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November 30, 2023

VIA ELECTRONIC MAIL

Honorable Michelle L. Phillips, Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1350

Re: CASE 22-M-0429 – Proceeding to Implement the Requirements of the Utility Thermal Energy Network And Jobs Act.

STAGE 1 FILING - FINAL UTEN PILOT PROJECT PROPOSALS

Dear Secretary Phillips:

Pursuant to Ordering Clause 2 of the New York State Public Service Commission's *Guidance Order,*[1] Consolidated Edison Company of New York, Inc. hereby submits for filing in the subject proceeding a Final UTEN Pilot Project Proposal for each of the three pilot projects within its portfolio:

- **Chelsea Project** – This urban UTEN will recycle waste heat from a local data center to provide heating, cooling, and domestic hot water to nearby New York City Housing Authority low-income multifamily buildings, and is in a Disadvantaged Community;

- **Mount Vernon Project** – This scalable suburban UTEN will serve a dynamic mix of buildings (connected to the ambient loop system via heat exchangers) in an area identified as having leak-prone natural gas piping, and is in a Disadvantaged Community; and

- **Rockefeller Center Project** – This densely urban UTEN consists of three large commercial buildings converting from steam heating to UTEN-connected heat pumps and will offer year-round heating and cooling.

Should any questions concerning any of these filing arise, please contact me directly.

Very truly,

Nikolai Albert T. M. Wolfe, Esq.

[1] Case 22-M-0429, *Proceeding on Motion of the Commission to Implement the Requirements of the Utility Thermal Energy Network and Jobs Act*, Order Providing Guidance on Development of Utility Thermal Energy Network Pilot Projects (issued September 14, 2023) (Guidance Order).

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Proceeding to Implement the	)	
Utility Thermal Energy Network	)	Case 22-M-0429
and Jobs Act	)	

Utility Thermal Energy Network Final Proposal

Consolidated Edison Company of New York, Inc. Project Located in Mount Vernon, New York

I. INTRODUCTION

In September 2022, the Public Service Commission ("Commission") directed[1] each of the State's seven largest utilities to propose at least one utility-owned Thermal Energy Network ("UTEN") pilot project as a means of implementing the State's July 2022 Thermal Energy Network Jobs Act ("Thermal Networks Act").[2] In September 2023, the Commission issued guidance on the development of UTEN pilot projects, establishing a process whereby projects advance through development stages as pilot projects achieve milestones and/or receive approval from Department of Public Service Staff ("DPS Staff") or the Commission.[3] Pursuant to Stage 1 of this process, Consolidated Edison Company of New York, Inc. ("Con Edison" or the "Company") respectfully requests DPS Staff approval of this Final Pilot Project Proposal for its UTEN project located in Mount Vernon ("Mount Vernon Project" or the "Pilot") ("Final Mount Vernon Proposal"). This Final Mount Vernon Proposal builds on the Company's October 2022,[4]

[1] Case 22-M-0429, *Proceeding to Implement the Utility Thermal Energy Network and Jobs Act* ("UTEN Proceeding"), Order on Developing Thermal Energy Networks Pursuant to the Utility Thermal Energy Network and Jobs Act (issued September 15, 2022) ("Thermal Energy Network Order").
[2] Laws of 2022, Chapter 375 (enacted July 5, 2022).
[3] UTEN Proceeding, Order Providing Guidance on Development of Utility Thermal Energy Network Pilot Projects (issued September 14, 2023) ("UTEN Guidance Order").
[4] UTEN Proceeding, Summary of Consolidated Edison Company of New York, Inc.'s Proposed Utility Thermal Energy Network Pilot Projects (filed October 7, 2022) ("October 2022 UTEN Proposal").

January 2023,[5] May 2023,[6] and August 2023[7] proposals and updates, and provides new details per the UTEN Guidance Order requirements.[8]

The proposed Pilot will serve up to 76 buildings with various owners covering a total of 379,172 square feet of floorspace, including approximately 241 dwelling units in a Disadvantaged Community, with clean space heating and cooling and/or clean water heating. The buildings in the Mount Vernon Project will encompass 1-4 family residential homes, an affordable multifamily housing complex, churches, a medical center, a fire station, and a recreation center. The Pilot will aim to retire 500 feet of leak prone pipe as a Non-Pipe Alternative ("NPA"). Additionally, the Pilot will engage customers with a rate structure tailored to each customer segment.[9] The Pilot will also prioritize community engagement, the use of union labor, local job creation, and workforce development. The Mount Vernon Project is designed to yield benefits and facilitate learning in five key areas:

1. **Emissions reduction:** The Pilot supports the achievement of Climate Leadership and Community Protection Act ("CLCPA") goals by reducing an estimated 133,000 metric tons of lifetime greenhouse gas emissions equivalent ("Lifetime CO_2e").[10] The Company estimates that future neighborhood UTENs built from the Mount Vernon Pilot model would each reduce roughly 940,000 metric tons of Lifetime CO_2e, equal to 12,300 cars off the road.

[5] UTEN Proceeding, Consolidated Edison Company of New York, Inc.'s Updated Proposal for Utility Thermal Energy Networks Pilot Projects (filed January 9, 2023) ("January 2023 UTEN Proposal").
[6] UTEN Proceeding, Supplemental Information for Consolidated Edison Company of New York, Inc.'s Utility Thermal Energy Network Pilot Project Proposals (filed May 10, 2023) ("May 2023 UTEN Proposal").
[7] UTEN Proceeding, Updated Information for Consolidated Edison Company of New York, Inc.'s Utility Thermal Energy Network Pilot Project Portfolio (filed August 16, 2023) ("August 2023 UTEN Proposal").
[8] UTEN Proceeding, UTEN Guidance Order, p. 20.
[9] See Section X for details on rate design.
[10] Compared to remaining on existing heating and cooling equipment using current energy sources.

2. **Evaluating the system, societal, and customer value propositions of dense suburban / light urban UTEN systems:** The Pilot will measure the reduction of the electric system impacts, which are estimated to be 45 percent less when compared to electrifying these buildings with Air Source Heat Pumps ("ASHPs"). The Pilot will also help quantify the overall societal value and customer bill impact of electrifying buildings with a high efficiency UTEN versus decarbonizing with ASHPs or Ground Source Heat Pumps ("GSHPs") without UTEN infrastructure.
3. **Equity and access to clean energy solutions in Disadvantaged Communities:** The Pilot will serve low-to-moderate income customers within a Disadvantaged Community with high efficiency electric space and/or water heating and/or cooling at costs equal or lower than the current heating and/or cooling. The Company will explore opportunities to engage with and educate residents and the local community to increase awareness of and interest in UTEN technology as a cutting-edge clean energy solution.
4. **A just transition for the gas and local workforce:** The Pilot will employ union labor for skilled trades work in construction and operation of Company-owned thermal energy network infrastructure and equipment. The Pilot will also engage local businesses and employ local workforce in low-income communities, where possible, to explore meaningful and scalable engagement models for union labor, local business, and local workforce development.
5. **Technical feasibility:** The Pilot aims to evaluate the technical viability of a UTEN using geothermal energy in low-rise buildings undergoing energy efficiency upgrades situated in a dense suburban/light urban environment. It seeks to retire leak-prone gas pipe as an NPA. The experience gained through the Pilot will be necessary to scale the use of district geothermal energy generally and for NPAs.

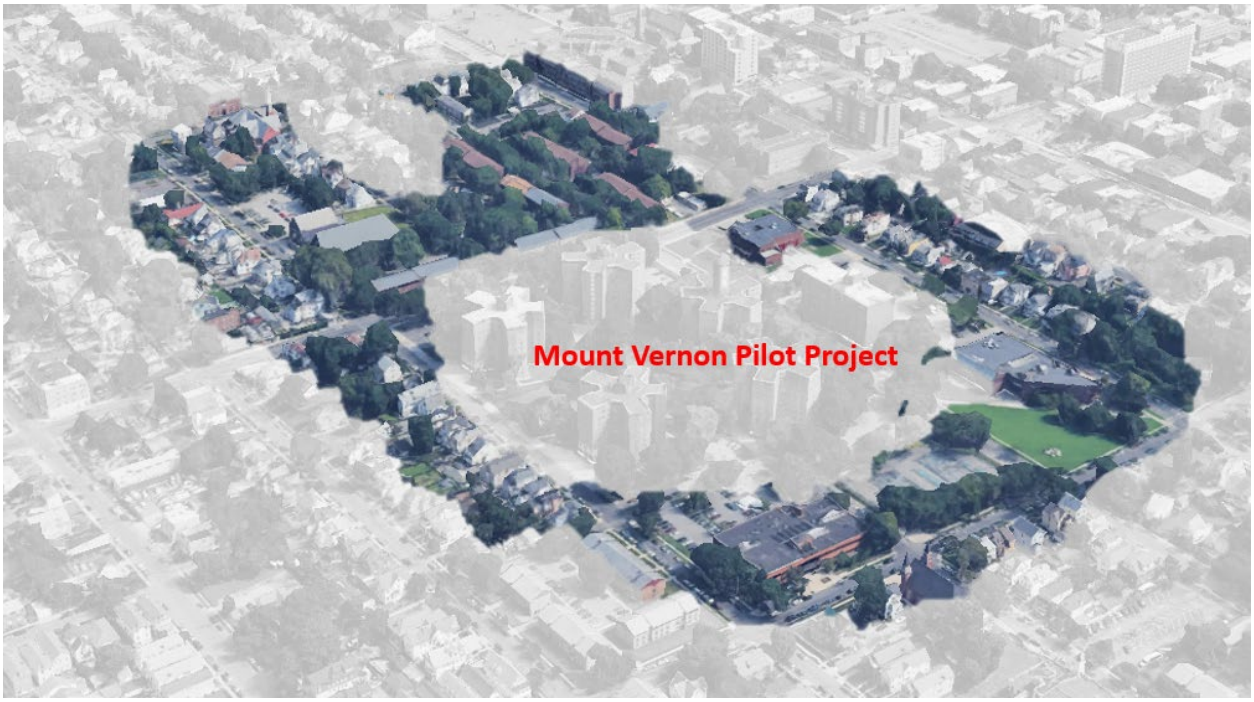
Con Edison is pursuing a diverse portfolio of UTEN pilots, in both dense urban and light urban/suburban environments, to support the Commission's evaluation of UTENs as a future utility offering and advance New York State's ("NYS" or "State") climate goals. The Mount Vernon Project is one of the three UTEN pilots that Con Edison is proposing. Utilities implementing such projects are likely to encounter both successes and obstacles that will contribute unique learnings to the policy discussion on UTEN implementation. Allowing too few projects to move forward risks leaving the Commission and NYS with too small a data set from which to determine future policy. Approval of the Mount Vernon Project is a critical step towards validating UTENs and thereby enabling UTENs to scale as a core clean energy solution that benefits Disadvantaged Communities and provides a just transition for the gas and local workforce.

II. PROJECT OVERVIEW

The Mount Vernon Project originated from a study the Company performed as part of its Gas Rate Plan District Energy Initiative, which identified sections of leak-prone pipe in the Company's service territory.[11] The original project scope was limited to the one block surrounding the section of leak-prone pipe. However, the Company retained the engineering consultants that were used on the original project, CDM Smith, and their subcontractor, ZBF Geothermal, to expand upon the original scope for the Pilot. The Mount Vernon Project is designed to serve up to 76 buildings in a Disadvantaged Community, with approximately 75 percent residential customer participation across seven blocks.

[11] In accordance with its 2019 Gas Rate Plan, Con Edison pursued a District Energy Initiative and has already completed some feasibility and engineering efforts, which culminated in the selection of two potential geothermal closed loop project sites. Both sites are located in a Disadvantaged Community. Neither site, however, met the conditions established in the Company's rate plan to move forward with implementation independently, as both project sites exceeded the cost of traditional infrastructure solutions. Case 19-G-0066, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Gas Service* ("Gas Rate Plan Proceeding"), District Energy Report (filed August 22, 2022) ("District Energy Report").

Figure 1. Mount Vernon Project Participating Buildings



Three proposed geothermal bore fields will supply connected buildings heating and cooling by using two ambient Utility Distribution Systems ("UDSs") connected via an Energy Center. The UDSs will connect to each other via an Energy Center that will allow for sharing of thermal energy between the two UDS loops, just as would need to be the case for a full-scale UTEN.

Connected buildings will upgrade their heating and cooling equipment to heat pumps tied into the UTEN. Many of them will also undergo energy efficiency upgrades. In the Mount Vernon Project, the Pilot will cover these customer costs.

As shown in Figure 2, a portion of the Mount Vernon Project area contains a section of eight-inch cast iron leak prone gas main, located on S 9th Avenue between W 2nd Street and W 3rd Street. This 500-foot section of leak prone pipe supplies gas to nine 1-4 family home buildings. Customers connected to the leak-prone portion of the gas main will be targeted for full building electrification. This will include electrification of space heating and cooling, and Domestic Hot

Water ("DHW") via connection to the UTEN, and also the installation of high efficiency electric appliances such as stoves, ovens, and dryers. By fully electrifying these customers, the Company will be able to retire the leak-prone pipe and take it out of service, thereby avoiding a gas capital replacement project. The Company will not fully electrify other participants to encourage customer participation (many customers may not yet be ready to make the move to full building electrification) and to manage pilot costs.

Figure 2. Leak Prone Pipe Section of Mount Vernon Project

The Mount Vernon Project's major participants are the owners and residents of neighborhood establishments and homes that will be connected to the UTEN. These include the Mount Vernon Neighborhood Health Center and the City of Mount Vernon, which owns the Fire

Station and the Doles Recreation Center. Related Companies will be a stakeholder, as it owns Ebony Gardens, a 144-unit affordable housing community in Mount Vernon that will be connected to the UTEN, as will be the buildings' residents. As such, the Pilot will be directly serving low-income customers and the Disadvantaged Community in which the Pilot is located. Residents of 1-4 family homes who connect to the UTEN will be important stakeholders for the Pilot as well. Several religious buildings will be connecting to the UTEN. Church involvement in the Pilot can help increase community awareness and engagement throughout the process.

The Mount Vernon Project's UTEN Customers will generally be the individuals, businesses or municipality who currently pay for heating directly to an energy company, whether to Con Edison or an oil company. Tenants who pay for heating indirectly through rent to a building owner will be important UTEN stakeholders.

III. PROJECT OBJECTIVES

The Mount Vernon Project will pilot novel technical and business approaches to deliver immediate and long-term benefits and learnings to customers and the State. The Company expects that the findings from the Mount Vernon Project will create a foundation for scaling UTENs as a building electrification and NPA solution for low- and moderate-income customers in Disadvantaged Communities in lightly urban/suburban environments, as the Pilot will establish the best practices, processes, and metrics for success. The Company anticipates the following goals and objectives:

Goal: Reduce emissions and achieve environmental goals, including those in the CLCPA, while proving out UTEN potential at scale to have lower societal costs than other electrification solutions.

- **Objectives:**
  - Reduce lifetime emissions by an estimated 133,000 metric tons of CO_2e, with the potential to reduce roughly 940,000 metric tons of Lifetime CO_2e in future neighborhood UTENs built from the Mount Vernon Pilot model; [12]
  - Reduce impact to the electric system by an estimated 45 percent when compared to converting the buildings to ASHPs;
  - Retire 500 feet of leak-prone gas pipe;
  - Reduce overall building energy consumption and improve customer comfort by pursuing cost effective energy efficiency upgrades such as weatherization measures; and
  - Evaluate savings realized by pairing UTENs with energy efficient building air sealing and insulation.

Goal: Provide a just transition for the local workforce.

- **Objectives:**
  - Complete all skilled trade work for both customer and Company owned infrastructure with a union workforce;
  - Enter a Labor Peace agreement with UWUA Local 1-2 for the Company's internal workforce;
  - Engage local businesses and employ local workforce in low-income communities, where possible; and
  - Inform future workforce and labor engagement strategies for UTEN.

Goal: Develop technical capabilities to deliver the Pilot and scale UTEN systems in the future.

[12] Compared to remaining on current heating and cooling equipment using current energy sources

- **Objectives:**
  - Serve as a model for future projects in the New York City ("NYC") outer boroughs, Westchester, and across the State in medium density and disadvantaged neighborhoods;
  - Provide learnings on the installation of geothermal boreholes on private property, as well as evaluating the feasibility of installing boreholes in public right of way;
  - Test a statewide project model that is not tethered to location-specific resources, like bodies of water or large cooling-dominant loads;
  - Revitalize an existing property as a Company-owned, centralized Energy Center Building to test operations of two distinct yet interconnected UDS loops; and
  - Develop learnings to operate a scalable system to expand district geothermal networks with positive community impact.

Goal: Develop rates that work for customers and encourage efficient use of UTEN systems.

- **Objective**:
  - Test residential and small commercial rates that are effective, fair, and clearly understandable to participants while fairly reflecting geothermal system cost drivers; and
  - Create a rate design framework that is intuitive to both the Utility and the customer as UTENs develop at scale.

