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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).

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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 Chelsea, Manhattan

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 Chelsea, Manhattan ("Chelsea Project" or the "Pilot") ("Final Chelsea

[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").

Proposal"). This Final Chelsea Proposal builds on the Company's October 2022,[4] 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 four buildings, covering a total of 307,000 square feet of floorspace, including approximately 327 New York City Housing Authority ("NYCHA") dwelling units in a Disadvantaged Community with clean space heating and cooling and/or clean water heating. In addition, the Pilot will engage NYCHA and thermal resource providers with a unique rate structure.[9] The Pilot will also prioritize community engagement and education, the use of union labor, local job creation, and workforce development. The Chelsea Project is designed to yield benefits and facilitate learning in five key areas:

1. **Emissions reduction:** The Pilot supports the achievement of the Climate Leadership and Community Protection Act ("CLCPA") goals by reducing an estimated 29,000 metric tons of lifetime greenhouse gas emissions equivalent ("Lifetime CO_2e").[10] It will also remove and recycle an estimated 9,300 MMBtu of heat currently released into the New York City ("NYC") environment each year. The Company estimates that future neighborhood UTENs built from the Chelsea Pilot model would each reduce 571,000 metric tons of Lifetime CO_2e, equal to 7,500 cars off the road.

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[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").
[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 urban UTEN systems:** The Pilot will measure the reduction of the electric system impacts, which are estimated to be 70 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 residents in affordable housing 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 waste heat in large multifamily residential buildings situated in a dense urban environment. It will examine the potential of utilizing waste heat from data centers and the scalability of the UTEN system for other affordable multifamily buildings. The experience gained through the Pilot will be necessary to scale the use of recycled waste heat, which has an estimated capacity to serve

70,000 to 100,000 dwelling units in Con Edison's territory.[11] This Pilot will also help assess the relative feasibility of electrifying large buildings in a dense urban environment with UTENs compared to ASHPs or GSHPs.

Con Edison is pursuing a diverse portfolio of UTEN pilots, in both dense urban and lightly 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 Chelsea Project is one of 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 Chelsea 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.

[11] Estimate from analysis of data centers and sewer wastewater in Con Edison territory and research on other types of waste heat sources in Europe (https://www.reuseheat.eu/).

II. PROJECT OVERVIEW

The Chelsea Project is a UTEN designed to capture excess heat from a commercial data center into a thermal network and supply multifamily buildings with heating, cooling, and Domestic Hot Water ("DHW") via the use of Water Source Heat Pumps ("WSHPs"). The Pilot will use heat exchangers to capture and recycle heat that would otherwise be released by the data center into the surrounding environment through a rooftop cooling tower. The system will repurpose this otherwise wasted heat to provide DHW services to four nearby low-income multifamily NYCHA buildings on the Fulton Houses Campus comprising 327 dwelling units, as well as space heating and cooling to two of these buildings. In the Chelsea Project, the Pilot will cover the costs the buildings will incur to connect to the UTEN.

Figure 1. Chelsea Project Participating Buildings

The Chelsea Project's major participants include NYCHA, which owns the Fulton Houses Campus, as well as Related Companies ("Related") and Essence Development ("Essence"), which manage the Fulton Houses Campus under the Permanent Affordability Community Together ("PACT") program with NYCHA. Vornado Realty Trust ("Vornado") is also a participant for the

Pilot, as Related and Vornado each have partial ownership of 85 10th Avenue, where the data center is located. The Chelsea Project's UTEN customers of record will be NYCHA[12] and 85 10th Avenue. Fulton Houses residents and the surrounding community are also core stakeholders critical to the success of this Pilot.

UTEN Integration into NYCHA Redevelopment

On June 20, 2023, NYCHA announced[13] that the majority of Fulton Houses residents registered support to rebuild the Fulton Houses Campus.[14] The rebuild, expected to begin late 2024, would entail increasing the number of apartments, redesigning community facilities and outdoor spaces, and adding mixed-use space by replacing all existing apartment buildings. To respond to and leverage the opportunity this change offers to scale the Pilot in the future, the Company revised and provided updated information on its strategy for the Chelsea UTEN Project.[15] The UTEN will provide clean energy benefits to *existing buildings* for at least the full five-year pilot operation and evaluation period, generating valuable learnings for both the Company and the State. During this period, the rebuild will progress south from the northernmost area of the Fulton Houses Campus, on 19th Street, such that the buildings participating in the UTEN Pilot on 16th Street will be the last to be rebuilt, starting no earlier than 2032. Once complete, NYCHA intends to connect much larger *newly constructed buildings* on the Fulton Houses site to the UTEN via the Pilot's Energy Center, thereby greatly increasing the square footage in the Pilot area and substantially growing the UTEN's scale.

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[12] This will mirror the current relationship between Con Edison and NYCHA, and NYCHA and its residents for Con Edison steam service. Con Edison bills NYCHA for steam, and NYCHA determines how residents pay for heating.
[13] *See*, https://www.nytimes.com/2023/06/20/nyregion/public-housing-demolish.html#:~:text=NYCHA%20is%20set%20to%20announce,the%20deteriorating%20buildings%20would%20cost.
[14] UTEN Proceeding, May 2023 UTEN Proposal.
[15] UTEN Proceeding, August 2023 UTEN Proposal.

More than 75 percent of total UTEN Pilot estimated project costs are for infrastructure that will not be impacted by the rebuild and would be used by the new NYCHA buildings connecting to the UTEN. Working directly with NYCHA, the Company chose the location of the Energy Center Building, which houses WSHPs, heat exchangers, and all utility-sided infrastructure, so that it would remain untouched and fully operational during the rebuild, allowing for its integration with buildings in both existing and future orientations of the Fulton Houses Campus. The Utility Distribution System ("UDS") along 16th Street and associated infrastructure at the data center ("Thermal Resource") would be untouched as well. Only the Variable Refrigerant Flow ("VRF") systems and their associated piping that connects them to the Customer Energy Transfer Station ("ETS") for the two existing Fulton Houses buildings would be retired halfway through their 15-year useful life.[16]

The scope for the Chelsea Project will generate immediate lessons on UTEN design, operation, and scalability, and it will also provide direct benefits to the residents of the selected buildings through electrified heating, cooling, and DHW. In addition, the Pilot would create long-term benefits by fully utilizing the UTEN system to provide clean heating and/or cooling to the newly rebuilt NYCHA buildings in the Pilot area. NYCHA and Con Edison also intend to explore opportunities to scale the UTEN beyond the Pilot area and serve more of the rebuilt campus, as NYCHA is targeting full elimination of fossil fuels across the Fulton Houses Campus. Finally, NYCHA and Con Edison will explore use of the Pilot as a blueprint for future UTEN projects on other NYCHA campuses (that have similar building typologies) throughout NYC. NYCHA continues to express its commitment to both the Chelsea Project and the long-term success of the UTEN in Appendix B.

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[16] The VRF system will not be able to be salvaged during the demolition of an existing building.

III. PROJECT OBJECTIVES

The Chelsea 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 Chelsea Project will create a foundation for scaling UTENs as a future solution for low-income customers in Disadvantaged Communities in dense urban environments, as the Pilot will establish the best practices, processes, and metrics for success. The Company anticipates achieving 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 29,000 metric tons of CO_2e, with the potential to reduce 571,000 metric tons of Lifetime CO_2e in future neighborhood UTENs built from the Chelsea Pilot model; [17] and
  - Reduce impact to the electric system by an estimated 70 percent when compared to converting the buildings to ASHPs.

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; 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.

[17] Compared to remaining on existing heating and cooling equipment using current energy sources.

- **Objectives:**
    - Demonstrate viability for the recycling of excess heat when geothermal boreholes are costly or technically infeasible in dense urban environments;
    - Pilot the use of excess heat from data centers, which are particularly promising UTEN thermal solutions because they are year-round heat resources with multiple suitable locations across the Con Edison service territory and the State; and
    - Develop a blueprint that can inform future decarbonization work across all 2,411 NYCHA buildings for both retrofitting and new construction.[18]

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

- **Objective:**
    - Test rates that keep the UTEN system in balance and are clearly understandable to multifamily building owners and thermal resource providers.

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

- **Objectives:**
    - Engage NYCHA residents and the local community to increase awareness and interest in UTEN technology as a cutting-edge clean energy solution; and
    - Provide residents with access to reliable heating, cooling, and hot water, which will be sourced from the thermal energy network.

[18] *See*, https://www.nyc.gov/site/nycha/about/developments.page.

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 Chelsea Project will provide benefits to NYCHA Fulton Houses residents, who are all low- and moderate-income and located in a Disadvantaged Community. These benefits include:

- **Improved quality of life:** The Pilot will replace fossil fuel-based water and/or space heating, and will provide widespread, more efficient, and comfortable cooling to residents;
- **Equal or lower energy bills**: The Pilot's bill protections will keep the Fulton Houses buildings, and by extension, the NYCHA residents, from paying more for heating and cooling on the UTEN than they would have if the buildings continued using existing equipment; 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[19]

The Chelsea Project design will test the feasibility of a UTEN to provide space heating and cooling, and DHW to multifamily buildings in a dense, urban environment using readily available waste heat. It will capture thermal energy from the data center (the "Thermal Resource"), and then transfer and transport it via the Utility Distribution System ("UDS") to the Customer Equipment that will provide DHW to all four buildings and space heating and cooling to two of them. 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.

The Thermal Resource, UDS, Energy Center, Customer Equipment, and SCADA System will be designed to allow for more buildings to connect in the future, including new construction from the anticipated NYCHA rebuild. Figure 2 below presents the buildings and elements of the Chelsea Project in relation to one another. Each part of the UTEN is described in more detail below.

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

Figure 2. Elements of the Chelsea Project UTEN

Thermal Resource

The Thermal Resource will be excess heat originating from the data center located at 85 10th Avenue. The data center will contribute heat to the UTEN to assist in maintaining the ambient temperature of the UDS.

Utility Distribution System

The UDS will consist of a Thermal Resource Energy Transfer Station ("Thermal Resource ETS"), supply and return pipes installed below 16th Street, and a second ETS connecting the UDS to the Fulton Houses ("Customer ETS").

The Thermal Resource ETS's heat exchanger will transfer captured heat into the UDS piping described below. This Thermal Resource ETS will also include valving, metering and controls equipment, and potential supplemental pumping. It will be located either inside the data center, in a Company-owned vault, or at another location 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 ETS and the Customer ETS. 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. Based on the preliminary design, the UDS is sized for 16-inch steel pipe, which will be protected from internal and external corrosion. 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. Once fully designed, the network's base and peak loads will be established. Currently, the Chelsea Pilot assumes the system will be designed to satisfy the total 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 Customer ETS will be located in a new, standalone building on the Fulton House property that NYCHA will own and within which the Company will maintain and operate its equipment ("Energy Center Building" – so named because it will also house the UTEN Energy Center described below). The Customer ETS heat exchanger will transfer the thermal energy between the UDS and the Customer Equipment. British Thermal Unit ("BTU") meters 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 the customer. The BTU meter readings will be used to bill the customer for use of the UTEN. Stage 2 of the Chelsea 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 mainly be located within the Energy Center Building. 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 include a Company-owned electrically powered cooling system to provide cooling to the UTEN beyond what the Fulton Houses' loads will generate. This cooling system will be sized at Stage 2 of the Pilot. In addition, the Energy Center Building will house an ETS heat exchanger that will denote the separation between Company-owned UTEN equipment and infrastructure and NYCHA-owned Customer Equipment and infrastructure. Finally, the Energy Center Building will house a WSHP and Thermal Energy Storage ("TES") for the DHW system and Customer Equipment piping that will run to the two VRF systems for heating and/or cooling two Fulton Houses buildings.

