



FROM BUILDINGS TO BLOCKS:

DEVELOPING A POLICY FRAMEWORK FOR ACHIEVING DEEP DECARBONIZATION AND ECONOMIC DEVELOPMENT AT THE NEIGHBORHOOD SCALE

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1. Executive Summary

Decarbonizing building by building is not enough to achieve New York State's ambitious climate goals. The New York State Energy Research and Development Authority (NYSERDA), has identified **neighborhood-scale decarbonization** as an under-explored but potentially effective means to meeting the state's emissions and electrification targets.

To that end, NYSERDA engaged a graduate research team from Columbia University's School of International and Public Affairs (SIPA) to explore how their existing strategies to decarbonize large, complex buildings can be **adapted** to facilitate energy-efficiency efforts at the neighborhood level.

This team, comprised of graduate researchers, undertook a months-long process in order to review the landscape of current practices and identify opportunities. During this endeavor, data was collected through a comprehensive review of existing research and interviews with stakeholders from across development, financing, government, and other sectors.

This research and outreach uncovered a landscape defined by fragmented ownership, high upfront costs, limited local capacity, and underdeveloped engagement pathways, all of which serve as significant barriers to the undertaking and eventual success of neighborhood-scale solutions. This process identified **a need for flexible, scalable, equity-oriented, and technology-neutral approaches** to bringing about decarbonization across the different settings, contexts and ownership models across New York State.

This framework identifies a series of financial, policy, and engagement strategies across varying levels of government that complement and reinforce each other. It puts forward a series of **recommendations** that, when combined, will help align incentives across diverse stakeholders in varying local contexts to create the favorable environment needed to bring about the transformative change needed for neighborhoods to become key drivers of progress towards the state's critical climate targets.

Create policies and regulations that explicitly support collective action: Policies and regulations made with innovations like district-scale retrofits, collaborative energy planning, and shared thermal or electrical systems in mind and that incentivize or require coordination between the different type of entities within a neighborhood are

essential to establishing a favorable policy landscape for larger-scale decarbonization efforts.

Bridge upfront cost barriers by creating flexible financing mechanisms: Establishing funding streams and creating new mechanisms that fill identified gaps in the current financing landscape is essential to reducing the cost barriers faced by many smaller-scale initiatives. Flexible programs can help local actors build diverse funding stacks that better leverage their specific resources and accommodate the unique needs of their areas and partners.

Invest in building local capacity to support neighborhood-scale decarbonization efforts at every stage of the process: Maintaining projects over time is just as critical to long-term success as overcoming the initial hurdles of initiation and implementation. Identifying and filling gaps in skill, knowledge, and institutional bandwidth at the local level will help prepare community-based initiatives to self-sustain. Relatedly, building out technical assistance and compliance capacity at the state and municipal levels will help governing bodies better support communities undertaking energy-efficiency projects as well as increase the effectiveness of their regulatory enforcement efforts.

Identify shared incentives to build buy-in and foster community collaboration: Using tailored messaging and trusted intermediaries can help align incentives across a fragmented ownership landscape and generate the engagement needed to kick-start neighborhood-scale planning and implementation.

Tailor approaches reflect community demographics and meet local needs: Place-based strategies can help ensure that the benefits from energy-efficient reforms and infrastructure improvements flow to community residents first and can help minimize the negative effects of large scale change on groups already likely to be disparately impacted.

2. Introduction

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation that was established by the state in 1975 to drive innovation in the energy sector. Today, NYSERDA works to equitably reduce emissions while accelerating economic growth and improving quality of life for New Yorkers. It advises the governor and legislature on energy policy, issues bonds for special energy projects, administers federal energy-related grants, runs programs that provide incentives for making buildings more energy efficient, and more.

