (NYSEG)</u>: to oversee project, design, construct, and operate the system <u>City of Ithaca</u>: working with NYSEG on access agreements, land use
Ownership and maintenance/operational structure	NYSEG to own, operate, and maintain the system
Year project became fully operational	N/A - design submitted in late 2025, awaiting approval to proceed
Borehole number and depth	No publicly-available information

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Challenges	● Delays due to engineering designs: need to prepare in advance by conducting thorough site visits, performing detailed review of existing documentation on historic uses of land to ID potential hazards
Lessons learned and project benefits	● Get a thorough understanding of the sites being evaluated before proceeding further in the planning process: environmental reviews, historic land uses, etc ○ Conduct soil sampling, environmental testing if necessary ● Important to conduct community engagement early in the planning process ○ Extensive efforts required to educate customers on the system, technologies, and potential benefits ● In addition to providing a just transition for gas utility workers, projects can create jobs upstream of construction and operation – including equipment and materials sourcing
Links to Case Study Info	New York State Electric & Gas: NYSEG Hosts Community Event for Proposed Utility Thermal Energy Network Pilot UTENJA Docket: Matter 22-M-0429
Key Contacts (if available)	No publicly-available contacts



Map of the proposed Ithaca UTENJA pilot project.
Source: Con Edison, UTENJA Stage 2 Mount Vernon Design Filing ([link](#))

Chelsea, Manhattan, NYC (UTENJA)

Chelsea, Manhattan (Con Edison UTENJA Pilot)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	<u>Primary</u>: Waste heat recovery from commercial office building with data center at 85 10th Avenue (captured from chilled water system via heat exchangers) <u>Supplemental/backup</u>: Not explicitly specified, likely maintaining natural gas hookups
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Multifamily residential (NYCHA Fulton Houses – 3 buildings, ~291 units, ~262,000 sq ft) • Commercial office/data center (thermal energy resource)
Single-owner campus or multi-ownership	• Mixed ownership ◦ NYCHA (public housing owner) ◦ Related + Essence (PACT program managers) ◦ 85 10th Ave (Related + Vornado joint ownership – thermal resource)
New construction vs. existing	• Retrofit of existing buildings (conversion from steam system to networked heat pump system)
System/campus size and expansion capacity	• <u>Buildings</u>: 3 residential + 1 thermal resource building • <u>Units</u>: ~291 apartments • <u>Square footage</u>: ~262,000 sq ft • <u>Expansion potential</u>: ◦ Integration with Fulton Houses redevelopment (future buildings) ◦ Potential to scale to broader Chelsea neighborhood

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

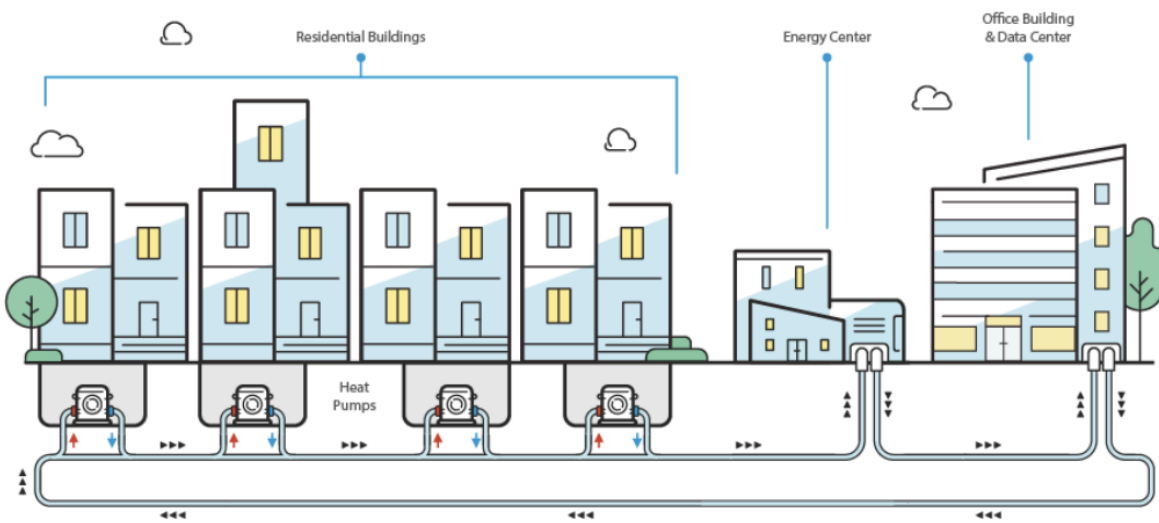
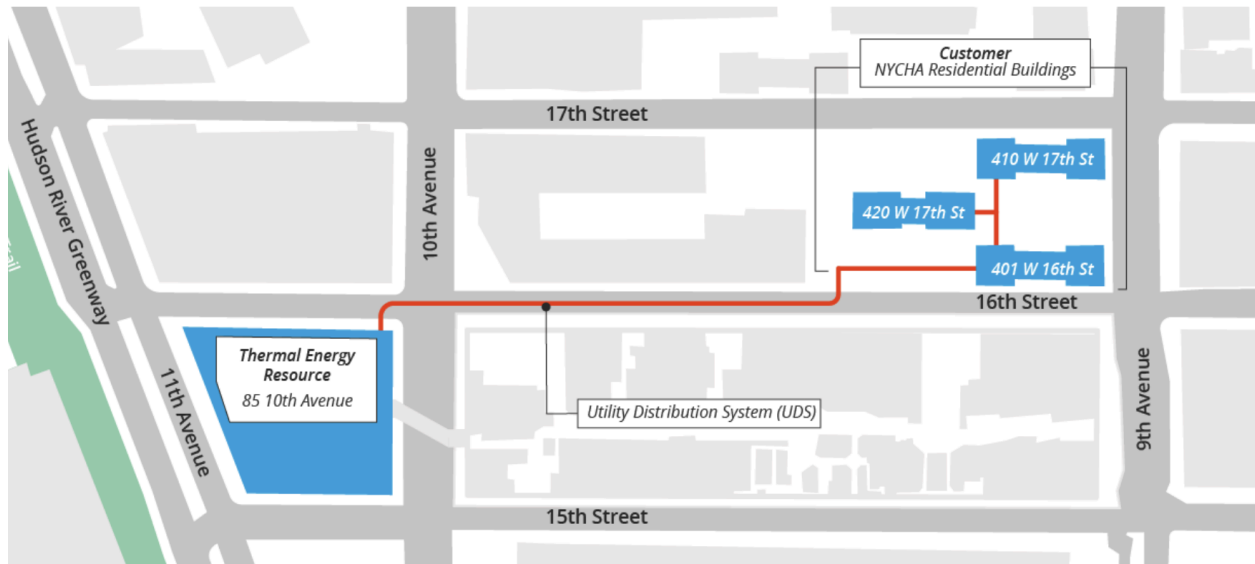


Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• 5th generation (closed ambient loop with distributed heat pumps and bidirectional heat exchange) • Utility Distribution System (UDS) • Heat exchanged at source building and transported via underground piping to NYCHA buildings • Water-source heat pumps at buildings for DHW and space conditioning • Heat otherwise rejected via cooling towers is captured and reused • Buildings can reuse internal waste heat between each other • Eliminates reliance on district steam
Additional projects: solar, building envelope/retrofits	• HVAC upgrades (fan coil units, improved ventilation and filtration)
Cost and funding sources	\$45.53 million (construction estimate, excluding contingency) • ~\$95 million total (including pilot lifecycle costs and O&M) • <u>Cost recovery</u>: electric ratepayers + thermal service charges
Timeframe	• Stage 2 Design Study Filing: July 2025 • Construction duration: ~21 months • Pilot duration: 5 years (subject to redevelopment timing)
Stakeholders & Solution Providers	• Con Edison (developer, operator) • NYCHA (customer, building owner) • Related + Essence (PACT partners) • Vornado (co-owner of thermal resource building) • Fulton Houses residents/community stakeholders
Ownership and maintenance/operational structure	• <u>Thermal resource</u>: privately owned (85 10th Ave Associates) • <u>Network owner/operator</u>: Con Edison (pilot period) • <u>Customer</u>: NYCHA (single billing entity; tenants not billed directly)
Year project became fully operational	Not yet operational (pending PSC approval and construction)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Borehole number and depth	• N/A (waste heat recovery system)
Challenges	• Major redevelopment uncertainty (Fulton Houses demolition during pilot period) and risk of stranded assets if buildings are demolished before full pilot lifecycle • Complex ownership and leasing arrangements (thermal resource site) • Urban siting constraints and infrastructure coordination • Cybersecurity limitations affecting control systems (SCADA constraints) • Need for alignment across multiple stakeholders, including NYCHA, PACT partners, and private owners
Lessons learned and project benefits	• Data centers are highly viable thermal resources in dense urban areas • Waste heat reuse can outperform geothermal in space-constrained environments • Early stakeholder coordination is critical, especially with public housing + redevelopment timelines • Minimally invasive retrofit strategies (fan coil units vs. VRF) improve feasibility • Thermal networks reduce peak electric demand vs. building-level electrification • Significant emissions reductions (~15,000 metric tons CO₂e lifetime) • <u>Replicability</u>: Strong model for dense urban environments and data center integration
Links to Case Study Info	• UTENJA Docket: Matter 22-M-0429 • Con Edison Chelsea TEN webpage • Stage 2 Design Study Filing (July 9, 2025)
Key Contacts (if available)	ConEdison TENs team: TenPilotProjects@coned.com



Conceptual map and diagram of the proposed Chelsea TEN System.

Source: Con Edison, UTENJA Stage 2 Chelsea Design Filing ([link](#))

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

LCOR – 1515 Surf Avenue

LCOR - 1515 Surf Ave/West 16th Street, Brooklyn, NY	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps (boreholes)
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	Mixed-use complex: multifamily apartments (including 30% affordable housing), commercial retail
Single-owner campus or multi-ownership	Single-owner campus
New construction vs. existing	New construction
System/campus size and expansion capacity	470,000 square feet No clear plan for expanding the system, but LCOR completed its second large-scale geothermal project with The Allen, a 28-story mixed-use development (multifamily rental units, retail/commercial space, parking) located in New Rochelle, NY – building on the successes it saw with the 1515 Surf Ave project
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Horizontal piping, two piping manifolds (one in each building in the residential complex)
Additional projects: solar, building envelope/retrofits	- Water source heat pumps in every apartment, connected to the building loop – powered by geothermal bore field - Heat Pump Energy Recovery Ventilation (ERV) Roof Top Units for ventilation - Building automation system for apartments and central plant
Cost and funding sources	- NYSERDA PON 4614: Design (Category C) funding - NYS Clean Heat (ConEd) geothermal incentives
Timeframe	Construction completed in 2024

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Stakeholders & Solution Providers	LCOR : multifamily development, investment, and operating company Solution providers: • Ecosave
Ownership and maintenance/operational structure	System owned by LCOR - maintenance and system management done by Ecosave through a 20 year Energy Performance Contract
Year project became fully operational	2024
Borehole number and depth, if applicable	153 boreholes, 500 ft depth
Challenges	• Volatile utility rates complicated the process for getting initial financial projections
Lessons learned and project benefits	• Developer was able to “break even” when considering rebate/incentive opportunities, utility savings – saw payback once capitalization rate was applied • Multifamily buildings with significant amenities/common spaces can generally make a stronger case for the project economics, since they are able to capture more savings
Links to Case Study Info	Largest NYC Geothermal Installation: Coney Island Residential Complex (Ecosave) LCOR 1515 Surf Avenue: Geothermal
Key Contacts (if available)	Ecosave: info@ecosaveinc.com *For introductions to LCOR please contact Sustainable Westchester