Customer Equipment

The Chelsea Project's Customer Equipment providing DHW and/or space heating and cooling to NYCHA buildings will begin at the isolation valve on the customer side of the ETS heat exchanger located within the Energy Center Building. (See "Point of Demarcation" below.) Customer Equipment at a minimum will include buried 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.

NYCHA will connect its DHW system supplying all hot water to all four buildings with the UTEN's UDS in the Energy Center Building. A large NYCHA-owned WSHP located in the Energy Center Building will extract heat from the UTEN via the Customer ETS to heat the DHW system. The Customer Equipment will then transport the heated water from the Energy Center Building to each of the four selected Fulton Houses buildings. The Chelsea Project will also install NYCHA-owned hot water storage tanks within the Energy Center Building to aid in DHW system operation and act as Thermal Energy Storage.

NYCHA will connect two VRF systems to the Customer ETS to provide heating and cooling to all dwelling units and the common spaces in two of the NYCHA buildings. A NYCHA-owned loop will connect and transfer heat between the Customer ETS heat exchanger and the VRFs.

In the heating-dominant winter months, both the NYCHA DHW and VRF systems will withdraw heat from the UTEN. In the cooling-dominant months, the VRF systems will release heat into the UTEN while the DHW system withdraws heat, thereby facilitating highly efficient simultaneous heating and cooling. When the amount of heat the VRF adds to the UTEN is greater than the amount of heat the DHW system removes, the Company's all-electric mechanical cooling system described above will dissipate the excess heat and keep the UTEN balanced.

The Chelsea Project will disconnect legacy DHW, cooling, and heating sources. The UDS and Customer Equipment will be designed to allow for more buildings to connect in the future, including new construction from the anticipated NYCHA rebuild.

Supervisory Control and Data Acquisition System

The Chelsea 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 ETS 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. Chelsea Project Construction Scope of Work by Party

Party	Scope of Work
Con Edison	• Install 2,000 linear feet of distribution piping on 16th Street ("UDS supply and return piping"). • Develop and construct the Energy Center Building structure with NYCHA. • Install and integrate ETSs at 85 10th Avenue and the Energy Center Building. The ETSs include heat exchangers, valving, metering and controls equipment, and potential supplemental pumping. • Install all other Company-owned Energy Center equipment, such as hydronic pumps, water chemistry controls, and makeup fluid tanks and controls. • Install a shell and tube heat exchanger connected to a dedicated district steam service to provide emergency backup to the UTEN system. • Install an electric cooling system at the Energy Center Building to remove excess heat from the UTEN system during summer months.
Pilot Participants • 85 10th Avenue • Fulton Houses Buildings	• Implement building piping installations and modifications required to connect existing building piping to the ETS at 85 10th Avenue. • Install WSHPs and TES in the Energy Center Building for DHW (to serve approximately 327 dwelling units). • Install a VRF system at two Fulton Houses buildings (to serve 72 dwelling units). • Install hydronic pumping equipment and associated infrastructure for the Customer Equipment. • Implement air sealing measures, where appropriate. • Implement electrical capacity upgrades at Fulton Houses and new electrical service at the Energy Center Building, if required.

Table 2. Chelsea Project Scope of Work by Building Site

Buildings	Scope of Work
85 10th Avenue	• Install UDS supplemental pumps and Thermal Resource ETS heat exchanger in 85 10th Avenue to collect excess heat. • Install piping to connect the UTEN system below grade and within a defined service vault area.
Fulton Houses Property	• Construct and integrate the Energy Center Building, including but not limited to WSHPs, TES, hydronic pumps, Customer Equipment piping, and controls. • Install Customer Equipment piping for the DHW Loop from the Energy Center Building to all four buildings. • Install Customer Equipment ambient temperature piping to connect the Customer ETS (in the Energy Center Building) to two buildings to be served with heating and cooling via VRF. • Install an electric cooling system at the Energy Center Building.
Fulton Houses Buildings • 401 W 16th Street (45,000 SF) • 434 W 17th Street (45,000 SF)	• Connect VRF systems to Ambient Temperature Customer Equipment for heating and cooling. • Integrate the Customer Equipment DHW Primary Loop into existing DHW infrastructure within each building. • Implement air sealing measures, where appropriate.
Fulton Houses Buildings • 410 W 17th Street (45,000 SF) • 420 W 17th Street (172,000 SF)	• Integrate the Customer Equipment DHW Primary Loop into existing DHW infrastructure within each building.

Point of Demarcation

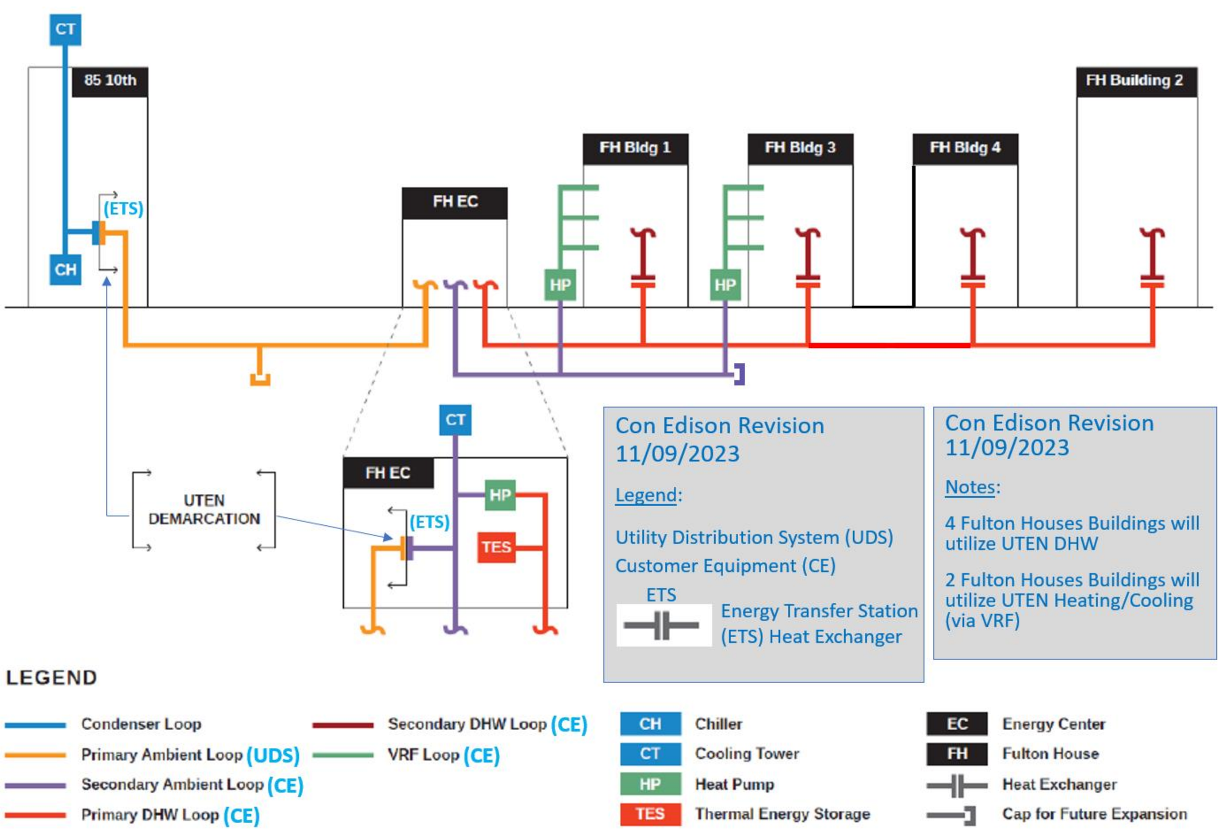
The Pilot's demarcation points mark where Company-owned and operated equipment ends and customer- or third party-owned and operated equipment begins. The demarcation point for the third-party-owned data center at 85 10th Avenue will be the isolation valve at the thermal resource side of the Thermal Resource ETS heat exchanger. The Company will own the UTEN equipment and infrastructure up to the isolation valve on the thermal resource side of the Thermal Resource

ETS heat exchanger. The owners of 85 10th Avenue, Related and Vornado, will own all equipment and infrastructure on their side of the isolation valve.

The demarcation point for the NYCHA buildings will be the isolation valve on the Customer side of the Customer ETS heat exchanger (located in the Energy Center Building). The Company will own the UTEN equipment and infrastructure up to the isolation valve on the Customer side of the Customer ETS heat exchanger. NYCHA will own the equipment and infrastructure past this isolation valve.

The demarcation points and an overview of the UTEN infrastructure for the Chelsea Project are depicted in the one-line diagram in Figure 3. A full-sized building one-line diagram and additional one-line diagrams can be found in Appendix A.

Figure 3: Chelsea Project Building One-Line Diagram



On-Site Energy Efficiency Upgrades

The Company does not plan to integrate energy efficiency into participating buildings at this time, as these buildings will be demolished and rebuilt at the Pilot's end. During the detailed assessment of participating buildings in Stage 2 of the Pilot, the Company will determine if there are opportunities to integrate energy efficiency upgrades that are cost effective within the limits of the five-year pilot period. The new Fulton Houses buildings will meet or exceed the New York City Energy Code's high levels of energy efficiency for new construction.

Thermal Energy Resources

The Chelsea Project will not provide any new natural gas service to a participating customer or include the installation of any new fossil fuel equipment. In addition, the Pilot will not include the use of fossil fuel resources in its expected operation. However, over the course of the Pilot period the Chelsea Project will have emergency and backup access to Con Edison district steam via a Company-owned shell and tube heat exchanger located at the Energy Center. This redundancy will increase customer reliability and system resiliency. During normal operation, the shell and tube heat exchanger will be offline. Although steam is not a fossil fuel, it is currently produced by fossil fuel-fired boilers at Con Edison steam generating stations. However, Con Edison's long-term plan is to decarbonize its steam generating stations. When that occurs, the production of the district steam for the Chelsea Project's emergency and backup systems will be entirely carbon-free.

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 Rockefeller Center 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, adequate, and reliable 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;
- Comply with existing standards and procedures for the new steam infrastructure and equipment required to ensure UTEN reliability during emergency and backup situations;
- Design equipment and infrastructure with appropriate heights, clearances, and shut-off points 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 a shell and tube heat exchanger at the Energy Center such that district steam can be used to provide heat to the UTEN during emergency and backup situations;

- Develop appropriate capacity standards such reserve capacity is available to meet fluctuating energy needs and waste heat availability; and
- Evaluate and provide the system with extra capacity during the five-year operation period of the Pilot as necessary; this will also aid future system expansion.

