

BEFORE THE STATE OF NEW YORK PUBLIC SERVICE COMMISSION

<p>Petition of Consolidated Edison Company of New York, Inc. for Authorization and Cost Recovery for Early Deployment Steam Decarbonization Projects and a Low-Carbon Fuels Pilot Program</p>	<p>Case No. _____</p>
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PETITION OF CONSOLIDATED EDISON COMPANY OF NEW YORK, INC. FOR AUTHORIZATION AND COST RECOVERY FOR EARLY DEPLOYMENT STEAM DECARBONIZATION PROJECTS AND A LOW-CARBON FUELS PILOT PROGRAM

CONSOLIDATED EDISON
COMPANY OF NEW YORK, INC.

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I. INTRODUCTION

Over the last 30 years, Con Edison has reduced steam system greenhouse gas emissions by more than 40 percent—and it plans to do even more.¹ As part of its Clean Energy Commitment, the Company has set a goal of achieving net-zero greenhouse gas emissions from its steam system by 2050.² Reduced emissions from the Company’s steam system will help the state make progress towards the goals of the Climate Leadership and Community Protection Act (Climate Act),³ and assist steam customers seeking to comply with the requirements of New York City Local Law 97.⁴

To advance toward its net zero goal, Con Edison has planned four early deployment steam

¹ Con Edison, *The Evolution and Future of the Con Edison Steam System* (2021), https://www.nyiso.com/documents/20142/33938587/20221021%20-%20Steam%20Future%20Overview_NYISO%20%28002%29.pdf/a9d573bd-c5d2-fae1-80ae-112e014dbe9c

² Con Edison, Clean Energy Commitment, <https://www.coned.com/en/our-energy-future/our-energy-vision/our-energy-future-commitment> (last visited May 12, 2025).

³ Chapter 106 of the Laws of 2019.

⁴ Local Law No. 97 (2019) of City of New York; codified at N.Y.C. Admin. Code §§ 28-320 and 28-321.

projects (Early Deployment Projects) and a steam low carbon fuels pilot program that will procure locally-sourced renewable natural gas from developers such as the New York City Department of Environmental Protection for use in generating steam. The Early Deployment Projects, which the Company estimates will cost \$332 million, are: 1) an industrial electric-powered heat pump at the East River Generating Station, 2) an electric boiler at the 74th Street Generating Station, 3) a thermal energy storage system to complement the electric boiler at the 74th Street Generating Station, and 4) a steam digital optimization system software tool (Steam Digital Optimization Solution). These projects will decrease onsite steam system emissions by an estimated 12 percent in 2030 and an estimated 23 percent by 2040, and provide a net increase in capacity of 300 Mlb/hr, which is three percent of the current net capacity.⁵ These projects are also scalable and compatible with all future decarbonization scenarios for the electric and gas systems.⁶ Together with the low carbon fuels pilot, the Company's Early Deployment Projects are expected to reduce carbon emissions by 33 percent by 2040, marking a significant step towards our goal of zero direct greenhouse gas emissions by 2040. Detailed carbon emissions reduction estimates are provided in Exhibit A.

Pursuant to the project approval mechanism included in the Joint Proposal for the current rate plan,⁷ The Commission should authorize Con Edison to build and recover the costs for the Early Deployment Projects,⁸ and to implement the low carbon fuels pilot program.⁹ First, these initiatives will help New York achieve its clean energy goals under the Climate Act. Second, they will benefit customers by providing a cost-effective, minimally invasive pathway that avoids disruptive and costly

⁵ 10,873 Mlb/hr including the Brooklyn Navy Yard Cogeneration Partnership.

⁶ Con Edison, Decarbonization Study and Implementation Plan (filed December 27, 2024; Case 22-S-0659).

⁷ The Joint Proposal for the current rate plan includes a "Future Decarbonization Project Approval Mechanism," which authorizes the Company to petition the Commission for approval and funding of future decarbonization projects (Case 22-S-0659, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, Order Adopting Terms of Joint Proposal at 16, 20 (Nov. 16, 2023) (hereinafter Order Adopting Joint Proposal).

⁸ As discussed later in this petition, the Company requests recovery through a surcharge if the projects are put into service prior to inclusion in a Company rate plan and/or recovery through base rates in a subsequent rate order.

⁹ The proposed tariff changes necessary to implement the low carbon fuels program are in Exhibit C.

building retrofits, thereby reducing building emissions and managing obligations and liabilities under New York City Local Law 97. Third, they will establish a foundation for future decarbonization investments.¹⁰ The Commission should also approve the request by its September 18, 2025, meeting, so that the Company may begin preliminary engineering work, procure long lead-time equipment, and execute contracts by the end of 2025 and bring the projects into service by 2030.

II. BACKGROUND

A. The Steam System

Con Edison's steam system comprises 105 miles of steam piping that provides service to nearly three million people who work, live, and visit Manhattan, from Battery Park to 96th Street on the West Side and 89th Street on the East Side. It produces steam and electricity at six generating facilities,¹¹ as shown in Figure 1. Each facility, except for the Brooklyn Navy Yard, is owned by Con Edison.

¹⁰ As mentioned by the Commission, the experience and lessons learned from earlier projects can be incorporated into subsequent projects (Order Adopting Joint Proposal at 20).

¹¹ This includes the Company's steam purchase contract with Brooklyn Navy Yard Cogeneration Partners (BNYCP).

Figure 1. Con Edison District Steam System Service Territory & Generation Stations



B. State and City Clean Energy Policy

The Climate Act directs that 70 percent of New York State's electricity must come from renewable sources by 2030 and be 100 percent zero emission by 2040. It requires an 85 percent reduction in economy-wide carbon emissions from 1990 levels by 2050, with an interim target of a 40 percent reduction by 2030. Additionally, New York City Local Law 97 imposes increasingly stringent annual carbon emission limits on large buildings, with financial penalties for non-compliance. Local Law 97 mandates that most buildings over 25,000 square feet begin reducing emissions in 2024,

aiming for net-zero emissions by 2050.

Con Edison recognizes the critical importance of addressing climate change and supports the goals of the Climate Act and Local Law 97. Indeed, the Climate Action Council's Final Scoping Plan envisions a role for a decarbonized steam system.¹² The Company's Clean Energy Commitment outlines the actions it intends to take to support the climate goals set by the City and State. The Clean Energy Commitment includes the goal of achieving zero direct greenhouse gas emissions from Company-owned electric-generating units on our steam system by 2040 and overall net-zero direct greenhouse gas emissions from Company operations by 2050.¹³

C. Steam Operations Decarbonization Study and Implementation Plan

On December 27, 2024, Con Edison published a Steam Operations Decarbonization Study and Implementation Plan that evaluated the potential role of the steam system in helping the State and City achieve their climate-related policies and legislation, such as the Climate Act and Local Law 97.¹⁴ The Decarbonization Study and Implementation Plan assessed three pathways to decarbonization and determined that electric-driven steam generation assets are the best option in the near term. The findings from the Decarbonization Study and Implementation Plan are the foundation of the Early Deployment Projects and will be used to aid the development of future decarbonization investment strategies for steam and electric generation.

In the Steam Decarbonization Study and Implementation Plan, the Company committed to petition the Commission for approval of these projects. The Company's current rate plan specifically authorizes the Company to petition the Commission for approval of proposed future decarbonization

¹² Order Adopting Joint Proposal at 13 (citing the Final Scoping Plan, p. 176, n. 210, p. 178).

¹³ Con Edison, Clean Energy Commitment, <https://www.coned.com/en/our-energy-future/our-energy-vision/our-energy-future-commitment> (last visited May 21, 2025).

¹⁴ The Company conducted the Study and developed the Implementation Plan pursuant to the Joint Proposal for the current rate plan on December 27, 2024 (Order Adopting Joint Proposal at 17).

projects of various types, scopes, and maturity levels.¹⁵ The rate plan requires that any such petition include a discussion of factors such as project design, location, feasibility, costs, and anticipated emissions reductions, and ability to contribute to achieving the Climate Act's targets.¹⁶ These factors are discussed generally within the body of this petition and detailed in each project's whitepaper in Exhibit B.

III. PROPOSED PROJECTS AND PROGRAM

This petition proposes funding for the design, construction, and commissioning of the four Early Deployment Projects at a cost of \$332 million. Detailed descriptions and cost estimates for each project are included in the attached whitepapers. The industrial heat pump, electric boiler, and thermal energy storage projects will provide efficiency, flexibility, and the ability to respond to a fluctuating electric grid. The Steam Digital Optimization Solution will facilitate the integration of new decarbonized production assets, such as the electric boiler, industrial heat pump, and thermal energy storage projects, into the current system. The low-carbon fuels pilot program will focus on procuring renewable natural gas.

With these Early Deployment Projects and low-carbon fuels pilot program, the Company can further reduce steam system emissions in the near term, assist the State and City in achieving their clean energy and greenhouse gas emissions reduction targets, and eventually, as demonstrated in the Steam Decarbonization and Implementation Plan, decarbonize the entire steam system. The Early Deployment Projects will also establish a foundation for future investment by the Company.

In addition, steam customers who are subject to Local Law 97 could benefit from the emissions reductions and corresponding reduced emissions penalties with a more cost-effective pathway to

¹⁵ The Joint Proposal for the current rate plan includes a "Future Decarbonization Project Approval Mechanism," which authorizes the Company to petition the Commission for approval and funding of future decarbonization projects (Order Adopting Joint Proposal at 16, 20).

¹⁶ Case 22-S-0659, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, Joint Proposal at 35 (September 1, 2023).

decarbonization than electrification. The Electrification Challenges in Dense Urban Environments study,¹⁷ found it would cost buildings 3-4 times more to electrify than to remain on the steam system for heating. Decarbonizing Con Edison's steam system provides other benefits, such as facilitating historical building preservation and centralization of decarbonization activities, which is preferable to relying on shifting individual customer behavior or relying on customer investments, particularly for buildings requiring substantial intervention for electrification of heating.

A. Description of Early Deployment Steam Decarbonization Projects

1. Industrial Heat Pump

The Company proposes a 35 MWe industrial heat pump project at the East River Generating Station. This project combines electric powered industrial heat pumps and mechanical vapor recompressors for district heating 50 MWth (150,000 lb/hr) of 400 psi steam to the steam distribution system, requiring 28 MW - 35 MW of electricity depending on the season, with a coefficient of performance of 1.5-2. The heat source for the heat pumps will be river water and electricity will be supplied from existing units at the station. The project has an estimated cost of \$146 million. If approved, the project will take up to four years to become operational. The industrial heat pump project will reduce emissions by decreasing the use of a natural gas package boiler that produces the same amount of steam. The Company will track and report on the heat pump project's electrical usage to determine its performance and the associated avoided natural gas.