Goal: Benefit and engage the customers and community through Pilot lifetime and beyond.

- **Objectives:**
  - Test community engagement approaches to enroll customers and build cross-stakeholder support for UTENs in Disadvantaged Communities, where residents may be less likely to engage with new utility offerings;

- Pursue educational programs for local students and residents to increase awareness and interest in UTEN technology as a cutting-edge clean energy solution;
- Partner with the Mount Vernon government, community, and labor leadership to maximize the engagement of local labor and Minority-, Women-, and Veteran-owned Business Enterprise ("MWVBE") contractors where possible in the construction and support of the Pilot;
- Prove out local community engagement and workforce development models that could be applied across Disadvantaged Communities statewide; and
- Provide residents with access to reliable heating, cooling, and hot water, which will be sourced from the thermal energy network.

IV. DISADVANTAGED COMMUNITIES

The Thermal Networks Act requires that at least one pilot project from each applicable utility be in a Disadvantaged Community within the utility's service territory, in alignment with CLCPA goals. The Mount Vernon Project directly serves a Disadvantaged Community, with 82 percent of residents considered low-to-moderate income or earning less than 80 percent of the Area Median Income.[13] This share of low-to-moderate income households is higher than 94 percent of census tracts in New York State.[14] Some potential benefits of the Mount Vernon Project include:

- **Improved quality of life**: The Pilot will provide widespread, more efficient and comfortable cooling options to customers and/or participants;

[13] *See*,https://hudgis-hud.opendata.arcgis.com/datasets/HUD::low-to-moderate-income-populationby-tract/explore?location=41.111344%2C-121.736028%2C4.49.
[14] *See,* https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria.

- **Equal or lower energy bills:** The Pilot's bill protections will keep customers and/or participants from paying more for heating, cooling, and/or DHW on the UTEN than they would have if the buildings continued using existing equipment;
- **Supporting community centers**: The Pilot will serve important community institutions, such as the local Fire Station, local churches, the Doles Recreation Center, and the Mount Vernon Neighborhood Health Center that serves the greater Disadvantaged Community; and
- **Opportunities for community education on the future of clean energy:** The Pilot will allow the local community to actively participate in achieving clean energy goals. In addition, the Energy Center Building will serve as an educational centerpiece for residents, fostering an introduction to opportunities in the clean energy industry.

V. SYSTEM DESIGN[15]

The Mount Vernon Project design will test 1) the feasibility of a geothermal UTEN in a dense suburban / light urban environment using a readily scalable system configuration, and 2) the use of a UTEN as a Non-Pipe Alternative. The Pilot is designed to capture geothermal energy from boreholes (the "Thermal Resource"), and then transfer and transport it via the Utility Distribution System ("UDS") to the Customer Equipment that will provide heating, cooling and DHW to UTEN customers. The Energy Center will have equipment necessary to operate the UDS. The Supervisory Control and Data Acquisition ("SCADA") System will control, monitor, and analyze the performance of the overall UTEN.

[15] All terms have been updated to reflect the updated terms from the UTEN Terms and Definitions Technical Conference. *See,* Matter 23-02117.

The Mount Vernon Project will also target full electrification of nine homes. If successful, it would retire 500 feet of leak-prone main as a Non-Pipe Alternative, eliminating the associated capital expenditure of main replacement.

The design of the Thermal Resource, UDS, Energy Center, Customer Equipment, and SCADA System will both accommodate connection of additional buildings within the pilot footprint and facilitate the integration of additional loops to expand to adjoining neighborhoods in the future. Figure 3 presents the buildings and elements of the Mount Vernon Project in relation to one another. Each part of the UTEN is described in more detail below.

Figure 3. Elements of the Mount Vernon Project UTEN

Thermal Resource

The Thermal Resource will be Company owned bore fields installed at existing parking lots and greenspaces in Mount Vernon. The bore fields, drilled to approximately 500 feet, will be spread across three sites in the network to allow for diverse energy loading. During the Design Phase, the Company will also evaluate the feasibility of installing boreholes in public right of way. By taking advantage of the constant temperature of the earth (~50-60°F year-round), the UTEN will extract heat from the bore fields during the winter to provide space heating and DHW for the Pilot's customers; likewise, during the summer, the UTEN will reject heat to bore fields to provide cooling.[16]

[16] *See,* https://www.eia.gov/energyexplained/geothermal/geothermal-heat-pumps.php.

Utility Distribution System

The UDS will consist of Thermal Resource Energy Transfer Stations ("Thermal Resource ETS"), supply and return pipes, and ETSs at each building connecting the UDS to the Pilot participants ("Customer ETSs").

The Thermal Resource ETSs heat exchangers will transfer heat to and from the UDS piping described below. These Thermal Resource ETSs will also include valving, metering and controls equipment, and potential supplemental pumping. Their location will be determined during the Pilot Project Engineering Design ("Stage 2") portion of the Pilot.

The UDS supply and return pipes will transport the thermal energy between the Thermal Resource ETSs and the Customer ETSs. These pipes will be buried underground below the frost line where possible and will be filled with a Heat Transfer Medium, a water-based solution that may contain freeze protection adequate for a fluid temperature range of approximately 30-90°F. The UDS pipe size and material will be selected during Stage 2 of the Pilot when the heating and cooling load requirements of the Pilot's customers are fully quantified. The Mount Vernon Pilot assumes the system will be designed to satisfy the total estimated connected load (base and peak loads) through normal operation of the UTEN without the use of additional fossil fuel-fired supplemental heating or cooling. The Mount Vernon Project has two interconnected UDSs with valving that allows the UDSs to operate either together to balance loads or in isolation if one UDS were offline. Given that one of the key learnings of these pilot projects is their ability to expand and scale, this design also tests the connection of two independent UTEN systems.

Customer ETSs will be located at each customer premise. The Customer ETS heat exchangers will transfer the thermal energy between the UDS and the Customer Equipment. A British Thermal Unit ("BTU") meter will use flow rate, inlet temperature, and outlet temperature

readings from the Company side of the heat exchanger to calculate the amount of thermal energy transferred between the UDS and each of the customers. The BTU meter readings will be used to determine customer UTEN bills. Stage 2 of the Mount Vernon Project will determine meter selection and billing integration strategy.

Energy Center

The Energy Center will be the centralized Company equipment necessary to operate the UDS. It will be located in a standalone building between the two UDS loops so that it may centrally serve the balancing needs of both loops. The Energy Center will include hydronic pumps to circulate the Heat Transfer Medium throughout the UDS, UDS makeup fluid tanks and controls, UDS heating/cooling controls, and other UDS equipment and instrumentation such as water chemistry monitors and controls. The Energy Center will also house electric heating and cooling equipment for use as emergency backup.

Customer Equipment

The Mount Vernon UTEN will seek to connect an estimated 76 buildings during the Pilot. This includes multiple types of customers, such as single-family homes, multifamily homes, religious buildings, a restaurant, the Mount Vernon Fire Station, the Mount Vernon Neighborhood Health Center, and the Doles Recreation Center. The Mount Vernon Project's Customer Equipment providing DHW, space heating, and cooling will begin at the isolation valve on the customer side of the ETS heat exchanger. (See "Point of Demarcation" below.) Customer Equipment at a minimum will include supply and return piping, valves, heat pumps, DHW tanks and Heating, Ventilation, and Air Conditioning ("HVAC") mechanical components and controls needed to operate the customer side of the UTEN. For Ebony Gardens (a multifamily complex), the Fire Station, and the religious buildings, a Variable Refrigerant Flow ("VRF") system installed

downstream of the customer's heat pump(s) will distribute the thermal energy as per the customer's specified settings. Any legacy heating/cooling systems that exist at UTEN customer premises will be disconnected.

Nine of the 1-4 family homes connected to the leak-prone portion of the gas main will be targeted for full building electrification – *e.g.,* electrification of any gas cooking equipment and gas clothes dryers on top of the UTEN-provided electric space heating and cooling domestic hot water.

Supervisory Control and Data Acquisition System

The Mount Vernon Project will implement a SCADA system to control, monitor, and analyze the performance of the UTEN. The SCADA system will provide active safety, resiliency, reliability and reporting benefits to the Pilot. It will generate alarms to alert the Company if it detects abnormal operating conditions. It will also generate and store operational data to facilitate reporting and analysis during the Pilot's five-year operation period. This will include data collected from the BTU meters installed at the Thermal Resource ETSs and the Customer ETS heat exchangers to document how much thermal energy is transferred to and from the UDS. The SCADA system, metering, and data communication designs will be developed during Stage 2 of the Pilot.

Table 1 provides a breakdown of the Project scope of work between the Company and the Pilot Participants. Table 2 provides a further breakdown of the scope of work in each building.

Table 1. Mount Vernon Project Construction Scope of Work by Party

Party	Scope of Work
Con Edison	• Install 6,000 linear feet of distribution piping ("UDS supply and return piping"). • Install three bore fields totaling over 100 boreholes. • Install the UTEN Energy Center, which includes hydronic pumps and loop heating/cooling capabilities for balancing. • Install and integrate ETSs at each customer and the Energy Center Building. The ETSs include heat exchangers, valving, metering and controls equipment, and potential supplemental pumping.
Pilot Participants[17]	• Install a new UTEN-connected heat pump for heating with the option for cooling and DHW (to serve estimated 76 buildings including 241 dwelling units). • Implement air sealing and insulation to reduce heating and cooling loads and improve occupant comfort. • Implement upgrades to existing electrical equipment where necessary. • For customers associated with the section of leak-prone pipe (nine multifamily homes), implement upgrades to facilitate full-electrification, including electric stoves, ovens, and dryers.

Table 2. Mount Vernon Project Scope of Work by Building Site

Buildings	Scope of Work
1-4 Family Homes	• Install heat pumps capable of heating and cooling.[18] • Implement electrical upgrades if required to support new equipment.
• Ebony Gardens • Mount Vernon Fire Station • Religious Buildings	• Install a UTEN-connected VRF system for heating and cooling. • Implement electrical upgrades if required to support new equipment. • Install geothermal boreholes in parking lots/green spaces (if selected as a bore field site).
• Mount Vernon Neighborhood Health Center	• Install UTEN-connected rooftop heat pump air handling equipment for heating and cooling.

[17] The Company plans to offer small customers a "turnkey" solution inclusive of the design, installation and commissioning of UTEN equipment and building upgrades. The Pilot will cover these costs. Large buildings will manage installation of heat pump, building and/or EE upgrades that meets the UTEN specifications themselves and then receive reimbursement from the Pilot upon building equipment commissioning.
[18] Nine of the 1-4 family homes connected to the leak-prone portion of the gas main will be targeted for full building electrification via the UTEN and by replacing any gas appliances.

• Doles Recreation Center	• Implement electrical upgrades if required to support new equipment. • Install geothermal boreholes in parking lots/green spaces (if selected as bore field site).

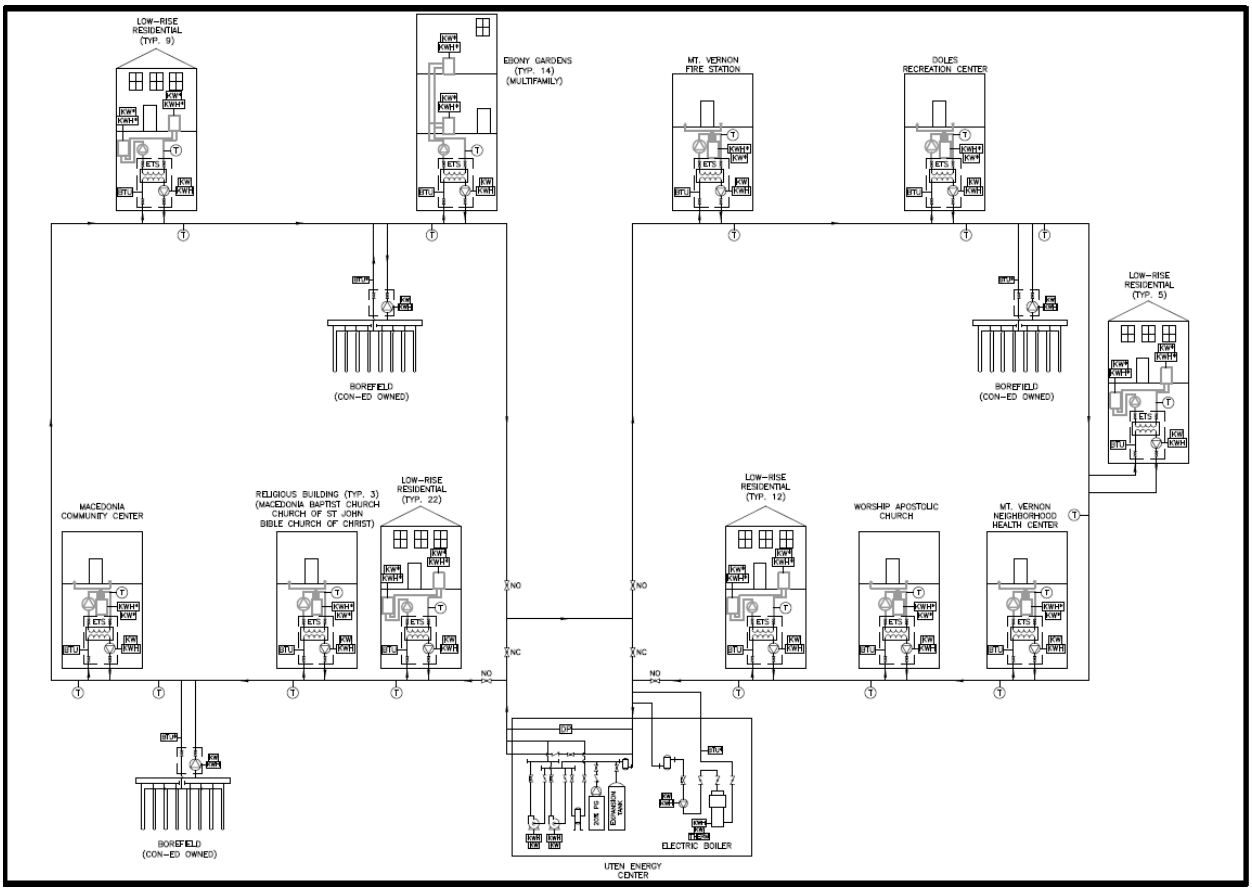
Point of Demarcation

The Pilot's demarcation points mark where Company-owned and operated equipment ends and customer- or third party-owned and operated equipment begins. Demarcation points dictate which party will operate and maintain a specific piece of equipment or infrastructure. The Company will own the three bore fields and the UDS.

The Mount Vernon demarcation points will be the isolation valve on the customer side of each of the Customer ETS heat exchangers. The Company will own the UTEN equipment and infrastructure up to the isolation valve on the customer side of the Customer ETS heat exchanger. The Customer will own all equipment and infrastructure past this isolation valve.

The demarcation points and an overview of the UTEN infrastructure for the Mount Vernon Project are depicted in the one-line diagram in Figure 4. A full-sized building one-line diagram and additional one-line diagrams can be found in Appendix A.

Figure 4. Mount Vernon Project Building One-Line Diagram



On-Site Energy Efficiency Upgrades

The Company plans to integrate energy efficiency into participating buildings, where appropriate and cost effective. The energy efficiency upgrades will aim to lower project capital costs by reducing on-site energy consumption, thereby reducing the required size of the UTEN heating, cooling, and/or DHW equipment. Building envelope measures, such as air sealing and roof insulation – similar to NYSERDA's Comfort Homes program upgrade packages[19] – are often the most effective energy efficiency measures to achieve these savings. The Company plans to fund the relevant energy efficiency upgrades in participating multifamily buildings and 1-4 family

[19] *See,* https://www.nyserda.ny.gov/All-Programs/Comfort-Home-Program

homes and will explore all reasonable energy efficiency opportunities with a focus on envelope upgrades. The Company has budgeted approximately $750,000 for energy efficiency upgrades in the Pilot as customer equipment construction costs. As a result, the Company is projecting approximately 5,400 MWh in lifetime savings of electricity needed by the WSHPs to heat and cool customer buildings and 34,600 MMBtu in lifetime savings of thermal energy the UTEN loop would otherwise need to provide.[20] The Company also performed a cost analysis of the impact that energy efficiency measures would have on the Mount Vernon Project at both its Pilot scale and at an expanded, scaled up version of the UTEN as part of the Lifecycle Cost Analysis presented in Section VIII.

In Stage 2 of the Pilot, the Company plans to perform energy assessments at each participating building to identify energy efficiency upgrade opportunities. The Company will then use this data to analyze the UTEN system cost savings that these upgrades enable.