Resiliency

- Design the system with redundancies and create a supply chain and logistics network 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; and
- Design the system to operate reliably within the operational environment of a public right-of-way.

Future Scalability

There are multiple opportunities to scale the Chelsea Project. First, NYCHA intends to connect newly constructed buildings within the UTEN footprint via the Pilot's Energy Center. NYCHA and Con Edison also intend to explore opportunities to scale the UTEN beyond the Pilot footprint and serve more of the rebuilt campus because NYCHA is targeting full elimination of fossil fuels across the Fulton Houses campus. There are also a multitude of other buildings outside of the Fulton Houses Campus with diverse loads which could be interconnected.

The Pilot has built-in and/or access to thermal capacity necessary to expand. The 10^{th} Avenue Data Center may have excess heat to serve additional dwelling units with space heating and hot water, and the Company has also identified additional thermal resources in the area such as additional data centers and sewer heat.

VI. PROJECT PLAN

Workplan

The following summarizes the Company's proposed workplan for the Chelsea Project, including key stages, activities, 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.[20] 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
- 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

[20] UTEN Proceeding, UTEN Guidance Order, p. 19.

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.[21] 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 for review 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
- Size the Company-owned electrically powered cooling system
- 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

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

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 an Order determining whether the Pilot can advance to Stage 3

<u>Stage 3: Customer Enrollment and Pilot Construction</u>

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 agreement for thermal energy source providers
- Procure all materials and equipment needed for construction
- Complete all work to connect the data center to the UTEN system via the Thermal Resource ETS
- Complete all street infrastructure work involving the installation of piping systems
- Build and connect the Energy Center
- Install all customer-owned building equipment
- Complete any previously identified energy efficiency upgrades, if applicable
- 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 to18 months after commencement of Pilot's construction

<u>Stage 4: Pilot Operation and Management</u>

In Stage 4, the Company will commission the thermal energy network and confirm proper operation of all network equipment. Once confirmed, buildings will have their building systems converted to UTEN and be tied into the network. Operational data and standardized metrics will be recorded and analyzed throughout the Pilot's life cycle.

Activities

- Commission Thermal Energy Resources
- Commission Utility Distribution System
- Commission Energy Center
- Commission Customer Equipment
- Connect 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 (data center connection) 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 Chelsea 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
    - Regulations necessary to support UTEN operations
- Create Pilot Close-Out Report

Deliverables

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

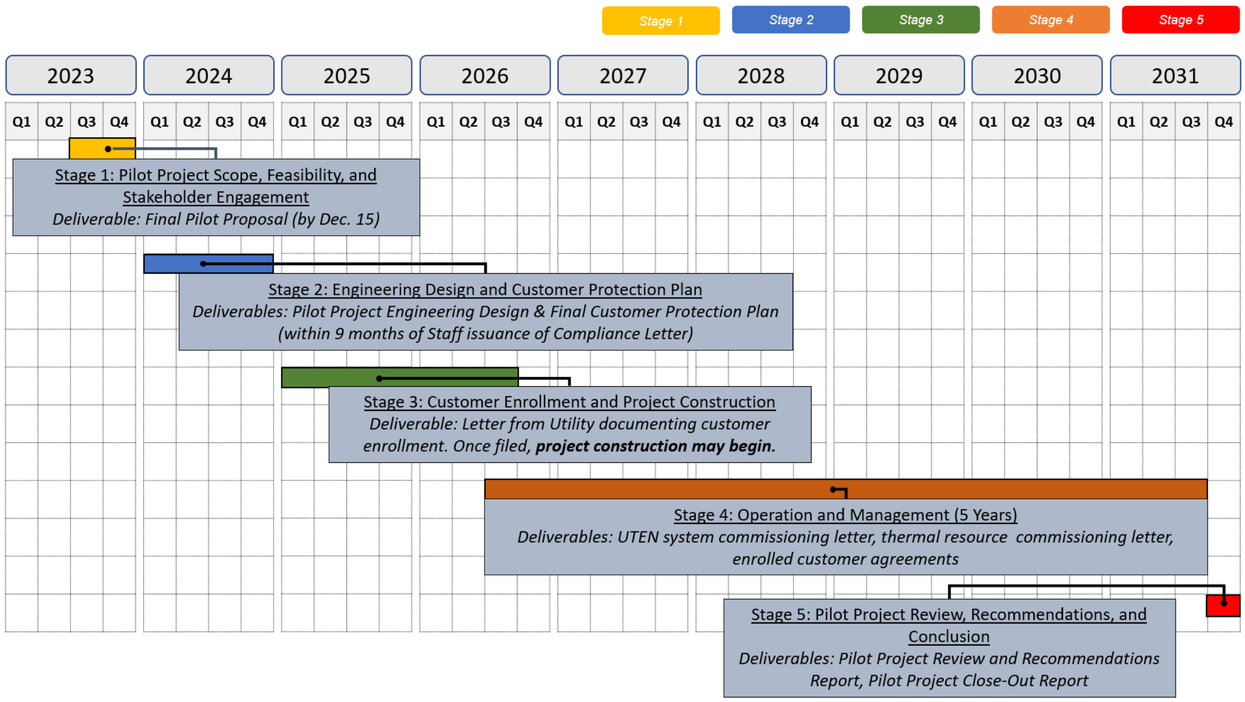
Milestones

- 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 4. 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 Chelsea Project will leverage the existing community network of the New York City Housing Authority and other New York City 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-sided 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, 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 the local community, including NYCHA, to share information about the Pilot, including all potential workforce opportunities. 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 to meet 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
• **Installation:** Access to NYCHA apartments for installation of VRF indoor units	• Work closely with NYCHA to inform residents of the Pilot and coordinate access for all required construction work
• **Installation:** Interference and construction delays associated with the installation of two large diameter pipes under 16th street in Manhattan	• Conduct advanced street surveys and exploratory test pits to identify all existing infrastructure, allowing for the most efficient installation
• **Equipment:** Delays in availability of Water Source Heat Pumps and VRF systems	• Source potential equipment in advance and, when able, from a variety of manufacturers so that products are available and delivered in time for construction
• **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

VII. BUDGET

The cost estimates below are based upon the conceptual design of the Chelsea 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 $81.1 million, plus an additional $10.5 million of portfolio administration costs, to develop and complete the Chelsea Project. Overarching portfolio administration costs include but are not limited to the incremental labor, support services, program management, and data management.

Table 4. Summary of Total Project Costs by Stage[22]

Stage	Chelsea Project Costs	Share of Portfolio Administration Costs[23]	Total
Stage 1	$104,035	$262,500	$366,535
Stage 2	$8,007,965	$787,500	$8,795,465
Stage 3	$64,896,000	$8,400,000	$73,296,000
Stage 4	$7,488,000	$945,000	$8,433,000
Stage 5	$624,000	$105,000	$729,000
Total	**$81,120,000**	**$10,500,000**	**$91,620,000**

[22] Contingency costs are included in total costs. Contingency costs were calculated as 30% of the Pilot costs.
[23] The Company identified portfolio administrative costs associated with the three proposed pilots in the August 2023 UTEN Proposal. Note that for the Final Chelsea 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).

Table 5. Summary of Total Project Costs by Category

Con Edison Estimated Costs	**Chelsea Project**
UTEN Construction *(UDS, Energy Center, ETSs, etc.)*	$10,300,000
Customer Equipment Construction *(Heat Pumps, Customer Pipes, etc.)*	$34,700,000
Engineering/Implementation/Operations	$14,400,000
Utility Capital Overheads and Sales Tax	$3,000,000
Estimated Project Costs	**$62,400,000**
Contingency *(30% of Estimated Project Costs)*	$18,720,000
Estimated Project Costs Including Contingency	**$81,120,000**
Portfolio Admin *(1/3 of Full Portfolio Estimate)*	$10,500,000
Total Estimated Costs	**$91,620,000**

Budget Flexibility

Given the novelty of the Chelsea 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 Chelsea Project, it may find alternative piping configurations which may result in variations in the split of costs between capital and regulatory asset, based on ownership of that piping.

VIII. LIFECYCLE COST ANALYSES

Per the requirements of the Guidance Order,[24] the Company conducted lifecycle cost analyses ("LCAs") of the Chelsea Project and three alternative heating and cooling system configurations.[25] 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 Chelsea Project, which will be advance 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 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.

<u>System Configurations Analyzed</u>

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.[26] Lifecycle costs include

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[24] UTEN Proceeding, UTEN Guidance Order, p. 39.
[25] 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.
[26] See "System Configuration Energy Costs and the CLCPA" section below for further discussion.

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.[27] The Company aligned projected energy supply and delivery costs with the Con Edison Gas System Long-Term Plan ("Gas LTP") assumptions.[28] 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 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").[29]

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[27] Laws of 2019, Chapter 106 (enacted June 18, 2019).
[28] 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").
[29] 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.

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").[30] The Societal models exclude state taxes. The Societal models discount all costs using a three percent societal discount rate.[31]

The Customer LCA considered 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,[32] a carbon price,[33] and state taxes. The Customer analyses used a blended real customer discount rate based on the customer market segment.[34]

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

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[30] 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.
[31] Consistent with the discount rate used in the NYS DEC cost of carbon calculation.
[32] For the Pilot, the utility will subsidize customer equipment and building upgrades as well as rates (See Section X).
[33] 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.
[34] 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.