2. Electric Boiler

The Company proposes a 50 MW electric boiler project at the 74th Street Generating Station. Electric boilers are a mature technology used for district heating in North America and Europe

¹⁷ Case 22-S-0659, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, "Electrification Challenges in Dense Urban Environments Study" (filed with the Records Access Officer for confidential/trade secret status on August 8, 2024).

including in Boston, Massachusetts and Copenhagen, Denmark. They offer benefits over traditional boilers, including quick startup and ramp rates and, if available, leverage electricity generated from renewable resources. The proposed boiler will provide 50 MWth (150,000 lb/hr) of 400 psi steam to the distribution system, requiring up to 50 MW of electricity from the 75th Street Substation. The proposed boiler can be operated using existing capacity and electric service at the site. Con Edison estimates that the project will cost \$50 million, based on competitive bidding for the boiler and auxiliary equipment. If approved, the project will take up to three years to become operational. The Company will monitor the boiler's electricity usage and ramp rate to assess its impact on the local electric network. The electric boiler will be an interruptible load facility, able to be shut down and replaced with alternate fueled boilers, as needed. Emissions reduction will come from reduced use of a natural gas package boiler (the Company will monitor the natural gas avoided).

3. Thermal Energy Storage

The Company proposes a 50 MWe thermal energy storage project at the 74th Street Generating Station to support decarbonization, flexibility, and resilience. Thermal energy storage is an important component of decarbonization. It enables cost reduction by charging with lower cost, lower emissions off-peak electricity and providing load relief during times of high demand. The proposed thermal energy storage system will provide up to 22 MWth (67,000 lb/hr) of 400 psi steam for 12-15 hours, charged from the 50 MWe feed supplying the electric boiler. Similar to the electric boiler, the electricity will be supplied from the 75th Street Substation. Con Edison estimates that the project will cost \$128 million. Con Edison has applied for \$20 million in funding for the project from the Department of Energy (DOE); and has won a \$5.35 million grant from the New York State Research and Development Authority (NYSERDA), that is contingent upon obtaining the DOE grant, which, if awarded, would reduce the needed cost recovery for this project. Construction of the thermal energy storage project is expected to take four years to become operational.

The thermal energy storage unit offers flexibility, operating as a peak shaving or emergency response unit. The steam system's ability to use thermal energy storage strategically will reduce overall electric system peak impact. It will be especially helpful for New York City's electric grid,¹⁸ which is already facing substantial demand growth. An optimized dispatch that leverages assets such as thermal energy storage can reduce electric load when the electric grid is most constrained. While electric and steam peaks are expected to occur on the same day during the winter, they are not projected to happen at the same time of day, even after accounting for building electrification. Therefore, the steam system could discharge thermal energy storage during the electric peak, reducing the need for grid-supplied power. By mitigating electric peak demand, thermal energy storage will also reduce the required electrical transmission and distribution upgrade investment associated with widespread electrification.

Thermal energy storage is expected to have minimal impact on the electric network. It will share electricity with the electric boiler and will be coordinated to minimize grid impact while meeting steam requirements. The Company will monitor the system's electric charging, steam ramp rate, and emissions reduction.

The project also includes a 2 MWe steam turbine to demonstrate electricity generation from thermal energy storage, which would provide electric load relief during peak times to the electric distribution system. Load relief can help minimize the cost of producing electricity for electric customers.¹⁹

4. Steam Digital Optimization Solution

The Company seeks funding to develop and integrate software to optimize steam system operations. The Steam Digital Optimization Solution is a comprehensive business intelligence system designed to be the central hub for the steam system's vertically integrated operations. It will facilitate

¹⁸ New York Independent System Operator's Load Zone J.

¹⁹ If the NYSERDA and DOE grants are not received, Con Edison will remove the steam turbine and generator from the scope of the thermal energy storage project.

the integration of the electric boiler, industrial heat pump, and thermal energy storage projects, and will reduce the system's carbon emissions and provide fuel savings.

Sponsored by Con Edison's Research and Development Department, the initial assessment of the Steam Digital Optimization Solution was found to be feasible and beneficial, potentially resulting in significant fuel cost reductions and carbon emissions reductions. In 2024, Con Edison used a module of the proposed Steam Digital Optimization Solution software to support the Steam Decarbonization Study and Implementation Plan to model various factors to provide technical and economic projections. Con Edison estimates that the Steam Digital Optimization Solution will cost \$7.96 million. The Steam Digital Optimization Solution includes a strategic digital roadmap and three-year action plan, which features software modules for forecasting, energy production management, strategic investment design, network management, customer analytics, and a client portal for carbon analytics. Based on the Company's estimates, this project will provide annual fuel savings that will result in a payback period of about 2.2 years.²⁰

B. Low Carbon Fuels Pilot Program

The low carbon fuels pilot will procure low-carbon fuels for use in steam production. For the first pilot project, Con Edison will integrate local sources of renewable natural gas into Steam Operation's natural gas supply portfolio. The pilot will procure renewable natural gas from suppliers in New York City and Westchester County in lieu of conventional fossil natural gas supplies. The pilot will secure both the physical gas supply and its associated environmental attributes. Purchasing attributes will require the Company to pay a premium above the cost of fossil natural gas, and the incremental costs will be passed on to steam customers through the Fuel Adjustment Clause (FAC).

²⁰ For a further description of the Steam Digital Optimization Solution, please see the related whitepaper in Exhibit B. Further, the Company has additional details of the Steam Digital Optimization Solution in the confidential CECONY Steam Digital Optimization Solution (SDOS) Phase 1 Technical Report prepared by Optit Corp, the Steam Digital Optimization Solutions operations research expert.

The tariff changes required to permit the Company to implement the pilot are described in Exhibit C.

The Company has discussed procuring renewable natural gas with the New York City Department of Environmental Protection and other developers. The Company estimates local sources could supply about 10 percent of the steam system's annual fuel use (approximately 10,900,000 Dt) within 10 years. Following approval of the tariff revisions outlined in this filing, the Company will commence formal negotiations with these suppliers and, if appropriate, issue formal solicitations.²¹

C. Local Law 97 Emission Factors

Con Edison believes the Early Deployment Projects and renewable natural gas procurement are a cost-effective approach to supporting City and State decarbonization goals. Most of Con Edison's steam customers are subject to Local Law 97 emissions requirements and will face penalties unless they reduce the carbon emissions from their buildings. The New York City Department of Buildings currently estimates the 2030-2035 emissions of the steam system at 0.00004320 tCO₂e/kBTU. Con Edison will engage with the Department of Buildings on lowering future emissions coefficients based on the deployment of the Early Deployment Projects and procurement of local renewable natural gas. If emissions from the steam system are reduced, it may facilitate a downward adjustment to the emission coefficient applicable to steam customers under Local Law 97. This would allow steam customers to lower their carbon intensity and reduce penalties that would otherwise apply to their steam use.

IV. PROJECT TIMELINE & COST RECOVERY

The current steam rate plan includes a Future Decarbonization Project Approval Mechanism.²² Con Edison is petitioning under this mechanism rather than waiting for its next steam rate case to accelerate the timeline for deployment of these projects. This decision is driven by the needs of steam

²¹ At the same time as these efforts, the Company plans to discuss the appropriate emissions coefficient under Local Law 97 with the New York City Department of Buildings.

²² Order Adopting Joint Proposal at 16.

customers. Customers have repeatedly told the Company that they are concerned about potential Local Law 97 impacts on their buildings. The timing of project approval may also be important for the next Local Law 97 Advisory Board's recommendations of what emissions factors to prescribe for the steam system. Further, many of our customers have their own emissions reductions goals and have advocated that Con Edison accelerate its decarbonization efforts.

The Company requests approval of the Early Deployment Projects and low carbon fuels pilot by the Commission's September 18, 2025, meeting. For the Early Deployment Project, this will enable them to move forward with preliminary engineering in 2025 and allow the Company to potentially sign contracts by the end 2025. This sets up the full portfolio of projects to be successfully online by 2030 (timelines for each project are included in the whitepapers in Appendix B).

For the Early Deployment Projects, the Company proposes to start the procurement of long lead-time equipment, such as industrial heat pump main equipment, step-down transformers, and thermal energy storage bricks in 2025. All these items are estimated at a 2–4-year lead time due to manufacturing constraints and international shipping requirements.

Further, the Company proposes to competitively bid the electric boiler project in 2025, after which preliminary engineering will begin. For the industrial heat pump, preliminary engineering has started and will continue in 2025. Approval of this petition would allow full project development to begin in early 2026.

As noted above, the thermal energy storage project has been submitted for Department of Energy and NYSERDA grants with a specific vendor proposal. If grants are awarded for the thermal energy storage project, the Company would have strict time-to-implementation requirements and would need to proceed quickly with contracts. If grants are not awarded, the Company will competitively bid the thermal energy storage project.

Table 1 shows the timeline for the decarbonization projects in the proposal from their initiation

date to their forecasted completion (in-service) date.

Table 1 – Timeline of Proposed Decarbonization Projects

Decarbonization Projects	2025				2026				2027				2028				2029				2030			
	Q1	Q2	Q3	Q4																				
74th St Electric Boiler																								
East River Industrial Heat Pump																								
74th St Thermal Energy Storage																								
SDOS																								

With respect to cost recovery, the Company requests a surcharge to recover the carrying costs after the Early Deployment Projects are placed into service and until such costs are reflected in base rates. As noted in the table above, the earliest projected in-service date for an Early Deployment Project is 2028.

V. CONCLUSION

The proposed Early Deployment Projects and low-carbon fuels pilot program will help the State, City, and Company achieve their clean energy and greenhouse gas emissions goals, and will provide customers with cost-effective decarbonization solutions. They are a first step that will establish a foundation for additional, future decarbonization investments. Accordingly, Con Edison respectfully requests the Commission authorize the Company to build and recover the costs of the projects and approve the proposed tariff modifications as set forth herein.

New York, New York
May 21, 2025

Respectfully submitted,

/s/ Christian Malanga

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EXHIBIT A

Project Emissions Reductions

To estimate the emissions reductions from the Electric Boiler (EB), Industrial Heat Pump (IHP), and Thermal Energy Storage (TES) projects, which all use electricity as their fuel source, Con Edison calculated the emissions associated with fuel-switching from gas to electric and accounted for multiple electric grid emissions scenarios. The baseline for the emissions reduction assumes the technologies are offsetting the operation of existing fossil natural gas package boilers. The existing natural gas package boilers have an efficiency of 88% based on the past 5-year average of steam equipment operations data.

Table 1 below shows the potential annual emissions reductions from the proposed projects under three electric emissions rate scenarios:

- Scenario (A) assumes the Local Law 97 (LL97) electric GHG emission factor set for the 2030-2034 timeframe by the City of New York of 0.145 mtCO₂/MWh.
- Scenario (B) assumes the anticipated LL97 electric GHG emission factor for the 2035-2039 timeframe by the City of New York of 0.087 mtCO₂/MWh (based off a DOB presentation²³ regarding LL97 and calculating building emissions and emission limits).
- Scenario (C) is shown for reference purposes and assumes the electric grid has fully decarbonized in 2040 in alignment with CLCPA or that renewable energy credits (RECs) are procured resulting in an electric GHG emission factor of zero, 0 mtCO₂/MWh

The electric emissions rates used in the scenarios are aligned with the emissions rates established by the City of New York for LL97. There is, however, still a net emissions benefit for all projects under the scenarios where emissions are not zero due to the net total efficiency increase when compared to the forecasted electric emissions and efficiency of the baseline (fossil natural gas package boilers).

