

Electrification Challenges in Dense Urban Environments Study

Executive Summary

August 2025

Decarbonization Challenges for Large NYC Buildings

- Con Edison's *Steam Long-Range Plan* sets out a strategy for its district steam network and aligns with New York state's goal of achieving net-zero emissions by 2050
 - To meet Local Law 97 (LL97) targets, large commercial and multifamily buildings currently using fossil fuels will need to evaluate strategies to reduce their GHG emissions
 - Electrification using technologies, such as air- or water-source heat pumps, is an option, but many buildings may face costly, time-consuming, and disruptive conversions due to complex infrastructure needs and limited mechanical space.
- Larger buildings in Manhattan could connect directly to Con Edison's district steam mains as a full heating and domestic hot water replacement solution to support decarbonization goals.



Key Policies

NYC Local Law 97

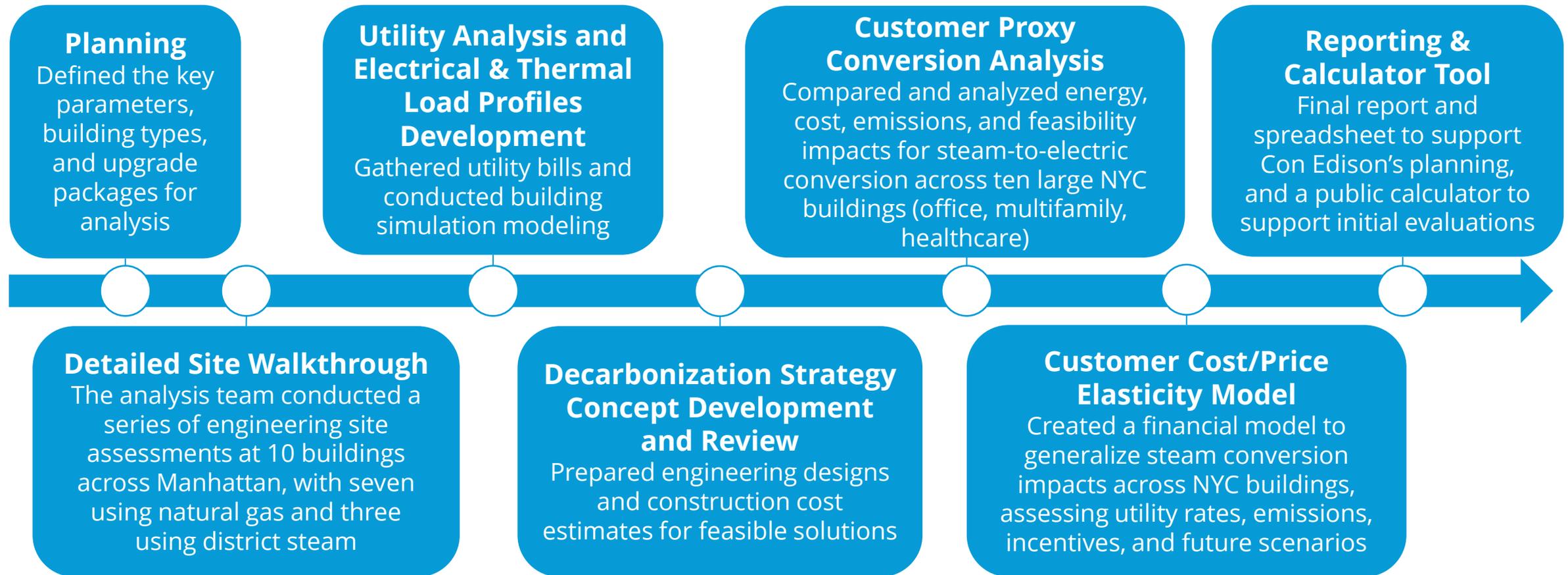
50% GHG reduction by 2030
100% GHG reduction by 2050

NYS CLCPA

100% zero-emission electricity
by 2040
85% emissions reduction by
2050

Approach & Methodology

Con Edison selected Guidehouse, WSP (formerly AKF), and Dharam Consulting to provide a detailed analysis of the attractiveness of district steam and electrification building decarbonization alternatives for large NYC customers



Customer Proxy Sites

- The 10 customer sites were chosen based on their proximity to steam mains, as well as for their representation of a variety of commercial building typologies found within Con Edison's district steam service territory.