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.[35] As such, the Company analyzed lifecycle costs of not just the Chelsea Project Pilot, but also of a future Full-Scale (*i.e.*, neighborhood-scale) UTEN built on the Chelsea 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 Chelsea Project design (*i.e.*, utilization of excess data center heat to serve buildings in a dense urban 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 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:

- In dense areas of Con Edison's service territory, such as Manhattan, electrification using only ASHPs may not be possible due to space constraints. ASHPs for high-rise Manhattan buildings would likely require more roof space for the outdoor equipment to meet the building load than is available;

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

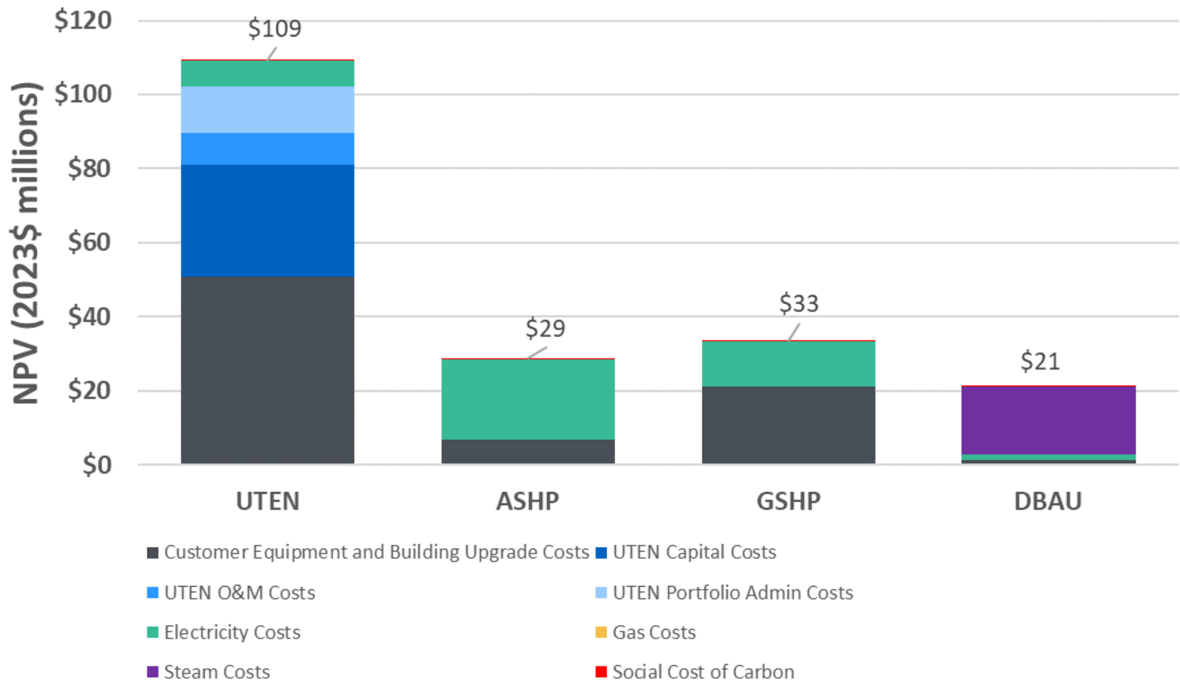
- Upgrading buildings with centralized ASHP water heating likely requires higher cost additional building upgrades that have not been quantified due to limited data;
- Electrification by GSHPs may not be feasible for buildings in dense environments, due to geothermal drilling constraints. Drilling equipment 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 by GSHPs 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 will provide cooling to NYCHA building residents who may not already have it. The LCAs do not quantify the associated health, safety, and comfort benefits these tenants 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 80-year analysis period.

Figure 5. Pilot-Scale Societal Lifecycle Cost Analysis Results[36]

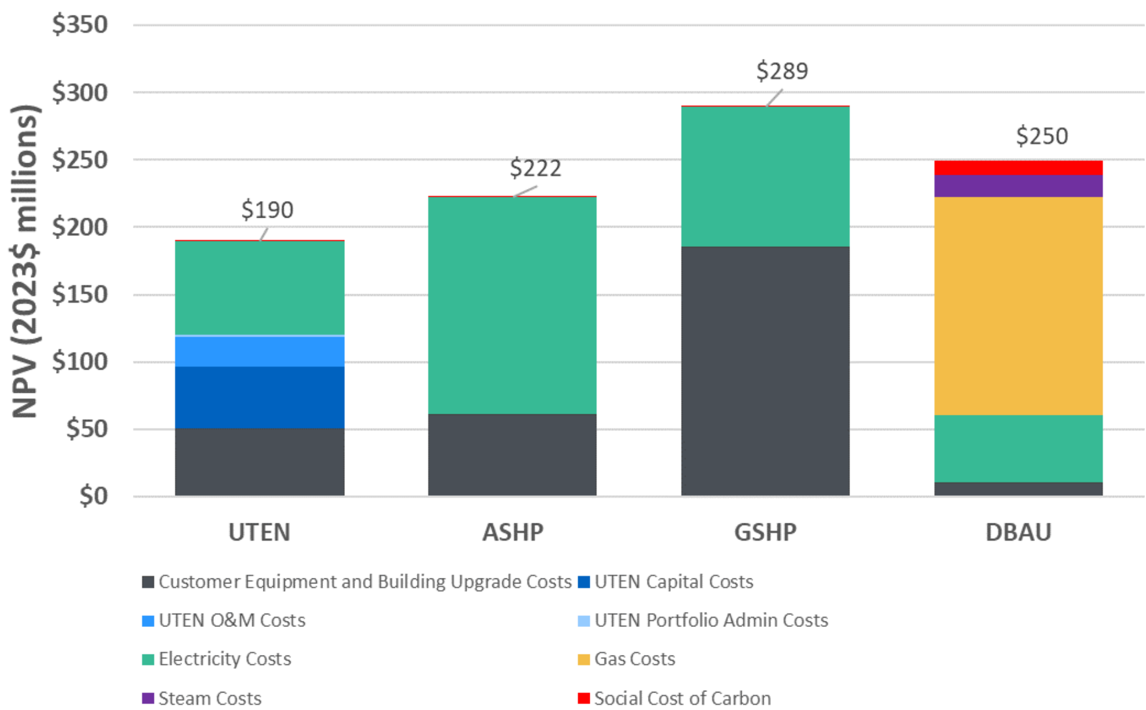


The results of the Pilot-Scale UTEN societal lifecycle costs are expectedly higher than ASHP, GSHP, and DBAU alternatives for several reasons. First, the Pilot does not benefit from the economies of scale that come from the construction of a larger system serving a much larger square footage of buildings. 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

[36]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. Electricity, Steam, and Gas costs are the supply and delivery system costs associated with the operation of customer equipment and the UTEN. The Societal analyses exclude state taxes.

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 6. Full-Scale Societal Lifecycle Cost Analysis Results[37]



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

[37] See Footnote 36.

Further, 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 costs are much higher because they include the cost of drilling geothermal boreholes in dense Manhattan, assuming this is even technically feasible. 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 Full-Scale UTEN is more efficient than GSHPs because the waste heat supplied by the data center is warmer than a ground loop.

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 real blended customer discount rate of 14 percent over the 80-year analysis period.[38] 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 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 could be appropriate tools.

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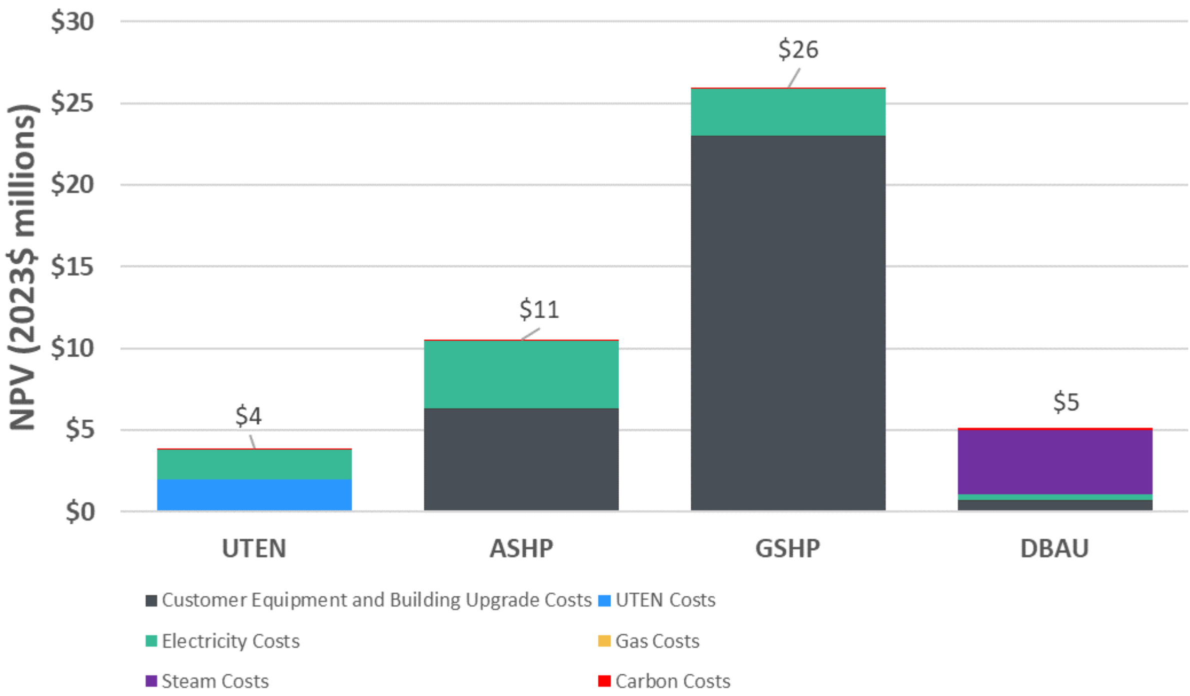
[38] Consistent with rates NYSERDA used in its 2023 *Assessment of Energy Efficiency and Electrification Potential in New York State Residential and Commercial Buildings, Appendix A. See*, https://www.nyserda.ny.gov/About/Publications/Evaluation-Reports/Building-Stock-and-Potential-Studies/Assessment-of-Energy-Efficiency-and-Electrification-Potential,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

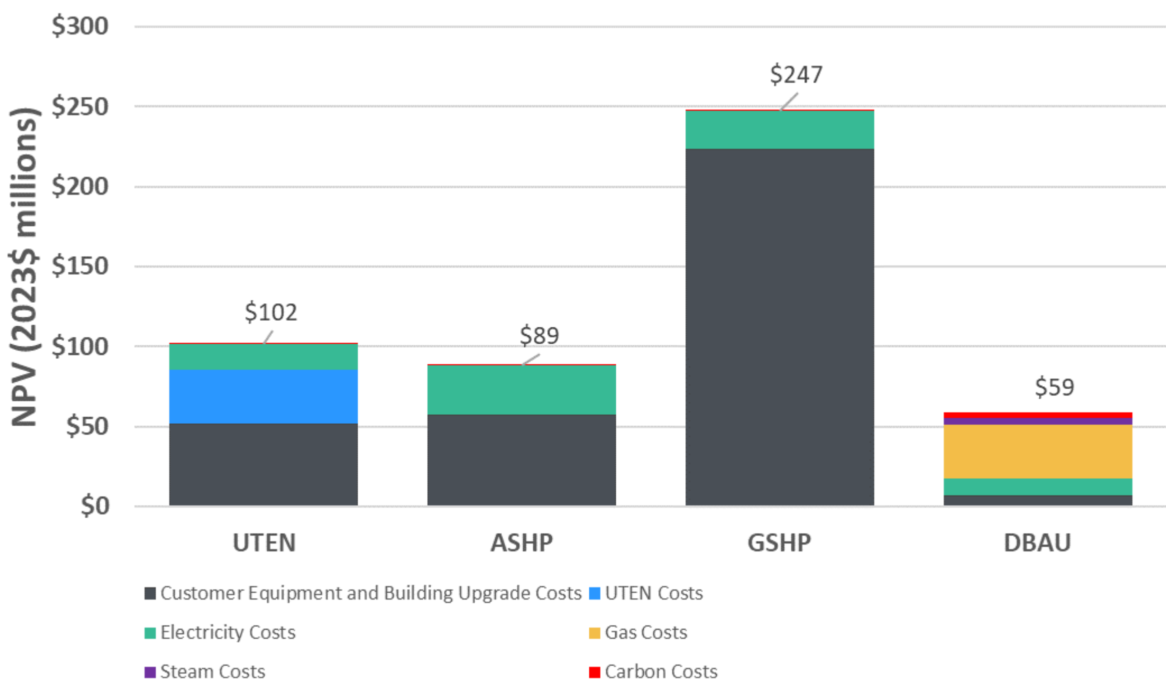
Figure 7. Pilot-Scale Customer Lifecycle Cost Analysis Results[39]



The results of the Pilot-Scale Customer LCAs indicate that customer UTEN costs are lowest compared to the alternative heating and cooling solutions. Both the subsidies that the Pilot provides to cover customer equipment and building upgrades, and the bill cap on the UTEN costs (see Section X on Rate Design below) largely drive this result.