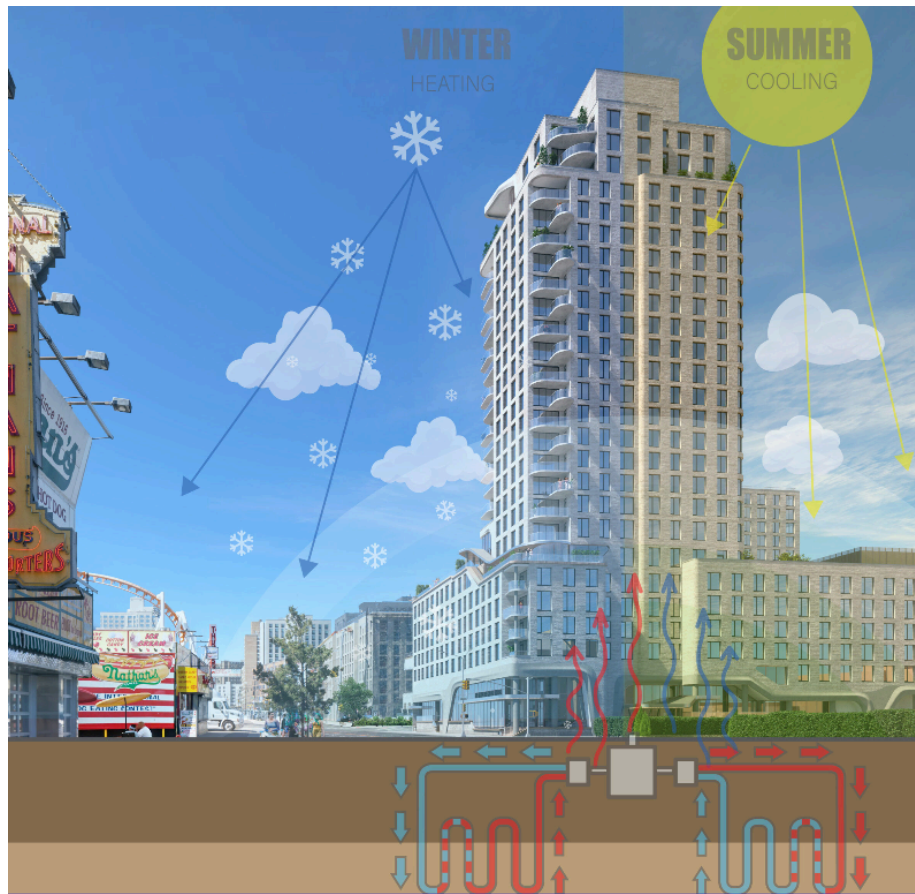


Image depicting the geothermal system at 1515 Surf Avenue.

Source: 1515 Surf Avenue ([link](#))



Sheridan Hollow

Sheridan Hollow - Albany, NY	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• Ground source heat pumps (boreholes) • Solar PV • Solar thermal
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Multifamily affordable housing • Commercial business
Single-owner campus or multi-ownership	Multiple owners
New construction vs. existing	Existing buildings
System/campus size and expansion capacity	Two buildings connected – seeking to expand to additional properties (original feasibility study looked at 109 buildings on 94 acres).
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Details not available
Additional projects: solar, building envelope/retrofits	• Insulation • Roof replacement • Electric system upgrades
Cost and funding sources	Feasibility study: • PON 4614 funding for the feasibility study Implementation: • American Rescue Plan Act (ARPA) • Community Loan Fund of the Capital Region • NYSERDA Cleaner Greener Communities program • NYSERDA EmPower+ program • Department of State Brownfield Opportunity Program

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Timeframe	Applied through NYSERDA PON 4614 for feasibility study funding - Round 3: link to project details Drilling underway as of September 2025
Stakeholders & Solution Providers	Albany Community Land Trust: owner of connected building • Building will be sold to an income-eligible, first-time homebuyer at completion of construction Orange and Dove St. Legacy Housing Foundation: owner of connected building City of Albany: initially proposed as potential system owners, provided pass-through financial support (ARPA funding) and public support for the project Solution providers: • Aztech Geothermal: system designer • Rototec: borehole driller • FW Webb: heat pump layout designer • Family Danz: heat pump installer • WPNT Construction: general contractor • TAP: architect
Ownership and maintenance/operational structure	Details not available
Year project became fully operational	Drilling underway as of September 2025 – unclear if full operational
Borehole number and depth	Details not available
Challenges	Details not available

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Lessons learned and project benefits	- Utilizing an easement agreement to document shared energy resources - Success came from a combination of various funding streams for different project phases (pre-electrification upgrades, insulation and air sealing, electrical upgrades, HVAC) - Made it possible to move the project forward – despite the additional costs and complexities associated with retrofit/existing building projects
Links to Case Study Info	PON 4614 Project Details: Sheridan Hollow Sheridan Hollow Alliance for Renewable Energy: Geothermal Project Underway in Sheridan Hollow Albany New York News Release
Key Contacts (if available)	City of Albany: Alyson Baker, abaker@albanyny.gov (included in press release)



Image from ribbon-cutting for commencement of geothermal drilling.

Source: Sheridan Hollow Alliance for Renewable Energy ([link](#))

Village of Hastings-on-Hudson, NY

Village of Hastings-on-Hudson: Geothermal Network at Village Hall and Library (Hastings-on-Hudson, NY)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground-source heat pump (geothermal) borehole field
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	Municipal buildings: Village Hall and Library
Single-owner campus or multi-ownership	Single-owner (if expanded, may include additional property owners)
New construction vs. existing	Existing buildings
System/campus size and expansion capacity	2 buildings: Hastings-on-Hudson Village Hall and Hastings-on-Hudson Library Original project scope explored the possibility of bringing in additional buildings – Village decided to focus on the two municipal buildings to start
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Closed loop water source geothermal system Neutral temperature distribution loop: vertical loop
Additional projects: solar, building envelope/retrofits	- Rooftop solar on the library (scoped and designed alongside the geothermal project) - Upgrading distribution system to pair with the new geothermal heat pump systems - Some improvements to the building envelope – i.e. reglazing windows

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Cost and funding sources	Estimated project cost: \$2.43 million Funding Sources: • NYSERDA Clean Energy Communities Grants ◦ Awarded as a result of the Village's CEC Campaigns – completed with support from Sustainable Westchester • NY-SUN Solar incentives • Federal budget appropriation: \$750,000 via the Department of Housing and Urban Development (HUD) for Community Planning and Development • Section 48 Investment Tax Credit – Elective Pay: for geothermal and solar components of project ◦ Accelerating solar project to meet Safe Harbor deadline (set by the One Big Beautiful Bill Act) • NYS Public Library Construction Aide Grant
Timeframe	• 2019: initial energy audit conducted, which introduced the idea of geothermal and solar for the Village Hall and Library • 2023: feasibility study completed for geothermal and solar • 2024: went to bid for geothermal and solar design • 2025-2026: geothermal system design underway • Aiming for completion of geothermal project by end of 2027
Stakeholders	<u>Village of Hastings-on-Hudson</u>: property owner, will own the system <u>Solution Providers</u> (to date): • OLA Consulting Engineers: completed the original energy audit • Wendel Companies: conducted the feasibility assessment
Ownership and maintenance/operational structure	Village of Hastings-on-Hudson will own, operate, and maintain the system – potentially with contracted support for O&M
Year project became fully operational	N/A – project in design stage, planning for completion by end of 2027
Borehole number and depth	Feasibility study proposed 20 boreholes at a depth of 500ft each (estimating capacity of 2.5 tons/borehole) – final design and installation to be determined

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Challenges	• When the feasibility study was done, initial payback period was 395 years for the geothermal project – had to figure out how to lower implementation costs without utilizing taxpayer funds • Stacking together various funding sources has been huge in making the project financially feasible – but grant funding often requires extensive tracking and reporting for compliance purposes • Long timeline to get from original project ideation → feasibility → design → implementation (started in 2019, aiming for completion by in 2027)
Lessons learned and project benefits	• Estimating significant carbon emissions reduction: 48 MT of CO2 equivalent • Important to have an overarching strategy, clear vision, and central advocate to keep up project momentum ◦ Hastings' leadership and demonstrable climate impact helped to build support from state & federal stakeholders ◦ Utilization of an owner's representative (or other outside support services) can be helpful for some municipalities, if they need additional support with bid management and/or evaluation • Maximizing project feasibility in the near-term ◦ Explored opportunities for future system expansion, but focusing now on what's realizable in the near-term ◦ Decomplicates planning for ownership and management • Have a financing and funding strategy in mind, and be willing to advocate for it ◦ Takes some negotiation and creative "incentive stacking" – as is common for networked geothermal/thermal energy network projects ◦ Having a grant writer can help to identify potential funding supports, and allows for in-house assistance with grant management: <i>projects interested in pursuing grants may want to consider including a grant/reporting manager in their proposed budget, if feasible</i>

Links to Case Study Info	Village of Hastings-on-Hudson: Addressing Climate Change – outlines various climate initiatives in the Village, including the geothermal project • Link to feasibility study
Key Contacts (if available)	Nicola Armacost (Former Mayor, Hastings-on-Hudson): narmacost@gmail.com

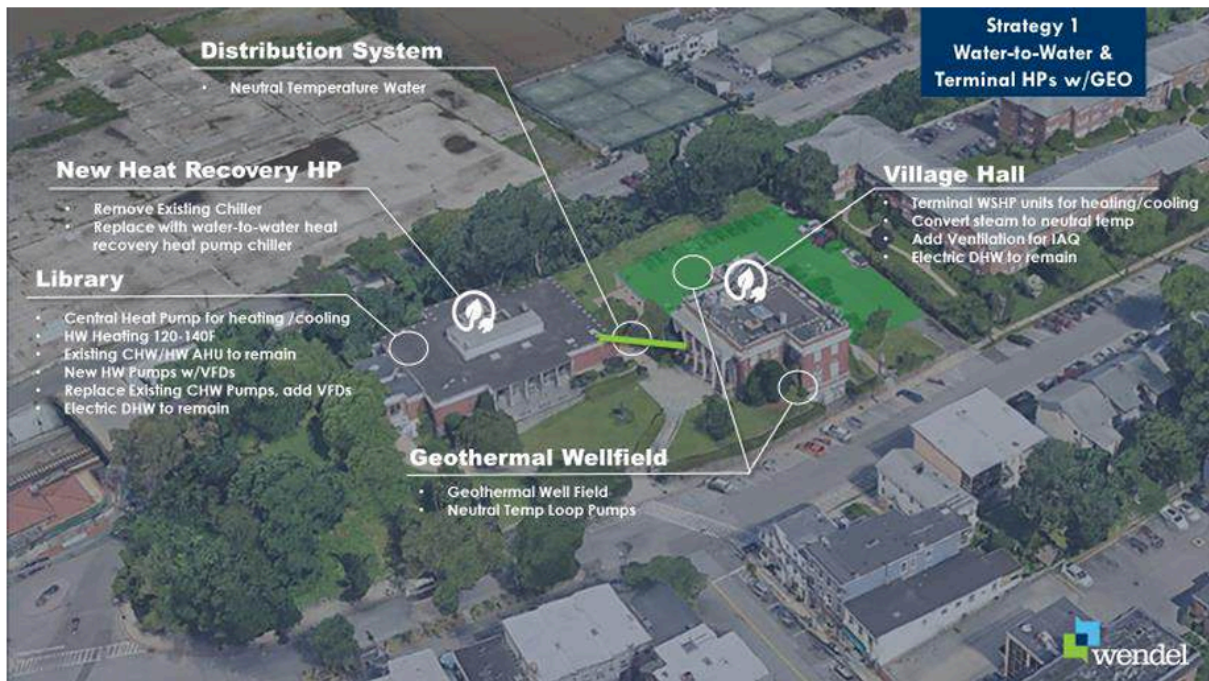


Figure 2. A summary of the proposed system changes included in Strategy 1

Proposed ground source heat pump system for the Village Hall and Library, featuring a networked design (shared geothermal borefield).