Thermal Energy Resources

Per the UTEN Guidance Order, the Mount Vernon Project will not provide new natural gas service to participating customers or include the installation of new fossil fuel equipment. In addition, the Pilot will not include the use of fossil fuel resources at either the customer level or the UDS level. Utilizing three bore fields as a thermal resource for the Pilot will satisfy the heating, cooling, and DHW needs for all of the Pilot's customers. Should the geothermal wells run into unexpected problems, system reliability backup options for heating and cooling will be located at the Company-owned Energy Center and will consist of electric chillers, electrified boilers, and/or ASHPs.

[20] Savings calculated over the weighted average lifetime of 21-25 years for envelope energy efficiency measures.

Safety, Reliability, and Resiliency

It is critical that the newly developed UTEN system is constructed and operates safely, reliably, and resiliently. To ensure reliability, the Company will design the Mount Vernon Project to be monitored and controlled by a SCADA system and to include supplemental thermal energy resources to maintain a balanced system. Throughout the operational phases of the Pilot, the Company will evaluate and determine the level of supplemental systems required for the existing Pilot and future UTEN systems. The Company will address the following key considerations as part of the Pilot's implementation to provide its customers with safe, reliable, and adequate service:

Safety

- Establish standards for handling and containing Heat Transfer Medium solutions;
- Leverage existing Company standards and procedures related to construction, infrastructure maintenance, and leak management, and modify as necessary to apply to the UTEN and its associated equipment;
- Comply with existing standards and procedures for any associated or impacted electric and gas infrastructure and equipment;
- Design equipment and infrastructure with appropriate heights, clearances, and shut-offs for safe maintenance;
- Incorporate sensors and equipment statuses into SCADA to allow the Company to remotely monitor the operation of the network to allow for early detection of potential faults or safety risks; and
- Establish operating and emergency procedures for the Pilot.

Reliability

- Incorporate sensors and equipment statuses into SCADA to allow the Company to remotely monitor and maintain system performance;
- Develop appropriate redundancy standards such that service can be preserved should a piece of equipment fail;
- Incorporate system reliability backup options at the Energy Center such as electric chillers, electric boilers, and/or ASHPs to provide heating and cooling to the UTEN during emergency and/or backup situations;
- Develop appropriate capacity standards such that a reserve of capacity is available to meet fluctuating energy needs and waste heat availability; and
- Design for future system expansion by having a greater capacity than the connected load. The extra capacity will have reliability benefits during the five-year operation period of the Pilot.

Resiliency

- Design the system with redundancies and creating a logistics supply chain so that repairs can be made quickly;
- Design the system to meet applicable flood standards;
- Design the system to operate reliably through temperature and weather extremes;
- Design the system to operate reliably within the operational environment of a public right-of-way; and
- Design the system's two UDSs to be able each to isolate and operate in isolation in the event the other were to go down.

Future Scalability

The Company has designed the Mount Vernon Project to be able to scale substantially in the future if it is successful. Within the Pilot footprint, the Pilot will be able to grow and connect buildings beyond the initial targeted 76. The modular design the Pilot is testing – two UDSs that can operate in integration or in isolation – would facilitate the addition to the network of adjoining neighborhoods in the surrounding four-mile area which consist of similar homes and buildings. Additionally, the Pilot is in close proximity to another possible UTEN pilot, the Endurant Energy (Endurant) Mount Vernon project, which was proposed as a feasibility study in the Company's May 2023 UTEN Proposal.[21]

VI. PROJECT PLAN

Workplan

The following summarizes the Company's proposed workplan for the Mount Vernon Project, including key stages, deliverables, and milestones:

Stage 1: Pilot Scope, Feasibility, and Stakeholder Engagement

Currently, all UTEN projects are in Stage 1 of the process as outlined by the September Order.[22] In Stage 1, the Company is developing a Final Pilot Proposal.

Activities

- Complete conceptual project design and cost estimates
- Complete initial building walkthroughs
- Conduct street surveys

[21] UTEN Proceeding, May 2023 UTEN Proposal, p. 28.
[22] UTEN Proceeding, UTEN Guidance Order, p. 19.

- Conduct initial stakeholder engagement
- Develop initial design contracts
- Develop framework for workforce integration
- Develop components and templates for customer agreements

Deliverables

- Submit Final Pilot Proposal

Milestones

- Company files Final Pilot Proposal by **December 15, 2023**
- DPS Staff reviews Final Pilot Proposal and issues a Compliance Letter for the company to advance to Stage 2

Stage 2: Pilot Engineering Design and Customer Protection Plan

In Stage 2, the Company will secure the primary design firm and commence full Engineering Design of the Pilot.[23] In addition, the Company will develop the Final Customer Protection Plan. Both the Engineering Design and the Customer Protection Plan will be submitted to the Commission at the end of this stage.

Activities

- Procure contracts for final Engineering Design
- Determine locations for Thermal Resource ETSs
- Select UDS pipe size and material

[23] The Company will not enter Stage 2 before January 2024 to account for the procurement process of the design engineering firm.

- Assess energy efficiency upgrade opportunities that could be cost effective over the course of the five-year pilot period
- Finalize Pilot cost estimates based on final UTEN design
- Determine meter selection and building integration strategy
- Develop SCADA system, metering, and data communication designs
- Perform customer and community outreach and engagement
- Obtain preliminary customer commitments for participation in the Pilot
- Develop the Final Customer Protection Plan, including the customer service agreement
- Finalize rate design
- Finalize workforce integration plans

Deliverables

- Submit Pilot Engineering Design
- Submit Final Customer Protection Plan

Milestones

- Company files Pilot Engineering Design and Final Customer Protection Plan within nine months of DPS Staff issuing the Company's Compliance Letter and is issued for public comment
- Commission issues Order determining whether the Pilot can advance to Stage 3

Stage 3: Customer Enrollment and Pilot Construction

In Stage 3, the Company will secure the minimum customer enrollment to commence construction. Once approved for construction, the Company will competitively procure all necessary construction contracts to build the UTEN system. Construction activities will include

both utility-owned infrastructure in the streets, thermal energy resources, and the Energy Center Building, as well as customer-owned equipment located inside private buildings.

Activities

- Finalize construction contracts
- Enroll customers in the Pilot
- Execute agreements for thermal energy sources
- Procure all materials and equipment needed for construction
- Complete all street infrastructure work involving the installation of piping systems
- Complete all customer-owned building equipment installations
- Build and connect the Energy Center
- Complete energy efficiency upgrades
- Complete installation of SCADA communication system

Deliverables

- Submit letter documenting customer enrollment

Milestones

- Once the Company files a letter documenting customer enrollment, Pilot construction may begin
- Completes construction within 12 to 18 months after commencement of Pilot's construction

Stage 4: Pilot Operation and Management

In Stage 4, the Company will commission the thermal energy network and confirm proper operation of all network equipment. Once confirmed, individual customers will be sequentially tied into the network and have their building systems converted to UTEN. Throughout the five years of the Pilot, the Company will continue to recruit any customers that may have not initially signed up to participate in the Pilot but were accounted for in the system design and budget. Operational data and standardized metrics will be recorded and analyzed throughout the Pilot's life cycle.

Activities

- Commission Utility Distribution System
- Commission Thermal Energy Resources
- Commission Customer Equipment
- Commission Energy Center
- Connect customers to UTEN
- Recruit and connect remaining customers to UTEN
- Provide maintenance of both customer-owned and Company-owned equipment
- Collect data and trends from the UTEN and optimize the system throughout the Pilot
- Retain regular communications with enlisted customers for customer feedback
- Establish and commence UTEN customer billing

Deliverables

- Complete UTEN system commissioning letter
- Complete Thermal resource (Borefield) commissioning letter

- Obtain customer agreements from enrolled customers
- Report standardized metrics at intervals determined by DPS Staff

Milestones

- Connects first customer post-UTEN system commissioning
- Completes five-year Pilot operation period

Stage 5: Pilot Review, Recommendations, and Conclusion

In Stage 5, the Company will review and analyze all the data that has been collected throughout the duration of the Pilot. The Company will perform an overall project review, produce recommendations, and propose next steps for the future of the Mount Vernon Project.

Activities

- Analyze the Pilot data and perform Evaluation, Measurement, and Verification ("EM&V")
- Document key findings
- Perform an evaluation of the Pilot
- Propose recommendations to the Commission
    - Future UTEN pilots
    - Full-scale UTEN operations
    - Promulgations of regulations necessary to support UTEN operations
- Create Pilot Close-Out Report

Deliverables

- Compile Pilot Review and Recommendations Report
- Compile Pilot Close-Out Report

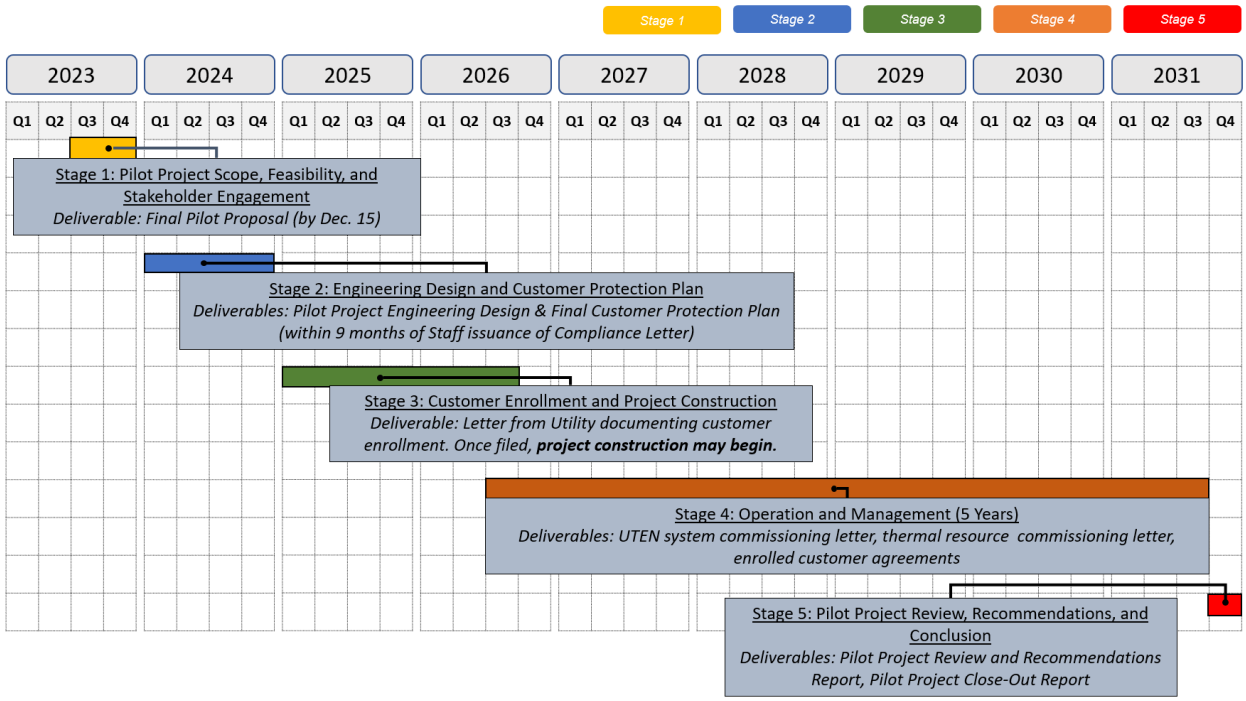
Milestones

- Submits Review and Recommendations Report
- Submits Pilot Close-Out Report

Pilot Timeline

The figure below details the proposed Pilot timeline broken out by stage.

Figure 5. Pilot Timeline



Project Management Team

The Company will have a dedicated Utility Thermal Energy Networks internal team ("UTEN Project Team") overseeing the development, design, construction, and operation of the Pilot. This dedicated team's members will specialize in specific areas, such as pilot design, strategy, engineering, project management, and customer protections and engagement. To better assist in areas that are novel to the Company, outside consultants will be added to supplement this

core team. Those areas of expertise range from thermal rate design to thermal energy network system design.

In addition to this team, other departments within the Company will provide support in various areas of expertise, including but not limited to: Legal, Customer Operations, Finance, Environmental Health and Safety, Rate Engineering, Billing, Procurement, and Gas Operations.

The Pilot will have a lead design engineering firm that will be responsible for the overall design of the Pilot. The Company will contract that design firm, which will report directly to the UTEN Project Team. The UTEN Project Team will also directly oversee the construction of the Pilot, as well as its commissioning and operation.

The larger project team will also include key stakeholders, such as skilled labor workforce representatives, local government officials, UTEN customers, thermal resources contributors, and community leaders.

Labor and Workforce Development

A major objective of the Thermal Networks Act is the engagement of union workforce, including workers in trades impacted by future changes to the gas system. Successful rollout and implementation of UTENs requires a trained and qualified workforce that can install, operate, and maintain the required infrastructure. The Company has identified two major workstreams for the transition of skilled labor towards UTEN systems: third-party contractor workforce and internal Company workforce. Both workstreams are important to not only the success of the Pilot, but also to the scaling of thermal energy networks in the future.

The Mount Vernon Project will leverage the existing community network of the City of Mount Vernon and New York State agencies to share information and opportunities associated with the construction of the Pilot.

Third-Party Contractors

The Company will procure third-party contractors for work on both customer-sided equipment and Company-owned UTEN infrastructure. Examples of customer-side work are plumbing and HVAC installations in customer buildings to connect to the UTEN. Company-owned UTEN infrastructure work includes installation of UTEN distribution piping, installation of geothermal boreholes, excavation, and street restoration. The Company will require that all skilled trade work on the thermal energy network infrastructure and equipment which it procures for the Pilot be completed by a union workforce. In addition, the Company will collaborate with local community organizations and trade groups to educate and share information regarding the potential UTEN work opportunities and seek vendors that will incorporate and develop local workforces. Throughout the Pilot, the Company will follow all best labor practices as outlined in the Thermal Networks Act.

Company Workforce

The Company will have a Labor Peace agreement with UWUA Local 1-2 for the internal workforce. Additionally, the Company will partner with both local community organizations and the City of Mount Vernon to share information about the Pilot as part of its labor outreach strategy. The Company's labor outreach strategy will include establishing a list of potential local and MWVBE contractors. The Company will organize public meetings, webinars, and other knowledge sharing sessions with these identified contractors. The Company will also design a short-term and long-term workforce plan to train employees with the skills, knowledge, and abilities to meet the strategic objectives of the Thermal Networks Act. This effort will proceed in three steps: 1) Workforce Development Plan; 2) Training and Implementation; and 3) Workforce Integration.

Step 1: Workforce Development Plan

- Establishing the Workforce Development Committee
    - The Company will first establish a UTEN Workforce Development Committee ("WDC") that will focus on Company labor. The mission of the WDC will be to develop a Company workforce plan that will deliver the right mix of employees to install, operate, and maintain the new UTEN infrastructure. The WDC will consist of key stakeholders from Company organizations such as Gas Operations, Gas Engineering, Human Resources, Union Labor Representatives, and The Learning Center. The WDC will provide oversight over all components necessary to integrate and transition existing company employees to perform UTEN work functions, including but not limited to: determining the right skill sets required; the number of individuals needed for each job category; content and schedule of training programs; and deciding what other areas of the organization will be part of the mix of staffing for the Pilot.
- Workforce Needs and Available Talent
    - The WDC will focus first on understanding all aspects of the nature and scope of the work related to the provision of thermal energy for heating and cooling. This clarification of work objectives is intended to aid in the development of an improved outline of the duties and tasks associated with the Pilot and is expected to provide insights into the amount and type of roles needed to meet Pilot deliverables.
    - The next step is to determine available talent within the Company. Based on the similarities of the infrastructure piping used for thermal energy networks and the

Company's natural gas system, existing gas personnel within the Company will play a central role in staffing the UTEN project. The unique experience of current Gas Operations employees gained through working on the gas system over time positions the Company to upgrade the skills of this group more rapidly, therefore quickening the learning curve required for any special skills associated with the UTEN systems. In addition to the gas workforce, additional employees from other departments will be evaluated for their suitability to support the needs of the Pilot, including employees in Customer Operations, Environmental Health and Safety, Construction, the Call Center, The Learning Center, and the Control Centers.

- Skills Assessment and Identifying Gaps
    - A skills assessment will be a necessary part of the Company workforce planning process to properly match current positions against the specific knowledge and skill requirements of UTENs. The WDC will select those positions with the right knowledge and talents for the Pilot after conducting this skills assessment.
    - To staff the Pilot with enough people and with the right skills and experience to successfully complete the Pilot goals and objectives, the WDC must also address skill gaps. After undertaking a skills inventory, the WDC will best understand what skill gaps exist within the Company and will create a training and development plan to close those gaps. The role of the WDC will entail creating an outline of training activities to raise the levels of skills required for Pilot execution.