[39] 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 and building upgrades during the Pilot period, with customers paying for replacement costs over the 80-year analysis period.

Figure 8. Full-Scale Customer Lifecycle Cost Analysis Results



The Full-Scale Customer LCAs show that ASHPs are the lowest-cost electrification heating and cooling solution 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.

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[40] as regulatory assets and amortizing these expenses over 15 years. This generally aligns with the useful life of the customer-sided equipment that would also be partially funded via the Pilot.

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.[41] Potential customers currently heat with many different fuel sources, including district steam, 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 6 below, recovering the cost of the proposed Pilot would have a lower bill impact than if the Pilot was recovered from gas customers.[42]

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

[41] 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. Thermal Energy Network Proceeding, January UTEN Proposal, P.p. 17-18.

[42] 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).

Table 6. Comparison of Estimated Customer Bill Impact[43]

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 to 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.[44]

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 Pilot cease operating. Customer costs in this scenario would include the cost to restore heating and cooling after loss of UTEN infrastructure[45] 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.[46]

If the Company needed to 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.

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[43] Based upon current estimate of project costs.
[44] 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.
[45] The Company is mitigating this potential impact by keeping disconnected existing customer heating and cooling equipment in place wherever possible in its pilot design.
[46] The Company currently estimates the cost to close the Chelsea Project at $20-$25M. Final estimates will be developed during Stage 2. These costs are not included in the Budget in Section VII.

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.[47] If eligible, the Company will claim the credit(s) in accordance with IRS Normalization rules and provide the benefit to electric customers, when realized.[48]

[47] The Chelsea Project is unlikely to qualify for the Geothermal ITC because it does not have geothermal wells.
[48] The Company notes that the ITC is applicable for systems that are in service for five years. If 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.

X. RATE DESIGN

The Company described three unique conceptual UTEN rate structures to be tested for each of its three proposed pilot projects.[49] 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. The Chelsea Project conceptual rate design is described below. Further work will be needed to finalize each of the three rate designs during Stage 2 of the project design.

Rates

The Company's conceptual rate design for the Chelsea project aligns the UTEN cost drivers to incent customers to use the network efficiently and conserve energy, is understandable for a large multifamily customer like Fulton Houses and provides revenue-stability to 85 10th Avenue.

The conceptual rate has three components: a nominal monthly customer charge, a fixed monthly contract demand charge, and two variable volumetric commodity charges (one for heating and one for cooling). The monthly customer charge would mirror the Company's electric, gas, and steam rate designs and would offset monthly billing and metering costs associated with the UTEN. The fixed monthly contract demand charge would be based on the capacity of the system needed to meet NYCHA's heating and cooling needs. This charge would recover a portion of the revenue requirement associated with the upfront capital investment to install the UTEN system. Both the supplier (85 10th Avenue) and the consumer (Fulton Houses) will pay the network charge. The commodity rates would be separate flat volumetric (per kBTU of exchange) rates for heating and cooling. These rates will be based on the service being demanded (heating or cooling) and paid by

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[49] UTEN Proceeding, May 2023 UTEN Proposal, p. 38.

the customer receiving the energy, which, in this case, is NYCHA. The commodity rates paid to the waste heat source will be negotiated separately and included in the Data Center's UTEN Participation Contract.

This rate design is scalable to incorporate additional users and suppliers of waste heat and could serve as a template for future UTENs using waste heat to serve multifamily and commercial buildings.

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.[50] 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 such that the customer will be expected to have an equivalent effective heating and cooling bill on the UTEN as it would if they had remained on their existing equipment. Second, the Company will provide an additional layer of protection 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 the customer would have been had they remained on their existing equipment, and this will become the cap on the customer's UTEN bills. After a predetermined period has elapsed (*e.g.*, one year), the Company will calculate the customer's realized bills for UTEN heating and cooling and compare that cost to

[50] 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.

the Bill Cap. If the realized bills are higher than the Bill Cap, the Company will refund the incremental cost to the customer.[51]

NYCHA will be the only customer or record taking heating and cooling service from the UTEN. The Company will work with NYCHA so that NYCHA energy costs charged to residents during the Pilot remain at or below the costs the residents would otherwise be charged absent the UTEN's implementation. Housing affordability remains a priority in the implementation of the Company's clean energy offerings.

The Company will provide the Thermal Resource similar protections by establishing a mechanism that guarantees any charges the data center incurs for using the UTEN infrastructure are lower than the revenue it generates from providing waste heat to the UTEN.

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.[52]

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[51] Such refunds would be considered costs to be recovered as described in Section IX above.

[52] 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 7. 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
	  ○ Comparison of UTEN system cost to individual customer-owned geothermal or air source heat pump installations
	  ○ Cost performance with varying levels of energy efficiency upgrades, if applicable
	  ○ 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:
	  ○ Per customer basis
	  ○ Per unit output basis
	  ○ Maximum system output basis
	• Company's system operating expenses on a:
	  ○ Per customer basis
	  ○ Per unit output basis
	  ○ 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 provided 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, and Steam 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 and steam service to the customer.
- **Waste Heat –** The Company will enter into an agreement with the customer for access and use of the customer or third-party owned thermal resource to transfer energy to the Company's thermal energy network.
- **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.[53]
- **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 Chelsea Project is unwound at the end of the Pilot period, the Company could:

[53] The Company will implement backup options for two types of outages: (1) if the clean thermal energy supply from the 85 10th Avenue data center were to go offline; and (2) if the entire UDS were to become temporarily unavailable (*e.g.*, unrelated street work accidentally damages pipes or mains). In either type of outage, a Con Edison steam shell and tube heat exchanger installed at the Energy Center would provide emergency backup heat to the Customer Equipment.

- Sell the Company-owned UTEN equipment to a third party or to one of the major customers on the system to continue providing the system service; or
- Decommission the UTEN infrastructure in the public right of way by removing the 85 10th Avenue heat exchanger equipment. Existing building cooling tower and chiller systems would provide full cooling capacity. Fulton Houses would own the equipment within its property boundary and use district steam service via a heat exchanger as the primary thermal source for their heat pumps, allowing both the DHW and VRF systems to remain in operation.

Customer Engagement Plan

The Company prioritizes customer 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 $250,000 for the Chelsea 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 develop a Final Customer Engagement Plan tailored to meet the needs of the Disadvantaged Community and residents served by the Chelsea Project. During Stage 2 of the Pilot, the Company will work with NYCHA to commence outreach efforts with individual residents and tenants in the buildings connecting to the UTEN. Engagement will initially focus on background information and education about UTENs. It will then evolve into education about how the UTEN benefits and affects Pilot participants and residents and will cover elements of the Customer Protection Plan as well. Additionally, the Company will host a series of webinars and in-person community information sessions to increase resident 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 Chelsea Project with community stakeholders. Stakeholders for the Pilot may include: individual residents, elected officials, local chambers of commerce, business improvement districts, local development corporations, not-for-profit community-based organizations, government entities such as community boards and the New York City Housing Authority, community housing associations, block associations, tenant associations, and residents living in the surrounding areas. The Company intends 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 Chelsea 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 NYCHA residents and the local community.

In addition to the outreach methods listed above, the Company will use marketing tactics to secure resident support for 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 in the Pilot buildings, as well as nearby buildings, 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 and State goals, and it should be visible and attractive to customers, residents, tenants, and passersby.

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.[54] While the UTEN customers of record in the Chelsea Project will be the Data Center and NYCHA, not individual residents, the Company will apply the Public Service Law requirement to the information it provides to residents as well. Materials at a

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[54] N.Y. Public Service Law § 44(4). Spanish is the only language that meets these thresholds in Con Edison's service territory.

minimum will be in both English and Spanish, and the Company will also evaluate use of other languages as needed.[55]

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

[55] *See*, Population and Languages of the Limited English Proficient ("LEP") Speakers by Community District | NYC Open Data (cityofnewyork.us).

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. Manhattan Project Locations