Source: Village of Hastings-on-Hudson / Wendel Companies ([link](#))

Skidmore College

Skidmore College	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	- Ground-source heat pump (geothermal) borehole fields - District geothermal connections between multiple buildings (to enable thermal / load balancing) - Solar thermal for partial campus domestic hot water needs
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	Higher education campus: classrooms, residence halls, dining, arts facilities
Single-owner campus or multi-ownership	Single-owner (Skidmore College)
New construction vs. existing	Existing campus with both retrofit and new construction buildings
System/campus size and expansion capacity	~700 wells serving ~950,000 sq ft; multiple district loops 47% campus heating and cooling needs met through geothermal
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	- Three district geothermal systems (connecting multiple buildings) - Closed-loop vertical boreholes - Twenty-three stand-alone geothermal systems
Additional projects: solar, building envelope/retrofits	- Solar thermal systems for hot water - Broader energy efficiency retrofit investments
Cost and funding sources	Costs: \$2M for initial system (122,800 sq ft of space) \$10.5M for energy retrofit portion of \$218M in renovation costs Incentives: \$800k in incentives from NYSEDA, DASNY & National Grid incentives - Remaining capital costs covered through capital project
Timeframe	First system in 2006; district loops installed through 2011 and beyond.

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Stakeholders & Solution Providers	Skidmore College facilities teams, NYSERDA, utility partners
Ownership and maintenance/operational structure	Owned/operated by Skidmore College
Year project became fully operational	Systems operational as early as 2011, with expansions through 2024
Borehole number and depth	700 bores total: • Arts Quad district geothermal: 119 bores • Wiecking Green district geothermal: 104 bores • Other district fields: 240 bores • Additional bores to serve stand-alone systems at dining hall and on-campus apartments • Borehole depths range from 400-500ft
Challenges	• Challenges with phasing and integrating systems over time • Coordinating expansions with construction/retrofits
Lessons learned and project benefits	Reduced boreholes and system infrastructure for district systems (when compared to standalone systems) - as well as greater operational efficiency. • District design reduced # of bores, total field loop size by 25-35% compared to a standalone system
Links to Case Study Info	NYSERDA case study (Skidmore College) Skidmore College: Geothermal
Key Contacts (if available)	sustainability@skidmore.edu



Map of Skidmore College's campus (orange highlighted areas indicate geothermal fields).

Source: Skidmore College ([link](#))

Arverne East

Arverne East - Far Rockaway, Queens, NYC (Building D)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps / geothermal borefield
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	Mixed-use affordable housing project – affordable housing (with amenity spaces), commercial/retail
Single-owner campus or multi-ownership	Single-owner
New construction vs. existing	Primarily new construction
System/campus size and expansion capacity	Current project incorporates 320 units, 378,415 sq ft • Could expand to incorporate 1,650 dwelling units and 2 million sf conditioned space; planning for multi-phase expansion
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Ambient loop design: temperature maintained between 40–70 °F
Additional projects: solar, building envelope/retrofits	• Project to meet Passive House standards • Rooftop solar (~12.4 GWh/year) • Potential battery storage
Cost and funding sources	Total project cost – for new construction <i>and</i> geothermal: \$207M Design: • NYSERDA PON 4614 funding (Category B) Implementation: • NYSERDA Multifamily Buildings of Excellence awardee: \$1M • Financing through tax credits, subsidy loans from NYC Housing Development Corporation, NYC Department of Housing

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

	Preservation and Development, NYS HCR, Urban Investment Group at Goldman Sachs Alternatives Resolution A funds from Queens Borough President, NY City Council
Timeframe	Design phase circa 2023–2025; phased construction through 2029 Building that will include the initial portion of the geothermal loop is aiming for 2028 construction date
Stakeholders & Solution Providers	- ZBF Geothermal: technical lead L+M Development Partners: developer FXCollaborative Architects: designers
Ownership and maintenance/operational structure	Not clearly stated – assuming developer (L+M Development Partners)
Year project became fully operational	Not applicable - currently in construction
Borehole number and depth	Approximately 482 boreholes planned at ~499 ft each in depth
Challenges	Large-scale district integration with phased buildout across diverse building type
Lessons learned and project benefits	Variety of load and building types included in the network – encouraging heat transfer/sharing between buildings
Links to Case Study Info	Arverne East Category B NYSERDA PDF Buildings of Excellence: Award Info Page (NYSERDA) NYC HDC Newsroom: Arverne East
Key Contacts (if available)	ZBF Geothermal



Rendering of Arverne East Building D.

Source: NYC Housing Development Corporation ([link](#))

New Haven, CT

New Haven, Connecticut	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps / geothermal borefield
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	Public housing, train station (Union Station) – historic building
Single-owner campus or multi-ownership	Single owner, multiple buildings
New construction vs. existing	Mixed - new construction (public housing), existing building (train station – Union Station)
System/campus size and expansion capacity	1,000 units of housing, Union Station - though interested in expanding to include more buildings (incl. other apartment units under development, police station, existing buildings)
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Closed loop, networked geothermal system
Additional projects: solar, building envelope/retrofits	No publicly-available information
Cost and funding sources	\$16.5 million total system cost Funding sources: • EPA Climate Pollution Reduction Grant (\$9.5 million) • Federal tax credits and state incentives to cover remaining \$7 million in project budget ○ Exploring bridge loan from Green Bank until it receives the federal geothermal investment tax credit

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Timeframe	Geothermal drilling (test boreholes) began in December 2025 Ground heat exchanger design underway Aiming for completion in late 2028
Stakeholders & Solution Providers	Stakeholders: • City of New Haven - owner of connected properties, project leader (Steven Winter - New Haven executive director of climate and sustainability) • New Haven Parking Authority • Housing Authority of New Haven Solution providers: • Aztech Geothermal (overseeing the project on behalf of New Haven) • CDM Smith
Ownership and maintenance/operational structure	Seeking a municipally-owned TEN model
Year project became fully operational	N/A - in construction (Estimating 2028 completion)
Borehole number and depth	200 boreholes, projecting approx 850 ft depth • Exploring the possibility of deeper boreholes to reduce borefield size
Challenges	• Initial uncertainty about status of federal funding – ultimately able to proceed and receive the funding • Pushing state government to issue bonds needed to fund the initiative

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Lessons learned and project benefits	• Working to phase the housing development project (new apartment units) to connect to the system as it is being built • Planning to integrate workforce development angle: job and hands-on apprenticeship opportunities for those in underserved areas • Aiming to use the project as a blueprint for similar cities, communities to use TENs to “support affordable housing production, economic development, and neighborhood-scale decarbonization”.
Links to Case Study Info	Canary Media – A major networked geothermal project gets underway in Connecticut CT Mirror – Can geothermal technology solve the CT electricity problem? Environmental Protection Agency – City of New Haven (Connecticut) Climate Pollution Reduction Grants
Key Contacts (if available)	City of New Haven: Office of Climate and Sustainability Steven Winter: Executive Director, Office of Climate and Sustainability: swinter@newhavenct.gov



Geothermal test borehole drilling across from Union Station.

Source: CT Mirror ([link](#))

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Jamestown, NY

Jamestown, NY	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Exploring <u>wastewater heat recovery</u> • Unique in that it is <i>currently operating</i> a municipally-owned, gas-fired district steam system and is looking to convert to cleaner energy (rather than build an entirely new system) ◦ Combined heat and power generating station
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	District steam system serving 70 facilities, over 700 low-income/assisted living apartments, plus several other building types Buildings connected to the existing district network include: • Commercial • Schools • Healthcare facilities • Sports arenas • Houses of worship (houses) • Multifamily residential • Small businesses • Nonprofit buildings
Single-owner campus or multi-ownership	Single ownership of the district energy system (Jamestown Board of Public Utilities), multi-ownership for connected buildings
New construction vs. existing	Existing buildings & re-design of existing district heating system
System/campus size and expansion capacity	System expansion will be needed to connect to the water treatment plant as a heat exchange resource • Can enable system growth and the addition of new customers – including the community college, industrial and commercial businesses, public schools, and more residential neighborhoods
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Unclear

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Additional projects: solar, building envelope/retrofits	No publicly-available information
Cost and funding sources	Funding sources: • NYSERDA Just Transition Site Reuse Planning Program: for planning study to explore next steps for its district energy system (which has largely reached end of life) • ~ \$20 million through the Sustainable Future Program (NYS Budget Allocation for FY2026 budget): for design and engineering
Timeframe	Estimating 2030 completion of construction
Stakeholders & Solution Providers	Stakeholders: • Jamestown Board of Public Utilities
Ownership and maintenance/operational structure	System owned and maintained by Jamestown Board of Public Utilities
Year project became fully operational	District energy system is currently operational, renewable thermal energy network plans are still in the design stage
Borehole number and depth	N/A - exploring wastewater heat transfer
Challenges	• Difficulty with funding the project's design stage – due to restrictions on using bonds for non-construction purposes • The system is currently fossil-fuel powered. Significant investment will be needed to retrofit and replace the existing aging hot water piping with an ambient temperature pipe loop
Lessons learned and project benefits	• Strength in starting with an existing customer base, though this won't be hugely applicable in certain areas of the state (i.e. there are no existing, municipally-owned utilities in Westchester County) • Positioning itself as a model for municipal TENS - garnering significant support from the State (budget allocations, NYSERDA funding...)

Links to Case Study Info	UpgradeNY: Statement From Upgrade NY Collaboration in Response to FY 2026 State Budget UpgradeNY: 2025 Lead by Example Budget Request (p.3 contains details about the Jamestown project) NYSERDA: City of Jamestown Case Study WNY News Now: Jamestown BPU Outlines Proposals to Retool & Expand District Heating Division
Key Contacts (if available)	N/A



Jamestown Board of Public Utilities' Samuel A. Carlson Generating Plant, which powers the City's district heating system, and is exploring opportunities to convert to low-carbon solutions.