Step 2: Training and Implementation

- The WDC, working closely with the Company's Learning Center, will create new curriculum and/or leverage existing training and development programs to reskill and/or

upskill existing gas employees and other Company personnel as needed. Training programs will consist of entry-level and career path Company-led programs and will include a variety of methods, including but not limited to: classroom training of field employees to effectively operate and maintain thermal energy systems; on-the-job hands-on experience; digital learning; job aids; and mentorship to support the transition to the new UTEN system. Providing retraining opportunities and support for employees is consistent with the Company's culture of building on existing technical skills and serves to motivate the workforce.

- Throughout the transition, it is important that field operating departments and personnel establish basic work principles and procedures to be able to maintain and operate the Pilot. In addition, all other functions outside of operations will be trained and prepared to supplement the needs of the Pilot. These include but are not limited to the Billing Department, Call Center Representatives, Energy Services, and The Learning Center.

Step 3: Workforce Integration

- In addition to preparing internal organizations and personnel for the workforce transformation, the WDC will also partner with union leaders and representatives to facilitate a smooth transition of work activities. This involves sharing the Company's clean energy priorities and how this move fits into the Company's overall business strategy. Partnering with the union at every stage of the process will increase support for building a workforce to successfully implement the Pilot.

Potential Barriers and Risks

Given the novelty of the proposed UTEN design, the Company expects that some challenges may arise. As such, the Company will work to identify, assess, and mitigate risks that may occur throughout the Pilot to the best of the Company's ability. An example of potential barriers and actions the Company may take to address these risks are summarized below.

Table 3. Potential Barriers and Mitigation Strategies

Potential Barrier	Mitigation Strategy
• **Customer Acquisition:** Reluctance from customers to agree to join onto the new thermal energy network	• Conduct large-scale efforts to communicate and educate potential UTEN customers at both the community and individual level • Partner with local community groups to help share knowledge • Pilot covers cost of customer building and EE upgrades to connect to UTEN
• **Property Acquisition:** Pilot schedule impact of acquiring property to construct the Energy Center Building	• Obtain advanced real estate assessments of the area to identify potential properties and select design parameters that could apply to most of the existing property sizes in the area
• **Community Engagement:** Concerns from local community around geothermal borehole drilling	• Share early and recurring information with the local community, with regular Pilot updates and knowledge of expectations regarding borehole drilling activities
• **Labor:** Availability of skilled workforce to construct and install thermal energy network infrastructure	• Identify skill sets needed for Pilot Construction during Pilot Design Phase • Partner with local workforce development organizations to close any skill gaps and develop a large pool of available and skilled contractors
• **Labor:** Availability of geothermal borehole contractors	• Conduct advanced planning and expediting of geothermal borehole contractors to ensure sufficient support for Pilot

VII. BUDGET

The cost estimates below are based upon the conceptual design of the Mount Vernon Project. The Company collaborated with an engineering consulting firm experienced in installing thermal energy network systems to estimate project costs. Where uncertain, the Company utilized historical cost data and best practices from traditional utility projects. As shown in Table 4, the Company estimates $66.8 million, plus an additional $10.5 million in portfolio administration costs, to develop and complete the Mount Vernon Project. Overarching portfolio administration costs include but are not limited to incremental labor, support services, program management, and data management.

Table 4. Summary of Total Project Costs by Stage[24]

Stage	Mount Vernon Project Costs	Share of Portfolio Administration Costs[25]	Total
Stage 1	$203,150	$262,500	$465,650
Stage 2	$6,478,850	$787,500	$7,266,350
Stage 3	$53,456,000	$8,400,000	$61,856,000
Stage 4	$6,168,000	$945,000	$7,113,000
Stage 5	$514,000	$105,000	$619,000
Total	**$66,820,000**	**$10,500,000**	**$77,320,000**

Table 5. Summary of Total Project Costs by Category

Con Edison Estimated Costs	Mount Vernon
UTEN Construction *(UDS, Energy Center, ETSs, etc.)*	$16,600,000
Customer Equipment Construction *(Heat Pumps, Customer Pipes, etc.)*	$16,900,000
Engineering/Implementation/Operations	$14,700,000
Utility Capital Overheads and Sales Tax	$3,200,000
Estimated Project Costs	**$51,400,000**
Contingency *(30% of Estimated Project Costs)*	$15,420,000
Estimated Project Costs Including Contingency	**$66,820,000**
Portfolio Admin *(1/3 of Full Portfolio Estimate)*	$10,500,000
Total Estimated Costs	**$77,320,000**

[24] Contingency costs are included in total costs. Contingency costs were calculated as 30% of the Pilot costs.
[25] The Company identified portfolio administrative costs associated with the three proposed pilots in the August 2023 UTEN Proposal. Note that for the Final Mount Vernon Proposal, the Company is allocating the Pilot-specific administrative costs by dividing the total administrative costs by the number of projects it is proposing (3).

Budget Flexibility

Given the novelty of the Mount Vernon Project, the Company must be able to quickly adapt the Pilot to the inevitable challenges and opportunities that will arise during design and implementation. To achieve this, the Company seeks budget flexibility in how it allocates the costs of capital and non-capital work. For example, as the Company finalizes the design of the Mount Vernon Project, it may determine that investing greater dollars in customer building insulation upgrades (non-capital) to reduce the required number of boreholes (capital) to meet the heating load would lead to lower overall project costs.

VIII. LIFECYCLE ANALYSES

Per the requirements of the Guidance Order,[26] the Company conducted lifecycle cost analyses ("LCAs") of the Mount Vernon Project and three alternative heating and cooling system configurations.[27] For each of these, the Company considered the Societal and Customer perspectives, and assessed lifecycle costs for both Pilot and Full-Scale scenarios of the project. All costs were assessed using real (2023) dollars.

It is important to note upfront that these analyses have been performed prior to completing full engineering and design of the Mount Vernon Project, which will be during Stage 2 of the Pilot. Further, projecting over an 80-year analysis period entails substantial uncertainties. The LCA Limitations section below details additional considerations. Accordingly, these analyses are only

[26] UTEN Proceeding, UTEN Guidance Order, p. 39.
[27] An LCA differs from a NYS Benefit-Cost Analyses ("BCA") in that it quantifies the absolute costs of each heating and cooling system type. By contrast, a BCA would define a baseline case (e.g., natural gas heating with no low carbon fuels) and compare the costs of the three building electrification options relative to this baseline reference point. For example, the LCAs quantify as a cost the greenhouse gas emissions of each of the four systems. A BCA would quantify as a benefit the emissions reductions of the electrification systems compared to staying on fossil fuel heating.

directional estimates of the relative lifecycle costs of the Pilot and alternative heating and cooling solutions.

The below sections describe the LCA approach and results, with greater details in Appendix C.

System Configurations Analyzed

The Company quantified lifecycle costs of 1) building electrification with a UTEN, 2) electrification of individual buildings using only ASHPs, 3) electrification of individual buildings drilling their own boreholes and using their own GSHPs; and 4) the buildings' existing heating and cooling methods with heating fuels that are decarbonizing over time.[28] Lifecycle costs include the purchase of materials and equipment, construction and installation in the street and buildings, equipment operation and maintenance, and equipment replacement. The Company used an 80-year analysis period to match the expected lifetime of the UTEN system.

System Configuration Energy Costs and the CLCPA

For all of its analyses, the Company assumes that New York State's energy systems meet the State's CLCPA goal of achieving net-zero emissions by 2050.[29] The Company aligned projected energy supply and delivery costs with the Con Edison Gas System Long-Term Plan ("Gas LTP") assumptions.[30] The Gas LTP models several decarbonization pathways for the Con Edison service territory to reduce emissions to meet CLCPA goals, incorporating various levels of renewable generation, low carbon fuels, and building electrification. In the LCA electrification system configurations (*i.e.,* UTEN, ASHP, and GSHP), the model costs follow the Deep

[28] See "System Configuration Energy Costs and the CLCPA" section below for further discussion.
[29] Laws of 2019, Chapter 106 (enacted June 18, 2019).
[30] Case 23-G-0147*, In the Matter of a Review of the Long-Term Gas System Plans of Consolidated Edison Company of New York, Inc. and Orange and Rockland Utilities, Inc.* ("Con Edison and O&R GSLTP Proceeding"), Gas System Long-Term Plan (filed May 31, 2023) ("Gas LTP").

Electrification Pathway which has widespread building electrification and significantly reduces use of the gas system. For the system configuration retaining the buildings' existing heating and cooling methods, the model costs follow the Hybrid Pathway which maintains a significant portion of the gas network but decarbonizes the heating fuel via the switch to low carbon fuels over time. This system configuration will therefore be referred to as the Decarbonizing Business As Usual ("DBAU").[31]

Societal vs. Customer LCAs

The Societal and Customer LCAs considered different perspectives. The Societal LCA considered the relative costs that each system configuration imposes on society as a whole. These include all system equipment, construction, installation, and replacement costs; energy supply costs; the impacts of each solution on utility electric or gas networks; and the social cost of carbon dioxide equivalent emissions ("Social Cost of Carbon").[32] The Societal models exclude state taxes. The Societal models discount all costs using three percent societal discount rate.[33]

The Customer LCA considers the perspective of just the participating customers, restricting itself to the costs that these customers experience. These include the costs that customers pay to purchase and install heating and cooling equipment, their energy supply and utility delivery rates,[34]

[31] In both pathways, there is 100% clean electricity generation by 2040, and the steam system decarbonizes using renewable electricity, low carbon fuels, and carbon capture.
[32] Greenhouse gas emissions costs are the annual costs NYS Department of Environmental Conservation three percent discount rate scenario. *See,* https://www.dec.ny.gov/docs/administration_pdf/vocapp23.pdf. Social Cost of Carbon is applied to carbon dioxide equivalent calculations that use 20-year global warming potential values and incorporate the emissions associated with production and transport of fossil fuels (lifecycle emissions). *See,* https://extapps.dec.ny.gov/docs/administration_pdf/ghgappxclcpaemissfctrs22.pdf.
[33] Consistent with the discount rate used in the NYS DEC cost of carbon calculation.
[34] For the Pilot, the utility will subsidize customer equipment and building upgrades as well as rates (See Section X).

a carbon price, and state taxes.[35] The Customer analyses use a blended real customer discount rate based on the customer market segment.[36]

Analyses completed from the Societal perspective should be used as the primary indicator of the value that UTEN projects will provide to New York State. The Customer perspective is helpful to understand whether customers will have an economic incentive to adopt the UTEN solution. Where a UTEN is the lowest cost solution for society but not the lowest lifecycle cost for participating customers, customer equipment subsidies would be appropriate tools to encourage UTEN adoption.

Pilot-Scale and Full-Scale Scenarios

The UTEN Guidance Order recognized that the costs of these systems will likely decrease as they leverage Pilot learnings and increase in scale.[37] As such, the Company analyzed lifecycle costs of not just the Mount Vernon Project Pilot, but also of a future Full-Scale (*i.e.,* neighborhood-scale) UTEN built on the Mount Vernon Project model. The Pilot-Scale scenario begins in 2026, when the Company expects to complete construction of the UTEN Pilot. The Full-Scale scenario begins in 2035, and while it follows the Mount Vernon Project design (*i.e.,* utilization of bore fields to serve buildings in a lightly urban/ dense suburban environment), it substantially expands the building area served to spread the fixed costs of UTEN infrastructure across a greater number of users and take advantage of other economies of scale. The Full-Scale scenario is the more

[35] Carbon costs reflect an expected carbon cost and accounting for New York State's planned implementation of the Cap and Invest framework. This is assumed equal to the Social Cost of Carbon values from the DEC three percent discount rate scenario used for the Societal LCA. *See,* https://www.dec.ny.gov/docs/administration_pdf/vocapp23.pdf.

[36] Consistent with rates NYSERDA used in its 2023 *Assessment of Energy Efficiency and Electrification Potential in New York State Residential and Commercial Buildings*, *Appendix A*. *See,* https://www.nyserda.ny.gov/About/Publications/Evaluation-Reports/Building-Stock-and-Potential-Studies/Assessment-of-Energy-Efficiency-and-Electrification-Potential, p. 37. The Company converted nominal rates in the NYSERDA report to real rates using a two percent assumed inflation rate.

[37] UTEN Proceeding, UTEN Guidance Order, p. 39.

accurate representation of the potential costs of UTEN compared to the alternative heating and cooling technologies.

LCA Limitations

While the LCAs quantify many of the costs of heating and cooling solutions, there are several non-quantifiable aspects to electrification that the analyses do not capture:

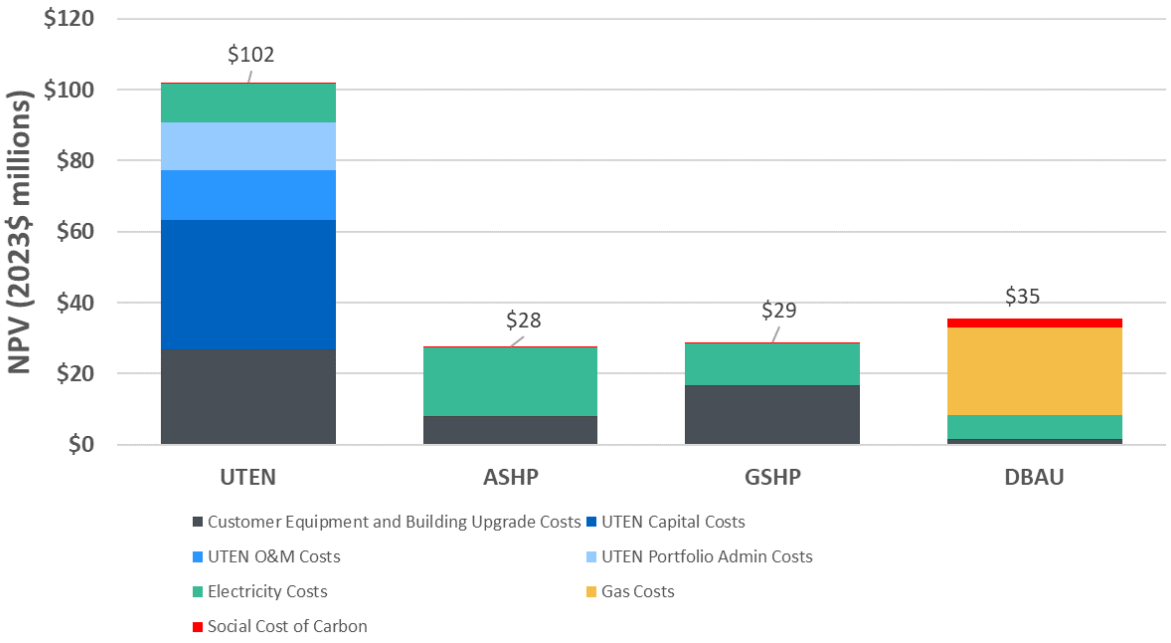
- Electrification using only ASHPs may not be possible for some buildings due to space constraints. In certain cases, ASHPs could require more roof space for the outdoor equipment to meet the building load than is available;
- Upgrading buildings with centralized ASHP water heating likely requires higher cost additional building upgrades that have not been quantified due to limited data;
- Electrification by GSHPs may not be feasible for some buildings due to geothermal drilling constraints. Drilling equipment may have to be brought into the basements of buildings, if that is even possible, or there could be constraints on the distance between boreholes that make electrification of all buildings with individual bore fields technically infeasible;
- The electrification system configurations reduce criteria air pollutants by eliminating on-site combustion; however, the societal costs associated with these pollutants are difficult to quantify and are not captured in the LCAs;
- Electrification system configurations could provide cooling to residents of a Disadvantaged Community who may not already have it. The LCAs do not quantify the associated health, safety, and comfort benefits these residents will receive from electrification of their homes; and
- The DBAU system configuration assumes that low carbon fuels become widely available in New York State. This may or may not be the case in the future.

Results

Societal LCAs for Pilot-Scale and Full-Scale Scenarios

The Societal LCAs show that sizing up the Pilot to a Full-Scale system would move the UTEN from being the least to the most societally cost-effective heating and cooling solution. This is because the Full-Scale system benefits from economies of scale and would not face certain Pilot-specific costs. Results are presented and discussed in the charts below, with additional detail provided in Appendix C. Again, the analyses are the net present value at the three percent societal discount rate over an eighty-year analysis period.