Figure A.2. Chelsea Project Building Locations

Figure A.3. Elements of the Chelsea Project UTEN

Figure A.4. Chelsea Project Building One-Line Diagram

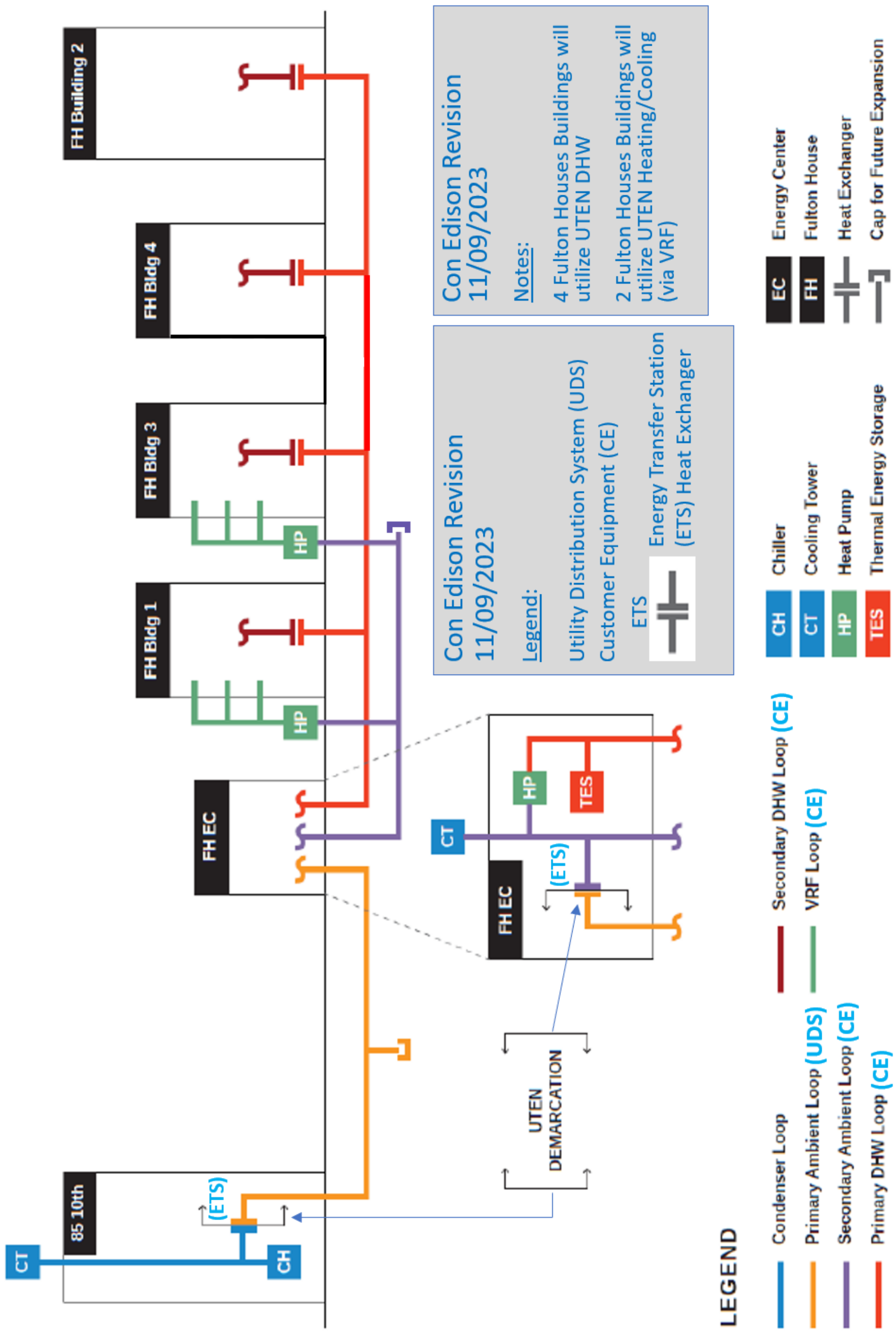
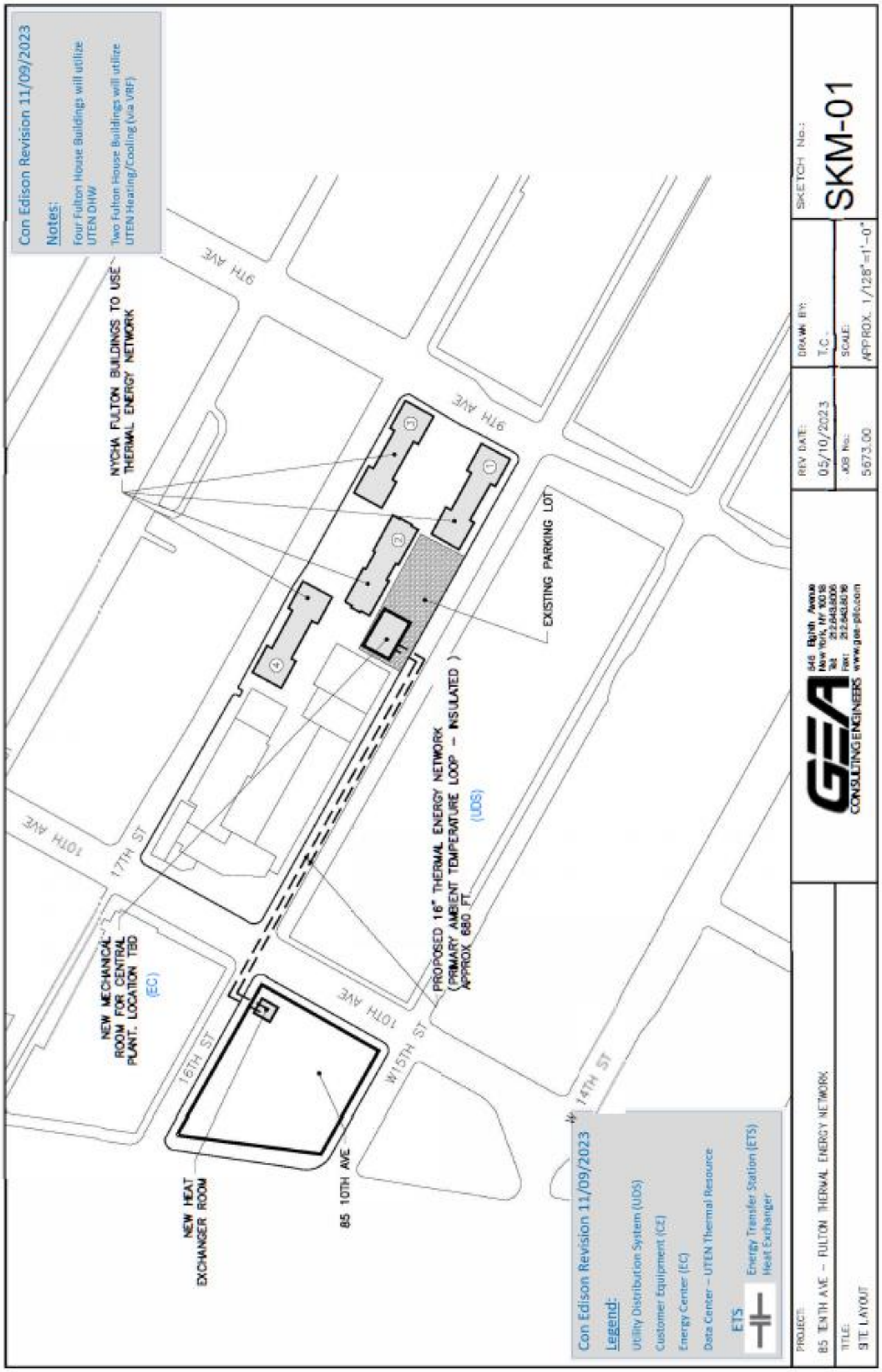


Figure A.5. Chelsea Project – Street One-Line Diagram



STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Figure A.6. Chelsea Project – Fulton Houses Street One-Line Diagram