Source: NYSERDA ([link](#))

SUNY University at Albany and ETEC Building

SUNY Albany TEN and ETEC Building	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Existing</u>: Natural gas-fired high-temperature hot water boilers (central plant) + steam-based system • <u>Primary</u>: Planned integration of low-temperature hot water network and heat recovery systems. Ground-source geothermal (closed-loop borefields at multiple buildings) + heat recovery chillers connected to the central plant
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Higher education campus • Academic buildings • Laboratory/research buildings (ETEC ~246,000 sq ft, high lab load) • Residential buildings (e.g., Liberty Terrace student housing)
Single-owner campus or multi-ownership	• Single-owner campus (SUNY / University at Albany)
New construction vs. existing	• Mixed ◦ New construction: ETEC building (2021, all-electric, geothermal) ◦ Existing campus retrofits: central plant upgrades, DHW systems, piping, etc.
System/campus size and expansion capacity	• <u>Campus</u>: Approximately 500-acres • <u>Buildings</u>: Over 100 • <u>Square footage</u>: ~6.5 million sq. ft • <u>Expansion potential</u>: Campus-wide transition to low-temperature hot water and integrated thermal network
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• Planned conversion of existing centralized high-temperature, steam-based system to a low-temperature hot water distribution network featuring: ◦ Integration of geothermal, heat recovery, and electrified chillers, and ◦ A hybrid approach using existing piping for seasonal low-temperature operation

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Additional projects: solar, building envelope/retrofits	• Solar PV system (~2 MW) supporting ETEC building • High-performance building envelope and lab ventilation systems • Campus-wide deep energy retrofits and infrastructure upgrades
Cost and funding sources	• ~\$30 million state appropriation for campus decarbonization project • ~\$2 million NYSERDA funding for net-zero master planning
Timeframe	• 2012: Liberty Terrace geothermal system installed • 2021: ETEC building completed (geothermal, all-electric) • 2023: \$30M decarbonization funding approved • 2025+: Central plant and campus system upgrades underway
Stakeholders & Solution Providers	• University at Albany (owner/operator) • NYSERDA (funding, planning support) • NYPA (program involvement) • New York State Legislature (capital funding) • Design consultants and engineering teams
Ownership and maintenance/operational structure	• University-owned central plant and campus energy infrastructure • TEN will be operated by campus facilities and central plant staff (~80 personnel)
Year project became fully operational	• Not yet fully operational (phased campus transition underway)
Borehole number and depth	• Liberty Terrace: ~150 boreholes, ~450 ft deep • ETEC: ~190 boreholes (depth not specified in sources)
Challenges	• Existing reliance on fossil-fuel-based central plant • Need to retrofit large campus buildings while occupied • Integration of new low-temperature systems with legacy infrastructure • Balancing cost, reliability, and phased implementation

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Lessons learned and project benefits	• Campus-scale planning enables integration of multiple technologies over time • Geothermal and heat recovery significantly reduce fossil fuel use (up to ~30%+ reduction) • Low-temperature hot water systems improve efficiency and enable electrification • Hybrid systems allow continued reliability while transitioning away from fossil fuels • ETEC demonstrates high-performance all-electric building model with ~70% energy savings
Links to Case Study Info	UAlbany: • UAlbany Campus Decarbonization Project • About ETEC NYSERDA: UAlbany GSHP Case Study NYLCV: UAlbany TENS Groundbreaking & Momentum
Key Contacts (if available)	Indu Lnu, Director of Energy at UAlbany: ilnu@albany.edu or (518) 442-318

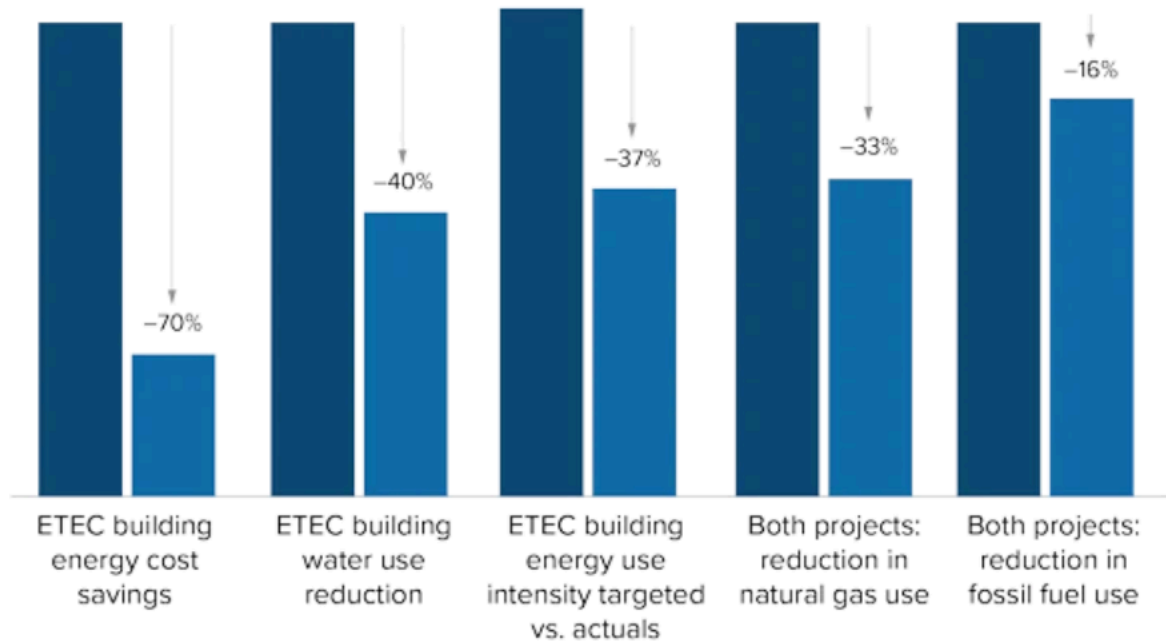


Figure 1 - Two University at Albany ground-source heat pumps projects by the numbers

▲ [Less](#)

- ETEC building energy cost savings -70%
- ETEC building water use reduction -40%
- ETEC building energy use intensity targeted vs. actuals -37%
- Both projects: reduction in natural gas use -33%
- Both projects: reduction in fossil fuel use -16%

UAlbany Ground-Source Heat Pump Project Impacts (Including ETEC)

Source: NYSERDA ([Link](#))

Cornell AgriTech

Cornell University, AgriTech Campus TEN (Geneva, NY)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Closed-loop geothermal borefield system • <u>Supplemental/backup</u>: Natural gas boilers for peaking and backup
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• College campus used for agriculture and food research, including: ○ Research labs ○ Offices ○ Growth chambers ○ Greenhouses ○ Food processing and storage facilities
Single-owner campus or multi-ownership	• Single-owner campus (Cornell University)
New construction vs. existing	• Existing campus retrofit (primarily) • New construction included (National Grape Improvement Center / Institute)
System/campus size and expansion capacity	• <u>Initial Study Focus</u>: 11 high-energy-use buildings, approx. ~362,419 sq. ft. • <u>Full Campus</u>: 44 buildings (including greenhouses), approx. ~500,000 sq. ft.
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• 4-pipe distribution network with central utility plant (heat pump chillers), integrated closed-loop geothermal system, and hot water distribution replacing steam. Includes: ○ 300 boreholes approximately 500 feet deep ○ Heat pump chillers using cascading configuration to achieve higher temperatures • System designed to produce ~180°F hot water • Natural gas boilers provide additional heating during extreme cold conditions • Greenhouses require heating loads above 160°F
Additional projects: solar, building envelope/retrofits	• Separate Deep Water Lake Cooling project at Cornell's Ithaca Campus

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Cost and funding sources	- Anticipated initial investment: ~\$30 million - Additional state and federal investment: approximately \$75 million over five years
Timeframe	- Phase 1 (2024–2025): Steam to hot water building conversions - Phase 2 (2025–2027): Hot water distribution piping - Phase 3 (2027–2030): Chilled water distribution and partial geothermal integration - Phase 4 (2030–2035): Central plant upgrades and full geothermal integration
Stakeholders & Solution Providers	- Cornell University (Project owner and campus operator) - NYSERDA (Funding and program support provider) - CHA Consulting, Inc. (Engineering and system design consultant)
Ownership and maintenance/operational structure	- Owner: Cornell University - Operator: TBD - Cornell campus facilities staff and/or 3rd-party contractor
Year project became fully operational	Not yet fully operational (phased campus transition underway)
Borehole number and depth	300 boreholes of approx. ~500 feet depth
Challenges	Aging infrastructure, including existing heating and cooling systems Need to maintain continuous operations for research and greenhouse functions High-temperature heating requirements for greenhouses
Lessons learned and project benefits	Phased approach enables transition without disrupting campus operations Transition from steam to hot water reduces thermal losses and emissions Centralized thermal production simplifies electrification and infrastructure upgrades Significant emissions reductions over time (up to ~85%) - Model is replicable for other campuses or mixed-use areas
Links to Case Study Info	NYSERDA Case Study: Cornell AgriTech IGSHPA Slides: NYSERDA Large-Scale Thermal Systems
Key Contacts (if available)	- Sue Dougherty, NYSERDA: sue.dougherty@nyserda.ny.gov - CHA Consulting (see Solution Providers resource for contact information)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Cornell Agritech Ariel Campus Image/Map
Source: IGSHPA via NYSERDA ([Link](#))

SUNY ESF

SUNY College of Environmental Science and Forestry (ESF)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Planned</u>: Low-temperature hot water system integrating geothermal, heat pumps, thermal energy storage, biomass, and other low-carbon technologies • <u>Existing</u>: Campus steam distribution network ○ Approximately 40% of steam purchased from Syracuse University and ~60% generated on-site via the Gateway Center CHP plant ○ Gateway Center CHP includes biomass (wood pellet) boiler, natural gas-fired steam boilers, microturbines, and heat recovery steam generator
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Higher education campus, including: ○ Academic buildings (e.g., Marshall Hall ~92,000 sq ft) ○ Laboratories and research facilities ○ Buildings with specialized loads (e.g., kilns, autoclaves) ○ Mix of historic and modern construction
Single-owner campus or multi-ownership	• Single-owner campus (SUNY ESF)
New construction vs. existing	• Predominantly existing campus undergoing phased retrofit and system transition • Includes deep energy retrofits and building-level system conversions (e.g., Marshall Hall)
System/campus size and expansion capacity	• Campus-wide district energy system serving multiple academic and research buildings • Existing steam network connects core campus buildings • Planned transition to campus-wide low-temperature hot water network, with integration of additional buildings and future thermal resources across campus