2.1 Background, Current Challenges, and Opportunities

Buildings are the largest contributors to greenhouse gas emissions in New York State, accounting for approximately one-third of total emissions due to heating, cooling, and electricity consumption. Despite the state's ambitious decarbonization goals, including electrifying millions of buildings and achieving net-zero emissions by 2050, existing policies, regulations, market conditions, and financing mechanisms remain insufficiently structured to support coordinated, equitable, and economically viable decarbonization at the neighborhood scale. While initiatives such as Local Law 97, which established carbon emission limits for large buildings in New York City, and statewide electrification mandates have begun addressing emissions from individual buildings, these efforts often fail to account for broader systemic challenges like stakeholder coordination, economic feasibility, and scalability across diverse communities (NYC Accelerator, 2025a).

Neighborhood-scale decarbonization presents a transformative opportunity to align climate action with economic development by fostering localized solutions that integrate building efficiency improvements with community-wide systems such as thermal energy networks. However, neighborhoods face a multitude of challenges that vary widely by context, examples of scalable implementation strategies are scarce, and the field lacks standardized benchmarks for success. Moreover, the financial burden of retrofitting older structures and transitioning to clean energy disproportionately impacts disadvantaged communities, further highlighting the need for flexible, equity-focused frameworks.

2.2 Project Overview

NYSERDA has identified this gap and tasked this project with developing a scalable policy framework that facilitates deep decarbonization at the neighborhood level while driving economic development. This requires addressing critical barriers such as policy misalignment, financing gaps, and stakeholder engagement challenges. By leveraging their Resource Efficient Decarbonization (RED) framework, created to help address the complexity of decarbonizing New York's diverse building stock, conducting comparative policy analyses, and engaging diverse stakeholders - including policymakers, community leaders, and economic experts - the project aims to deliver actionable recommendations that overcome these barriers.

2.3 RED Framework

Resource Efficient Decarbonization (RED) is a strategic, phased approach to decarbonizing buildings - especially large, complex ones - by focusing on minimizing energy use at each stage. Instead of a one-size-fits-all or all-at-once electrification, RED recommends prioritizing the reduction of energy demand, recovery of waste heat, reconfiguration of systems for efficiency, and replacement of fossil fuel equipment incrementally over time. This method helps buildings become carbon-neutral in a cost-effective, technically feasible, and minimally disruptive way - aligning with long-term capital planning and leveraging existing infrastructure when possible. It also does so in a technology neutral way - it forgoes advising stakeholders on using specific technologies over others, recognizing the wide variation in situations and preventing the limitations that can come from pursuing one strategy over another too early on in the process. This makes it an especially relevant strategy to inform the development of neighborhood-scale decarbonization approaches where diverse building types, stakeholder interests, and infrastructure constraints must be considered. As a foundational element of this project, RED offers a practical lens through which to explore how equitable and scalable decarbonization might be realized at the community level.

2.4 Methodology

In order to accomplish the aim of answering the question posed by NYSERDA, this capstone project endeavored to first conduct a thorough review of the existing legal, regulatory, and industry literature on scaling decarbonization efforts, interview and collect insights and perspectives from over 30 stakeholders across the field including representatives from state and local governments, major utilities, development companies, and financing institutions.

(Refer to the Appendix for a synthesis of our interview notes.)

Then, our research sought to identify existing barriers to achieving decarbonization at a neighborhood scale and develop a theory of change that would inform guidelines and recommendations for stakeholders seeking to pursue or encourage that work.

Throughout this process, the RED framework served as both a conceptual foundation and practical lens for analysis. Its phased, systems-oriented approach informed the structure of our research and helped shape the contours of the neighborhood-scale framework we ultimately developed - one that maintains RED's emphasis on **efficiency, flexibility, and feasibility** while expanding its application to community-wide contexts.

2.5 Project Goals

Ultimately, our work seeks to provide a roadmap for scalable neighborhood decarbonization that is equitable and economically viable while advancing New York State's climate goals. By prioritizing **systemic solutions that integrate environmental sustainability with economic growth**, this framework will position neighborhoods as key drivers of statewide decarbonization efforts.