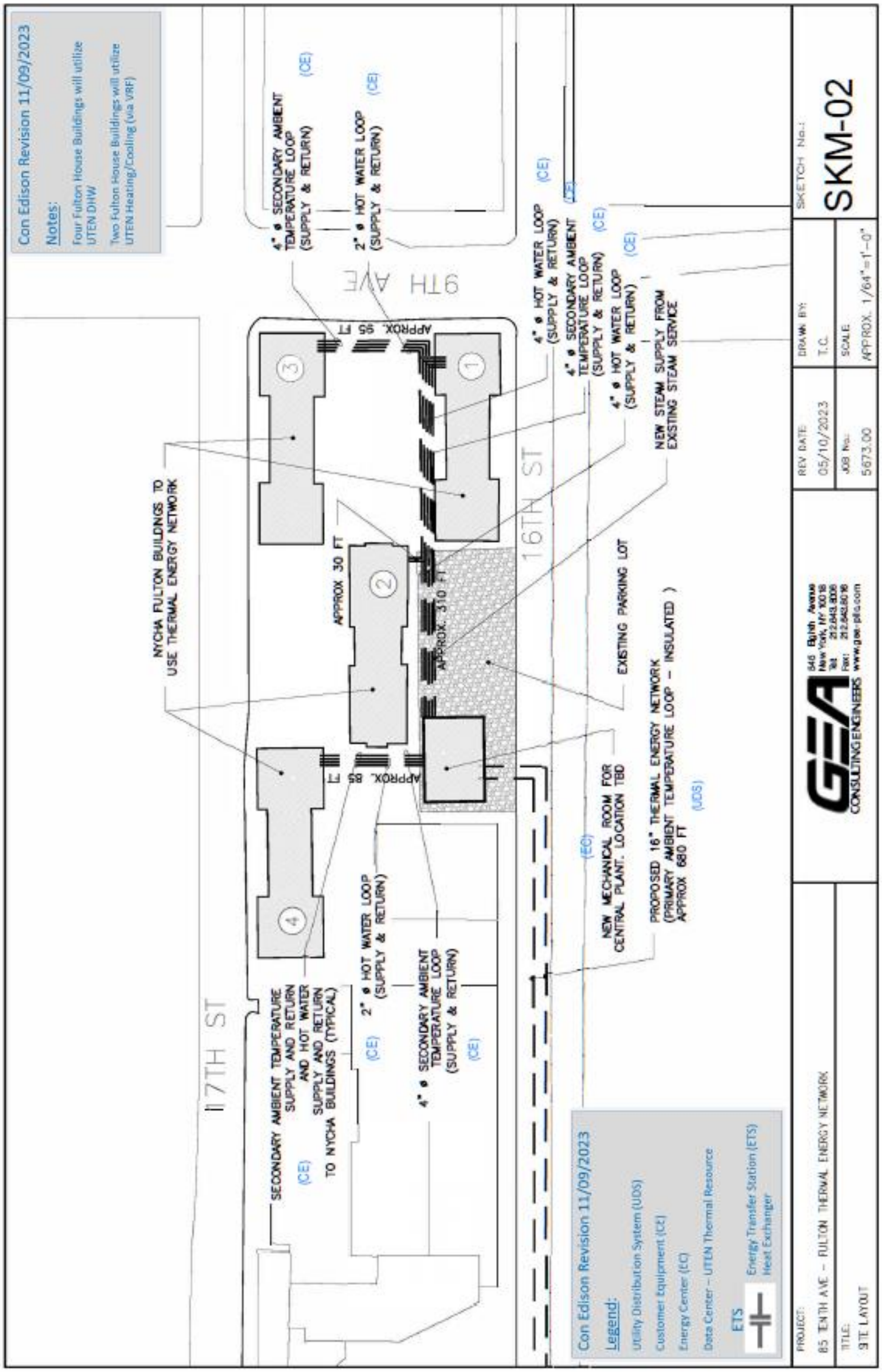


Figure A.7. Chelsea Project – Detailed Building One-Line Diagram

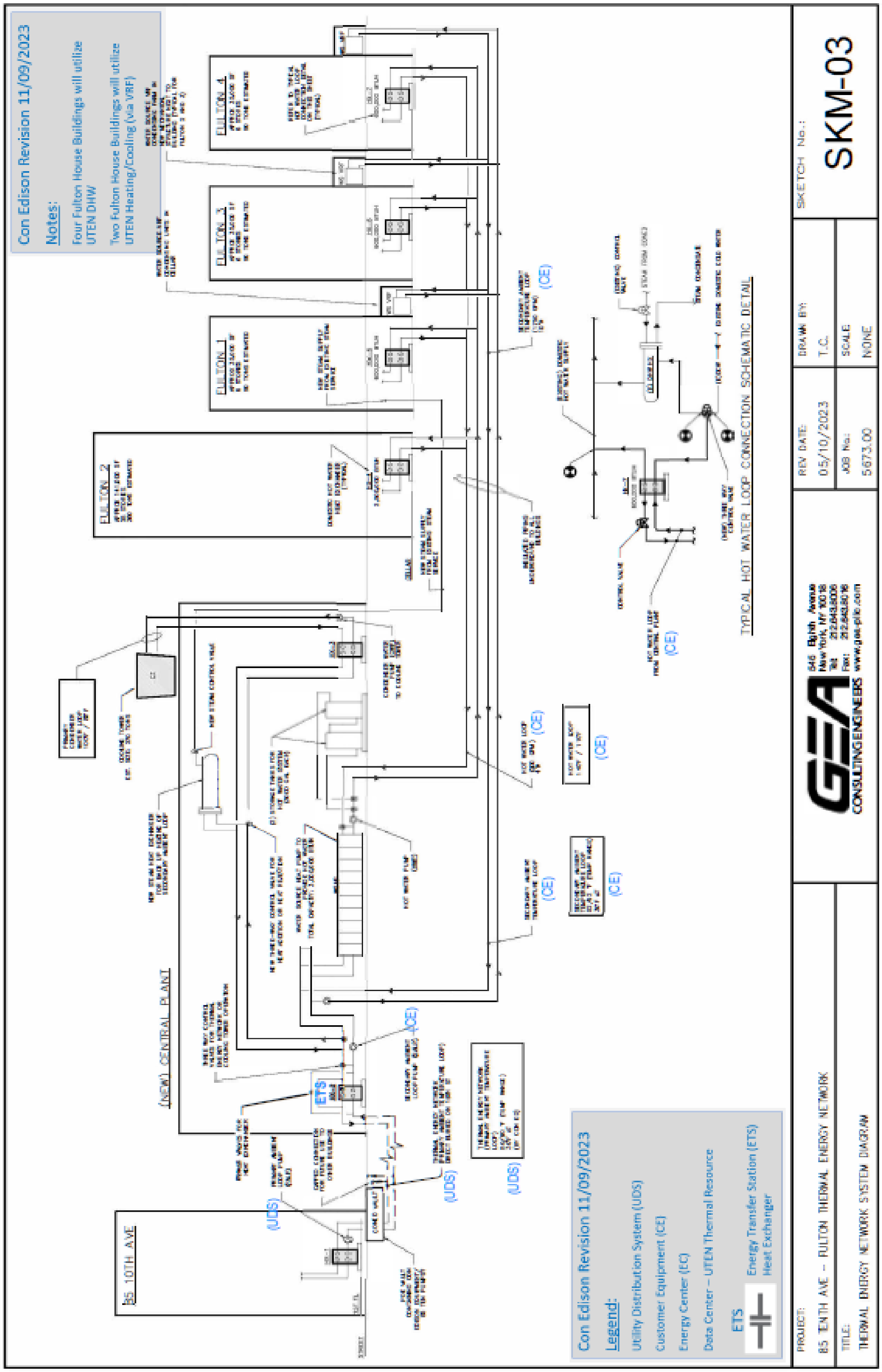


Figure A.8. Chelsea Project – Central Plant One-Line Diagram

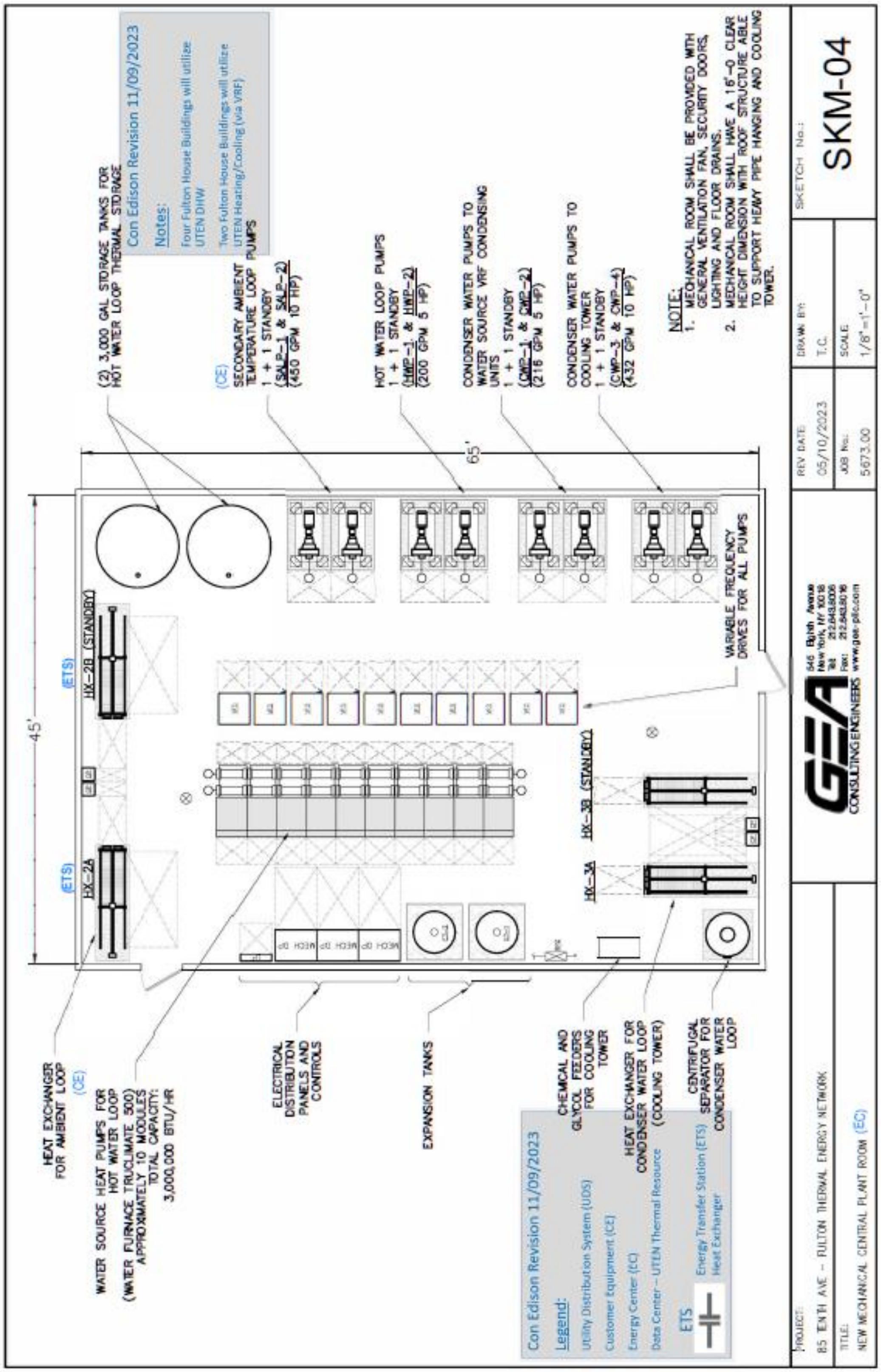
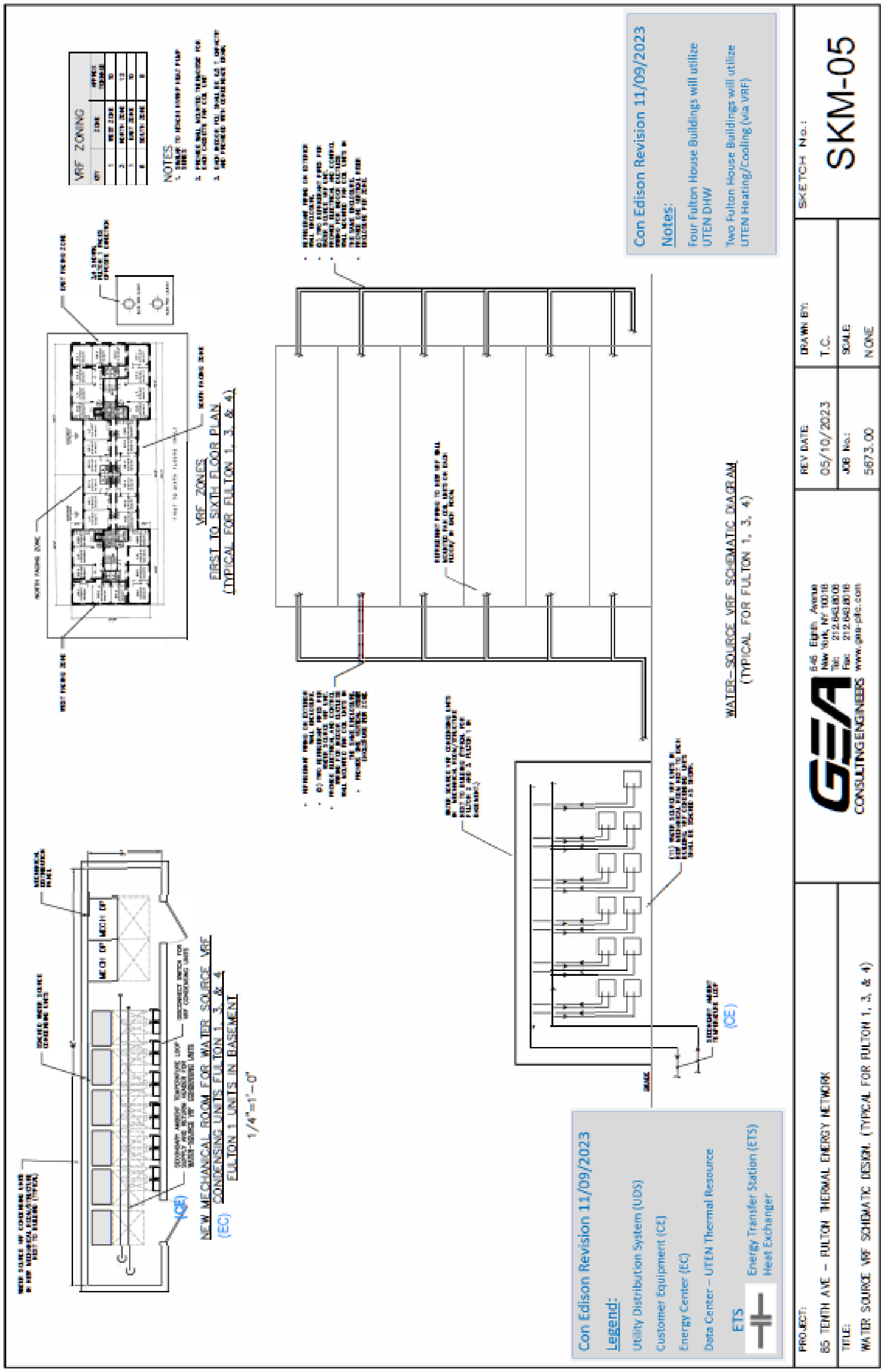


Figure A.9. Chelsea Project – VRF System One-Line Diagram



APPENDIX B – LETTERS OF SUPPORT

B.1. NYCHA and Essence Chelsea Project Letter of Support

NEW YORK CITY HOUSING AUTHORITY
90 CHURCH STREET • NEW YORK, NY 10007
TEL: (212) 306-3000 • nyc.gov/nycha

ESSENCE DEVELOPMENT
6 GREENE STREET, SUITE 600 • NEW YORK, NY 10013

August 7, 2023

Dear Secretary Phillips:

The New York City Housing Authority (NYCHA) and Essence Development (Essence) jointly submit this letter to express their continued support of the Con Edison utility-owned thermal energy network (UTEN) at NYCHA Fulton Houses, including the proposed scope changes set forth above. Recently, a survey of NYCHA residents indicated the preference to rebuild the Fulton Houses campus, rather than undergo a major retrofit. In future redevelopment, the goal for NYCHA Fulton Houses is to eliminate the use of fossil fuels and connecting the UTEN to existing buildings will allow for immediate reduction of fossil fuel use. NYCHA and Essence support the reduction in scope described by Con Edison wherein two buildings are retrofitted with variable refrigerant flow (VRF) systems, rather than three buildings. NYCHA and Essence further confirm that the rebuild should not impact the timeline of operating the UTEN in existing buildings for the planned five-year pilot period. Planning and design of the new site is underway and demolition of the buildings that will be connected to the UTEN is not scheduled to begin until 2030 at the earliest.