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

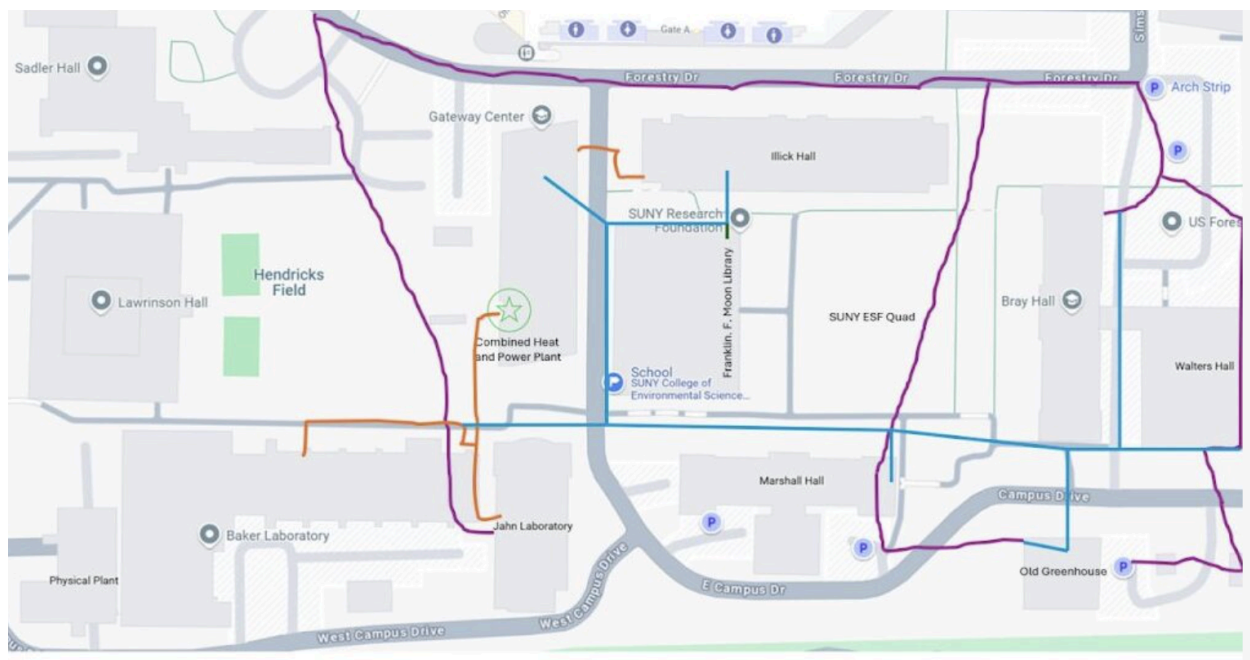
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• <u>Existing system</u>: Centralized steam distribution network with partial reliance on external supply (Syracuse University) • <u>Planned system</u>: Conversion to low-temperature hot water distribution network • Designed to support flexible integration of geothermal, thermal storage, heat pumps, biomass, and emerging technologies • Transition includes decentralization of select buildings (e.g., Marshall Hall) from steam system • Generation type: Transition from legacy steam system toward 4th/5th generation district energy system
Additional projects: solar, building envelope/retrofits	• Campus-wide deep energy retrofits aligned with SUCF Directive 1B-2 • Building-level upgrades including envelope improvements, lighting, and ventilation • Marshall Hall identified as a major deep energy retrofit and system conversion project • Campus planning includes future energy storage and renewable integration
Cost and funding sources	• Mix of funding through SUNY Construction Fund (SUCF) and state sources (NYSERDA) • Cost: Unknown (TBD)
Timeframe	• Clean Energy Master Plan developed in 2021 (Ramboll) • Marshall Hall renovation planned completion by 2025/2026 • Campus transition identified as long-term, phased implementation
Stakeholders & Solution Providers	• SUNY ESF (Project owner, campus operator, and system planning lead) • Ramboll (clean energy master plan drafter, energy planning and engineering consultant) • SUNY Construction Fund (SUCF Directive 1B-2; capital planning and oversight authority) • NYPA and NYSERDA (geothermal study support at Moon Library; state funding and technical support) • Syracuse University (steam supplier for portion of campus load)

Ownership and maintenance/operational structure	- Owned and operated by SUNY ESF - Campus energy system partially supplied by on-site Gateway Center CHP plant and external steam purchases from Syracuse University
Year project became fully operational	Not yet fully operational (phased campus transition underway) Individual building components (e.g., Marshall Hall) operational as of 2025/2026
Borehole number and depth	- Not yet constructed at campus scale - Moon Library geothermal well field studied (test borehole and feasibility completed) - Planned well field could serve both Moon Library and future campus hot water network
Challenges	Legacy System Transition: Transitioning from a legacy steam system with partial external dependency Phased Retrofit Complexity: Phased retrofit of multiple buildings with varying load types and infrastructure constraints Interim Service Requirements: Maintaining interim steam service for buildings not yet converted System Integration: Integrating new low-temperature systems with existing CHP infrastructure Financing and Coordination: Financing and coordinating a long-term, campus-wide energy transition
Lessons learned and project benefits	Phased Implementation Strategy: Campus-scale transitions require phased implementation combining building retrofits with system transformation System Conversion Foundation: Conversion from steam to low-temperature hot water is foundational for integrating renewable and low-carbon thermal resources Decentralization Flexibility: Decentralizing select buildings (e.g., Marshall Hall) enables flexibility and future network compatibility Resource Integration: Multi-resource systems (biomass CHP, geothermal potential, thermal storage) enhance resilience and energy diversity System Efficiency: Campus-scale planning enables higher utilization of shared thermal resources and improved overall system efficiency

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Links to Case Study Info	SUNY ESF Clean Energy Master Plan LEED Certification: SUNY ESF Marshall Hall Planet Forward ESF TEN Feature
Key Contacts (if available)	Michael Amadori , Campus Energy Manager, SUNY ESF: amadori@esf.edu or 315-470-6580



Map of Existing Steam Loops (SU in Purple & ESF in Orange) and Proposed Hot Water Distribution Network (in Blue)

Source: Planet Forward ([Link](#))

Eastchester Gardens and Jackson Developments (NYCHA)

NYCHA Eastchester Gardens & Jackson Developments (DHW)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Closed-loop vertical geothermal borefield system (approximately 500 ft. deep wells into bedrock) • <u>Supplemental/backup</u>: Natural gas boilers for space heating (separate system)
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Multifamily residential public housing (NYCHA) • 17 apartment buildings • Approximately 1,745 apartments
Single-owner campus or multi-ownership	• Public ownership (New York City Housing Authority)
New construction vs. existing	• Retrofit of existing multifamily residential developments
System/campus size and expansion capacity	• 17 buildings • Approximately 1,745 apartments • Expansion capacity: Unknown
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• Closed-loop geothermal ground-source heat pump system serving domestic hot water (DHW) loads, with distributed heat pump systems decoupled from space heating • Boreholes drilled approximately 500 ft into bedrock supporting high-temperature DHW production (above 140°F) using custom 30-ton dual-compressor heat pumps • System incorporates double-walled heat exchangers, high-efficiency storage tanks, mixing valves, and variable speed pumps with modulating controls to regulate discharge temperature and prevent heat pump lockout • Differentiated tank configurations: Jackson Houses uses parallel preheat tanks with multi-pass flow (~10°F temperature rise), while Eastchester Gardens uses series preheat tanks with single-pass flow (40–80°F temperature rise)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Additional projects: solar, building envelope/retrofits	• Installation of high-efficiency gas-condensing boilers for space heating
Cost and funding sources	• Approximately \$60–65 million project cost • Funding sources: Unknown (TBD)
Timeframe	• Approximately 2-year construction timeline
Stakeholders & Solution Providers	• Supports compliance with New York City Local Law 97 emissions reduction requirements • New York City Housing Authority (owner) • CSA Group (lead design firm, structural and MEP engineer) • Adams European Contracting Inc. (construction manager/design-build) • Buffalo Geothermal (geothermal system design and construction) • Matrix New World Engineering (civil engineer) • AECOM (program management)
Ownership and maintenance/operational structure	• Owner: New York City Housing Authority • Operator: NYCHA with 3rd party solution provider assistance
Year project became fully operational	• Completed in late 2025
Borehole number and depth	• Number of boreholes: TBD • Depth: Approx. ~500 ft
Challenges	• Installation within occupied residential buildings required carefully phased construction, including coordination with residents and building management to minimize disruption to daily living conditions while maintaining continuous domestic hot water service • Legacy piping leaks required identification, isolation, and repair prior to system integration, adding complexity to installation and increasing project timelines and costs • Undocumented or incomplete records of existing building infrastructure complicated system design, requiring additional field investigation and conservative sizing assumptions • Coordination with utilities introduced additional timing and logistical challenges, particularly related to electrical service upgrades, interconnection approvals, and capacity constraints

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Lessons learned and project benefits	• Geothermal domestic hot water (DHW) systems can effectively replace fossil-fuel-based DHW systems in dense multifamily buildings, while providing reliable and consistent hot water service to residents • Decoupling DHW from space heating systems improves overall system efficiency and operational performance, particularly in retrofit conditions • System configuration and controls play a critical role in performance: series tank arrangements lower entering load-side temperatures, enabling higher heat pump efficiency and contributing to approximately 23% higher coefficient of performance, with additional 10–20% efficiency gains achievable through reduced tank churn and standby losses • Optimizing load-side flow rates can improve performance by enabling single-pass operation and increasing leaving load temperatures by approximately 15–20°F at a given discharge temperature • High-temperature geothermal systems can achieve strong performance (approximately COP of 4), supporting electrification of DHW in buildings with existing high-temperature requirements • These systems reduce on-site greenhouse gas emissions and support long-term building and community decarbonization goals
Links to Case Study Info	• ENR Project Profile and Best in Residential/Hospitality 2025 Profile • CSA Project Page • NYCHA Project Announcement
Key Contacts (if available)	• Jens Ponikau, Buffalo Geothermal, Owner & System Designer: 716-686-8848



New high-efficiency, gas-condensing boilers and hot water tanks were installed for the projects at Jackson Houses and Eastchester Gardens.

Image of new high-efficiency, gas-condensing boilers and hot water tanks installed at Jackson Houses and Eastchester Gardens.

Source: NYCHA Now ([link](#))

St. Patrick's Cathedral, Manhattan

St. Patrick's Cathedral, Manhattan	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Ground-source geothermal via standing column wells (open-loop groundwater exchange). Heat recovery chillers and water-to-water / water-to-air heat pumps. • <u>Supplemental/backup</u>: Natural gas boilers and cooling tower (installed but largely unused)
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Religious institution (cathedral) • Historic landmark (completed 1879) • ~76,000 sq ft campus including cathedral, rectory/parish house, and residence • High-volume interior space with intermittent occupancy and large thermal mass
Single-owner campus or multi-ownership	• Single owner (Archdiocese of New York)
New construction vs. existing	• Existing historic building undergoing major renovation and system retrofit
System/campus size and expansion capacity	• Campus-scale system serving multiple buildings on a full city block • Provides full heating and cooling capacity for the cathedral campus • <u>Expansion capacity</u>: Not specified (site-constrained urban installation)
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• Standing column well geothermal system (open-loop hybrid) • Four-pipe water distribution system with simultaneous heating and cooling capability • Multiple water loops connecting wells, heat exchangers, and building systems • Centralized geothermal plant with distributed fan coils • <u>Generation type</u>: Not explicitly categorized (functions similarly to 4th gen low-temperature hydronic system)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