2.6 Importance of Neighborhood-scale Decarbonization

Our climate goals are ambitious. They necessarily require **collective action**. At first glance, it may seem like a classic collective action problem, and it is. But it's also an opportunity to reframe climate action in terms of collective risks, rewards, and reasons that resonate at the local level to drive action at the community level.

Motivation looks different from person to person, neighborhood to neighborhood, and country to country. Neighborhood-scale decarbonization **meets people where they are**, connects to what they care about, and transforms climate goals into climate action by aligning various actors' shared and seemingly disparate incentives. What drives action in one place – lower energy bills, healthier homes, clean air – may be different in another. That's why neighborhood-scale decarbonization is a powerful climate action tool.

For municipalities, neighborhood-scale decarbonization offers an actionable starting point: one that can be piloted, expanded over time, aligning development and equity goals with broader climate mandates. It's a practical way to strengthen communities, and meet ambitious climate goals in ways residents can truly benefit from.

By focusing on the neighborhood, we can design interventions that align with specific infrastructure, social networks, and **community priorities**, which may may not always include emissions reduction. We can build trust through co-creation, reduce costs through bulk retrofits, and deliver **benefits that matter** – whether it’s cooler homes, lower utility bills, or green job pathways. We can also center equity, making sure those most affected by energy injustices are first in line for solutions.

In short, neighborhood-scale decarbonization reframes climate action from an abstract global imperative into a shared, local investment in economic development and community wellbeing.

3. Literature Review

The growing field of neighborhood decarbonization has emerged as a promising approach to climate action. It blends technical innovation with community priorities while creating economic opportunities across diverse urban and rural contexts.

3.1 What is Neighborhood Decarbonization?

New York State is already showing what neighborhood-scale decarbonization looks like by piloting coordinated energy upgrades across multifamily housing, commercial buildings, and public infrastructure. Local governments, trusted community-based organizations, local champions, and a growing network of clean energy contractors drive these efforts. By **aligning climate goals with local priorities**, from health and safety to affordability, New York is turning a collective action problem into collective benefit, one neighborhood at a time.

However, based on our review of neighborhood-scale decarbonization efforts in New York State and the Northeast, it's evident that these projects are never just about decarbonization. They're about place-based investment, energy justice, economic development, and building community resilience. They're about designing systems that serve people - not just reduce emissions. Neighborhood-scale decarbonization is part of a global movement toward **Community Energy Initiatives**. It can be broken down as:

- **Community:** A set of buildings and people with shared priorities, barriers, values, and vision - often rooted in a shared sense of place, culture, or lived experience.
- **Energy:** Electricity, gas, or thermal systems – not just supply, but how energy is used, managed, and paid for. This includes efficiency, affordability, reliability, and local control, depending on what matters most to the community.
- **Initiative:** A structure for action - whether government-led, community-owned, or jointly governed. It's about finding the governance model that reflects community priorities and delivers real, accountable outcomes - ranging from a municipally owned utility to a community-owned LLC.