The table also displays the potential emissions reduction from using the Steam Decarbonization Optimization Solution (SDOS) business intelligence model. While the Company acknowledges that Climate Leadership and Protection Act (the Climate Act) uses a 20-year Global Warming Potential

²³ https://www.nyc.gov/assets/buildings/pdf/l197_emissions.pdf

(GWP) metric, the emissions reductions shown in this petition are based on 100-year GWP, except for the SDOS reductions. This approach is the standard approved by the Intergovernmental Panel on Climate Change and widely adopted in industry. It also correlates with the emissions coefficients used in LL97. The emissions reductions noted in the whitepapers (Exhibit B) are from Scenario A, the most conservative of the estimates. Actual emissions will be significantly influenced by the dispatch strategy of the district steam system and the annual electric emission rate. Further emission reductions could be achieved by optimizing and balancing dispatch decisions between economic factors and emission levels. Dispatch trends depend on the specific profile of each day (i.e., load, weather, asset condition and scheduled maintenance) and are highly sensitive to electric and fuel price assumptions and a variety of factors that could influence what an operator decides to dispatch in any given hour. Con Edison will continue to report actual steam system emissions annually.

Table 1. Electric Coefficient Scenarios- Early Deployment Project Emissions Reductions

	Electric Emissions Rate = LL97 Est. 2030-2034		Electric Emissions Rate = LL97 Est. 2035-2039		Electric Emissions Rate = 2040 NY Electric Policy	
Scenario:	(A)		(B)		(C)	
Electric Emissions Rate:	0.145 mtCO2/MWh		0.087 mtCO2/MWh		0 mtCO2/MWh	
Decarbonization Project	Est. Annual Emissions Reductions	% Reduction of Current Steam System Emissions*	Est. Annual Emissions Reductions	% Reduction of Current Steam System Emissions*	Est. Annual Emissions Reductions	% Reduction of Current Steam System Emissions*
	<i>mtCO2</i>	%	<i>mtCO2</i>	%	<i>mtCO2</i>	%
74th street Electric Boiler	17,900	2%	30,600	4%	49,600	6%
East River Industrial Heat Pump	54,000	6%	72,000	9%	99,000	12%
74th Street Thermal Energy Storage	6,000	1%	11,000	1%	20,000	2%
Project Total	77,900	9%	113,600	13%	168,600	20%

Decarbonization Project	Est. Annual Emissions Reductions	% Reduction of Current Steam System Emissions*
	<i>mtCO2</i>	%
Steam Digital Optimization Solution	27,000	3%

*Assumes electric assets offset runtime from gas-fired package boilers. Emissions reductions use a forecasted runtime of the assets in 2030.

Table 2 displays the projected emissions reductions from using renewable natural gas (RNG) in the Company’s fuel mix for steam production. Using RNG would offset the use of fossil fuel derived natural gas. Fuel oil was not chosen as the baseline fuel to be offset, as fuel oil is typically only a small portion of steam’s fuel mix annually, depending on weather and the occurrence of gas curtailments. The use of RNG is part of what the Company is considering for use within the steam system as a low-carbon fuels (LCFs). The Company is a founding member of the Low Carbon Resource Initiative that is assessing how clean fuels like RNG can help reduce greenhouse gas emissions. Although low carbon fuels like RNG are not currently part of the City’s plan for decarbonization due to their burner tip emissions, their classification may change if revisited, considering the overall lifecycle of the fuel.

Table 2. Emissions Reductions from Purchase of RNG for 10% of Gas Supply

Decarbonization Project	Est. Annual Emissions Reductions*	% Reduction of Current Steam System Emissions*
	<i>mtCO2</i>	<i>%</i>
Renewable Natural Gas	84,000	10%

*using 5-yr average steam system emissions

Table 3 shows that up to 188,900 tCO2 in emissions reductions can be achieved by 2035 using the LL97 prescribed electric emissions coefficient if each of the proposals contained in this petition are approved. The emissions estimates do not assume any interactive effects between the proposals. For example, the potential for the emissions reduction from RNG is not factored into the package boiler emissions baseline used for estimating the emissions reduction for the IHB, EB, and TES.

Table 3. Total Emissions Reduction from Early Deployment Decarbonization Projects & Low-Carbon Fuels Pilot Program

Decarbonization Projects	Est. Annual Emissions Reductions	Est. Annual Emissions Reductions	Est. Annual Emissions Reductions
Scenario:	<i>(A)</i>	<i>(B)</i>	<i>(C)</i>
	<i>mtCO2</i>	<i>mtCO2</i>	<i>mtCO2</i>
74th street Electric Boiler	17,900	30,600	49,600
East River Industrial Heat Pump	54,000	72,00	99,000
74th Street Thermal Energy Storage	6,000	11,000	20,000
Steam Digital Optimization Solution	27,000	27,000	27,000
Renewable Natural Gas	84,000	84,000	84,000
Total	188,900	224,600	279,600
Est. Overall District Steam System Emissions Rate, tCO2/kBtu	0.000032	0.000030	0.000027
Percent Reduction from Current LL97 Emissions Coefficient of 0.00004320 tCO2/kBtu	26%	31%	38%

EXHIBIT B

Steam Decarbonization Projects Whitepapers

East River Industrial Heat Pump Installation

Central Operations / Steam Operations 2025-2029

1. Project / Program Summary

Type: <input checked="" type="checkbox"/> Project <input type="checkbox"/> Program	Category: <input checked="" type="checkbox"/> Capital <input type="checkbox"/> O&M <input type="checkbox"/> Regulatory Asset
Work Plan Category: <input checked="" type="checkbox"/> Regulatory Mandated <input type="checkbox"/> Operationally Required <input type="checkbox"/> Strategic	
Project/Program Title: East River Industrial Heat Pump (IHP) Installation	
Project/Program Manager: TBD	Project/Program Number (Level 1): TBD
Status: <input checked="" type="checkbox"/> Initiation/Planning <input type="checkbox"/> In-Progress (Projects Only) <input type="checkbox"/> On-Going (Programs Only)	
Estimated Start Date: January 1, 2025	Estimated Date In-Service: January 1, 2030
A. Total Funding Request (\$000) Capital: \$145,660 O&M:	
Work Description: This project will install an industrial heat pump (IHP) at the East River Generating Station. The IHP combined with a mechanical vapor recompressor (MVR) will be capable of providing 35 MWe (150,000 lbs/hr) of steam at 400+ psi and 15F superheat to the steam distribution system. It is estimated to have a coefficient of performance (COP) range of 1.6-1.8. Mechanical work will include the procurement and installation of compressors, heat exchangers, condensers, steam piping systems, including tie-ins to existing steam systems, refrigerant piping systems, and cooling water systems. This will also include installation of supporting balance of plant systems such as chemical systems, and other appurtenances, as well as fire-protection and safety systems. Civil work will include the addition, relocation, and modification of building structures, including structural steel beams, columns, wells for pumps, supporting piles, concrete, foundations, platforms, stairs, and railings. Installation of an explosion-proof containment structure or other suitable containment facilities will be constructed. Electrical work will include procurement and installation of new high-voltage transformers, switchgear and associated disconnect switches and required cables. Also included will be new electrical panels for variable-frequency drive motors, uninterruptible power supply systems, as well as local power supplies for low-voltage motors, instrumentation, and controls. Instrumentation and controls work will include the installation of automated valves, instrumentation, local control panels and integration into the plant's distributed control system. It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities. The complexity of this project is compounded by several factors, which include the required continual operation and maintenance of adjacent equipment, the age of the facility where this equipment is being installed, and the location of the facility in a congested urban environment.	
Justification Summary: The New York State Climate Leadership and Community Protection Act (CLCPA) requires a reduction in economywide greenhouse gas (GHG) emissions of 40% by 2030 and 85% by 2050 from 1990 levels. To meet this directive, Con Edison is planning to decarbonize its steam system by 2050. This project will help meet this	

goal by reducing the use of fossil fuel boilers with a more efficient electric steam production technology.

IHPs and MVRs are commercially available technologies that have been used in industries around the world. While the combination of these two technologies for district heating has not yet been commercially deployed, similar designs are being planned in other district heating systems. Con Edison has benchmarked these systems and equipment suppliers to assess the technological readiness level (TRL) and confirmed its feasibility for installation at the East River Generating Station with a TRL of 8 (TRL is a method of estimating the maturity of technologies on a scale of 1-9, with 9 being the most mature).

This installation has the potential to reduce CO₂ emissions by approximately 54,000 tons per year,²⁴ as well as other greenhouse gases, at the source of generation, equating to around \$90/tCO₂e in savings. This will be achieved by the reduced use of fossil fuels to provide the necessary heat to generate steam. The CO₂ emissions reduction estimate is calculated assuming a gas-fired package boiler with 88% efficiency as the baseline system whose production will be offset. The Company will monitor the performance of the IHP system to verify emission reductions and determine the efficiency improvements relative to other steam generation technologies.

Discussion Topics Required by the Joint Proposal:

The Joint Proposal requires a petition for approval of proposed future decarbonization projects to include a discussion of twelve factors. The discussion of these factors below is in addition to and supplements the discussion in the body of the petition.

1. Project maturity and an explanation of why the Commission should approve the project at that level of maturity

Please refer to the Work Description and Justification Summary sections of this whitepaper for a description of project maturity. In addition to the reasons stated in the Justification Summary section of this whitepaper, the Commission should approve this project because if the project is not funded at this time, the Company will not be able to attain the desired emission reduction timeline identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

2. Preliminary Project design

Please see the Work Description section of this whitepaper.

3. Project location or potential locations

This project will take place at the East River Generating Station.

4. Project feasibility, including, as applicable, any material assumptions or uncertainties

Please see the Work Description and Justification Summary sections of this whitepaper.

5. Estimated Project cost and cost estimate details

Total Project Cost: \$145,660,000. A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies.

6. Proposed timeline for installation and final commissioning

This project would commence January 1, 2025, and be in-service by January 1, 2030.

7. How the Project contributes to, advances, or is otherwise consistent with Con Edison's planning or applicable decarbonization goals (e.g., Company, State, or City)

²⁴ Assumes emissions reduction calculation is using the electric emission factor set for the NYC LL97 2030-2034 timeframe on a 100yr GWP basis

This project will support the objectives of the CLCPA and is consistent with the Company’s long-range plans. This is also discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

8. Measurements or other results the Company plans to monitor (if applicable)

The Company will monitor the performance of the IHP system to verify emission reductions and determine the efficiency improvements relative to other steam generation technologies.

9. Potential emissions reductions, including measurement and verification plan

Please see the Exhibit A and the Justification Summary section of this whitepaper.

10. Other benefits that may be produced or derived from the Project.

Please see the description of non-financial benefits in the Supplemental Information section of this whitepaper.

11. Where a phased approach will be used, an explanation of the use of such an approach and a description of the phases.

It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities.

12. The Project’s potential impact on electric reliability, if any, and any resulting operating restrictions

This installation will not impact electric reliability as the IHP system can be taken offline if there are any system reliability concerns.

Relationship to Broader Company Plans and Initiatives (e.g. Long-Range Plans, CLCPA Initiatives, Risk Mitigation)

This project will support the objectives of the CLCPA and is consistent with the Company’s long-range plans. This is also discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

2. Supplemental Information

Alternatives

Various project and technology alternatives and reasons for rejection were identified and discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Risk of No Action

If the project is not funded at this time, the Company will not be able to attain the desired emission reduction timeline identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Non-Financial Benefits

The core benefit of this project will be a reduction of greenhouse gas emissions at the source of steam generation achieved through improved thermal efficiency. This project will help identify practical challenges and constraints with decarbonization of the steam generating system.