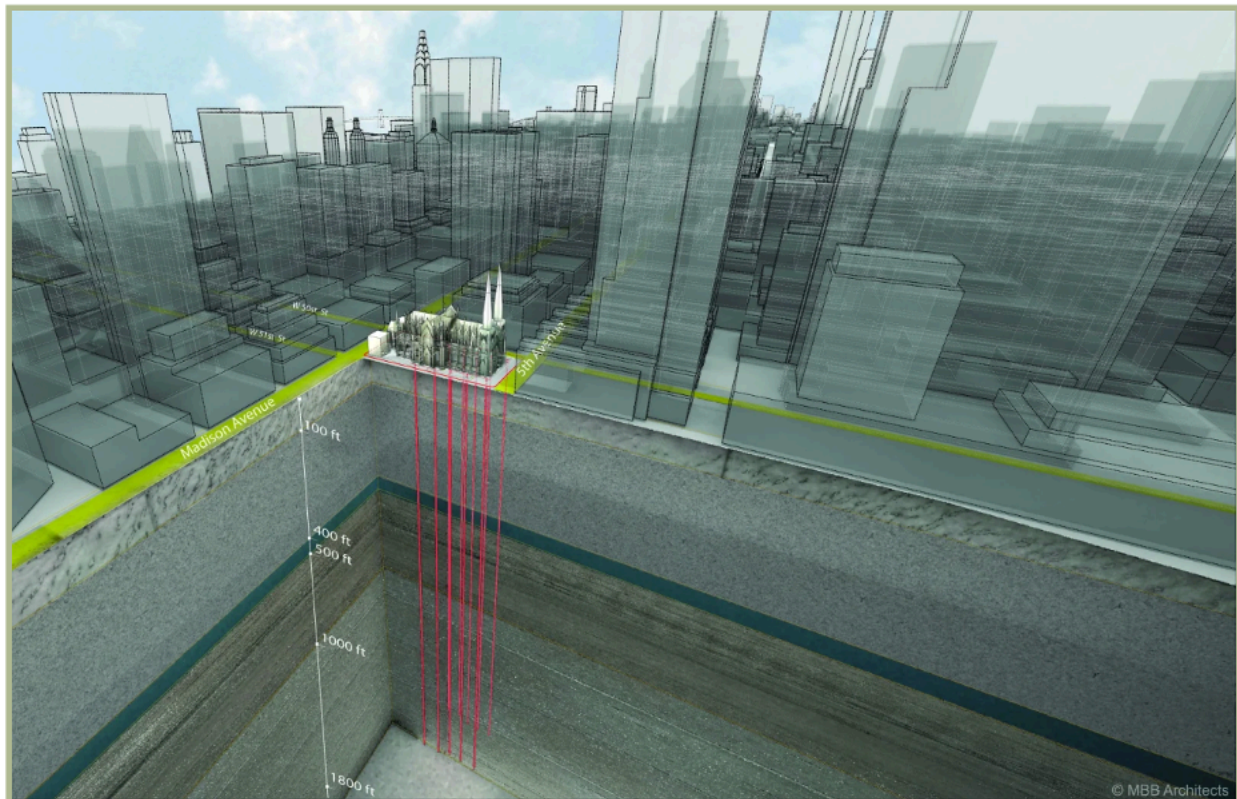


Additional projects: solar, building envelope/retrofits	• Full building restoration (~\$177M total project) • Envelope improvements (windows, glazing, air sealing) • LED lighting upgrades • Stormwater and landscape restoration with native plantings
Cost and funding sources	• Funding: Archdiocese and donors (not fully specified) ◦ ~\$35 million geothermal system cost ◦ ~ \$177 million total renovation project
Timeframe	• Renovation period: ~2012–2015 • Geothermal installation completed ~2016–2017
Stakeholders & Solution Providers	• Archdiocese of New York (owner) • Murphy Burnham & Buttrick (MBB) Architects (lead architect) • Landmark Facilities Group (engineering) • P.W. Grosser Consulting (geothermal design) • Structure Tone (construction management)
Ownership and maintenance/operational structure	• Owned by Archdiocese of New York • Operated and maintained by facilities/engineering teams (Landmark Facilities Group involvement)
Year project became fully operational	• 2017 (geothermal system launch)
Borehole number and depth	• 10 standing column wells ◦ Depth range: ~800 ft to ~2,200 ft ◦ Average depth: ~1,600–1,800 ft
Challenges	• Historic Preservation Constraints: Compliance with Landmarks Preservation Commission requirements for a designated landmark building • Aesthetic Limitations: Prohibition on visible mechanical equipment to preserve architectural character • Urban Drilling Logistics: Complex subsurface drilling conditions in a dense Midtown Manhattan environment • Load Variability: Large thermal mass and variable occupancy patterns affecting system design and performance • Integration Complexity: Incorporating geothermal infrastructure within existing architectural cavities and legacy building systems

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Lessons learned and project benefits	• Urban Feasibility: Demonstrates geothermal viability in dense, urban, and historic building contexts • Geologic Advantage: Standing column wells are highly effective in bedrock environments typical of urban settings • Equipment Elimination: Eliminates the need for boilers, cooling towers, and other visible mechanical equipment • Energy and Emissions Reduction: Achieves approximately 30% reduction in energy use and associated emissions • Interior Protection: Improves thermal comfort and humidity control, supporting preservation of historic interiors • Replicability: Provides a model for decarbonizing landmark and historically significant buildings
Links to Case Study Info	Causeway Energies St/ Patrick's cathedral case study New York Times feature High Performance Buildings Magazine case study Dandelion Energy overview
Key Contacts (if available)	Jeffrey Murphy (Murphy Burnham & Buttrick Architects) P.W. Grosser Consulting (engineering firm)



Geothermal wells were drilled 2,200 feet into Manhattan bedrock, six times as deep as the Cathedral's iconic spires are tall.

St. Patrick Cathedral's geothermal system includes 10 wells with depths that range from 800 ft (243.8 m) to 2,200 ft (670.5 m) deep.

Source: M.K. McGowan, ASHRAE Journal via MBB Architects ([link](#))

Syracuse 15th Ward / East Adams

Syracuse 15th Ward / East Adams	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Proposed district-scale system: ambient closed-loop distribution with geothermal borefields/ground-source geothermal heat pumps integrated into Phase I housing • <u>Potential supplemental sources</u>: sewer heat recovery + Syracuse University energy center waste heat
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Mixed-income affordable housing redevelopment • Phase I: 132 units (majority ≤60% AMI) • Broader plan: ~1,400–1,500 total units across phases • Includes townhomes, mid-rise apartments, senior housing, and community facilities
Single-owner campus or multi-ownership	• Multi-owner / multi-entity redevelopment (public housing authority + private developer + public funding stack)
New construction vs. existing	• Hybrid: demolition + new construction + renovation • Replacement of McKinney Manor + upgrades to existing buildings (e.g., AOT)
System/campus size and expansion capacity	• ~118-acre, 27-block redevelopment area • Multi-phase (11 phases) over ~10+ years • Designed for district-scale infrastructure deployment across phases
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• Proposed ambient loop district energy system (heat pump-based) • Evaluating 4th-generation (four-pipe) vs. ambient loop configurations • Distributed building-level heat pumps • Integration with new underground infrastructure during redevelopment (cost advantage)
Additional projects: solar, building envelope/retrofits	• All-electric, high-performance buildings with modern envelopes and efficient appliances • Renovation of existing housing (AOT) includes geothermal + full system upgrades • Public infrastructure: parks, streets, community facilities, schools

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Cost and funding sources	• ~\$102M Phase I development • ~\$1 billion total redevelopment value • <u>Funding stack</u>: LIHTC (~\$42M equity), NYS HCR subsidy (~\$45M), ESD loan (\$8M), HUD CNI funds, local/state contributions
Timeframe	• <u>Groundbreaking</u>: December 2025 • Construction start: 2025 (Phase I) • Full buildout: ~2025–2035
Stakeholders & Solution Providers	• Syracuse Housing Authority (project owner and lead developer) • City of Syracuse (local government partner and approvals authority) • McCormack Baron Salazar (master developer and project partner) • Blueprint 15 (community coalition and stakeholder representative) • CenTrio + CHA Consulting (district energy feasibility and system design) • NYSERDA (scoping and funding support)
Ownership and maintenance/operational structure	• Housing: SHA + private developer partnership • <u>Potential district energy</u>: third-party/operator model (CenTrio-style concessionaire)
Year project became fully operational	• TBD (phased implementation; early phases operational mid/late 2020s)
Borehole number and depth	• Not specified
Challenges	• Phasing Complexity: Complex multi-phase redevelopment requiring resident relocation and adherence to right-to-return requirements • Construction Coordination: Coordinating district energy system deployment across a phased construction timeline • Financing Complexity: Layered financing challenges across housing redevelopment, infrastructure, and energy systems • Equity Integration: Integrating new energy systems within a low- and moderate-income (LMI) affordable housing context • Site Constraints: Brownfield remediation requirements and legacy infrastructure limitations impacting development and system design

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Lessons learned and project benefits	• Integrated Development Model: Strong example of embedding district energy systems into affordable housing redevelopment • Equity Deployment: Demonstrates feasibility of thermal energy networks in LMI and environmental justice communities • Phased Implementation: Phased redevelopment enables infrastructure-first planning and system integration opportunities • Scalability Opportunity: Integration with broader urban transformation (I-81 removal) enhances long-term scalability • Cost and Performance Benefits: Potential for lower energy costs and improved overall building performance
Links to Case Study Info	Governor Hochul groundbreaking announcement Syracuse public housing redevelopment news East Adams project overview Community-led project updates Comprehensive redevelopment master plan
Key Contacts (if available)	Syracuse Housing Authority (William Simmons, Executive Director) CenTrio (district energy developer/operator)

Pratt Landing

Pratt Landing Mixed-Use Development, New Rochelle, NY	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Heat recovery heat pumps • <u>Secondary/potential</u>: water-source (Echo Bay), geothermal boreholes, sewer heat recovery, air-source HPs
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Mixed-use waterfront redevelopment • <u>Units</u>: ~383 rental units + 99 condos + hotel + retail • <u>Square footage</u>: ~800,000–850,000 SF total development
Single-owner campus or multi-ownership	• Initially single developer (Twining Properties) with potential future subdivision • Designed as district-scale system under common ownership
New construction vs. existing	• Primarily new construction (7 new buildings + 1 historic reuse – Naval Armory)
System/campus size and expansion capacity	• ~11–12.5 acre waterfront site • Phased buildout across 4 phases
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• Proposed 4th-generation district system (central thermal plant) distributing hot/chilled water • Load aggregation strategy to flatten peaks across buildings
Additional projects: solar, building envelope/retrofits	• Brownfield cleanup + shoreline restoration • Potential solar PV + battery storage integration • EV charging integration
Cost and funding sources	• Large-scale private + public partnership (Twining + City + NYS) • Brownfield Cleanup Program participation
Timeframe	• <u>Site plan approval</u>: January 2025 • <u>Pre-construction</u> (remediation/demolition): 2025–2026 • <u>Construction start</u>: expected 2026 • <u>Completion</u>: ~2029
Stakeholders & Solution Providers	• Twining Properties (project developer and lead sponsor) • City of New Rochelle (local government authority) • NYSERDA (feasibility study funding) • Endurant Energy (thermal feasibility lead)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Ownership and maintenance/operational structure	• District-scale system under common ownership
Year project became fully operational	• Late 2020s (~2029) if built as planned
Borehole number and depth	• Not specified (multiple thermal resource pathways still under evaluation)
Challenges	• Major permitting complexity (wetlands, Army Corps, DEC) • Environmental remediation of brownfield Waterfront + habitat impacts (Echo Bay)
Lessons learned and project benefits	• Strong candidate for district energy in mixed-use TOD development • Demonstrates value of load diversity (residential + hotel + retail) • Shows regulatory friction points for water-based systems
Links to Case Study Info	Twining Properties Pratt Landing overview City of New Rochelle approval and project details NYSERDA Pratt Landing TEN study summary
Key Contacts (if available)	• Tony Amis, Endurant: tamis@endurant.com



Aerial site plan of the Pratt Landing redevelopment in New Rochelle, illustrating phased development parcels (A–D)