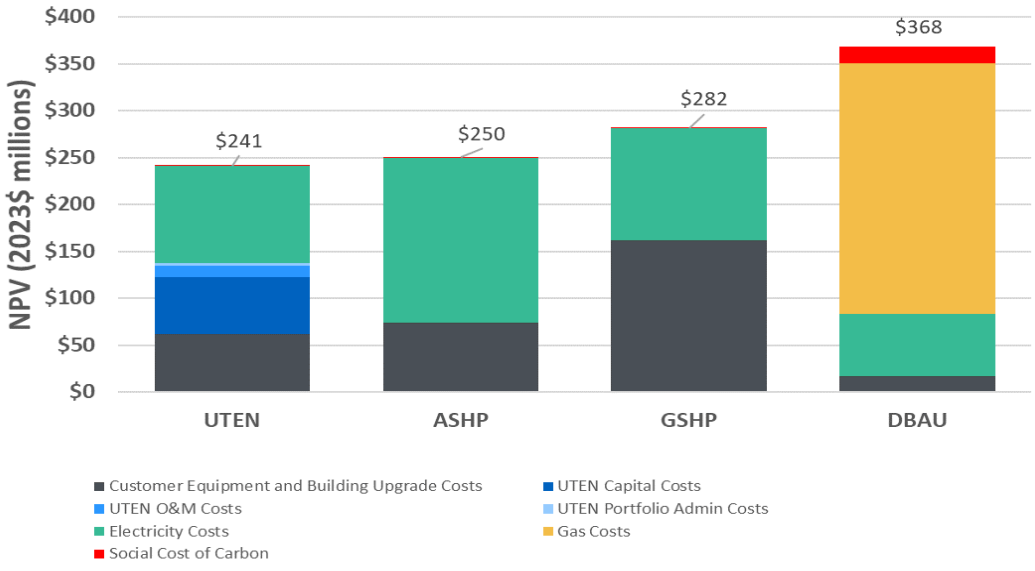
Figure 6. Pilot-Scale Societal Lifecycle Cost Analysis Results[38]



[38] UTEN capital costs include loop construction, the Energy Center, heat exchangers, BTU meters, supplemental cooling equipment, and engineering design and implementation. UTEN O&M costs include revocable consent for piping, system maintenance, and energy costs for loop operations. UTEN portfolio administration costs include administrative costs shared among all UTEN projects, including customer operations, billing, UTEN team labor, and central construction support. Customer costs are all costs related to purchase, installation and replacement of customer heating and cooling systems. They also include the cost of energy efficiency upgrades in the UTEN system configuration. Electricity and Gas costs are the supply and delivery system costs associated with the operation of customer equipment. The Societal analyses exclude state taxes.

The results of the Pilot-Scale UTEN societal lifecycle costs are expectedly higher than ASHP, GSHP, and DBAU alternatives for several reasons. First, the Pilot does not benefit from the economies of scale that come from the construction of a larger system serving a much larger square footage of buildings. Second, the Pilot-Scale design includes additional levels of system reliability that will be necessary to attract customers in a Pilot but would not be needed once the design has proven successful. Third, the Pilot includes contingency costs because the Pilot will likely need to solve unanticipated challenges associated with a first-time implementation of the Pilot design. The Full-Scale implementation would benefit from the Pilot having already solved these challenges and would not incur this contingency. Finally, the Pilot-Scale LCA includes certain one-time portfolio administration costs that will not apply to the Full-Scale scenario such as data collection and management, billing system integration, legal support, and consulting services.

Figure 7. Full-Scale Societal Lifecycle Cost Analysis Results[39]



[39] See Footnote 38.

The Full-Scale LCAs show that UTEN is the lowest-cost societal heating and cooling solution, followed closely by ASHP, then GSHP, and finally the DBAU. Compared to the Pilot-Scale version of the UTEN, the Full-Scale project benefits from economies of scale in expanding utility-sided loops, Energy Center investments, and boreholes to serve a much higher square footages of connected buildings. Both system Operations and Maintenance ("O&M") and soft costs like engineering also benefit from additional scale.

Full-Scale UTEN customer equipment and building upgrade costs are lower than ASHP because ASHP has higher total replacement costs over the span of the analysis due to the equipment's shorter lifetime. GSHP customer costs are higher because they include the cost of drilling geothermal boreholes at each individual building. Electricity costs of the UTEN and GSHPs are lower than those of ASHPs because those technology solutions are more efficient, especially during the coldest and hottest days. The DBAU system configuration is the most expensive because the Gas Costs are substantially higher than the Electricity Costs in the other three configurations.

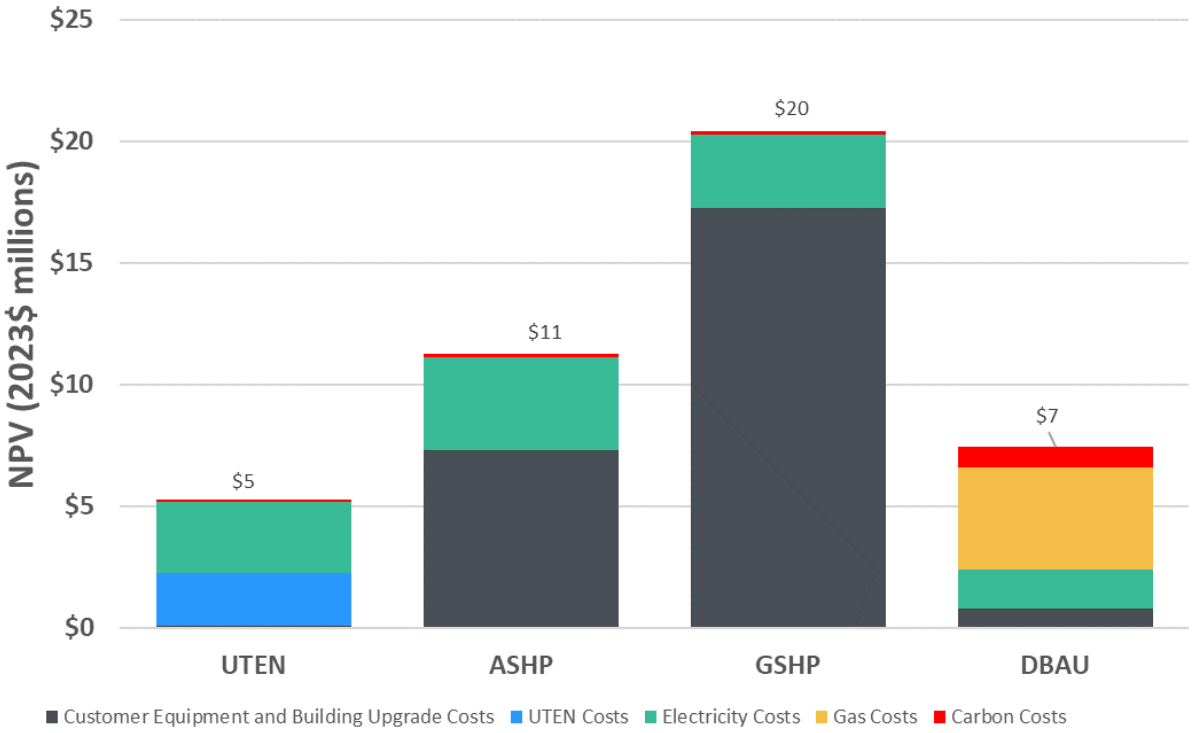
Customer LCAs for Pilot-Scale and Full-Scale Scenarios

Results of the Customer LCAs are presented in the charts below, with additional detail provided in Appendix C. The analyses are the net present value of costs at a blended customer discount rate of 14 percent over the 80-year analysis period.[40] As discussed above, while the Customer perspective analyses can be informative, analyses completed from the Societal perspective should be used as the primary indicator of the value that UTEN projects will provide

[40] Consistent with rates NYSERDA used in its 2023 *Assessment of Energy Efficiency and Electrification Potential in New York State Residential and Commercial Buildings*, *Appendix A*. *See,* https://www.nyserda.ny.gov/About/Publications/Evaluation-Reports/Building-Stock-and-Potential-Studies/Assessment-of-Energy-Efficiency-and-Electrification-Potential, p. 37. The Company converted rates in the NYSERDA report to real rates using a two percent assumed inflation rate.

to New York State relative to other heating and cooling solutions. To encourage customers to adopt the solution with the lowest costs to society, UTEN equipment subsidies would be appropriate tools.

Figure 8. Pilot-Scale Customer Lifecycle Cost Analysis Results[41]

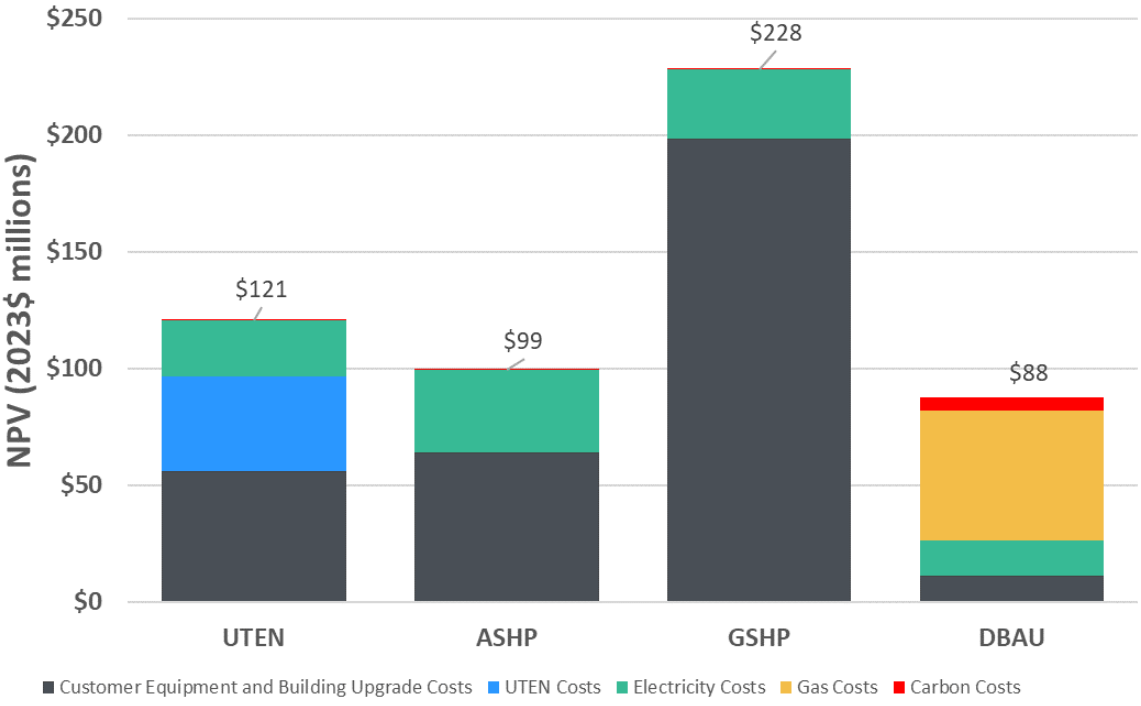


The results of the Pilot-Scale Customer LCAs indicate that customer UTEN costs are lowest compared to the alternative heating and cooling system configurations. The subsidies that the Pilot provides to cover customer equipment, building upgrades, and energy efficiency

[41] UTEN costs are the estimated costs of the UTEN that a customer will pay on their UTEN bill, assuming that Con Edison subsidizes rates during the Pilot period and for a transition period of the subsequent 5 years. Customer equipment and building upgrade costs assume that Con Edison subsidizes customer equipment, building upgrades, and energy efficiency upgrades during the Pilot period, with customers paying for replacement costs over the 80-year analysis period.

upgrades, as well as the bill cap on the UTEN costs (see Section X on Rate Design below), largely drive this result.

Figure 9. Full-Scale Customer Lifecycle Cost Analysis Results



The Full-Scale Customer LCAs show that ASHPs are the lowest-cost electrification heating and cooling system configuration from the Customer perspective, followed by the UTEN, and then GSHPs. ASHPs are the lowest cost because the Customer perspective LCA heavily discounts the future cost savings from UTEN or GSHPs due to the high customer discount rate. GSHPs are the most expensive option because they require installation of high-cost ground loops by individual customers. The DBAU case, which requires no upfront building upgrades and has lower upfront equipment costs, appears as the lowest cost option in the Full-Scale model from the Customer perspective.

Impacts of Energy Efficiency

The Company analyzed the impacts of energy efficiency upgrades in multifamily and 1-4 family homes on the UTEN Societal LCA for both the Pilot-Scale and Full-Scale versions of the system. The results show that energy efficiency should lower the societal costs of the UTEN.

Table 6. Impact of Energy Efficiency on Pilot-Scale UTEN Societal Lifecycle Cost Analysis Results

Cost Category	LCA With Energy Efficiency	LCA Without Energy Efficiency	Cost Impact of Including Energy Efficiency
Customer Equipment and Building Upgrade Costs[42]	$26,870,000	$25,560,000	$1,310,000
UTEN Costs	$63,880,000	$64,390,000	-$510,000
Electricity Costs	$11,060,000	$12,280,000	-$1,220,000
Gas Costs	$0	$0	$0
Social Cost of Carbon	$170,000	$200,000	-$30,000
Total	**$101,980,000**	**$102,430,000**	**-$450,000**

Table 7. Impact of Energy Efficiency on Full-Scale UTEN Societal Lifecycle Cost Analysis Results

Cost Category	LCA With Energy Efficiency	LCA Without Energy Efficiency	Cost Impact of Including Energy Efficiency
Customer Equipment and Building Upgrade Costs	$61,360,000	$55,400,000	$5,960,000
UTEN Costs	$76,290,000	$80,840,000	-$4,550,000
Electricity Costs	$103,320,000	$107,590,000	-$4,270,000

[42] Customer equipment and building upgrade costs include Con Edison payment of initial customer equipment costs, building upgrade costs, and energy efficiency costs, estimated to cost $21.93 million in the LCA with energy efficiency and $21.17 million in the LCA without energy efficiency. Customers would pay for replacement costs over the 80-year analysis period.

Gas Costs	$0	$0	$0
Social Cost of Carbon	$190,000	$200,000	-$10,000
Total	**$241,160,000**	**$244,030,000**	**-$2,870,000**

In both the Pilot-Scale and Full-Scale UTENs, energy efficiency measures, such as air sealing and insulation, decrease total project costs because they reduce building heating and cooling loads. Customer equipment and building upgrade costs will increase as a category, because the costs of energy efficiency upgrades outweigh reductions in customer heat pump capacity that energy efficiency upgrades enable. However, reductions in UTEN Costs and Electricity Costs are greater.

IX. COST RECOVERY AND ACCOUNTING TREATMENT

The Company proposes to recover all costs for the Pilot. The Company will treat all capital investments owned by the Company as capital expenditures recovered over the useful lifetime of the assets. Given that this technology will be newly integrated at utility-scale, a generally accepted useful life for UTEN equipment does not currently exist that would enable the Company to assign a particular number of retirement units. As such, the Company will propose average service lives and capitalization requirements for the potential retirement units at a future date.

The Company proposes booking charges that are not typical Company capital expenditures[43] as regulatory assets and amortizing these expenses over fifteen years. This generally aligns with the useful life of the customer-sided equipment that would also be partially funded via the Pilot.

[43] *E.g.,* Company labor and buy-downs of customer equipment costs.

The Company proposes to recover costs from electric customers, to better align costs with those customers who will be directly benefitting from the UTEN investment.[44] Potential customers currently heat with many different fuel sources, including oil and gas. Electricity is the common energy source for all potential pilot customers. Additionally, wider adoption of thermal energy networks in an electrified future would reduce the peak electric system demand when compared to electrification by ASHPs, helping to manage electric infrastructure needs and benefiting electric customers. Finally, as shown in Table 8 below, recovering the cost of the proposed Pilot would have a lower bill impact than if the Pilot was recovered from gas customers.[45]

Table 8. Comparison of Estimated Customer Bill Impact[46]

If UTEN Recovered Exclusively From:	Average Bill Impact [%]	Residential Bill Impact [%]
Electric customers	0.09%	0.06%
Firm gas customers	0.32%	0.31%

While the Company intends for the Pilot to be successful and operate its full useful life, this is a first-of-its kind project in New York State and in Con Edison's densely populated service territory. If the Pilot terminates, the Company will recover all undepreciated balances as regulatory assets over a 15-year period.[47]

Pilot customers have expressed that they cannot participate in the Pilot unless alternatives to the Pilot's ongoing operation are available to meet their heating and cooling needs should the

[44] As proposed in the January UTEN Proposal, the Company proposes to recover costs from electric customers through the Monthly Adjustment Clause for Company customers and through a surcharge for New York Power Authority customers. UTEN Proceeding, January UTEN Proposal, P.p. 17-18.
[45] The rate impact for the pilots and UTENs will, in the longer term, be lower when recovered across the larger electric rate base than the gas rate base and paired with the offsetting impact of increased electricity usage. Thermal Energy Network Proceeding, CECONY and O&R Reply to Party Comments on UTEN Proposals (filed April 24, 2023).
[46] Based upon current estimate of project costs.
[47] For instance, the Company could be forced to end a pilot because of unique construction issues, unforeseen operational problems, or future decisions made in the UTEN proceeding.

Pilot cease operating. Customer costs in this scenario would include the cost to restore heating and cooling after loss of UTEN infrastructure[48] and the write-off of building upgrade investments made specifically for the UTEN. On the utility side, the Company would decommission the UTEN system (*e.g.*, restore facility/property to suitable conditions, dispose of site infrastructure). To enable Pilot participation and address this contingency, the Company shall record these expenses as regulatory assets as incurred and recover them using a 15-year amortization period.[49]

If it were required that the Company exit the Pilot by selling UTEN infrastructure to a customer or third party, the Company proposes that any such proceeds accrue to the benefit of electric customers.