	Office 1.9 Million GSF	Healthcare 0.9 Million GSF	Multifamily 2.1 Million GSF
District Steam Heating	 Two sites	 One site	
Gas or Oil Heating	 Three sites		 Four sites

Electrification and Steam Solutions

Onsite Electrification



- Air-to-water, water-to-water, and water-to-air heat pumps
- Variable refrigerant flow systems
- Heat recovery chillers
- Packaged terminal heat pumps
- Electric boilers
- HVAC infrastructure and distribution upgrades
- Electrical service and infrastructure upgrades

District Steam Conversion



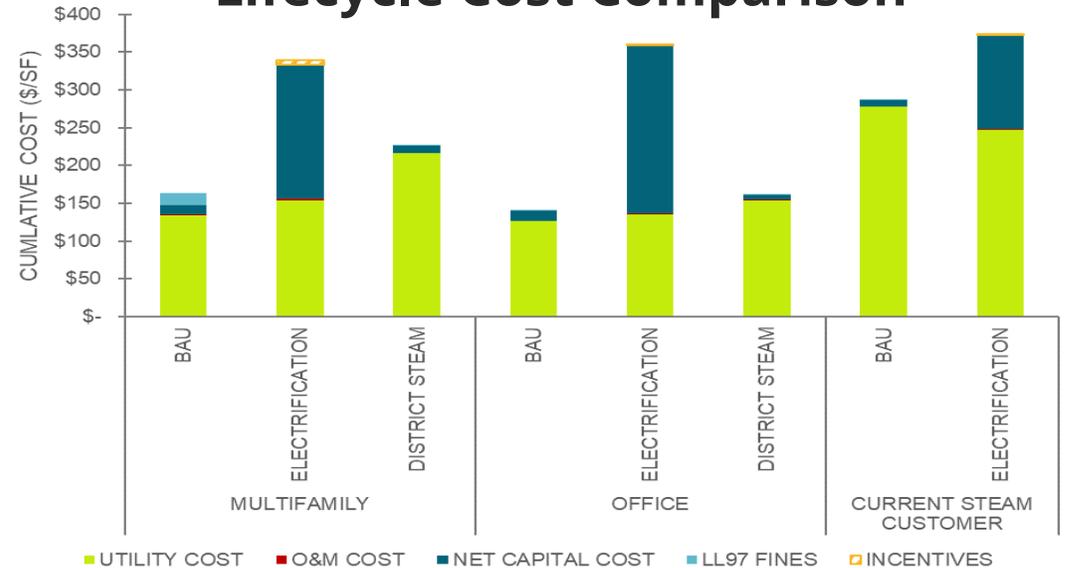
- New steam service with pressure-reducing valve (PRV) station to replace natural gas or fuel oil boilers
- Steam-to-water heat exchangers for domestic hot water
- Condensate removal and heat recovery
- No change for buildings already using district steam today

Electrification and Steam Considerations

Both electrification and district steam conversions require careful consideration of the tradeoffs in the following areas:

- Amount of carbon reduced
- Upfront and lifecycle costs
- Severity of tenant disruption
- Potential for leveraging existing infrastructure
- Opportunities to improve cooling systems and comfort
- Equipment space constraints
- Operational complexity
- Potential contribution to peak electricity demand
- Unique process loads (e.g., hospital sterilization)

Lifecycle Cost Comparison



With a decarbonized upstream steam supply, the district steam alternatives could provide lower capital cost and lifecycle cost than onsite electrification for existing large NYC buildings that are close to district steam service (within 250 feet) and face electrification challenges.

Key Analysis Findings

- **Emissions:** Each site could technically accommodate electrification and district steam solutions, and eliminate on-site fossil fuels
- **Upfront Cost:** Electrification carries much higher upfront costs
- **Annual Utility Cost:** Most sites had higher annual operating costs for district steam than for electrification
- **Lifecycle Cost:** District steam offers 6-70% lower lifecycle costs than electrification for the analyzed sites
- **Installation & Tenant Considerations:**
 - Mechanical space constraints, tenant access requirements, and outdoor equipment placement influence electrification conversion complexity.
 - Most analyzed sites had available electrical capacity and would not require additional utility-side electrical infrastructure for electrification projects

Key Conclusions

- Decarbonized district steam can help buildings **avoid LL97 fines** and **reach net-zero emissions** by 2050.
- Steam has higher annual utility costs, but **lower capital and lifecycle costs** than electrification.
- Steam conversion utilizes **existing mechanical infrastructure** within the building and avoids **potentially complex upgrades and disruption** throughout mechanical, basement, roof, and tenant space.
- Given the significant variety and mechanical complexity of NYC's large commercial and multifamily buildings, **decarbonized district steam can be a complementary solution to onsite electrification** to reach 2050 building decarbonization goals.

Steam Decarbonization Calculator

- **Interested in seeing whether your building is a good fit for Con Edison's Clean Steam?**
- The Steam Decarbonization Calculator is the first step for assessing your building's eligibility and exploring the benefits of steam connection.
- The Excel-based tool and User Guide can be found here: [WEBSITE TBD](#)
- **Ready to learn more?** The Con Edison team is available to discuss your district steam options. Please contact steamsales@coned.com