Summary of Financial Benefits and Costs (attach backup)

1. Cost-Benefit Analysis (if required)

See Case 22-S-0659, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service*, “Electrification Challenges in Dense Urban Environments Study” (issued April 4, 2024) for reference on cost-effective pathways for decarbonization for buildings that are currently served by the steam system.

2. Major Financial Benefit

Cost-effective decarbonization and the potential for lower emissions penalties for customers as described in Exhibit A.

3. Basis of Estimate

A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies.

Project Risks and Mitigation Plan

Risk 1: Permitting and regulatory review.

Mitigation 1: The Company has identified unique permitting risks associated with this project. This includes use of refrigerants and river water withdrawal. Regulatory review and studies are being conducted to identify whether any changes to the current East River State Pollutant Discharge Elimination System (SPDES) permits are required. The Company is also working with the Electric Power Research Institute (EPRI) to study larva and egg survivability, with expected completion by December 2025.

Risk 2: First-of-a-kind project.

Mitigation 2: Con Edison has leveraged technical expertise with numerous internal departments and external subject matter experts to develop the detailed scope of work and cost estimate and to ensure project feasibility.

Risk 3: Impact on electric reliability.

Mitigation 3: This installation will not impact electric reliability as the IHP system can be taken offline if there are any system reliability concerns.

Other risks are identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Technical Evaluation / Analysis

Industrial heat pumps are one of the three technologies identified for deployment in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Project Relationships (if applicable)

N/A

3. Funding Detail (\$000)

Historic Spend

	Actual 2021	Actual 2022	Actual 2023	Actual 2024	Test Year* (O&M Only)	Forecast 2025
O&M	0	0	0	0	0	0
Regulatory Asset	0	0	0	0	0	0
Capital	0	0	0	0	0	0

Total Request by Year (\$000)

	2026	2027	2028	2029
O&M	0	0	0	0
Regulatory Asset	0	0	0	0
Capital (Total)	50,980	36,414	29,132	29,132

Labor	825	589	472	472
M&S	28,523	20,373	16,299	16,299
Contract Svcs.	200	143	114	114
Other	269	192	154	154
Overheads	21,163	15,117	12,093	12,093

74th Street Electric Boiler Installation

Central Operations / Steam Operations 2025-2029

Type: <input checked="" type="checkbox"/> Project <input type="checkbox"/> Program	Category: <input checked="" type="checkbox"/> Capital <input type="checkbox"/> O&M <input type="checkbox"/> Regulatory Asset
Work Plan Category: <input checked="" type="checkbox"/> Regulatory Mandated <input type="checkbox"/> Operationally Required <input type="checkbox"/> Strategic	
Project/Program Title: 74 th Street Electric Boiler (EB) Installation	
Project/Program Manager: TBD	Project/Program Number (Level 1): TBD
Status: <input checked="" type="checkbox"/> Initiation/Planning <input type="checkbox"/> In-Progress (Projects Only) <input type="checkbox"/> On-going (Programs Only)	
Estimated Start Date: January 1, 2026	Estimated Date In-Service: June 1, 2028
Funding Request (\$000) Capital: \$50,090 O&M:	
Work Description:	
<p>This project will install an electric boiler at the 74th Street Steam Generating Station. The boiler will be capable of providing 150,000 lbs/hr of steam at 400+ psi and 15F superheat to the steam distribution system. The boiler will be powered by an existing 13.8 kV feeder from the 75th Street Substation. The feeder will provide 50MW of interruptible electricity which will be shared with a thermal energy storage (TES) system also being considered for installation (note, the EB and the TES will not draw power concurrently).</p> <p>Mechanical work will include the procurement and installation of new feedwater and steam piping, valves, pumps, deaerators, tanks, chemical systems, and other appurtenances. Civil work will include the addition, relocation, and modification of building structures, including structural steel, concrete, foundations, platforms, stairs, and railings.</p> <p>Electrical work will include the replacement of high voltage cables from the 75th St. Substation, addition/modification of electrical feeds and switchgear, as well as local power supplies for instrumentation and controls. Instrumentation and controls work will include the addition of automated valves, instrumentation (measuring instruments), local control panels and integration into the plant’s distributed control system.</p> <p>It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities. The complexity of this project is compounded by several factors which include the required continual operation and maintenance of adjacent equipment, the age of the facility where this equipment is being installed, and the location of the facility in a congested urban environment.</p>	
Justification Summary:	
<p>The New York State Climate Leadership and Community Protection Act (CLCPA) requires a reduction in economywide greenhouse gas (GHG) emissions of 40% by 2030 and 85% by 2050 from 1990 levels. To meet this directive, Con Edison is planning to decarbonize its steam system to the greatest extent possible by 2050. This project will help meet this goal by reducing dependence on fossil fuel-fired steam generators.</p> <p>The Company believes this project to have high feasibility as electric boilers are a mature technology that has</p>	

been installed throughout the country for district heating and steam needs. An internal feasibility assessment identified 74th Street as having the available infrastructure, electric capacity, and system connections to accommodate the development of a detailed project scope, and schematic drawings have been developed

This installation has the potential to reduce CO₂ emissions by approximately 17,900 tons per year, as well as other greenhouse gases, at the source of generation, equating to around \$93/CO₂e in savings. This will be achieved by the reduced use of fossil fuels to provide the necessary heat to generate steam. The baseline for the CO₂ emissions reduction estimate is running a gas-fired package boiler with 88% efficiency.

The Company will monitor the performance of this electric boiler system to verify emission reductions and determine the efficiency improvements relative to other steam generation technologies.

Discussion Topics Required by the Joint Proposal:

The Joint Proposal requires a petition for approval of proposed future decarbonization projects to include a discussion of twelve factors. The discussion of these factors below is in addition to the discussion in the body of the petition.

1. Project maturity and an explanation of why the Commission should approve the project at that level of maturity

Please refer to the Work Description and Justification Summary sections of this whitepaper for a description of project maturity. In addition to the reasons stated in the Justification Summary section of this whitepaper, the Commission should approve this Electric Boiler at 74th Street because it is a mature technology. It has a technology readiness level (TRL) of 9. TRL is a method of estimating the maturity of technologies on a scale of 1-9, with 9 being the most mature. This technology is deployed in other jurisdictions (e.g., Vicinity’s system in Boston and in many cities in Europe); it will reduce emissions (as described in the aforementioned Justification Summary and Exhibit A), which will help New York cost-effectively achieve its clean energy goals under the CLCPA; it will benefit customers by providing them with a cost-effective, minimally disruptive pathway to reduce their building emissions; and it will provide Con Edison with the opportunity to develop expertise in integrating and operating electric boilers which the Company anticipates will be a key future asset for decarbonization at many of the steam generation stations.

2. Preliminary Project design

Please see the Work Description section of this whitepaper.

3. Project location or potential locations

This project will be installed at the 74th Street Generating Station. Con Edison anticipates installing additional Electric Boilers across the system as described in the 2024 Steam Decarbonization Study and Implementation Plan.

4. Project feasibility, including, as applicable, any material assumptions or uncertainties

Please see the Work Description and Justification Summary sections of this whitepaper.

5. Estimated Project cost and cost estimate details

Total Cost Estimate: \$50,090,000. A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies.

6. Proposed timeline for installation and final commissioning

This project would commence January 1, 2026, and be in-service by June 1, 2028.

7. How the Project contributes to, advances, or is otherwise consistent with Con Edison’s planning or applicable decarbonization goals (e.g., Company, State, or City)

In addition to the body of this petition, please refer to the Justification Summary section of this whitepaper.

8. Measurements or other results the Company plans to monitor (if applicable)

The Company will monitor the performance of this electric boiler system to verify emission reductions and determine the efficiency improvements relative to other steam generation technologies.

9. Potential emissions reductions, including measurement and verification plan

Please see the Exhibit A and the Justification Summary section of this whitepaper.

10. Other benefits that may be produced or derived from the Project.

Please see the description of non-financial benefits in the Supplemental Information section of this whitepaper.

11. Where a phased approach will be used, an explanation of the use of such an approach and a description of the phases.

It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities.

12. The Project’s potential impact on electric reliability, if any, and any resulting operating restrictions.

This installation will not impact electric reliability as the boiler can be taken offline if there are any system reliability concerns.

Relationship to Broader Company Plans, Initiatives, and the NYS Climate Leadership and Community Protection Act

This project will support the objectives of the CLCPA and is consistent with the Company’s Steam Decarbonization Study and Implementation Plan, Clean Energy Commitment, and long-range plans.

2. Supplemental Information

Alternatives

Various project and technology alternatives and reasons for rejection were identified and discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Risk of No Action

If the project is not funded at this time, the Company will not be able to attain the desired emission reduction timeline identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Non-Financial Benefits

The core benefit for the use of electric boilers is the elimination of greenhouse gas emissions at the source of steam generation. An additional benefit is that electric boilers have faster ramp rates than existing fossil fuel powered boilers and hence can be more responsive to changes in demand on the steam system. Lastly, this project will help identify practical challenges and constraints with full scale electrification of the steam generating system.

Summary of Financial Benefits and Costs (attach backup)

1. Cost-Benefit Analysis (if required)

See Case 22-S-0659, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service, “Electrification Challenges in Dense Urban Environments Study” (issued April 4, 2024) for reference on cost-effective pathways for decarbonization for building’s that are currently served by the steam system.

2. Major Financial Benefit

N/A

3. Basis of Estimate

A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies.

Project Risks and Mitigation Plan

Risk 1: Insufficient supply of electricity.

Mitigation 1: Con Edison has identified a local network source for this project capable of providing 50 MW with limited curtailments for the next 20 years. These curtailments would be limited to mid-day hours during the summer peaks and some hours in the winter after 2041.

Risk 2: First-of-a-kind project.

Mitigation 2: Con Edison has leveraged technical expertise with numerous internal departments and external subject matter experts to develop the detailed scope of work and cost estimate and to ensure project feasibility.

Risk 3: Impact on electric reliability.

Mitigation 3: This installation will not impact electric reliability as the boiler can be taken offline if there are any system reliability concerns.

Other risks are identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Technical Evaluation / Analysis

Electric boilers are one of the three technologies identified for deployment in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Project Relationships (if applicable)

This project assumes a new 13.8 kV electrical switchgear will be installed at 74th Street Generating Station to transfer power to the new electric boiler. The switchgear will include a manual transfer switch which will be able to route power to either the new electric boiler or to a future thermal energy storage (TES) system being considered for installation.