The Company will pursue the Geothermal and/or Research and Development ("R&D") Investment Tax Credits ("ITCs"), as provided in the Inflation Reduction Act, where eligible. If eligible, the Company will claim the credit(s) in accordance with IRS Normalization rules and provide the benefit to electric customers, when realized.[50]

X. RATE DESIGN

The Company described three unique conceptual UTEN rate structures to be tested for each of its three proposed pilot projects.[51] By offering multiple rate designs, the Company seeks to learn which rate model(s) will work best across a variety of customer and system design types with opportunities to be replicable at scale.

[48] The Company is mitigating this potential impact by keeping disconnected existing customer heating and cooling equipment in its pilot design. Section V above provides additional detail.
[49] The Company currently estimates the cost to close the Mount Vernon Project at $5-$10M. Final estimates will be developed during Stage 2. These costs are not included in the Budget in Section VII.
[50] The Company notes that the ITC is applicable for systems that are in service for five years. In the event that the assets are deemed no longer used or useful within five years of being in service, the Company would be subject to investment recapture. The Company proposes to recover all costs associated with recapture as a regulatory asset.
[51] UTEN Proceeding, May 2023 UTEN Proposal, p.38.

Rates

The Company proposes that the rates for the Mount Vernon Project be simple, transparent, and broken into rate classes based on customer type – Residential, Small Non-Residential, and Large Non-Residential. The Company's conceptual rate design is a fixed charge, reflecting the structure of the incurred costs which are almost entirely fixed in this Pilot because it will utilize geothermal boreholes as the Thermal Resource.[52] The costs to operate the Energy Center and two UDS loops will be relatively constant and can be considered fixed costs.

The Company proposes two different rate design concepts for these fixed charges: a contract demand charge for Large Non-Residential customers (over 500 kBTUh) and a monthly fixed charge for Residential and Small Non-Residential customers (less than 500 kBTUh). The Large Non-Residential customers are classified as having a peak heating load. For the Residential and Small Non-Residential classes, the fixed charge will be set based on the average heating demand of all customers with the rate class. These charges would recover a portion of the revenue requirement associated with the upfront capital investment to install the UTEN system.

This rate design matches the major cost driver of this type of UTEN system and is customer-friendly. It reflects the fact that most of the cost of this network is fixed, and the fixed price also provides a relatively simple rate design. For Large Non-Residential customers, the contract demand charge sends a price signal which encourages building improvements that lower annual peak demand. Customers will continue to have an incentive to conserve electricity by operating their heat pumps efficiently because by doing so they may be able to save money on their electric bills.

[52] UTEN Proceeding, January UTEN Proposal, p. 13.

Customer Bill Protection to Drive Participation

In order to recruit customers to participate in pilot UTEN systems, the Company proposes to limit financial risk for participating customers by capping their UTEN energy bills at the cost they would otherwise have incurred for heating and cooling energy service.[53] This feature is particularly important to resolve participant concerns that switching to a new form of energy for heating and cooling could increase their energy costs. Taken together with the effort to undertake such a change, these concerns could cause customers to decline to participate in the pilot.

The Company will implement this in two steps. First, it will set the UTEN rates for each customer class at a level such that the typical customer in each will be expected to have an equivalent effective heating and cooling bill on the UTEN as they would if they had remained on their existing equipment. Second, the Company will provide an additional layer of protection for each Pilot customer with a UTEN Bill Cap. The Company will develop a methodology to calculate on an ongoing basis what the estimated heating and cooling bills for individual customers would have been had they remained on their existing equipment, and this will become the cap on each customer's UTEN bill. After a predetermined period has elapsed (*e.g.*, one year), the Company will calculate each customer's realized bills for UTEN heating and cooling and compare that cost to Bill Cap. If the realized bill is higher than the Bill Cap, the Company will refund the incremental cost to the customer.[54]

The Mount Vernon Project may include residential buildings in which the residents are not a UTEN Customer (*e.g.*, renters who do not have utility gas accounts). The Company will require from building owners that any energy costs they charge to residents during the Pilot remain at or

[53] The expected heating and cooling bill would factor in any subsidies that a customer would no longer be eligible to receive as a UTEN Pilot participant.
[54] Such refunds would be considered costs to be recovered as described in Section IX above.

below the costs they would otherwise be charged absent the UTEN's implementation. Housing affordability remains a priority in the implementation of the Company's clean energy offerings.

As a consequence of the above customer bill protections, revenues from customers participating in the Pilot will not cover the entire pilot-related revenue requirement. For the Pilot, electric ratepayers will contribute the revenue requirement with the UTEN rates offsetting some but not all of the revenue requirement (described in Cost Recovery and Accounting Treatment Section IX).

XI. METRICS

The Company proposes to track and measure the Pilot's successes based on the metrics detailed below. The Company will work with DPS Staff and other stakeholders to develop standardized metrics in upcoming technical conferences.[55]

[55] Per the UTEN Guidance Order, the Company will include standardized performance metrics that will be incorporated into the Company's Final UTEN Pilot Project Engineering Design and Consumer Protection Plan filings. Metrics reporting will occur on a quarterly basis or as determined by the Commission if the Company receives approval to begin construction on the Pilot in Stage 3 and receives approval to operate the Pilot in Stage 4.

Table 9. UTEN Project Metrics

Metrics Category	Metrics
Technical	• Frequency and duration of time the UTEN system is operating outside of defined temperature and flow ranges • System electricity consumption, normal operation vs. peak • Asset tracking of UTEN infrastructure (*i.e.*, pipe sizes, materials, age, commodity) • Frequency and duration that backup/emergency heating is required for the customer and system

Financial	• Company's operating expenses required to balance the UTEN system
	• Company's capital expenses
	• Cost of customer equipment and building upgrades paid for by the Pilot
	• UTEN customer expenses
	  o Comparison of UTEN system cost to individual customer-owned geothermal or air source heat pump installations
	  o Cost performance with varying levels of energy efficiency upgrades, if applicable
	  o Customer bill impacts of the UTEN compared to previous energy costs, including calculation of what bills would be without Bill Protection
	• Company's capital expenses on a:
	  o Per customer basis
	  o Per unit output basis
	  o Maximum system output basis
	• Company's system operating expenses on a:
	  o Per customer basis
	  o Per unit output basis
	  o Maximum system output basis

Customer / Societal	• Customer/resident/tenant satisfaction surveys • Impact of energy efficiency upgrades to the UTEN, if applicable • Change in customers' total energy costs after converting to the UTEN • Call center queries (number, concern, resolution, and time to resolution) • Number of customers exiting or entering the Pilot after construction is complete • Calculated site emissions of Customers • UTEN calculated system emissions • Billing accuracy and timeliness • Customer complaints • Customer engagement

Safety / Reliability	• OSHA Incident Rate for UTEN related work • Contractor damages • Rules We Live By (RWLB) violations • Number of leaks reported on the system • Number of customer outages • Duration of customer outages

XII. PRELIMINARY CUSTOMER PROTECTION PLAN

The Company's preliminary Customer Protection Plan, including structure, customer agreement template, and customer engagement activities, are detailed below.

Plan Structure and Customer Agreement Template

A representative, but not exhaustive, list of customer protections, customer rights, and responsibilities, as well as issues that will need to be addressed in the Final Customer Protection Plan and Final Customer Agreement Template for the proposed Pilot, are below. Where applicable, customer rules and protections will align with provisions in Parts 11 and 13 of 16 NYCRR Chapter 1 Subchapter B, as well as the Company's Electric, Gas, and Steam Tariffs.

- **Eligibility for Service –** The Company will determine eligibility for service based on the scope of the Pilot and will engage with select customers in the Pilot territory.
- **Obtaining Service –** The Company will identify and contact customers eligible to participate in the Pilot.
- **Minimum Documentation –** The Company will establish the minimum documentation necessary for customer enrollment.
- **Customer Consent and Privacy –** The Company will address customer consent and privacy in the Customer Agreement.

- **Deposit –** The Company and the customer will agree on the requirements, if any, for new account deposits.
- **UTEN Service Request –** The Company will collaborate with participating customers to quantify the service need from the UTEN system.
- **Parameters and Length of Service –** The Company and customer will agree on a specified length of time for the Company to provide service through the UTEN.
- **UTEN Service Commitment –** The Company and customer will agree upon the Company's service responsibilities for predictable operation.
- **Existing Electric & Gas Service –** The Company will work with the customer to identify what new electric service is needed for UTEN equipment via the Company's existing processes for establishing and/or upgrading services. The Company will also maintain existing gas service to the customer, with the exception of customers participating in the Mount Vernon Project that are connected to the segment of leak-prone gas main targeted for abandonment.
- **UTEN Rates –** The Company will establish a defined rate structure with Commission approval and communicate that structure to the customer.
- **Metering –** The Company will determine how the UTEN service will be metered and how meter data will be relayed back to Con Edison.
- **Billing –** The Company will establish a billing process that will address items such as billing cadence, content of bills, back billing, late payment charges, and other fees approved by the Commission.

- **Payments –** The Company will establish a payment process that will address payment issues such as payment methods, conditions of payment extensions, and deferred payment agreements.
- **Pricing Options –** The Company will provide pricing options and bill protections to minimize the risk of higher energy bills. See Section X for more details.
- **Arrears –**The Company will establish provisions for arrears that align, to the extent applicable, with provisions for arrears in existing regulations and the Company's Electric and Gas Tariffs.
- **Special Services (LSE, EBD, MEDH) –** The Company will establish provisions for special services, which include but are not limited to life sustaining equipment ("LSE"), assistance for the elderly, blind, and disabled ("EBD"), and those who are facing medical hardship ("MEDH").
- **Additional Services for a Fee –** The Company will identify any additional services that may be offered to customers for a fee**.**
- **Customer Complaints –** The Company will establish a process for participating customers to submit formal complaints regarding UTEN construction, operation, customer experience, and other related issues to the Company.
- **Clear Access Requirements –** The Company and customer will agree on the requirements for clear access to Company equipment that align, to the extent applicable, with clear access requirements in the Company's Electric and Gas Tariffs.
- **Company's Right to Access Company Equipment –** The Company and customer will agree on the terms and conditions for accessing Company equipment.

- **Outages –** The Company will implement system reliability backup options to address potential outages. The Company will identify additional measures to address potential outages during the Pilot Project Engineering Design portion of the Pilot.[56]
- **Emergency/Safety –** The Company will establish safety procedures to safely deliver thermal energy and protect customer equipment and buildings.
- **Terminations –** The Company and the customer will agree on the process, conditions, and customer protections for termination of service in accordance with provisions in the Company's Electric and Gas Tariffs and State regulations for Electric, Gas, and Steam service.
- **Reconnections –** The Company and customer will agree on the process, conditions, and customer protections for restoration of service consistent with State regulations for Electric, Gas, and Steam service.
- **Early Exit Provisions –** The Company and customer will agree to provisions that address what happens if or when a customer's participation in the Pilot ends, prior to the end of the agreed length of service.
- **Pilot Closure –** The Company and the Customer will agree to provisions to address what happens when the Pilot ends, per any requirements issued by the Commission. To protect customers if the Mount Vernon Project is unwound at the end of the Pilot period, the Company could:

[56] The Mount Vernon Project will include system reliability backup options for heating and cooling. The UTEN Energy Center will house an electric boiler and an electric chiller. Further, by having two interconnected loops as the UTEN configuration, energy can be shared between the loops to balance uneven loading. In addition, customer-owned equipment installed by Company contractors will be supported for the duration of the pilot.

- Sell the complete UTEN system to a third party or one of the major customers on the system; or
- Restore buildings to an alternative HVAC resource, returning to their original energy equipment or converting to Air Source Heat Pumps. For buildings located near a bore field, the boreholes closest to that building can be isolated to that building so that the building can maintain its existing geothermal HVAC systems.

Customer Engagement Plan

The Company prioritizes community engagement as an important aspect of UTEN deployment and recognizes the importance of being proactive in understanding the needs and priorities of customers, residents, tenants and affected communities. The Company estimates a customer engagement budget of $500,000 for the Mount Vernon Project (included in the Pilot budget detailed above), which would include but would not be limited to funding for in-person engagement and outreach materials to increase access to Pilot offerings and project information. The Company will also continue to build relationships with Pilot participants, including the local building owners, residents, and the City of Mount Vernon. The Company will develop a Final Customer Engagement Plan tailored to meet the needs of the Disadvantaged Community and its residents served by the Mount Vernon Project. During Stage 2 of the Pilot, the Company will commence outreach efforts with individual residents and tenants in the buildings connecting to the UTEN. Engagement with customers will initially focus on background information and education about UTENs. It will then evolve into education about how the UTEN benefits and affects both Pilot participants and elements of the Customer Protection Plan. Additionally, the Company will host a series of webinars and in-person community information sessions to increase customer awareness and understanding of all elements of the Customer Protection Plan.

Outreach, Education, and Recruitment Plan

The Company is committed to transparency in sharing the goals, objectives, project schedule, status, and impacts of the Mount Vernon Project with community stakeholders. Stakeholders for the Pilot may include: individual residents and tenants, elected officials; local chambers of commerce; business improvement districts; local development corporations; not-for-profit community-based organizations; government entities such as the Mount Vernon City Council; community boards; community housing associations; block associations; tenant associations; and residents living in the surrounding areas. The Company hopes to cement strong relationships with these key stakeholders throughout the lifetime of the Pilot. To achieve this, the Customer Engagement Plan will include various methods of outreach, such as:

- Convening in-person community information sessions and town halls open to the public;
- Hosting online webinars to answer questions from the public, including questions about the Customer Protection Plan;
- Sending information packets in various languages to all households;
- Placing public signage describing Pilot updates in affected buildings;
- Press releases;
- Promoting the Pilot through virtual platforms, such as a dedicated web page and social media posts;
- Work notifications detailing construction projects that may impact the community; and
- Information on UTEN construction, as needed.

The Company also plans to use the Mount Vernon Project's Energy Center to serve both a functional and educational role within the surrounding area. Beyond its functions described in

Section V above, the building's design will allow for tours and training. Such tours and training will showcase UTEN technologies at the utility scale, providing educational opportunities for residents and the local community.

In addition to the outreach methods listed above, the Company will use marketing tactics to secure resident support, recruit potential customers to the Pilot. For example, the Company may:

- Print collateral materials, such as brochures, flyers, and doorhangers, that explain the benefits of UTEN technologies, such as energy savings and lower carbon emissions. These materials should be distributed to residents and building owners in the targeted areas, as well as local businesses, schools, local government, and other community partners.
- Include signage at UTEN work sites with the Company logo and the UTEN project name, along with a QR code that links to a dedicated webpage. The signage should indicate that the work site is part of a clean energy initiative that supports City of Mount Vernon and New York State goals, and it should be visible and attractive to tenants, customers, building owners, and passersby.
- Email customers who have expressed interest in the Pilot or who are eligible for participation based on their location and building type. The email should provide an overview of the Pilot and its benefits, as well as a clear call to action to sign up for a free consultation or a site visit. The email should also include a link to the dedicated webpage where customers can find more information and updates about the Pilot.

The Company recognizes language accessibility as a priority for participation in the clean energy transition. Public Service Law §44(4) directs that vital documentation be made available to customers in additional languages in cases where greater than 20 percent of the population in a

county speaks a language other than English.[57] The Company will also apply this Public Service Law requirement to the information it provides to residents who are not UTEN customers themselves but reside in buildings that are UTEN customers. As such, the Company will provide, at minimum, all information to these customers and/or residents in Spanish and English and the Company will also evaluate use of other languages as needed.[58]

The Company values the role that community-based organizations ("CBOs") can play in building trust and fostering collaboration between the Company and the neighborhood's residents. The Company will work with CBOs as needed to align the Pilot with the community's needs. Some of the ways that the Company may work with CBOs are:

- Inviting CBOs to provide feedback and input on the Pilot implementation.
- Supporting CBOs in their outreach and education efforts to inform and engage customers and residents about the Pilot and its benefits.
- Partnering with CBOs to host community events, where the Company can showcase the UTEN technologies and answer any questions or concerns from the community.

Con Edison is committed to providing excellent customer service and support to customers, residents and tenants who participate in the Pilot. Throughout the operation of the Pilot, the Company intends to conduct customer satisfaction surveys which will be evaluated throughout the duration of the Pilot and included as part of the Pilot Close-Out Report. Following project close-out, the Company will conduct a customer satisfaction survey to collect feedback and suggestions on the Pilot and its impacts. The Company will also email customers the Pilot Close-Out Report

[57] N.Y. Public Service Law § 44(4). Spanish is the only language that meets these thresholds in Con Edison's service territory.
[58] *See,* Population and Languages of the Limited English Proficient ("LEP") Speakers by Community District | NYC Open Data (cityofnewyork.us).

that summarizes the Pilot's achievements, benefits, and challenges, as well as recommendations for future improvements and opportunities.