In addition to the operation of the UTEN in existing buildings, NYCHA and Essence are committed to integrating the UTEN and its Energy Center into the newly constructed buildings' design as part of the Fulton Houses rebuild. NYCHA and Essence plan to build a fully electric campus and UTENs can help achieve this goal by efficiently electrifying these buildings, reducing average and peak electricity demand compared to air source heat pumps. Therefore, NYCHA and Essence will design the new buildings to be UTEN-ready, capable of interconnecting to the UTEN infrastructure for heating, cooling, and/or domestic hot water. Further, the site of the UTEN Energy Center was selected purposefully to preserve the building during rebuild, meaning it will not be impacted by construction. Should the pilot prove successful with the system functioning as designed, the newly constructed buildings impacted by the pilot will be connected to the UTEN, leveraging Energy Center and other existing infrastructure to maximize its utility and long useful life. There are opportunities to expand the UTEN, as well, to integrate additional sources of recycled excess heat and provide thermal energy to additional buildings on the Fulton Houses campus.

For all of these reasons, NYCHA and Essence respectfully urge the Commission to approve this project.

Respectfully Submitted,

Vlada Kenniff, Ph.D.; Senior Vice President for Sustainability at NYCHA

Jamar Adams, Founder and Managing Principal, Essence Development

B.2. NYCHA Chelsea Project Letter of Support

NEW YORK CITY HOUSING AUTHORITY
NEW YORK CITY HOUSING AUTHORITY
23-02 49th AVENUE • LONG ISLAND CITY, NY 11101
TEL: (212) 306-3000 • http://nyc.gov/nycha

February 15, 2023

Gregory Koumoullos
Consolidated Edison Company of New York, Inc.
4 Irving Place
New York, NY 10003

SUBJECT: Letter of Support for Con Edison Utility Thermal Energy Networks (UTEN) Pilot Project

Mr. Koumoullos,

The intent of this letter is to express our preliminary interest and support of the Zero Carbon Mile (ZCM) proposed thermal energy network pilot project along and in the vicinity of the High Line in the neighborhood of Chelsea in Manhattan. The ZCM is a compelling initiative that aligns with New York City Housing Authority's (NYCHA) commitment to decarbonization of the built environment and energy infrastructure systems.

NYCHA is one of the largest owners and managers of public housing in the United States. NYCHA properties exist throughout New York City and in particular are located within proximity of the Zero Carbon Mile target UTEN zone along the High Line. Specifically, the Fulton Houses NYCHA property is located across the street from 111 Eighth Avenue, a critical source of renewable heat for the proposed Zero Carbon Mile concept.

Fulton Houses is somewhat in the middle of the High Line corridor and serves as a potential thermal energy customer anchor for the Zero Carbon Mile. Fulton Houses falls under the management framework of the Permanent Affordability Commitment Together (PACT) program, whereby a partnership between Essence Development and the Related Companies was formed to manage and rehabilitate the property. This represents a great opportunity to align the Zero Carbon Mile approach with in-building reinvestment planned via the PACT agreement. While there is strong conceptual alignment between our organizations and the Zero Carbon Mile team, additional technical and financial due diligence is required before we can fully commit to supporting thermal energy network infrastructure at or near Fulton Houses.

If the Zero Carbon Mile team is successful in being selected as one of the thermal energy network pilot projects, NYCHA would be pleased to support Zero Carbon Mile efforts to develop and expand a neighborhood thermal energy network in Chelsea. We look forward to learning more about this opportunity with the Zero Carbon Mile team and Con Edison.

Sincerely,

Vlada Kenniff
Senior Vice President of Sustainability | Asset & Capital Management Division

B.3. IGSHPA Chelsea 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

IGSHPA

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

B.4. NYLCV Chelsea Project Letter of Support

NYLCV
NEW YORK LEAGUE OF CONSERVATION VOTERS

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.

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[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.5. REBNY and NYECC Chelsea 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.

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 Chelsea 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 Chelsea 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 footprint for the Chelsea 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	• 2,500,000 sq. ft. served (9.5x the heated floor area of the Pilot) • 6,000 linear feet of distribution piping (3x the pipe length of the Pilot)
Thermal resources in the Full-Scale network	• Data centers • Load balancing with domestic hot water • Cooling towers
Customers participating in the Full-Scale network	• Large multifamily • Commercial

Energy Modeling

The Company used energy modeling to quantify the estimated peak load and energy usage of the Full-Scale Chelsea 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 and steam 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, gas, and steam consumption, summer and winter electric peaks, and relevant equipment capacities.

Table C.2. Energy Determinants

Category	UTEN	ASHP	GSHP	DBAU
Total Electricity (kWh)	4,813,607	8,121,364	7,386,173	2,883,708
Winter Electric Heating Peak (kW)	2,190	6,576	3,646	-
Summer Electric Cooling Peak (kW)	1,542	2,433	1,672	3,076
Data Center Capacity (kW-thermal)	13,500	-	-	-
Ground Loop Heat Capacity (kW-thermal)	-	-	15,541	-
UTEN Cooling Tower Capacity (kW-thermal)	8,300	-	-	-

Total Gas (kBTU)	-	-	-	85,013,985
Total Steam (kBTU)	-	-	-	8,032,936

Electricity, Gas, and Steam Costs

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 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 configuration 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, gas, and steam over the span of the lifecycle cost analysis.

Table C.4. Electricity, Gas, and Steam 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
Steam Supply	Aligned with Gas LTP Hybrid Pathway for DBAU analyses
Steam 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
Steam Supply	Aligned with Gas LTP Hybrid Pathway for DBAU analyses
Steam Delivery	Aligned with Gas LTP Hybrid Pathway for DBAU analyses

Customer and Societal Costs

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 Chelsea 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 Chelsea 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 Chelsea 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 steam 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

Customer Equipment and Building Upgrade Costs

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 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 • 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 • Additional $/sq. ft. cost for electrical upgrades • 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

Equipment Useful Life

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
Cooling tower	15 years	New York State Technical Resource Manual
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

Emissions Costs

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, 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,[56] adjusted to incorporate lifecycle emissions accounting.[57] 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.[58] Emissions rate over time is based on the Gas LTP
Steam emissions rate	Aligned with Gas LTP. Uses 2021 New York City GHG Inventory,[59] adjusted to incorporate lifecycle emissions accounting.[60] Emissions decline linearly to achieve carbon neutral steam production by 2040

<u>Results Calculation</u>

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

[56] *See*, https://www.epa.gov/system/files/documents/2023-01/eGRID2021_summary_tables.pdf.
[57] 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.
[58] *See*, https://extapps.dec.ny.gov/docs/administration_pdf/ghgappxclcpaemissfctrs22.pdf.
[59] *See*, https://climate.cityofnewyork.us/initiatives/nyc-greenhouse-gas-inventories/.
[60] Assumes all steam emissions come from gas. Uses upstream and downstream emissions factors for gas. Increases NYC GHG inventory 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.

Customer	14%	Blend of rates adjusted for inflation for different customer segments from the NYSERDA 2023 Potential Study

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

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

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs[61]	$50,930,000	$6,910,000	$21,220,000	$1,180,000
UTEN Capital Costs[62]	$30,210,000	$0	$0	$0
UTEN O&M Costs[63]	$8,610,000	$0	$0	$0
UTEN Portfolio Administration Costs[64]	$12,390,000	$0	$0	$0
Electricity Costs[65]	$6,930,000	$21,680,000	$12,110,000	$1,560,000
Gas Costs	$0	$0	$0	$0
Steam Costs	$0	$0	$0	$18,370,000
Social Cost of Carbon	$90,000	$160,000	$140,000	$170,000
Total	**$109,160,000**	**$28,750,000**	**$33,470,000**	**$21,280,000**

[61] Customer costs are all costs related to purchase, installation and replacement of customer heating and cooling systems. These include Con Edison payment of initial customer equipment and building upgrade costs, estimated to cost $45.1 million. Customers would pay for replacement costs over the 80-year analysis period.
[62] UTEN capital costs include loop construction, the Energy Center, heat exchangers, BTU meters, supplemental cooling equipment, and engineering design and implementation. The Societal analyses exclude state taxes.
[63] UTEN O&M costs include revocable consent for piping, system maintenance, and energy costs for loop operations.
[64] UTEN portfolio administration costs include administrative costs shared among all UTEN projects, including customer operations, billing, UTEN team labor, and central construction support.
[65] Electricity, Steam, and Gas costs are the supply and delivery system costs associated with the operation of customer equipment and the UTEN.

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

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs	$50,850,000	$61,110,000	$186,080,000	$10,820,000
UTEN Capital Costs	$45,760,000	$0	$0	$0
UTEN O&M Costs	$21,990,000	$0	$0	$0
UTEN Portfolio Administration Costs	$1,900,000	$0	$0	$0
Electricity Costs	$69,010,000	$161,200,000	$103,200,000	$49,400,000
Gas Costs	$0	$0	$0	$162,360,000
Steam Costs	$0	$0	$0	$16,090,000
Social Cost of Carbon	$90,000	$160,000	$140,000	$10,860,000
Total	**$189,600,000**	**$222,470,000**	**$289,420,000**	**$249,530,000**

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

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs[66]	$50,000	$6,340,000	$22,990,000	$730,000
UTEN Costs[67]	$1,940,000	$0	$0	$0
Electricity Costs	$1,800,000	$4,100,000	$2,900,000	$320,000
Gas Costs	$0	$0	$0	$0
Steam Costs	$0	$0	$0	$3,950,000
Carbon Costs	$60,000	$120,000	$100,000	$120,000
Total	**$3,850,000**	**$10,560,000**	**$25,990,000**	**$5,120,000**

[66] Customer equipment and building upgrade costs assume that Con Edison subsidizes customer equipment, building upgrades, and energy efficiency during the Pilot period. Customers would pay for replacement costs over the 80-year analysis period.
[67] 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.

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

Cost Category	UTEN	ASHP	GSHP	DBAU
Customer Equipment and Building Upgrade Costs	$51,800,000	$57,670,000	$223,480,000	$7,310,000
UTEN Costs	$33,900,000	$0	$0	$0
Electricity Costs	$16,110,000	$30,830,000	$23,790,000	$10,130,000
Gas Costs	$0	$0	$0	$33,910,000
Steam Costs	$0	$0	$0	$4,050,000
Carbon Costs	$50,000	$90,000	$80,000	$3,450,000
Total	**$101,860,000**	**$88,590,000**	**$247,350,000**	**$58,850,000**