Historic Spend

	Actual 2021	Actual 2022	Actual 2023	Actual 2024	Test Year* (O&M Only)	Forecast 2025
O&M	0	0	0	0	0	0
Regulatory Asset	0	0	0	0	0	0
Capital	0	0	0	0	0	0

Total Request by Year

	2026	2027	2028
O&M	0	0	0
Regulatory Asset	0	0	0
Capital (Total)	17,500	20,000	12,500

Labor	1,600	1,800	1,100
M&S	4,100	4,700	2,900
Contract Svcs.	1,500	1,800	1,100
Other	700	800	500
Overheads	9,600	11,000	6,900

74th Street Thermal Energy Storage System Installation

Central Operations / Steam Operations 2025-2029

1. Project / Program Summary

Type: <input checked="" type="checkbox"/> Project <input type="checkbox"/> Program	Category: <input checked="" type="checkbox"/> Capital <input type="checkbox"/> O&M <input type="checkbox"/> Regulatory Asset
Work Plan Category: <input checked="" type="checkbox"/> Regulatory Mandated <input type="checkbox"/> Operationally Required <input type="checkbox"/> Strategic	
Project/Program Title: 74 th Street Thermal Energy Storage (TES) System Installation	
Project/Program Manager: TBD	Project/Program Number (Level 1): TBD
Status: <input checked="" type="checkbox"/> Initiation/Planning <input type="checkbox"/> In-Progress (Projects Only) <input type="checkbox"/> On-going (Programs Only)	
Estimated Start Date: January 1, 2026	Estimated Date In-Service: January 1, 2030
Total Funding Request (\$000) Capital: \$128,370 O&M:	
Work Description: <p>This project will install a thermal energy storage (TES) system at the 74th Street Generating Station. The TES system will be capable of storing 360 MWh of heat energy and producing 70 Mlb/hr of steam for the steam distribution network for 12-15 hours. The TES system will be powered by a 13.8kV feeder from the 75th Street Substation. The feeder will provide 50MW of interruptible electricity which will be shared with an electric boiler also being considered for installation.</p> <p>The TES system will consist of a Rondo RHB300 heat battery charged via the feeder and will be capable of simultaneous charging and discharging to allow for continuous steam operation. The heat battery is constructed of refractory brick. The weight of this material will require significant civil modifications. Mechanical work will include the procurement and installation of treated water feed pumps, deaerators, boiler feed pumps, a heat recovery steam generator (HRSG), isolation valves, chemical systems, and other appurtenances. Civil work will include the addition, relocation, or modification of building structures, including structural steel beams, columns, supporting piles, concrete, foundations, platforms, stairs, and railings.</p> <p>Electrical work will include the installation of high-voltage electrical feeds and switchgear, as well as local power supplies for mechanical equipment, and instrumentation and controls. Instrumentation and controls work will include the addition of automated valves, local control panels and integration into the plant's distributed control system.</p> <p>It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities. The complexity of this project is compounded by several factors which include the required continual operation and maintenance of adjacent equipment, the age of the facility where this equipment is being installed, and the location of the facility in a congested urban environment.</p>	
Justification Summary: <p>The New York State Climate Leadership and Community Protection Act (CLCPA) requires a reduction in economywide greenhouse gas (GHG) emissions of 40% by 2030 and 85% by 2050 from 1990 levels. To meet this directive, Con Edison is planning to decarbonize its steam system by 2050. This project will help meet this goal by reducing dependence on fossil fuel-fired steam generators and providing load shifting flexibility that will help prevent oil usage during system peaks, increase opportunities for cost-optimization and affordability, and enhancing the system's ability to leverage future renewable electric generation to drive deeper emissions</p>	

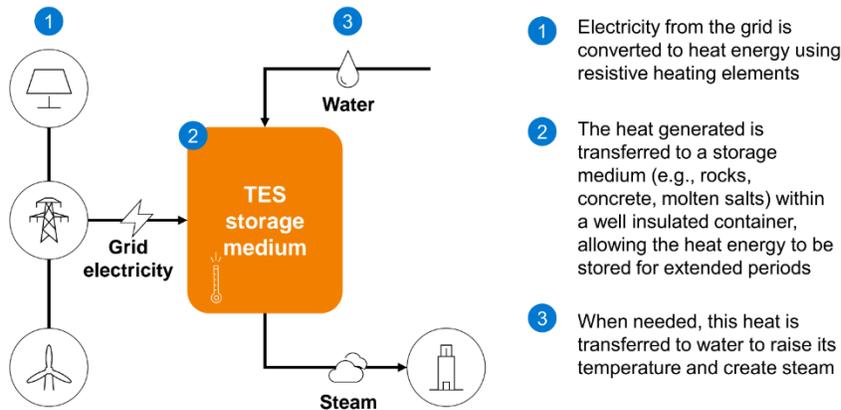
reductions.

The TES Con Edison is proposing will convert off-peak electricity to heat that is stored in refractory material for use at a later time to produce both steam and electricity. While there are several suppliers of this technology, the Company, in collaboration with the Electric Power Research Institute (EPRI), has chosen to partner with Rondo Energy as a sole source vendor for this project as part of an approved U.S. Department of Energy (DOE) and NYSERDA grant collaboration. The Rondo TES has a technology readiness level (TRL) of 7. TRL is a method of estimating the maturity of technologies on a scale of 1-9, with 9 being the most mature.

The Company responded to a DOE Funding Opportunity Announcement (FOA). DOE FOA-3399 which was submitted by the Company on October 15, 2024, if awarded, would provide up to \$20 million towards the project. In addition, the NYSERDA Program Opportunity Notice (PON) 5472, which was submitted on September 24, 2024, would provide an additional \$5.35 million to outfit the installation with a back pressure turbine and generator that would simultaneously output 2 MW of electric energy into the grid during peak times and provide steam at 400+ psi to the steam distribution system. Both grants could be awarded in the third quarter of 2025 and if successful would obligate the Company to continue to collaborate with EPRI and Rondo Energy to receive the funding. An internal feasibility assessment identified 74th Street Generating Station as having the available infrastructure and system connections to accommodate the development of a detailed project scope.

This installation has the potential to reduce CO2 emissions by approximately 6,000 tons per year,²⁵ as well as other greenhouse gases, at the source of generation, equating to around \$719/tCO2e in savings. This will be achieved by the reduced use of fossil fuels to provide the necessary heat to generate steam. The CO2 emissions reduction estimate is calculated assuming a gas-fired package boiler with 88% efficiency as the baseline system whose production will be offset. The Company will monitor the performance of the system to verify emission reductions.

How TES works¹



Why TES is beneficial

TES allows for timing of electric-driven steam production to be “decoupled” from timing of electric supply, allowing for:

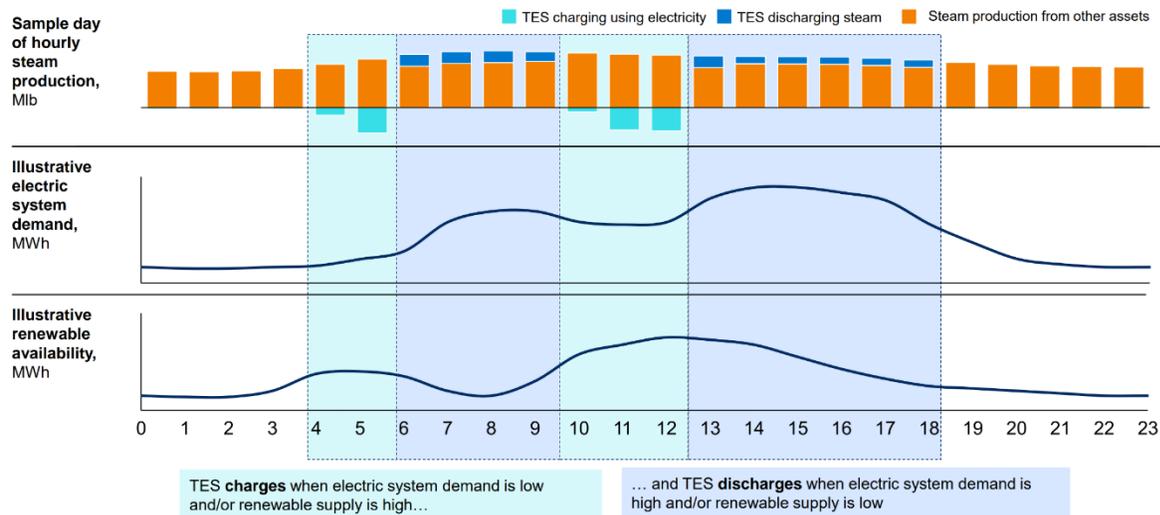
- **Minimized electric grid impact:** TES can charge when electricity demand is low and discharge when electricity demand is high
- **Optimized economics for steam:** As electricity price is variable, TES charge when price is low and discharge when price is high

1. Reflects operation of a sensible heat TES system; exact mechanisms of thermochemical heat and latent heat systems can differ in how heat energy is stored

²⁵ Assumes emissions reduction calculation is using the electric emission factor set for the NYC LL97 2030-2034 timeframe on a 100 year Global Warming Potential basis

This TES functionality allows for the steam system to have valuable intra-day flexibility and responded to a fluctuating grid

ILLUSTRATIVE



Discussion Topics Required by the Joint Proposal:

The Joint Proposal requires a petition for approval of proposed future decarbonization projects to include a discussion of twelve factors. The discussion of these factors below is in addition to and supplements the discussion in the body of the petition.

1. Project maturity and an explanation of why the Commission should approve the project at that level of maturity

Please refer to the Work Description and Justification Summary sections of this whitepaper for a description of project maturity. In addition to the reasons stated in the Justification Summary section of this whitepaper, the Commission should approve this project because the Rondo thermal energy storage has a TRL of 7, the highest of the thermal energy storage vendors the Company identified as suitable for integration in the system. Furthermore, the DOE and NYSERDA grants could be awarded in the third Quarter of 2025 and if successful would obligate the Company to continue that collaboration to receive the funding.

2. Preliminary Project design

Please refer to the Work Description section of this whitepaper.

3. Project location or potential locations

This project will take place at the 74th Street Generating Station.

4. Project feasibility, including, as applicable, any material assumptions or uncertainties

Please see the Work Description and Justification Summary sections of this whitepaper.

5. Estimated Project cost and cost estimate details

Total Capital Cost: \$128,370,000. A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies. Please also see Basis of Estimate in the Financial Benefits and Costs Section of this whitepaper.

6. Proposed timeline for installation and final commissioning

This project would commence January 1, 2025, and be in-service by January 1, 2030.

7. How the Project contributes to, advances, or is otherwise consistent with Con Edison's planning or

applicable decarbonization goals (e.g., Company, State, or City)

This project will support the objectives of the CLCPA and is consistent with the Company’s long-range plans. This is also discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

8. Measurements or other results the Company plans to monitor (if applicable)

The Company will monitor the performance of the system to verify emission reductions.

9. Potential emissions reductions, including measurement and verification plan

Please see the Exhibit A and the Justification Summary section of this whitepaper.

10. Other benefits that may be produced or derived from the Project.

Please see the description of non-financial benefits in the Supplemental Information section of this whitepaper.

11. Where a phased approach will be used, an explanation of the use of such an approach and a description of the phases.

It is anticipated that this project will be completed in a single phase for all engineering, procurement, construction, and commissioning activities.

12. The Project’s potential impact on electric reliability, if any, and any resulting operating restrictions

This installation will not impact electric reliability as the storage system can be taken offline if there are any system reliability concerns.

Relationship to Broader Company Plans and Initiatives (e.g. Long-Range Plans, CLCPA Initiatives, Risk Mitigation)

This project will support the objectives of the CLCPA and is consistent with the Company’s long-range plans. This is also discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

2. Supplemental Information

Alternatives

Various project and technology alternatives and reasons for rejection were identified and discussed in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Risk of No Action

If the project is not funded at this time, the Company will not be able to attain the desired emission reduction timeline identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Non-Financial Benefits

The core benefit of this project will be a reduction of greenhouse gas emissions at the source of steam generation achieved through improved thermal efficiency. The addition of a back-pressure turbine and generator will allow the system to supply electricity to the local network during peak hours. The TES system will also act as a quick response reserve as it can provide 12-14 hours of steam in the event of a unit trip or outage of another unit.