In addition to all the methods listed above, the Company welcomes suggestions or recommendations on Outreach, Education, and Recruitment for the Pilot via public comment.

APPENDIX A – TECHNICAL DRAWINGS

Figure A.1. Mount Vernon Project Participating Buildings

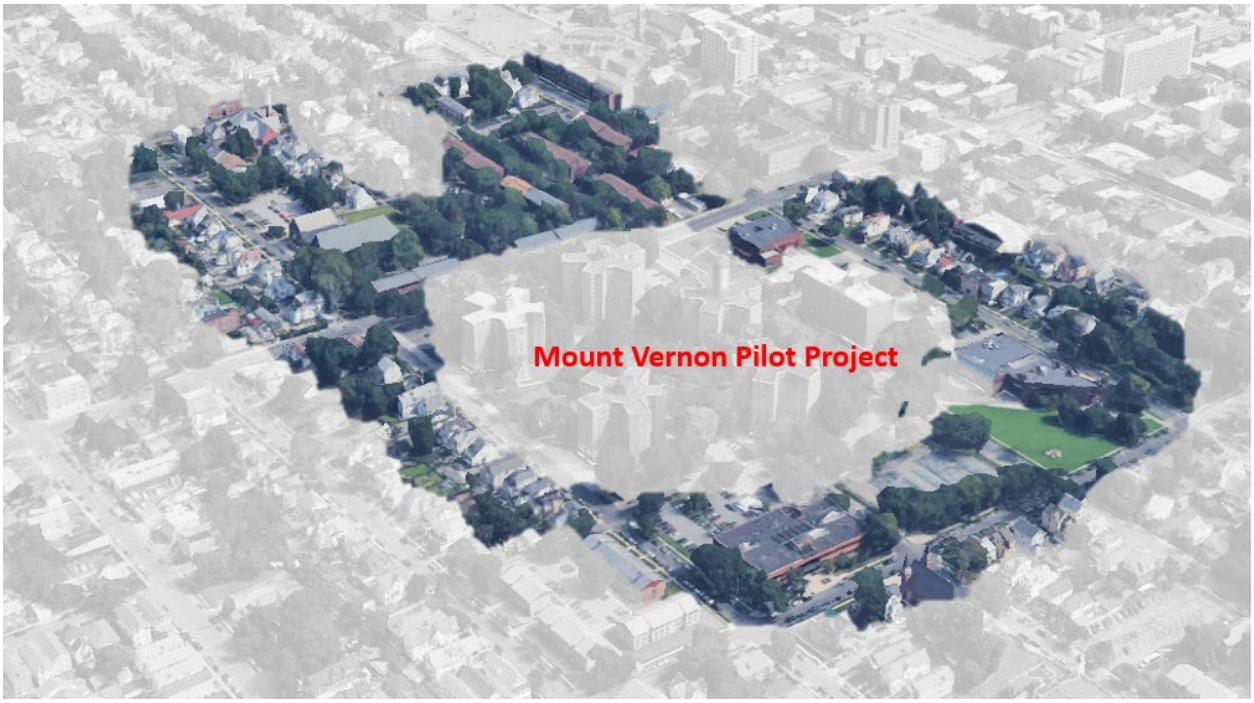


Figure A.2. Mount Vernon Project Locations

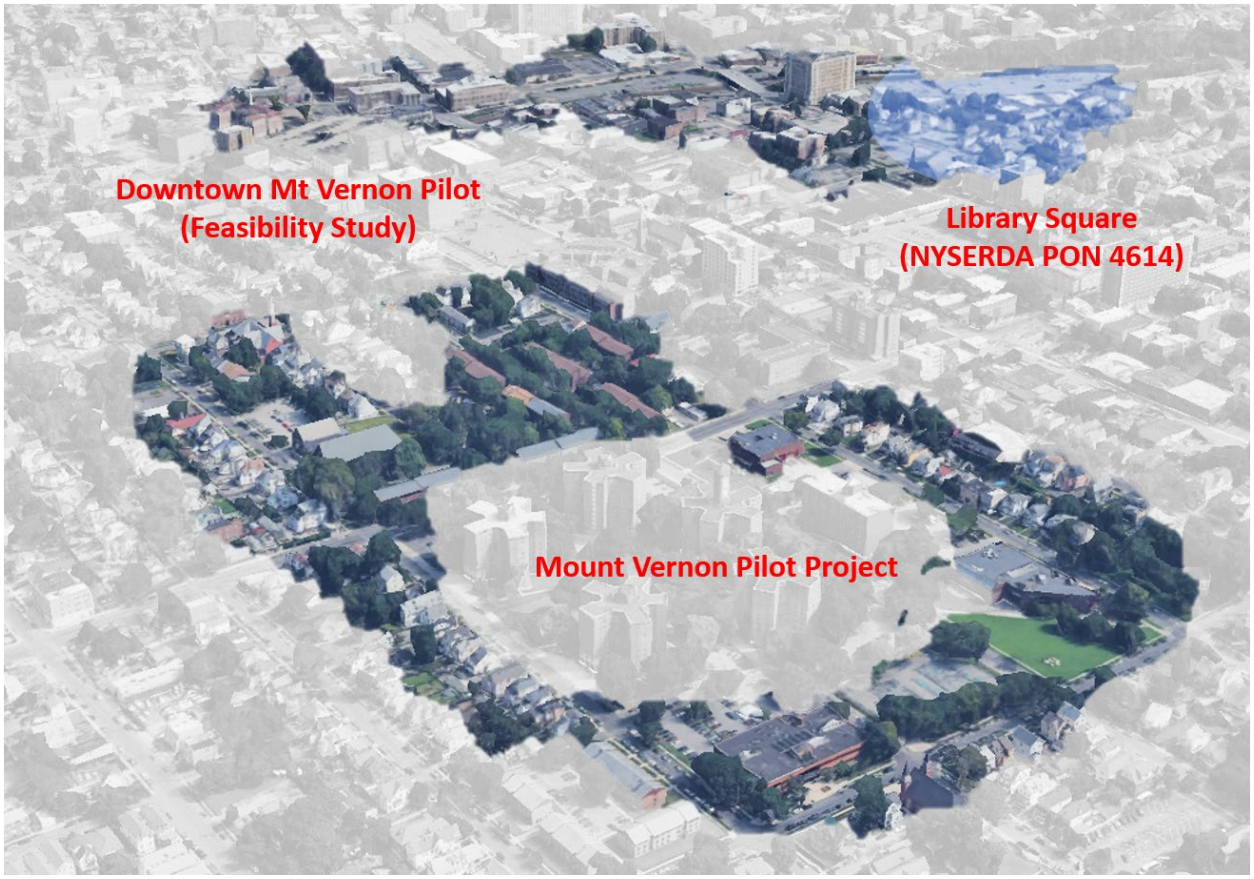


Figure A.3. Elements of the Mount Vernon Project UTEN

Figure A.4. Mount Vernon Project Building One-Line Diagram

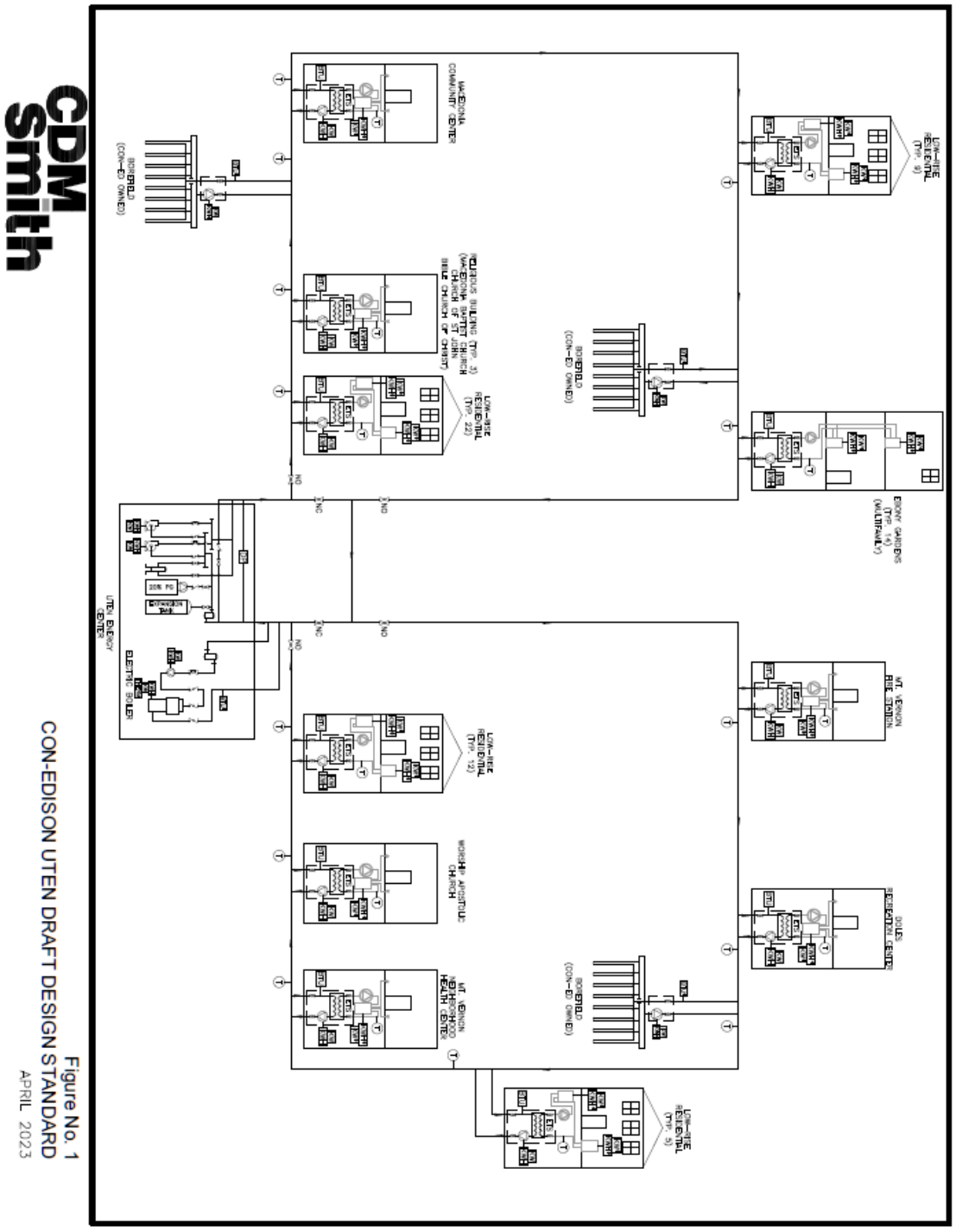


Figure A.5. Leak Prone Pipe Section of Mount Vernon Project

Figure A.6. Mount Vernon Project – Street One-Line Diagram

APPENDIX B – LETTERS OF SUPPORT

B.1. City of Mount Vernon Letter of Support

CITY OF MOUNT VERNON, N.Y.
Mayor Office

SHAWYN PATTERSON-HOWARD, MPA
Mayor

City Hall, One Roosevelt Square
Mount Vernon, NY, 10550
(914) 665-2362 – Fax: (914) 665-6173

KRISTYN BRIEZ REED
Chief of Staff

May 8th, 2023

Consolidated Edison
4 Irving Place,
New York, NY 10003

Subject: Letter of Support on Behalf of City of Mount Vernon
Con Edison Mount Vernon UTEN Pilot Project

Consolidated Edison:

The City of Mount Vernon appreciates the opportunity to support Con Edison's proposal for a Utility Thermal Energy Network Pilot Project in Mt. Vernon. We fully support their thermal energy network concept that would connect several buildings including affordable housing, 1-3 family homes, health facility, fire station, religious buildings and the recreation center.

The proposed project will support Mount Vernon's carbon reduction goals for decarbonization. The project will provide essential information for Mount Vernon in evaluating our options and making decisions about our community's infrastructure, to understand energy burden for Mount Vernon residents, and to contribute to meeting New York State's decarbonization mandates.

We are delighted to team with Con Edison to create an innovative renewable energy solution that will act as a beacon for other cities across the nation.

On behalf of City of Mount Vernon, I am pleased to provide our support and cooperation to their proposed thermal energy network pilot proposal. Any legal or financial commitment by the City of Mount Vernon remains subject to City review and approval.

Sincerely,

Shawyn Patterson-Howard, MPA
Mayor, City of Mount Vernon

"The Jewel of Westchester"

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

B.2. IGSHPA Mount Vernon Project Letter of Support

INTERNATIONAL GROUND SOURCE HEAT PUMP ASSOCIATION
312 S. 4th Street, Suite 100
Springfield, Illinois 62701 USA
igshpa.org • 1-800-626-4747 • info@igshpa.org

July 3, 2023

Secretary Michelle L. Phillips
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, NY 12223-1350

Dear Secretary Phillips:

The International Ground Source Heat Pump Association (IGSHPA), a 501(C)(6) non-profit, providing training, standards, and support for the ground source heat pump technology since 1987, respectfully submits a letter of support seeking Commission approval for Con Edison's and Orange and Rockland Utilities' (O&R's) proposed portfolio of utility-owned thermal energy network (UTEN) projects per their respective May 19, 2023 filings.[1] UTENs will help New York State and New York City meet their climate and equity goals. Con Edison's portfolio includes three unique and distinct projects and two feasibility studies; O&R proposes one project and a feasibility study. Approval of all projects and associated budget will be critical in determining the viability and scalability of UTENs across all building typologies downstate as New York moves towards electrification and decarbonization.

The UTEN pilot projects proposed by Con Edison and O&R will provide real climate benefits to New York City and the State. The portfolio of projects will reduce greenhouse gas emissions while recycling waste heat. The pilots are also estimated to reduce impacts to the electric system when compared to full electrification of the selected participating buildings with air source heat pumps. New York State must explore and deploy a variety of clean heat solutions to achieve its climate goals, and UTENs are an efficient means of electrification, creating more pathways for decarbonization.

These projects will also be good for the community. Two of Con Edison's projects and O&R's project will be serving disadvantaged communities and low-income housing. This is an opportunity to include disadvantaged communities in the clean energy transition and cover the costs of large infrastructure and energy efficiency projects that these buildings might not otherwise be able to afford. We urge the Commission to approve Con Edison's and O&R's proposed UTEN pilot projects so that the companies can gather sufficient learnings on UTENs in the New York City, Westchester, and Hudson Valley areas to help the State meet its ambitious climate and equity goals.

Thank you for your consideration,

Jeff L. Hammond
Executive Director
jhammond@igshpa.org

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

B.3. NYLCV Mount Vernon Project Letter of Support

Secretary Michelle L. Phillips
New York State Public Service Commission
Empire State Plaza
Agency Building 3
Albany, NY 12223-1350

July 6th, 2023

Dear Secretary Phillips:

The New York League of Conservation Voters respectfully submits a letter of support seeking Commission approval for Con Edison's proposed portfolio of utility-owned thermal energy network (UTEN) projects per its May 19, 2023 filing.[1] UTENs will help New York State and New York City meet their climate and equity goals. Con Edison's approach includes pilot projects, as well as funding for feasibility studies, which will be critical in determining the viability and scalability of UTENs across all building typologies downstate as New York moves towards electrification and decarbonization.

Working with our coalition partners across the state, NYLCV helped to pass the Utility Thermal Energy Network and Jobs Act ("UTENJA") in 2022. Our long-term goal in supporting this legislation is to move New York's buildings strategically off of fossil fuels at a speed and scale commensurate with our climate mandates while protecting energy access, reliability, and affordability as we preserve and expand the skilled workforce required to make an equitable transition to clean energy.

The UTEN pilot projects proposed by Con Edison will provide real climate benefits to New York City and Westchester. The portfolio of projects will reduce greenhouse gas emissions while recycling waste heat. The pilots are also estimated to reduce impacts to the electric system when compared to full electrification of the selected participating buildings with air source heat pumps. New York State must explore and deploy a variety of clean heat solutions to achieve its climate goals, and UTENs are an efficient means of electrification, creating more pathways for decarbonization.

We are hopeful that the proposed pilots will be of significant long-term benefit for the communities they will serve and provide critical training for skilled union jobs as well as a pipeline for future employment opportunities. Two of the projects will be serving disadvantaged communities and low-income housing. This is an opportunity to include disadvantaged communities in the clean energy transition and to cover the costs of large infrastructure and energy efficiency projects that these buildings might not otherwise be able to afford.

[1] Case 22-M-0429, *Proceeding to Implement the Utility Thermal Energy Network and Jobs Act*, Supplemental Information for Consolidated Edison Company of New York, Inc.'s Utility Thermal Energy Network Pilot Project Proposals (filed May 19, 2023).