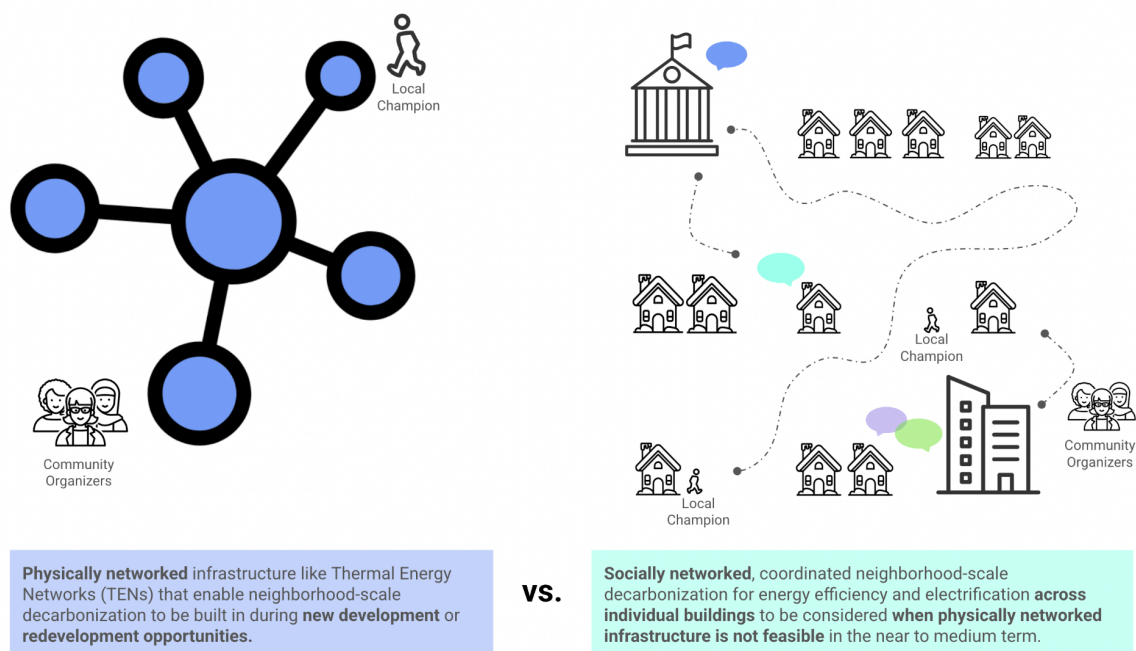
In this report, we use “**neighborhood**” as a geographic and social unit – equating it with “community” in existing global literature – to emphasize the shared infrastructure, social dynamics, and priorities that make place-based climate action possible. RED focuses on improving efficiency first, through upgrades, electrification, and decarbonization, regardless of whether they are connected to a shared system. **Thermal**

Energy Networks (TENs) allow for RED principles to be applied at the neighborhood-scale through shared thermal infrastructure that connects multiple properties.

Community Energy Initiatives may include RED principles in two different ways, and can be integrated in the process of planning or building a new vision for a neighborhood:

1. Shared systems like TENs that enable resource efficiency by sharing waste heat through physical infrastructure
2. Coordinated efficiency upgrades across individual buildings by tapping into social networks and aligning shared incentives.

Figure 1. A physically networked (TEN) vs. a coordinated socially networked approach



3.2 Empire Building Challenge and Implementation of RED

At its core is the Resource Efficient Decarbonization (RED) framework, which emphasizes an incremental, capital-aware roadmap prioritizing deep energy reductions, heat recovery, and electrification in phases that align with asset management cycles.

The Empire Building Challenge (EBC), a \$50 million public-private program administered by NYSERDA, convenes real estate owners, solution providers, and engineering teams to pilot low-carbon retrofits in tall, cold-climate buildings across New

York State. EBC and RED demonstrate that technically ambitious decarbonization can be financially viable and scalable for diverse building types.

RED was formulated through EBC to address the unique constraints of existing tall buildings capital timing, tenant rights, and complex mechanical systems. Rather than one-off overhauls, RED promotes:

1. Strategic Decarbonization Assessments that integrate asset-management plans with decarbonization roadmaps, balancing maintenance cycles and tenant improvements.
2. Phased Enabling Measures (e.g., hydronic re-piping, heat recovery) that set the stage for later full electrification and on-site renewables.
3. Continuous Optimization, using advanced controls and thermal dispatch models to prioritize low-carbon energy flows in real time.

3.3 Legal Overview of Relevant Legal Instruments pertaining to Building Decarbonization

Building decarbonization in the United States is guided by a multi-layered framework that spans federal, state, and local governance. This framework facilitates reduction in greenhouse gas emissions from the built environment, by leveraging policies and regulations to accelerate the transition to low-carbon, energy-efficient buildings.

At the federal level, key legislative measures such as the **Inflation Reduction Act of 2022** support decarbonization efforts by offering enhanced tax deductions (up to \$5 per ft² under IRC §179D) for commercial and residential buildings that achieve significant energy savings (U.S. Department of Energy [DOE], 2023a). Additionally, expanded Investment Tax Credits incentivize renewable installations, and the **Infrastructure Investment and Jobs Act of 2021** allocates \$225 million to strengthen state and local building energy-code implementation, while establishing 60 Department of Energy (DOE) programs to bolster grid resilience and electrification efforts (DOE, 2023b).