Summary of Financial Benefits and Costs (attach backup)

1. Cost-Benefit Analysis (if required)

See Case 22-S-0659, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Steam Service, “Electrification Challenges in Dense Urban Environments Study” (issued April 4, 2024) for reference on cost-effective pathways for decarbonization for buildings that are currently served by the steam system.

2. Major Financial Benefit

As described in the Project / Program Summary, TES can be dispatched to optimize electric-steam production costs and reduce both steam and electric peaks.

3. Basis of Estimate

A detailed conceptual project cost estimate was developed in accordance with Company engineering procedure CE-0304, Cost Estimating. A conceptual-level estimate is based on the detailed scope of work, preliminary schematic drawings, material and equipment quantities and take-offs, budgetary quotes received from equipment manufacturers, and expected construction start, end, and in-service dates. Elements of the estimate include direct costs including site preparation, procurement of equipment, and labor, as well as indirect costs including overheads, an escalation factor, and contingencies.

Project Risks and Mitigation Plan

Risk 1: Insufficient supply of electricity.

Mitigation 1: Con Edison has identified a local network source for this project capable of providing 50 MW with limited curtailments for the next 20 years. These curtailments would be limited to mid-day hours during the summer peaks and some hours in the winter after 2041.

Risk 2: First-of-a-kind project.

Mitigation 2: Con Edison has leveraged technical expertise with numerous internal departments and external subject matter experts to develop the detailed scope of work and cost estimate and to ensure project feasibility.

Risk 3: Impact on electric reliability.

Mitigation 3: This installation will not impact electric reliability as the storage system can be taken offline if there are any system reliability concerns.

Other risks are identified in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Technical Evaluation / Analysis

Thermal energy storage is one of the three technologies identified for deployment in the Con Edison 2024 Steam Decarbonization Study and Implementation Plan filed under PSC Case 22-S-0659.

Project Relationships (if applicable)

This project assumes a new 13.8 kV electrical switchgear will be installed at 74th Street Generating Station to transfer power to an electric boiler. The switchgear will include a manual transfer switch which will be able to route power to either the TES system or a future electric boiler being considered for installation.

3. Funding Detail (\$000) Historic Spend

	Actual 2021	Actual 2022	Actual 2023	Actual 2024	Test Year* (O&M Only)	Forecast 2025
O&M	0	0	0	0	0	0
Regulatory Asset	0	0	0	0	0	0
Capital	0	0	0	0	0	0

Total Request by Year (\$000)

	2026	2027	2028	2029
O&M*	0	0	0	0
Regulatory Asset	0	0	0	0
Capital (Total)	44,928	32,091	25,673	25,673
Labor	1,253	895	716	716

M&S	15,694	11,210	8,968	8,968
Contract Svcs.	8,632	6,166	4,933	4,933
Other	156	112	89	89
Overheads	19,193	13,709	10,967	10,967

Steam Digital Optimization Solution “SDOS”

Central Operations / Steam Operations 2025-2029

1. Project / Program Summary

Type: <input type="checkbox"/> Project <input checked="" type="checkbox"/> Program	Category: <input checked="" type="checkbox"/> Capital <input checked="" type="checkbox"/> O&M
Work Plan Category: <input type="checkbox"/> Regulatory Mandated <input type="checkbox"/> Operationally Required <input checked="" type="checkbox"/> Strategic	
Project/Program Title: Steam Digital Optimization Solution (SDOS)	
Project/Program Manager: Ildi Telegrafi	Project/Program Number (Level 1):
Status: <input type="checkbox"/> Initiation <input checked="" type="checkbox"/> Planning <input type="checkbox"/> Execution <input type="checkbox"/> On-going <input type="checkbox"/> Other: _____	
Estimated Start Date: 1st January 2026	Estimated Date In Service: progressive release of functionalities throughout a 3-year duration
B. Total Funding Request (\$000) Capital: \$7,960 O&M: \$1,146 (2029-2033)	C. <input type="checkbox"/> 5-Year Gross Cost Savings (\$000) <input checked="" type="checkbox"/> 5-Year Gross Cost Avoidance (\$000) O&M: \$0 Capital: \$0 Steam Operations Fuel Purchased for Steam/Power: \$4,000/year
C. 5-Year Ongoing Maintenance Expense (\$000) O&M: \$229/year average starting in 2029 through 2033 in as spent \$ Capital: \$0	D. Investment Payback Period: ~2.2 years (Years/months) (If applicable)
Work Description: Background In recent years the Company studied and modelled an end-to-end digital analytics platform that could be used to optimize operations and reduce carbon emissions for the Steam System. Phase 0 and Phase 1 type studies were sponsored by the Company’s Research and Development Organization (R&D) and an all-in-one software optimization package that models the Steam System’s production and distribution system operations, forecasting, fuel, carbon emissions, and economics; with the goal of an end-to end optimization has been deemed feasible and beneficial to steam customers. The project proposed for the development and deployment of such a software optimization package is known as the Steam Digital Optimization Solutions Project or “SDOS”. The Phase 0 Study examined optimizing daily steam forecasting, generation, dispatch, fuel use, carbon accounting, and an enhanced customer analytics experience. Optit Corp., a firm with European origins and experience with district energy and electric grid operations research optimization, proposed a solution involving a series of application software modules that would connect numerous data streams across various sections of the Steam organization, Information Technology, Steam Engineering, and Commodity Forecasting with the objective of reducing costs, optimizing fuel use and purchased steam, improving daily forecasts and dispatch, reducing line loss, and providing customers their consumption data and associated carbon attributes. District energy systems in Bologna/Emilia-Romagna, Brescia, and Milano, Italy are currently employing similar SDOS from Optit yielding financial and emissions reduction benefits for several years. The Phase 1 Study focused its examination on steam production opportunities to enhance both environmental and economic performance without compromising steam reliability. This underscored the importance of introducing a	

Steam Production Digital Twin (DT) and an optimization model in this pivotal moment of CECONY's history and its Clean Energy Commitment (Additional details of the Steam Digital Optimization Solution are in the confidential CECONY Steam Digital Optimization Solution (SDOS) Phase 1 Technical Report prepared by Optit Corp, the Steam Digital Optimization Solutions operations research expert).

The DT was utilized in the modeling of the recent Steam Decarbonization Study, to support future decarbonization efforts. The Company employed the DT to model various factors, including steam and steam-electric production assets, system constraints, economic constraints, electric markets, gas market prices, and electric transmission constraints. This model also considered more detailed dispatch factors, such as quick response reserve, and economic factors, like Brooklyn Navy Yard Cogenerating Partners plant contractual mechanisms, to provide comprehensive technical and economic projections, including power demand, operating costs, water cost, and fuel costs. The DT output was compared to historical operations and with the software's optimized operation. The positive results for this module were noticeable in terms of fuel cost reduction and carbon reduction; approximately \$4 million in fuel and 3.6% carbon reduction for the year 2023. These savings were only associated with one of the six proposed SDOS modules. As such, additional fuel and carbon emissions can be expected for the full deployment of SDOS.

These R&D study efforts of the SDOS Phase 1 proved the DT useful in enabling clean energy potential for the Steam System. The effort gave a picture of the DT's flexibility to describe future dynamics where decarbonized steam production units will be included in the Steam System's operations. This was done through the SDOS' Strategic Investment Designer Tool. The DT was inclusive of electric energy market prices allowing optimal selection of components towards the most economical balancing operation. Modernizing specific assets, such as transitioning gas boilers to electric-based systems like electric powered heat pumps, electric boilers, and electric powered thermal storage is key to significantly reduce citywide carbon emissions.

Fully Developed Capital Project Proposed Scope of Work

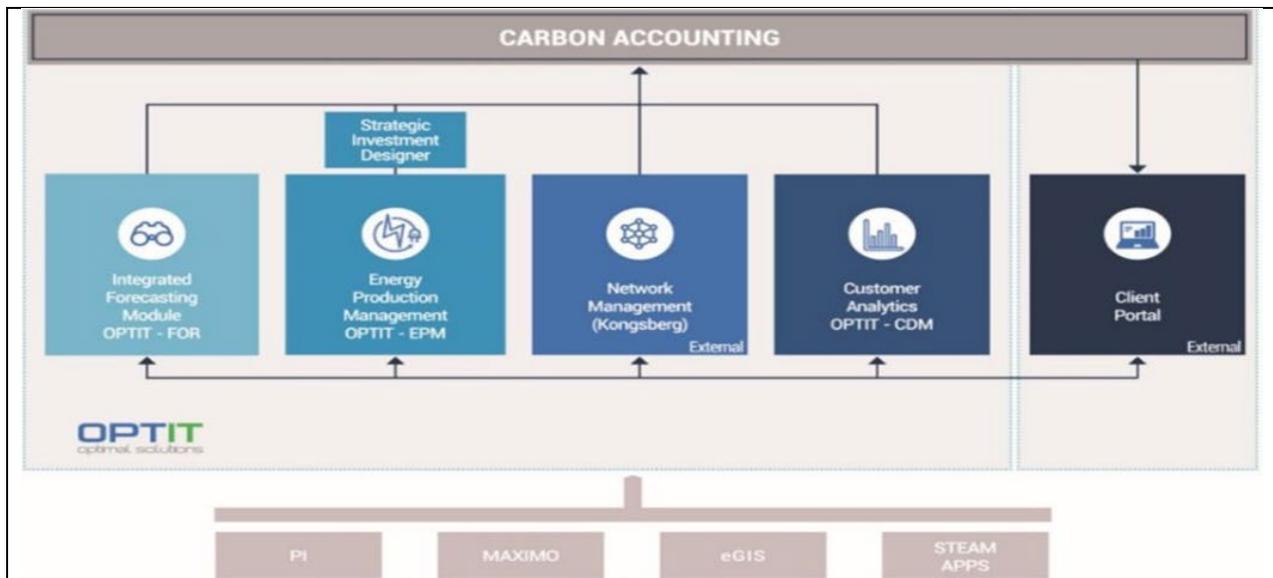
The Company now seeks funding to fully develop and integrate the software modules into Company systems and processes. The Company consolidated information across the Energy Management (Commodity Forecasting and Commodity Operations), System Operation (Energy Control Center's Energy Dispatchers), Steam Services (Operations Planning), Steam Distribution Engineering, and Information Technology organizations and crafted a strategic digital roadmap with a 3-year action plan to build, test, and deploy the SDOS.

This analysis led to the creation of modular solutions for integrated data architecture, forecasting platforms, optimal dispatching solutions, and customer management; all designed to adapt to the evolving energy landscape efficiently. The software package includes the following aspects:

- **Forecasting Module** - Forecasting software capable of providing daily operational guidance to Steam-owned plants towards steam generation, electric generation, and electric consumption (from decarbonized generators).
- **Energy Production Management Module** - Digital Twin (DT) simulation that represents the entire dynamic that Steam Generating assets participate.
- **Strategic Investment Designer Tool** - Optimization software capable of providing the most efficient operation for a continually diversifying portfolio of equipment. Strategic simulation of hypothetical scenarios, such as adding an electric boiler, electric heat pump, and electric powered thermal storage assets, that model optimal transition pathways for decarbonization.
- **Network Manager Module** - Steam Transmission and Distribution System integration for pressure balancing to continuously validate safety and reliability. This can afford an opportunity to reduce steam variance.
- **Customer Analytics Module** - Steam consumption analytics that increase transparency for existing customers, new customers, and regulatory agencies.
- **Client Portal** - Carbon Analytics & Accounting platform to assess consumption patterns and project carbon emissions at the individual customer level.