We urge the Commission to approve the three proposed UTEN pilot projects so that Con Edison can gather sufficient learnings on UTENs in the NYC and Westchester areas to help the State meet its ambitious climate and equity goals.

Thank you for your consideration,

Sincerely,

Julie Tighe
President, NYLCV

B.4. REBNY and NYECC Mount Vernon Project Letter of Support

REBNY
Real Estate Board of New York

nyecc
NEW YORK ENERGY CONSUMERS COUNCIL

June 30, 2023

To Whom it May Concern:

In order to help comply with the 2022 Thermal Energy Network Jobs Act, in September of 2022, the Public Service Commission (PSC) ordered the State's seven largest utilities to propose at least one utility-owned thermal energy network (UTEN) pilot project. "The Supplemental Information for Consolidated Edison Company of New York, Inc.'s Utility Thermal Energy Network Pilot Project Proposals" filing with the PSC is Con Edison's most recent effort to fulfill their commitment to move UTEN pilots forward. The document proposes three pilots that are ready to move forward, and two that need additional study, but that are likely to also be viable. The Real Estate Board of New York (REBNY) and the New York Energy Consumer Council (NYECC) is writing in support of these proposals.

The role of these pilots, broadly speaking, is to learn more about the development of UTENs and to evaluate their potential to meet a number of State climate goals. These goals include reducing emissions, minimizing the amount of work electrifying buildings, environmental equity, and a just and fair transition away from fossil fuels, which includes workforce development in new technologies.

The projects proposed by Con Edison address all of these goals, and they do so while including a large and diverse building stock. Collectively the pilots will engage 85 buildings covering 4.3 million square feet of floorspace and about 570 housing units. Two of the three projects are in disadvantaged communities, while the third takes on the challenge of servicing three large Manhattan commercial buildings. Of the two potential other pilots, one is in a disadvantaged community.

These proposed projects also include unique rate structures to assure customers, especially those in disadvantaged communities, pay lower rates than they do now. The pilots include upgrading buildings through adding insulation and plugging leaks so that they require less heating and cooling. Finally, the proposals include job training, with a focus on the local workforce.

The Chelsea Pilot Project, submitted by the Zero Carbon Mile Consortium consisting of Reshape Strategies and Related Companies, will capture heat from a data center and use it to provide heat, cooling, and hot water to four nearby NYCHA multifamily buildings. The Mount Vernon Pilot was developed by Con Edison and their consultants. It would service 76 buildings in a disadvantaged community via a geothermal system which will provide heating, with cooling and hot water available for buildings with certain configurations. The Rockefeller Center Project was proposed by Tishman-Speyer, AKF Engineering, and Ecosystem. It will use clean recycled waste heat from multiple building systems to meet year-round heating needs for two buildings and multiple heating loads in a third, with cooling as an option.

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The goals of this State-wide pilot program are critical to meeting the emissions reduction mandates at the State and local level in an efficient way. The specific pilots Con Edison has selected meet those goals in creative and sophisticated ways. Therefore, REBNY and NYECC would encourage that they move forward expeditiously.

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APPENDIX C – LIFECYCLE ANALYSES

As discussed in Section VIII, the Company conducted several lifecycle cost analyses of the Mount Vernon Project. The methodology, key assumptions, and detailed results are included in this Appendix.

Characterization of the Full-Scale UTENs

To conduct the lifecycle cost analyses for the Full-Scale version of the Mount Vernon Project, the Company developed a high-level design for a future Full-Scale (neighborhood-level) UTEN scenario. This included estimates of the customer footprint, types of thermal resources, and heating and cooling loads that would be served. The Full-Scale model increases the total gross floor area and UTEN system footprint for the Mount Vernon Project to simulate a larger network. Additionally, the Full-Scale model increases the diversity of customer types on the network to realize economies of better load balancing on the system.

Table C.1. Full-Scale Analysis Assumptions

Assumption Category	Assumption Detail
Size of the Full-Scale network	• 385,000 sq. ft. served (9x the heated floor area of the Pilot) • 12,000 linear feet of distribution piping (2x the pipe length of the Pilot)
Thermal resources in the Full-Scale network	• Bore fields
Customers participating in the Full-Scale network	• Small commercial • Multifamily • 1-4 family homes

Energy Modeling

The Company used energy modeling to quantify the estimated peak load and energy usage of the Full-Scale Mount Vernon Project. First, the Company generated normalized (kW per sq. ft.) load shapes for space heating, space cooling, and domestic hot water heating for multiple residential and commercial customer types. These customer types were based on representative New York load profiles produced by the National Renewable Energy Laboratory ("NREL") and published in their ResStock and ComStock datasets. Load profiles were then scaled based on the assumed gross floor areas of each customer type in the full-scale network.

The Company then constructed a custom hourly UTEN balancing model that simulates balancing of thermal loads among buildings within the network and models dispatch of any additional needed thermal resources required to satisfy net load. Additionally, the Company built custom alternative dispatch models that simulate use of ASHPs, GSHPs, and decarbonized gas to satisfy the same thermal loads.

Using the custom models, the Company computed energy determinants for the four heating and cooling solutions (*i.e.,* UTEN, ASHP, GSHP, and DBAU). These determinants are the key outputs driving costs of the lifecycle cost analyses. The determinants include aggregate electric and gas consumption, summer and winter electric peaks, and relevant equipment capacities.

Table C.2. Energy Determinants

Category	UTEN	ASHP	GSHP	DBAU
Total Electricity (kWh)	9,731,179	13,636,083	12,357,156	6,567,502
Winter Electric Heating Peak (kW)	4,322	8,882	4,941	-
Summer Electric Cooling Peak (kW)	3,165	4,591	3,183	5,935

Bore Field Heat Capacity (kW-thermal)	16,078	-	-	-
Ground Loop Heat Capacity (kW-thermal)	-	-	24,330	-
Total Gas (kBTU)	-	-	-	139,843,255

Cost Development

To estimate the Societal and Customer costs of each heating and cooling solution, the Company utilized various assumptions regarding the future of New York State's energy systems. Given the assumption that New York State will achieve CLCPA goals by 2050, the Company projected energy supply and delivery costs accordingly in alignment with the Gas LTP. In the Gas LTP, the Deep Electrification Pathway significantly reduces operation of the gas system, whereas the Hybrid Pathway maintains a larger portion of the gas network using low carbon fuels. Both pathways assume 100 percent clean generation by 2040 and zero carbon steam generation by 2050. The fuel and infrastructure costs assumed for each heating and cooling solution map to the projected costs in these pathways. All costs were assessed using real (2023) dollars.

Table C.3. Pathways to Achieving CLCPA Goals

Heating and Cooling Solution	Assumption
UTEN	Costs aligned with Gas LTP Deep Electrification Pathway
ASHP	Costs aligned with Gas LTP Deep Electrification Pathway
GSHP	Costs aligned with Gas LTP Deep Electrification Pathway
DBAU	Costs aligned with Gas LTP Hybrid Pathway

The Company leveraged the Gas LTP projections and studies to project the costs of electricity and gas over the span of the lifecycle cost analysis.

Table C.4. Electricity and Gas Costs for UTEN System and Customer Equipment

Cost	Data Source
Societal	
Electricity Supply	NYISO market actuals with growth rates from the Gas LTP
Electricity Delivery	Aligned with Gas LTP Reference Pathway, with any incremental load being served at the marginal cost of service from the Con Edison 2015 MCOS study
Gas Supply	Aligned with Gas LTP Hybrid Pathway for DBAU analyses
Gas Delivery	Aligned with Gas LTP Hybrid Pathway for DBAU analyses
Customer	
Electricity Supply	NYISO market actuals with growth rates from the Gas LTP
Electricity Delivery	Aligned with Gas LTP Deep Electrification Pathway for UTEN, ASHP, and GSHP analyses; aligned with Gas LTP Hybrid Pathway for DBAU analyses
Gas Supply	Aligned with Gas LTP Hybrid Pathway for DBAU analyses
Gas Delivery	Aligned with Gas LTP Hybrid Pathway for DBAU analyses

The Company leveraged Pilot project budgets and estimated Full-Scale project costs to model the Customer and Societal costs of UTEN infrastructure and services.

Table C.5. UTEN Costs

Cost	Data Source
Societal	
UTEN CapEx	• Pilot-Scale costs based on Mount Vernon Project budget • Full-Scale costs based on high-level estimates of how costs will change with economies of scale and learning
UTEN O&M	• Pilot-Scale costs based on Mount Vernon Project budget • Full-Scale costs based on percentage of CapEx scaled from the Pilot • Full-Scale excludes Pilot-Specific O&M costs (*e.g.,* EM&V)
UTEN Portfolio Administration	• Pilot-Scale costs based on Mount Vernon Project budget

	• Full-Scale costs exclude one-time administration costs (e.g., setting up billing during the Pilot) and based on high-level estimate of how costs will change with economies of scale and learning
Customer	
UTEN Costs	• Pilot-Scale costs developed by capping costs at the gas cost from 2026 up to 2035, then switching to Full-Scale rates from 2035 onwards • Full-Scale costs developed by estimating UTEN revenue requirements based on CapEx and O&M from societal models

The Company then calculated customer equipment and building upgrade costs. The Company assumes that customers make building upgrades for compatibility with each heating and cooling solution. In the Pilot-Scale models, the Company has budgeted to cover the costs of customer equipment, energy efficiency upgrades, and building upgrades during construction of the UTEN.

Table C.6. Customer Equipment and Building Upgrade Costs

Cost	Data Source
UTEN WSHP	• Building HVAC upgrade costs based on average $/sq. ft. costs from sample Con Edison Clean Heat Program projects • No electrical upgrades assumed because of high efficiency of UTEN • Energy efficiency upgrade $/sq. ft. aligned with Con Edison's New Efficiency New York filings • WSHP equipment installed cost based from EIA, with a NYC premium
ASHP	• Building HVAC upgrade costs based on average $/sq. ft. costs from sample Con Edison Clean Heat Program projects • Additional $/sq. ft. cost for electrical upgrades • ASHP equipment installed cost from EIA, with a NYC premium
GSHP	• Building HVAC upgrade costs based on average $/sq. ft. costs from sample Con Edison Clean Heat Program projects • No electrical upgrades assumed because of high efficiency of GSHP • GSHP equipment cost from EIA, with a NYC premium
Boiler and Room A/Cs	• No HVAC or electrical upgrade cost • Boiler and A/C equipment costs from EIA, with a NYC premium

The analysis spans the lifetime of Company-owned UTEN piping, which is 80 years. The Company assumes that during this period, customers invest in replacement of equipment that has a shorter useful life.

Table C.7. Equipment Useful Life

Equipment	Useful Life	Data Source
UTEN piping	80 years	Con Edison Joint Proposal gas pipe book life
UTEN WSHP	25 years	New York State Technical Resource Manual
ASHP	15 years	New York State Technical Resource Manual
GSHP	25 years	New York State Technical Resource Manual
Boiler	24 years	New York State Technical Resource Manual
Residential room A/C	12 years	New York State Technical Resource Manual

In the Societal models, greenhouse gas emissions are treated as a societal cost, valued at the social cost of carbon. Carbon calculations use 20-year global warming potential values and include emissions associated with fossil fuel production and transportation (lifecycle emissions). In the Customer models, the Company assumes that a cap and invest program will be in place, and that the penalty for greenhouse gas emissions (including upstream emissions), valued at the social cost of carbon, will be passed through to emitting customers.

Table C.8. Emissions Costs and Rates

Emissions Data	Data Source
Social cost of carbon (Societal LCAs)	Department of Environmental Conservation three percent discount rate scenario
Carbon cost (Customer LCAs)	Cap and invest program penalty, assumed to be equal to the social cost of carbon from the Department of Environmental Conservation three percent discount rate scenario

Electricity emissions rate	Aligned with Gas LTP. Uses 2021 eGrid,[59] adjusted to incorporate lifecycle emissions accounting.[60] Emissions rate over time decreases in alignment with the CAC Integration Analysis to produce electricity with 70 percent clean energy by 2030 and 100 percent clean energy by 2040
Gas emissions rate	Aligned with Gas LTP. Uses 2022 New York State GHG Inventory, inclusive of lifecycle natural gas emissions.[61] Emissions rate over time is based on the Gas LTP

Results Calculation

To calculate the final lifecycle cost analysis results for each heating and cooling solution under each cost perspective, the Company multiplied energy determinants by the costs developed. The Company then took the net present value of the 80 years of costs. Distinctive discount rates are used for the Societal and Customer perspective analyses.

Table C.9. Discount Rates

Analysis Perspective	Assumed Discount Rate	Data Source
Societal	3%	New York State Department of Environmental Conservation
Customer	14%	Blend of rates adjusted for inflation for different customer segments from the NYSERDA Potential Study

Results of the Mount Vernon Project LCAs, presented as charts in Section VIII, are presented below.

[59] *See,* https://www.epa.gov/system/files/documents/2023-01/eGRID2021_summary_tables.pdf.
[60] Assumes all electricity emissions come from gas. Uses upstream and downstream emissions factors for gas. Increases eGrid emissions factor at the ratio of upstream plus downstream gas emissions relative to combustion gas emissions. *See,* https://extapps.dec.ny.gov/docs/administration_pdf/ghgappxclcpaemissfctrs22.pdf.
[61] *See,* https://extapps.dec.ny.gov/docs/administration_pdf/ghgappxclcpaemissfctrs22.pdf.

Table C.10. Pilot-Scale Societal Lifecycle Cost Analysis Results

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs[62]	$26,870,000	$8,150,000	$16,680,000	$1,500,000
UTEN Capital Costs[63]	$36,370,000	$0	$0	$0
UTEN O&M Costs[64]	$14,160,000	$0	$0	$0
UTEN Portfolio Administration Costs[65]	$13,350,000	$0	$0	$0
Electricity Costs[66]	$11,060,000	$19,390,000	$11,890,000	$6,870,000
Gas Costs	$0	$0	$0	$24,790,000
Social Cost of Carbon	$170,000	$210,000	$180,000	$2,340,000
Total	**$101,980,000**	**$27,750,000**	**$28,750,000**	**$35,500,000**

Table C.11. Full-Scale Societal Lifecycle Cost Analysis Results

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs	$61,360,000	$74,000,000	$161,480,000	$17,260,000
UTEN Capital Costs	$60,870,000	$0	$0	$0
UTEN O&M Costs	$12,550,000	$0	$0	$0

[62] Customer equipment and building upgrade costs include Con Edison payment of initial customer equipment costs, building upgrade costs, and energy efficiency costs, estimated to cost $21.93 million. Customers would pay for replacement costs over the 80-year analysis period.
[63] UTEN capital costs include loop construction, the Energy Center, heat exchangers, BTU meters, bore fields, supplemental cooling equipment, and engineering design and implementation. The Societal analyses exclude state taxes.
[64] UTEN O&M costs include revocable consent for piping, system maintenance, and energy costs for loop operations.
[65] UTEN portfolio administration costs include administrative costs shared among all UTEN projects, including customer operations, billing, UTEN team labor, and central construction support.
[66] Electricity and Gas costs are the supply and delivery system costs associated with the operation of customer equipment.

UTEN Portfolio Administration Costs	$2,870,000	$0	$0	$0
Electricity Costs	$103,320,000	$175,990,000	$119,880,000	$65,960,000
Gas Costs	$0	$0	$0	$267,070,000
Social Cost of Carbon	$190,000	$260,000	$240,000	$17,860,000
Total	**$241,160,000**	**$250,250,000**	**$281,600,000**	**$368,150,000**

Table C.12. Pilot-Scale Customer Lifecycle Cost Analysis Results

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs[67]	$120,000	$7,300,000	$17,250,000	$780,000
UTEN Costs[68]	$2,170,000	$0	$0	$0
Electricity Costs	$2,890,000	$3,840,000	$3,050,000	$1,620,000
Gas Costs	$0	$0	$0	$4,200,000
Carbon Costs	$120,000	$150,000	$130,000	$860,000
Total	**$5,300,000**	**$11,290,000**	**$20,430,000**	**$7,460,000**

Table C.13. Full-Scale Customer Lifecycle Cost Analysis Result

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs	$55,960,000	$64,310,000	$198,380,000	$11,140,000
UTEN Costs	$40,730,000	$0	$0	$0
Electricity Costs	$24,020,000	$34,920,000	$29,820,000	$15,170,000
Gas Costs	$0	$0	$0	$55,790,000
Carbon Costs	$100,000	$140,000	$130,000	$5,670,000

[67] Customer equipment and building upgrade costs assume that Con Edison subsidizes customer equipment, building upgrades, and energy efficiency upgrades during the Pilot period. Customers would pay for replacement costs over the 80-year analysis period.
[68] UTEN costs are the estimated costs of the UTEN that a customer will pay on their UTEN bill, assuming that Con Edison subsidizes rates during the Pilot period and for a transition period of the subsequent 5 years.

Total	**$120,810,000**	**$99,370,000**	**$228,330,000**	**$87,770,000**