In New York State, the Public Service Law mandates that investor-owned utilities deliver integrated energy-efficiency and building-electrification portfolios as part of the “New Efficiency: New York” initiative. Moreover, the **Resilient and Equitable Decarbonization Initiative (REDi: EB)** dedicates \$16.5 million to retrofitting affordable housing [New York State Energy Research and Development Authority], 2023). The **Climate Leadership and Community Protection Act** requires a 40% emissions reduction by 2030, while ensuring that at least 35% of the benefits are directed to disadvantaged communities through the Justice40 equity framework (New York State, 2019).

At the municipal level, **New York City's Local Law 97 of 2019** imposes carbon intensity caps on approximately 50,000 buildings over 25,000 ft² (New York City Mayor's Office of Sustainability, 2021). The **2020 New York City Energy Conservation Code** strengthens energy efficiency standards for new construction and major renovations, contributing to the city's mandate for carbon neutrality by 2050. In alignment with these efforts, **All-Electric Buildings Law (Int. 2317-2021)** prohibits fossil fuel equipment in new small buildings starting in 2026 and larger buildings by 2029, driving full electrification of heating and hot water systems (New York City Council, 2021). These initiatives are complemented by code updates that integrate ASHRAE standards and lifecycle cost analyses to ensure cost-effective carbon reductions.

In addition to these legal frameworks, NYSERDA's **Program Opportunity Notice (PON) 4614 (2024)** accelerates the adoption of community-scale heat pumps and thermal energy networks (TENs) across New York State. This program supports projects in three stages: Analyze, Design, and Build, and focuses on demonstrating the technical and economic viability of TENs, particularly in disadvantaged communities. Notably, Category C projects must serve low- to moderate-income (LMI) residents to be eligible for funding. As of Round 10, up to \$5.5 million in funding is available for such projects (District Energy, 2023).

Further supporting thermal energy networks, the **Utility Thermal Energy Network and Jobs Act of 2022 (UTENJA)** enables utilities to develop TENs that provide heating and cooling through shared infrastructure, utilizing geothermal and wastewater heat sources. By April 2024, nine pilot projects, including initiatives in Manhattan's Chelsea neighborhood, Mount Vernon, and Syracuse, have advanced to the engineering phase. These projects focus on serving disadvantaged communities and generating union jobs through apprenticeship programs (Upgrade NY, 2024).

3.4 The Role of Participatory Planning in Neighborhood-Scale Energy Transitions

Achieving neighborhood-scale decarbonization requires technical strategies and inclusive, place-based planning processes. Participatory energy planning involves engaging residents, property owners, community organizations, and local governments directly in designing and implementing energy strategies.

Embedding community voices ensures solutions are better tailored to local needs, infrastructure realities, and community priorities. Participatory approaches build trust, foster durable buy-in, and address long-standing equity concerns by allowing historically marginalized groups to influence decisions around energy access, affordability, and health outcomes. Effective participatory planning transforms decarbonization from a

top-down intervention into a community-driven process, increasing the chances of successful and sustained implementation.

3.4.a. Decarbonizing the Built-Environment as a Driver of Economic Opportunity

Beyond reducing emissions, neighborhood-scale energy planning can catalyze local economic development. Strategic investments in building retrofits, renewable energy infrastructure, and grid modernization support job creation. Investing in energy efficiency generates nearly three times more jobs per dollar than fossil fuel investments. Moreover, decarbonizing the building stock inherently requires local labor. Construction jobs cannot be outsourced as easily as those in other sectors (RMI, 2021).

Ensuring retrofit projects, solar panel installations, electrification upgrades, and thermal network expansions are performed by workers based in or near the communities where these projects occur will allow energy investments to be rooted in local economies, directly benefiting the populations undergoing the transition. This reinforces the importance of designing decarbonization projects as engines of economic vitality and community wealth-building.