Figure 1 below illustrates the end-to-end value chain integration afforded by the SDOS.

Figure 1 – SDOS Modular Framework



The software package integration assumes access to real-time data from secure Con Edison operational systems, Con Edison forecasts, public market information, heat rates, gas availability constraints, system topological constraints, and network load pockets and bottlenecks. This software package will facilitate the integration of new decarbonized production assets, such as electric boilers, electric heat pumps, and electric charged thermal energy storage, into the current system. It will also help determine the optimal hourly dispatch patterns for the Steam System as these new assets are deployed. As the system evolves to incorporate multiple fuel and storage capabilities, the Company will need to update its operational policies and procedures. Anticipated market volatility will necessitate an approach that leverages sector coupling to optimize dispatch efficiency while complying with technical and regulatory constraints.

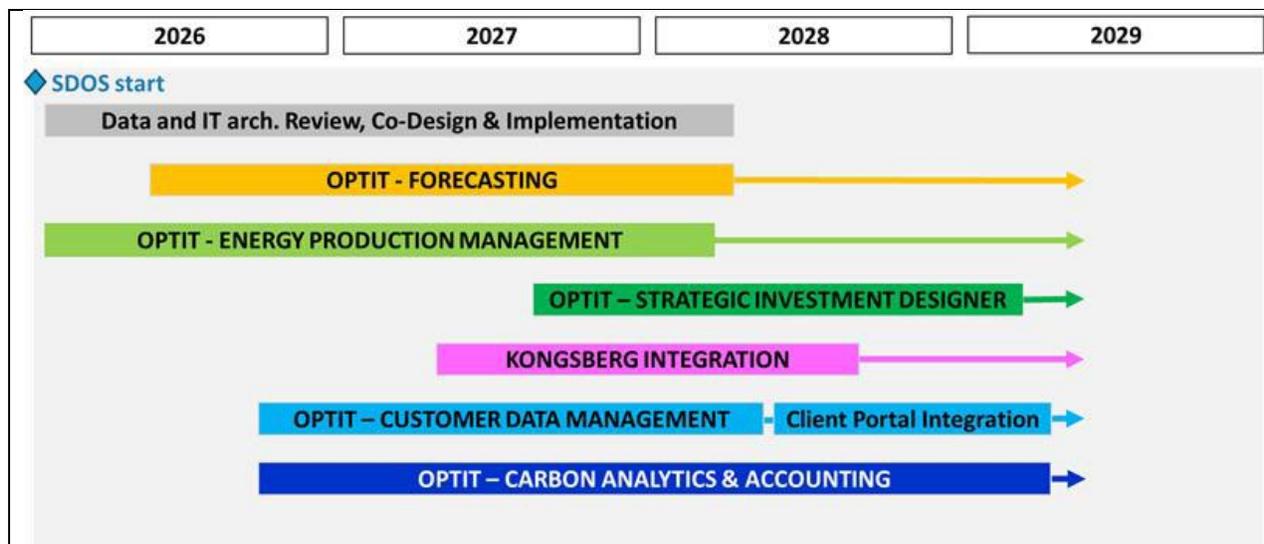
The Steam System has the capability to generate electricity. The cogeneration and electric production characteristics were modelled in Phase 1 to capture the requirements and engineering/operating requirements and criteria were met so as not to jeopardize electric production. As decarbonized Steam components that consume electricity are integrated, the relationship with the electric energy marketplace will become increasingly complex in managing reliability and economics. The SDOS will consider the dynamics and changes to plan the pathways and enable an optimal real-time operation that considers all aspects.

The integration of the foregoing modules described will improve Steam Operation’s capacity to deal with the increasing level of complexity required both to achieve the City’s decarbonization targets and to meet customer needs in lieu of changing regulations. The project is intended to be carried out over 3 years, with progressive release of functionalities in order to capture early benefits. The above modules will lead to an improvement in overall performance, which is expected to lead to lower emissions and fuel costs for steam customers, both within a relatively short payback period for the capital cost required.

Capital Project Cost Estimate, Schedule, and Maintenance Cost Estimate

The work plan for developing a fully integrated and functional SDOS software package, which would be housed internally within Con Edison. Information Technology infrastructure is estimated to take approximately 36 months and cost approximately \$7.96 million. The 5-year incremental O&M estimate averages to about \$229,000 per year. The new SDOS will not require incremental Con Edison labor to operate or maintain the software package. Assuming a modest \$4 million/year in fuel savings and based on the foregoing Capital and O&M cost estimates, this project has a simple payback of about 2.2 years. The monetary value of emissions reduction benefits have not been included in this simple payback calculation.

The Project’s Schedule is as follows:



The SDOS is an all-in-one business intelligence system that is necessary to be the primary and central hub for Steam Operation’s vertically integrated business. Steam is the only Con Edison business that takes raw materials, produces steam and electricity, delivers it to its customers, and provides customer care. Due to recent regulations and the need to incorporate innovation into its current and future operations for decarbonization, the SDOS will enable optimized change.

Justification Summary:

Con Edison Steam operates one of the largest district energy systems in the world, serving ~1,500 customers through a 105-miles long network and a generation portfolio centered around gas-fired CHP units and boilers.

In the current framework, numerous trends are transforming the sector, in order to meet New York City and New York States decarbonization regulations/targets, necessary to mitigate climate change. Optimizing the operation of existing assets and having the tools to plan for electrified steam production and storage units are essential for Steam Operations in its decarbonization journey.

The positive results from the DT in Phase 1 were noticeable in terms of fuel cost reduction and carbon reduction; approximately \$4 million in fuel and 3.6% carbon reduction for the year 2023. These savings were only associated with one of the six proposed SDOS modules. Assuming a modest \$4 million/year in fuel savings and based on the foregoing Capital and O&M cost estimates, this project has a simple payback of about 2.2 years. The monetary value of emissions reduction benefits have not been included in this simple payback calculation.

Additional fuel and carbon emissions savings can be expected for the full deployment of SDOS.

The R&D study efforts associated with Phase 0 and Phase 1 of this project proved the solution useful in enabling clean energy potential for the Steam System. The effort gave a picture of the DT’s flexibility to describe future dynamics where decarbonized steam production units will be included in the Steam System’s operations. This was done through the SDOS’ Strategic Investment Designer Tool. The DT was inclusive of electric energy market prices allowing optimal selection of components towards the most economical balancing operation. Modernizing specific assets, such as transitioning gas boilers to electric-based systems like electric powered heat pumps, electric boilers, and electric powered thermal storage is key to significantly reduce citywide carbon emissions.

Discussion Topics Required by the Joint Proposal:

The Joint Proposal requires a petition for approval of proposed future decarbonization projects to include a discussion of twelve factors. The discussion of these factors below is in addition to and supplements the discussion in the body of the petition.

1. Project maturity and an explanation of why the Commission should approve the project at that level of maturity

As stated in the Work Description section of this whitepaper:

The integration of the foregoing modules described will improve Steam Operation’s capacity to deal with the increasing level of complexity required both to achieve the City’s decarbonization targets and to meet customer needs in lieu of changing regulations. The project is intended to be carried out over 3 years, with progressive release of functionalities in order to capture early benefits. The above modules will lead to an improvement in overall performance, which is expected to lead to lower emissions and fuel costs for steam customers, both within a relatively short payback period for the capital cost required.

2. Preliminary Project design

Please see the Work Description section of this whitepaper.

3. Project location or potential locations

It would be housed internally within Con Edison Information Technology infrastructure.

4. Project feasibility, including, as applicable, any material assumptions or uncertainties

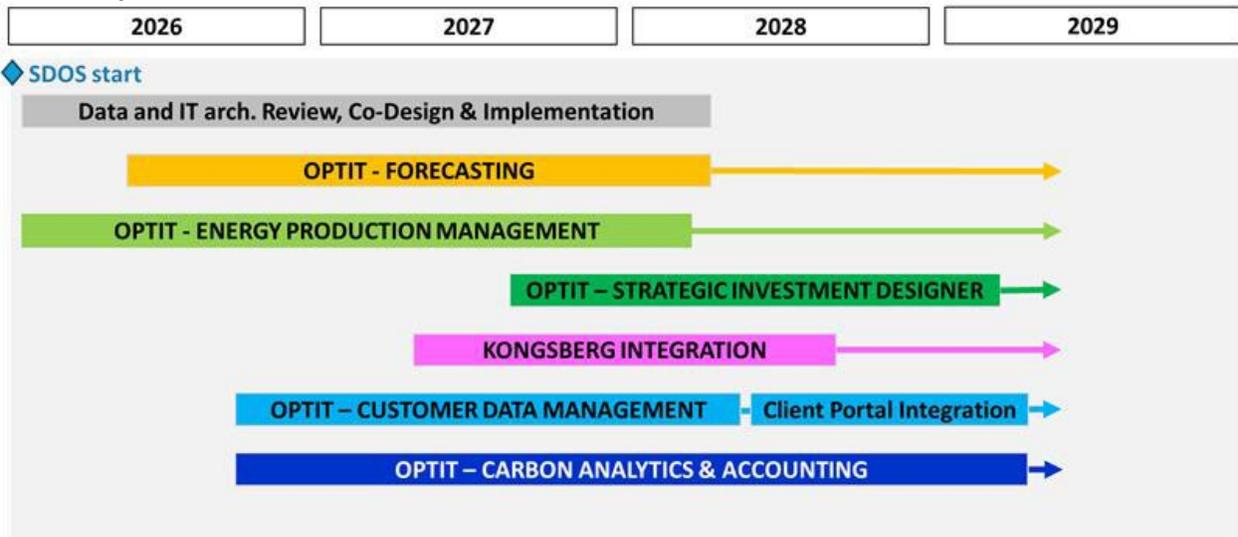
Please see the Work Description section of this workpaper.

5. Estimated Project cost and cost estimate details

Please see Summary of Financial Benefits and Costs section of this whitepaper.

6. Proposed timeline for installation and final commissioning

The Project’s Schedule is as follows:



7. How the Project contributes to, advances, or is otherwise consistent with Con Edison’s planning or applicable decarbonization goals (e.g., Company, State, or City)

Please see the Work Description section of this whitepaper.

8. Measurements or other results the Company plans to monitor (if applicable)

Not applicable.

9. Potential emissions reductions, including measurement and verification plan

As stated in the Work Description section of this whitepaper, 3.6% carbon reduction for the year 2023. These savings were only associated with one of the six proposed SDOS modules. As such, additional fuel and carbon emissions can be expected for the full deployment of SDOS.

10. Other benefits that may be produced or derived from the Project.

As stated in the Justification Summary section of this whitepaper, the savings were only associated with one of

the six proposed SDOS modules. Assuming a modest \$4 million/year in fuel savings and based on the foregoing Capital and O&M cost estimates, this project has a simple payback of about 2.2 years. The monetary value of emissions reduction benefits have not been included in this simple payback calculation.