Source: Twining Properties

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



False Creek, Vancouver

False Creek, Vancouver Neighbourhood Energy Utility (NEU)	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Wastewater heat & energy transfer
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Residential buildings • Commercial • Institutional
Single-owner campus or multi-ownership	Single ownership of the district energy system (City of Vancouver / False Creek Neighbourhood Energy Utility), multiple property types w/ different owners connected
New construction vs. existing	Primarily new development (former site of the Vancouver Olympic Village)
System/campus size and expansion capacity	Currently encompasses over 1.9 million square meters (over 20 million square feet) of residential, commercial, institutional space • Covers Southeast False Creek, Mount Pleasant, False Creek Flats, Northeast False Creek • Built to be scalable over time, as new users/technologies come online • 2024 expansion oversaw a tripling of the system's operating capacity
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	<u>Centralized system</u> provides space and water heating: 70% of energy generated from renewable sources – primarily sewage heat recovery • Seeking to go 100% renewable by 2030 <u>False Creek Energy Centre</u>: centrally-based, housing sewage pumping station, sewage heat recovery plant, boiler plant – located under the Cambie Bridge in Vancouver, BC, Canada • Processing 200 liters per second of wastewater (approximately 3,170 gallons per minute) • Sewage heat recovery plant: annual average efficiency of 320% • Natural gas boiler plant on site to “top up” energy supply during periods of high demand from the neighborhood

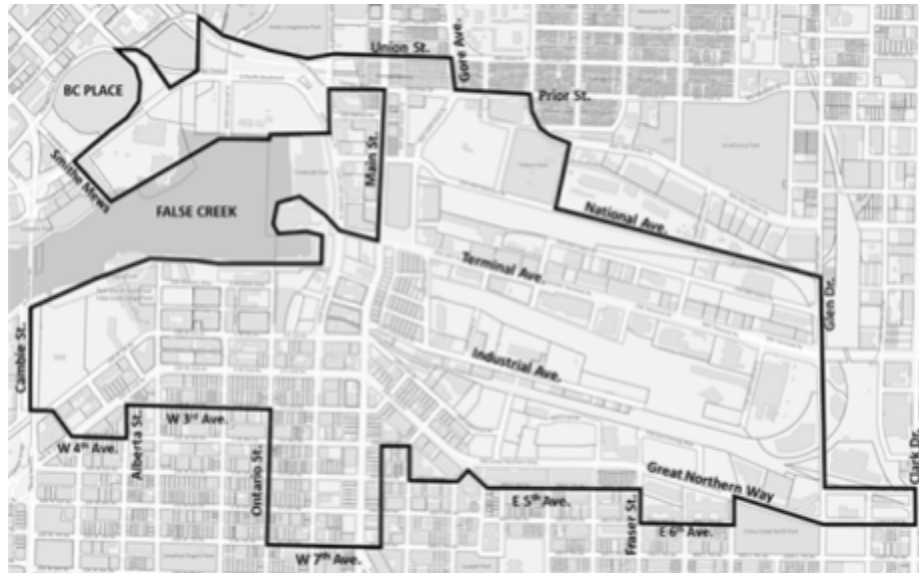
DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

	Energy Transfer Stations (ETS) located in each connected building to control space heating, domestic hot water distribution by the building mechanical system ETSs are owned and operated by the utility, building mechanical systems are owned and operated by the building owners Underground, distribution piping system to deliver hot water to connected buildings – owned and operated by the NEU Satellite peaking plants: installed to support growth of the system, enhance system resiliency
Additional projects: solar, building envelope/retrofits	No publicly-available details
Cost and funding sources	Funded by the City of Vancouver: allows return on investment to City taxpayers
Timeframe	2006: Council approved creation of NEU to provide space heating, domestic hot water service to Southeast False Creek buildings 2007: Council enacted Energy Utility System By-law 2009: Council approved By-law amendments, including establishment of 2009 rates and fees 2010: operation began 2012, 2018: Council approved amendments to the By-law to expand service area 2024: system expansion – added 6.6 MW of sewage heat recovery capacity to the False Creek Energy Centre (tripled capacity from 3.2 MW → 9.8 MW) - Included supply, commissioning of 5 SHARC Energy Systems
Stakeholders & Solution Providers	City of Vancouver: system owner and operator - Owns the False Creek Neighbourhood Energy Utility Solution Providers: SHARC Energy: sewage heat recovery technology



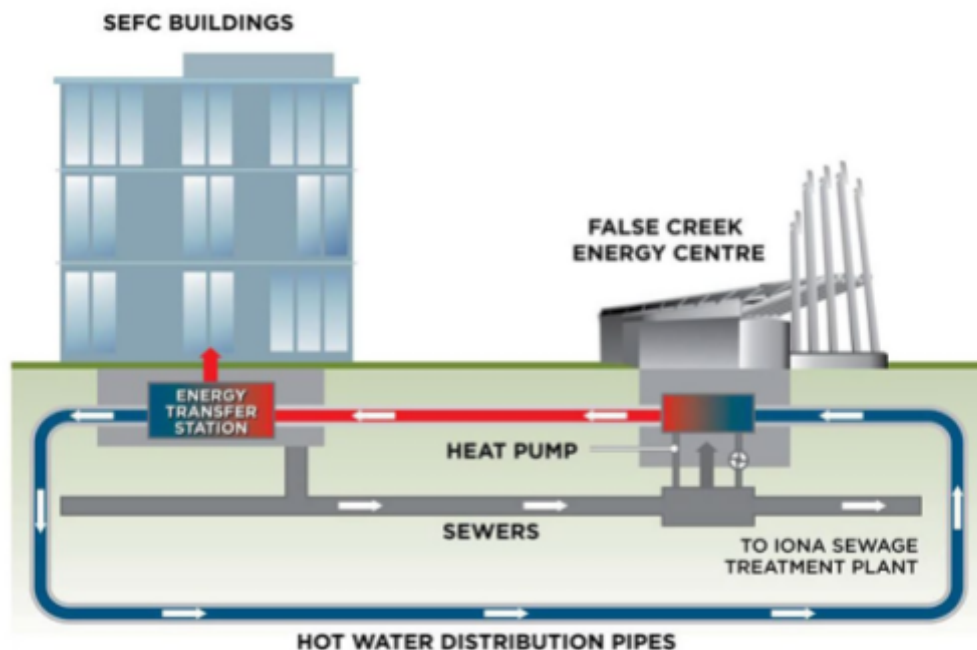
Ownership and maintenance/operational structure	<u>City of Vancouver</u> : owner and operator of the False Creek Neighbourhood Energy Utility (NEU)
Year project became fully operational	Launched in 2010
Borehole number and depth	N/A (wastewater heat transfer system, no boreholes needed)
Challenges	No publicly-available details
Lessons learned and project benefits	• Strong model for a measured transition to renewable energy system: planning to transition its energy supply to 100% renewable by 2030 • First application of large-scale raw sewage waste heat recovery in North America • Over time, the City kept potential system expansion in mind – reserved space on-site for additional equipment to enable further buildout of utility service • Easier ability to introduce new technologies, thanks to the centralized nature of the system • Reducing reliance on existing power grid (BC Hydro) thanks to the annual average Coefficient of Performance (COP) for generating heat at False Creek NEU • Carbon emissions reduction estimated at 4,400 tonnes per year
Links to Case Study Info	City of Vancouver: False Creek Neighbourhood Energy Utility (NEU) City of Vancouver: Neighbourhood Energy Utility Tour SHARC Energy: False Creek Neighbourhood Energy Utility (NEU) SHARC Energy Press Release: City of Vancouver NEU Expansion Opens as the Largest Operating WET Project in North America City of Vancouver: Council Report – 2025 False Creek NEU Customer Rates
Key Contacts (if available)	*For introductions to SHARC Energy please contact Sustainable Westchester and Pace Energy and Climate Center

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



False Creek Neighbourhood Energy Utility Service Map

Source: City of Vancouver



Neighbourhood Energy Utility Concept Diagram.

Source: City of Vancouver

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

West Union, Iowa

West Union, Iowa	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps – geothermal borefield
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Municipal: West Union Public Library • Retail and commercial: shops, cafe, banks, Chamber of Commerce • County: Fayette County Courthouse • Housing: apartments
Single-owner campus or multi-ownership	System is under single ownership (City of West Union), connects multiple property types with different owners
New construction vs. existing	Primarily existing buildings
System/campus size and expansion capacity	12 downtown buildings • Has the capacity to serve ~60 additional buildings that have access to the geothermal loop • Received a grant from Iowa Economic Development Authority / Iowa Energy Center in 2012 to study the current system, explore potential for expansion, and share it out as a model for other communities
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	Geothermal wells located in Fayette County Courthouse Lawn • Pumps and controls in the Fayette County Courthouse basement • No central backup system - individual buildings may have backup boilers for the coldest days Loop field located below streets of the town square • High density polyethylene (HPDE) – pipe has an 80-year asset life expectancy by gas/water utilities, but theoretical life could be 200+ years

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Additional projects: solar, building envelope/retrofits	Part of a larger downtown revitalization/development project that included: • Replacing street lights with LEDs • Permeable paving • Stormwater-filter bioswales • Civic plaza development
Cost and funding sources	Total cost: • Downtown revitalization project: \$10.2 million • Geothermal network: \$2.2 million Funding: 100% grant funded • Iowa Economic Development Authority - Green Streetscapes funding • Department of Energy Grant • HUD Community Development Block Grant: supported with building retrofit needs • Environmental Protection Agency Grant • Main Street Iowa Grant • USDA Rural Energy for America Program (REAP) program: ◦ Provided funding to property owners for building retrofits, geothermal heat pump equipment to connect to the geothermal system • Utility incentives - Alliant Energy ◦ Provided rebates for the well field (to the City of West Union, as the ground loop owner) AND installation of geothermal heat pumps (for individual properties intending to connect to the district system)
Timeframe	• 2008: Iowa Economic Development Authority sought a pilot community for a “Green Streetscapes” project to implement urban sustainability • 2010: groundbreaking kick-off ceremony • 2012: completion of Green Streetscapes project • 2014: first buildings connected to the geothermal network



Stakeholders & Solution Providers	City of West Union: owns the system, leases it to users West Union District Energy LLC (WUDE): manages the system • 11 members – who are the system’s current users, paying monthly user fee based on their building’s energy demand Additional Stakeholders: • West Union City Council • Alliant Energy • Fayette County – geothermal wells located in Fayette County Courthouse lawn • Iowa Geothermal Association
Ownership and maintenance/operational structure	<u>Ownership:</u> Municipally-owned (city of West Union), leased to property owners that want to connect to the system • System is leased on a month-by-month basis to West Union District Energy LLC (WUDE), with membership made up of the system’s users ◦ In light of City concerns about operating a new utility <u>Operations and Maintenance:</u> • 2014-2021: under a third-party operator, though struggled to find one initially • 2020: ◦ New operator selected through a competitive bidding process – Geothermal Eco Options ◦ Provider also selected through competitive bidding process for system equipment management, to handle remote monitoring – Winona Controls
Year project became fully operational	Operational as of 2014
Borehole number and depth	132 boreholes, 300 ft deep • Located beneath courthouse square



Challenges	• Questions about ownership and regulatory oversight: West Union District Energy LLC (WUDE), made up users who lease the system from the city, is not legally a utility under Iowa law – and Iowa Utilities Board previously determined it has no jurisdiction over geothermal heating and cooling • Operations and maintenance challenges: WUDE/geothermal network users ran into issues with high operational costs (due to operator expenses) and technical complications, before eventually switching to new third-party operations and maintenance providers – was then able to resolve technical issues, lower operational costs significantly
Lessons learned and project benefits	• Found success in aligning geothermal drilling with infrastructure projects: i.e. repavement of streets • Importance of strong leadership, cross-agency collaboration to unlock funding and centralize oversight ◦ Able to successfully manage a municipally-owned system by receiving direct input from offtakers/customers • Visibility of the project helped garner local buy-in and city pride • Utilization of grant funding: the City hired a grant writer to secure fund for the Green Streetscapes project
Links to Case Study Info	Building Decarbonization Coalition: Case Study – West Union, Iowa Green Up West Union: • About Green Up West Union • Green Up West Union Team
Key Contacts (if available)	No publicly-available contacts



Drawing depicting West Union's Green Streetscapes project, which includes the networked geothermal system.