11. Where a phased approach will be used, an explanation of the use of such an approach and a description of the phases.

Please see the Project's Schedule in #6 above.

12. The Project's potential impact on electric reliability, if any, and any resulting operating restrictions

The SDOS will optimize the operation of the steam system and is not likely to have any impact on electric reliability.

Relationship to 5-Year and Long-Range Plans and Enterprise Risk Management Strategy

Steam Operations will need to dramatically enhance its capacity to achieve the required significant emissions reductions.

- Decision-making, with respect to the steam and Con Edison's integrated long-range plan, will be unlocked by the capability to perform thorough and extensive scenario analyses, thus qualifying better the investment parameters and drivers. A more robust model will reduce the risk involved in the assets design process and the associated capital investment.
- Efficiency in every day operations will increase, by introducing a high level of process automatization and optimization, by providing a framework in which dispatching strategies will fully exploit available data to achieve greater performances from an economic and environmental standpoint. A more dynamic management approach can help in mitigating losses and inefficient decisions taken under uncertain operative conditions (e.g., low load steam days, and sudden cold days).
- Carbon accounting at all levels of the value chain will support the decarbonization process and, indeed, a cultural shift that may upgrade Con Edison's identity and public perception. Supporting customers can reduce the risk of losing customer because of uninformed decisions.
- Customers will become more involved in the process, creating a new, more collaborative effort amongst the Utility, the end users and the City for the common goal of increasing energy efficiency.

2. Supplemental Information

Alternatives

Alternatives considered during project development were:

- Increase the capabilities of existing digital tools: This solution was rejected during the analysis due to the lack of integration among the various digital tools that will remain at the end of the project. Startup, development, and overhead costs, within Con Edison will also be higher considering the greater number of vendors involved with the project.
- Select vendors with existing solutions: Given the specific and unique infrastructure, process and overall situation of the Con Edison Steam System, there is no ready-made digital solution to rely upon.
- Select different vendors per each module: This alternative was evaluated and deemed inefficient and costly. Considering higher startup costs for each vendor (e.g., procurement, third party risk assessments, onboarding management, and overhead costs), as well as a possible delay in the deployment time and the importance of having an integrated platform made this solution not convenient, given the time and budget constraints. A tremendous amount of legal considerations and agreements would be required under this approach.

Risk of No Action

The resulting risks are several opportunity costs, that may result in a worse economic performance:

- Not meeting NYC and NYS decarbonization goals and subsequent penalties for steam customers
- Sub-optimal operation of the Steam System and poor integration of new electrified production equipment

- Business as usual emissions
- Increased lost business for Steam and subsequent increased cost per customer due to lost sales

Non-Financial Benefits

- The benefits from developing the SDOS integrated software package capital project include:
- Reduced Emissions for the Steam System
- Integrated real-time simulation tool that optimize asset utilization, reliability, and economics
- Improved operational planning of the development of new innovative steam production equipment that have less carbon emissions than current equipment
- Advanced strategic planning through increased visibility of potential pathways
- Synchronized participation from customers

Summary of Financial Benefits and Costs (attach backup)

1. Cost-benefit analysis

The work plan for developing a fully integrated and functional SDOS software package, which would be housed internally within Con Edison Information Technology infrastructure is estimated to take approximately 36 months and cost approximately \$7.96 million. The capital cost element detail is as follows:

Capital Cost Estimate	12 Months in 2026	12 Months in 2027	12 Months in 2028	Total
SDOS Developer - Optit Corp	\$1,000,000	\$1,165,000	\$1,335,000	\$3,500,000
Company Support*	\$440,583	\$440,583	\$440,583	\$1,321,749
IT Vendor Support	\$226,911	\$226,911	\$226,911	\$680,732
Licenses	\$143,876	\$663,632	\$153,175	\$960,684
Company Overheads and Indirect Costs**	\$451,516	\$546,355	\$499,202	\$1,497,073
Total	\$2,262,886	\$3,042,481	\$2,654,871	\$7,960,238

*Energy Management, Steam Operations, Steam Engineering, System Operations, and IT Support Labor

** Company Labor Fringe Benefits, Sales/Use Tax, AFUDC, and Contingency

The new SDOS will not require incremental Con Edison labor to operate or maintain the software package. The 5-year incremental O&M estimate detail is as follows and averages about \$229,000 per year:

O&M ESTIMATE	2029	2030	2031	2032	2033
Optit Corp Maintenance/Support	\$90,000	\$98,345	\$107,465	\$117,430	\$128,318
Licenses (Kongsberg and PI)	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
On Premise Equipment and Servers	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
IT Support (Silver App)/Infrastructure SSO	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Contingency	\$10,000	\$10,417	\$10,873	\$11,371	\$11,916
Total	\$210,000	\$218,762	\$228,338	\$238,801	\$250,234

Assuming a modest \$4 million/year in fuel savings and based on the foregoing Capital and O&M cost estimates, this project has a simple payback of about 2.2 years and has positive benefits to pay for ongoing O&M every year thereafter. Emissions reduction benefits, at least 3% carbon savings annually, have not been monetized in this payback.

2. Major financial benefits

See Section 1 above.

3. Total cost

See Section 1 above.

4. Basis for estimate

External costs are based on a proposed estimate provided by Optit Corp, who relied on the results of its Phase 0 and Phase 1 R&D studies.

The balance of costs was estimated by Energy Management, IT, Steam, and Finance based on experience in previous similar projects, and the insights gained from the Phase 0 & 1 R&D studies.

5. Conclusion

The project has the potential to become entirely cost sustainable about 2 years after being placed into service, and this project is likely to generate fuel and emissions savings to steam customers in the following years.

Project Risks and Mitigation Plan

1. Data may be unavailable or of poor quality

Data quality assurance will be applied to verify presence of outliers or missing data, leveraging on machine learning and statistical approaches to cleanse the data sets. Digital procedures will be designed to be flexible with respect to data availability, in order to ensure that sensible solutions are provided even in scarcity of good-quality data.

2. Data security

The project will be developed and deployed within Con Edison digital architecture, with external consultants and software developers access under safety conditions compliant with the highest company standards. Engagement rules will be set to prevent data being processed outside these environments.

3. Lack of engagement by internal users

The program is going to be sponsored by at least one of Con Edison's vice presidents, while both an internal and external (provider's) Project Managers will be appointed to ensure relevant resources' involvement and a significant level of internal visibility will be raised, in order to enhance commitment. The actual number of users should not be extremely large (excluding customers accessing the platform), and they will be engaged already during the project to increase a sense of ownership of the solution (that will reinforce as the benefits become more and more apparent).

4. Lack of resources to conduct the project

Once the basic data and infrastructure analysis is performed, the operational and strategic modules (especially those related to Energy Production Optimization) are expected to generate benefits in terms of margins enhancements. These should make the project sustainable in a relatively short timeframe.

5. Regulatory risk

Changes in regulatory environment may require Con Edison to adapt quickly. The digital platform, the models and the algorithms will be designed and developed with an embedded flexibility to keep the overall impact of changing regulation low.

Historical Spend

	<u>Actual 2022</u>	<u>Actual 2023</u>	<u>Actual 2024</u>	<u>Historic Year</u> (O&M only)	<u>Forecast 2025</u>
Capital	\$0	\$0	\$0	\$0	\$0
O&M	~\$220	~\$240	~\$240	\$0	\$0

Total Request:

Total Request by Year:

	<u>2025</u>	<u>Request 2026</u>	<u>Request 2027</u>	<u>Request 2028</u>	<u>Request 2029</u>
Capital		\$2,263,000	\$3,043,000	\$2,655,000	\$0
O&M					\$210,000

Capital Request by Elements of Expense:

<u>EOE</u>	<u>Request 2026</u>	<u>Request 2027</u>	<u>Request 2028</u>
Company Labor	\$441,000	\$441,000	\$441,000
M&S	\$144,000	\$6640,000	\$1530,000
Contract Services (Optit & IT Vendor)	\$1,227,000	\$1,392,000	\$1,562,000
Other			
Overheads	\$452,000	\$547,000	\$499,000
Total	\$2,263,000	\$3,043,000	\$2,655,000

Total Gross Cost Savings / Avoidance by Year:

	<u>2029</u>	<u>2030</u>	<u>2031</u>	<u>2032</u>	<u>2033</u>
Steam Fuel / Purchased Steam Savings	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000	\$4,000,000
O&M Avoidance					
Capital Savings					
Capital Avoidance					

Total Ongoing Maintenance Expense by Year:

	<u>2029</u>	<u>2030</u>	<u>2031</u>	<u>2032</u>	<u>2033</u>
O&M	\$210,000	\$219,000	\$229,000	\$239,000	\$251,000
Capital					

*If whitepaper is supporting a capital project/program this refers to implementation O&M

Exhibit C

Proposed Tariff Modifications

GENERAL INFORMATION - Continued

8. Adjustment of Rates Related to Changes in the Cost of Fuel and Other Adjustments -Continued

8.2 Base Cost of Fuel

The base cost of fuel under all Service Classifications is composed of the following:

- a. a charge of 617.90 cents for each Mlb of steam used by the Customer, plus
- b. the per unit equivalent, as determined on a monthly basis, of fuel costs collected through the Customer Charge.

The per unit equivalent will be expressed on the basis of cents per Mlb of steam used by the Customer and will be calculated by multiplying (1) fuel cost revenues collected through the Customer Charge divided by sendout for the month of computation by (2) sendout for the 12-month period ending with the month of computation divided by sales for the 12-month period ending with the month of computation.

8.3 Average Cost of Fuel

The weighted average cost of fuel will be determined monthly by dividing the cost of oil, gas, renewable natural gas, and other fuel incurred by the Company (excluding storage and handling costs as described below) plus the contractual variable cost of steam purchased from others for resale including BNYCP charges, by the sum of the number of pounds of steam produced by such fuel and the number of pounds of steam purchased from others for resale. The average cost of fuel includes the costs of environmental attribute product purchases, such as renewable energy credits and carbon offset products, as well as financial hedging instruments associated with transactions intended to reduce price volatility to customers (e.g., transaction costs, such as option premiums, costs of providing credit support and margin requirements, and professional fees, and gains and losses associated with such transactions made in the commodities exchanges and with other counterparties). If applicable, the average cost of fuel will also include the recovery of purchases of Regional Greenhouse Gas Initiative allowances and credits to customers of proceeds from the sale of such allowances.

Alongside, as used herein, means alongside the Company's generating stations, or alongside leased plants, or alongside the storage yard, wherever the Company accepts delivery of fuel from the supplier or transportation agency. The alongside costs include:

- c. cost of fuel at the point of delivery by the vendor;
- d. transportation from the point of delivery by the vendor to alongside the generating station or storage yard;
- e. New York City compensating use tax, the Federal transportation tax and other similar taxes;
- f. cargo insurance and uninsured cargo losses on barge or tanker deliveries;
- g. unloading, handling and reloading at the storage yard;
- h. transportation from storage yard to alongside generating stations; and
- i. license fees imposed under Article 12 of the Navigation Law entitled "Oil Spill Prevention, Control and Compensation."

Alongside costs do not include:

- a. demurrage or damage to barges or tankers;
- b. unloading or handling at generating stations; and
- c. interest and taxes on fuel in storage or on property and equipment used for storage of fuel.