Source: Green Up West Union



Downtown West Union, Iowa, above the geothermal network.

Source: Building Decarbonization Coalition

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

Framingham, Massachusetts

Framingham, Massachusetts – Utility-Owned Thermal Energy Network	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	Ground source heat pumps – geothermal boreholes
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Municipal buildings: firehouse, low-income housing units controlled by the Framingham Housing Authority • School building • Single-family homes
Single-owner campus or multi-ownership	Multiple property types and owners connected to a utility-owned TEN system
New construction vs. existing	Existing buildings
System/campus size and expansion capacity	135 residential and commercial customers connected across 36 buildings (as of 2024) • 375 ton system • Total volume of conditioned space: 1,778,147 cubic feet <u>Expansion capacity:</u> Received funding from the US Department of Energy in 2025 to expand to ~140 new customers
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	One-pipe ambient loop • Approximately one mile of pipe, buried at a depth of about 5 - 7 feet (deeper than traditional gas main, which is at 3 feet)
Additional projects: solar, building envelope/retrofits	Interior HVAC retrofits, exterior landscaping

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Cost and funding sources	Cost: • First loop & building retrofits for Phase 1 customers: estimated at \$22 million Funding sources: • Phase 1 (initial loop) funded through utility rate case approved by Massachusetts Department of Public Utilities (DPU) • Subsequent expansions funded by Department of Energy grant (\$715k awarded in April 2023 for feasibility studies, \$8.6m in 2025 for construction)
Timeframe	• 2020: approved by the Massachusetts Department of Public Utilities • 2023: groundbreaking ceremony • 2024: installed and operational • Dec. 2025: approved to expand system to double the original size
Stakeholders & Solution Providers	<u>Eversource</u>: owner and operator of the system, utility provider <u>City of Framingham</u>: key stakeholder <u>HEET</u>: non-profit organization supporting with project coordination, funding and financing the project, and sharing lessons learned/impact <u>Framingham Housing Authority</u>: manages the affordable housing units that are part of the network's customer base Solution providers: • CDM Smith
Ownership and maintenance/operational structure	<u>Eversource</u>: utility owner and operator • Responsible for installation, customer acquisition, billing, maintenance
Year project became fully operational	Fully operational as of 2024
Borehole number and depth	Three borefields, 90 boreholes – approximately 500 ft in depth



Challenges	• Needed significant customer incentives from the utility to motivate participation – i.e. interior retrofits, exterior landscaping – which may not be replicable at scale (or for non-utility projects) ◦ Health and safety repairs – i.e. mold, asbestos – as a particularly prominent barrier, due to lack of relevant funding opportunities • Lack of robust workforce for geothermal borehole drilling
Lessons learned and project benefits	• Successful customer acquisition strategies included door-to-door canvassing w/ comprehensive marketing materials (which included a Letter of Support from the Mayor), hiring a utility staff member dedicated to outreach and engagement during the construction/installation stage • City was able to leverage findings gathered from previous clean energy feasibility studies – on building stock and neighborhood energy needs • Working alongside a community-based organization (HEET) to promote comprehensive data sharing on project outcomes ◦ Able to partner with other organizations (Geothermal Drillers Association, International Ground Source Heat Pump Association) to lead free trainings on borehole drilling • Low monthly service fee for connected buildings during the pilot period • Lower costs to expand the system once primary equipment is already in place – expansion costs approximately 60% of the initial system
Links to Case Study Info	City of Framingham: Eversource Geothermal Pilot Program Eversource: • Geothermal Pilot Reference Guide (key statistics, FAQs) • Geothermal Pilot Project Updates (includes construction updates) CDM Smith: Eversource Pilots Geothermal Energy in Framingham, Massachusetts Canary Media: First utility-owned geothermal network to double in size with DOE funds

	Building Decarbonization Coalition: Case Study – Framingham, Massachusetts HEET: Eversource Gas breaks ground on first networked geothermal installation
Key Contacts (if available)	Eversource: geothermal@eversource.com



Map of the geothermal pilot project in Framingham, Massachusetts.

Source: Eversource

The Heights St. Paul

The Heights, St. Paul, Minnesota	
TEN Project Characteristics	Project-Specific Details
Thermal resources employed	• <u>Primary</u>: Aquifer Thermal Energy Storage (ATES) geothermal system (groundwater-based heat exchange) with networked geothermal wells, distribution piping, and building-level heat pumps • Integrated with renewable electricity, solar, and energy storage
Building type(s) - sector and characteristics (residential, multifamily, office, school...)	• Mixed-use redevelopment: residential + light industrial • <u>Units</u>: ~1,000 housing units (including affordable housing) • <u>Square footage</u>: ~1 million sq ft light industrial space • Designed as a carbon-neutral community with LEED for Communities certification
Single-owner campus or multi-ownership	• Multi-ownership development (housing developers, industrial tenants) • Master developer: St. Paul Port Authority
New construction vs. existing	• New construction (112-acre brownfield redevelopment of former golf course)
System/campus size and expansion capacity	• 112-acre district-scale system • Serves entire site (all buildings required to connect) • One of the largest networked geothermal systems in Minnesota
Network system characteristics (pipe/loop configuration, 4th vs. 5th gen, additional details)	• District-scale thermal energy network with underground piping connecting buildings • ATES system storing thermal energy seasonally in aquifers (heat/cold storage) • Bidirectional heat exchange between buildings and aquifer • Eliminates on-site fossil fuel combustion (no natural gas baseline) • <u>Generation type</u>: 5th-generation style ambient loop (low-temp network with distributed heat pumps)
Additional projects: solar, building envelope/retrofits	• Solar integration and energy storage paired with geothermal system • High-efficiency new construction buildings • Site-wide sustainability + resilience planning (transportation, waste, land use)

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.

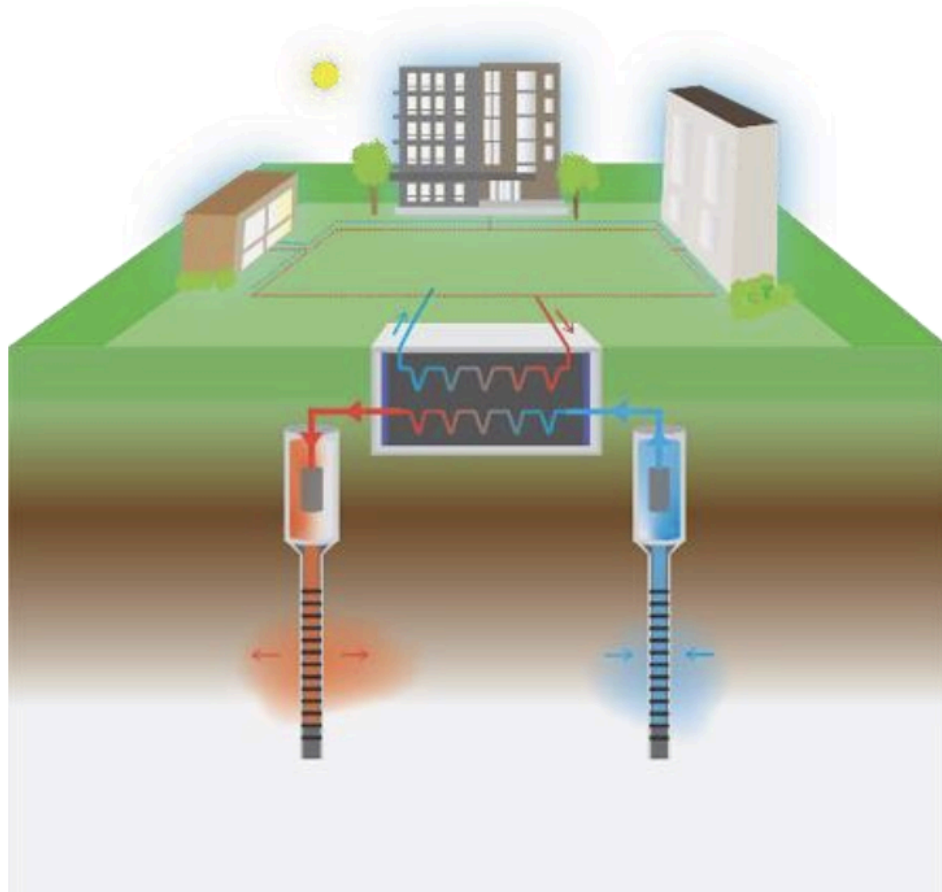


Cost and funding sources	• ~\$12 million geothermal system infrastructure (partial estimate) • \$4.7 million MnCIFA (state “green bank”) loan • Additional funding: federal tax credits (IRA), state and local sources
Timeframe	• Loan awarded: March 2024 • Construction start: 2024 (utilities + first buildings) • Phased buildout through ~2026+ (site development schedule)
Stakeholders & Solution Providers	• St. Paul Port Authority (master developer) • The Heights Community Energy (system owner/operator) • District Energy St. Paul (utility partner) • Ever-Green Energy (engineering, operations) • City of St. Paul (public infrastructure) • Housing partners: Sherman Associates, JO Companies, Habitat for Humanity
Ownership and maintenance/operational structure	• Owned and operated by The Heights Community Energy (nonprofit utility entity model) • Managed under District Energy St. Paul / Ever-Green Energy
Year project became fully operational	• TBD (under construction; phased deployment starting 2024)
Borehole number and depth	• Not specified (aquifer wells rather than traditional borehole field) • System uses groundwater aquifers (~100–150 meters depth typical range)
Challenges	• Regulatory Novelty: First ATES system in Minnesota, introducing both technological and regulatory uncertainty • Financing Gap: Required public “green bank” intervention to close funding shortfalls and enable project viability • Phased Coordination: Coordinating a district-scale system alongside a phased development buildout • Connection Requirement: Ensuring universal system connection across a mixed-use development with multiple stakeholders • Equity Alignment: Integrating equity and affordability goals into system design, performance, and long-term operations

DISCLAIMER: Please note that project information may be subject to change as time progresses. The case studies contained in this document reflect information gathered as of May 2026.



Lessons learned and project benefits	• District Development Model: Strong model for integrating district-scale geothermal systems into new development projects • Technology Validation: Demonstrates the viability of aquifer thermal energy storage (ATES) systems in U.S. markets • Cost and Emissions Reduction: Reduces energy costs and improves system reliability, with significant emissions reduction potential (~70%+) • Fossil Fuel Elimination: Eliminates on-site fossil fuel use at the building level • Equity Benefits: Supports environmental justice and affordability goals through lower utility costs and broader access to clean energy • Replicability: Provides a replicable model for community-scale decarbonization and non-profit or mission-driven ownership structures
Links to Case Study Info	The Heights geothermal funding announcement The Heights sustainability and energy overview Minnesota Climate Innovation Finance Authority (MnCIFA) financing overview DistrictEnergy.com: project award coverage
Key Contacts (if available)	Ever-Green Energy / District Energy St. Paul leadership (e.g., Michael Auger – SVP) St. Paul Port Authority (project sponsor)



Conceptual diagram of The Heights' aquifer thermal energy storage (ATES) system

Source: MnCIFA