3.4.b. Leveraging Density for Scalable, Efficient Neighborhood Decarbonization

Higher-density neighborhoods enable more cost-effective and technically feasible decarbonization by supporting shared energy infrastructure, such as district thermal networks, microgrids, and coordinated electrification systems. Concentrated building stock lowers per-unit retrofit and grid connection costs while improving system performance (Stupka & Kennedy, 2010).

Density also enhances the viability of shared solar installations and waste-to-energy strategies by concentrating rooftop area, waste streams, and thermal demand. Research shows that higher-density neighborhoods can meet greater portions of their energy needs through local generation and recovery, despite slight increases in energy loads (Stupka & Kennedy, 2010).

Local zoning, building codes, and development incentives can further unlock these benefits by fostering energy-ready dense corridors optimized for neighborhood-scale decarbonization.

4. Case Study Review: Neighborhood-Scale Decarbonization

From individual buildings to entire neighborhoods, these examples provide a practical roadmap for decarbonization that balances technological innovation with economic feasibility and social equity.

4.1 New York State

4.1.a. Building-Scale Decarbonization: Empire Building Challenge

New York State's Empire Building Challenge (EBC) is a \$50 million public-private partnership launched under the Climate Leadership and Community Protection Act to pilot scalable cold-climate decarbonization pathways for tall buildings (NYSERDA, 2025a). Two notable projects demonstrate its impact across different building contexts:

Amalgamated Housing Corporation (AHC) retrofitted two 20-story affordable housing towers in the Bronx, serving as a Naturally Occurring Retirement Community. Using a \$3 million NYSERDA grant and \$16.5 million in additional funding, the project implemented integrated hydronic re-piping, wastewater energy transfer, ground-source heat pumps, envelope upgrades, and full electrification (NYSERDA, 2025c). This comprehensive approach addressed the dual challenges of affordability and resident comfort, forecasting over 60% emission reductions while improving thermal control for low-to-moderate income residents. The successful implementation in these 316 units offers a blueprint for similar properties across the state's 200 million ft² of multifamily buildings with aging piping systems.

Vornado Realty Trust's retrofit of PENN 1, a 57-story Manhattan office tower built in 1972, demonstrates decarbonization in large commercial buildings. With a \$1 million NYSERDA grant and \$3 million in additional investment, the project employs advanced waterside heat recovery, strategic electrification via air-source heat pumps, and an innovative thermal dispatch model (NYSERDA, 2025c). These **phased improvements, aligned with tenant cycles** over a 15-year horizon, are projected to reduce site energy use by 22% and carbon emissions by 38% by 2030. The approach shows that even fully-occupied 2.5 million ft² skyscrapers can pursue **cost-effective pathways** to carbon neutrality while maintaining operational continuity.

4.2 Other Domestic Cases

4.2.a. West Union, Iowa: Rural Energy Innovation

In the heart of rural Iowa, West Union demonstrates that innovative decarbonization transcends urban boundaries. The project originated unexpectedly from stormwater management efforts as stormwater run-off was affecting the local trout-fishing economy, evolving into a groundbreaking community energy initiative centered on the town's downtown square. What emerged was a unique geothermal system that transformed **local infrastructure and community identity** (Green Up West Union, 2023).

The project's economic impact was immediate and striking. The local courthouse saw annual energy costs plummet from \$20,000 to \$8,000, providing tangible proof of the system's effectiveness. Uniquely, the initiative brought together 20 different organizations to implement a cutting-edge geothermal project during a time when such technologies were still experimental. Despite initial skepticism and low public awareness, the project became a functional asset that reshaped community perceptions of energy infrastructure (U.S. Department of Energy, 2023b).

This innovative district geothermal system was designed to serve 330,000 square feet of mixed-use space in downtown West Union, with 130 geothermal wells installed in Courthouse Square (U.S. Environmental Protection Agency, 2020). The system is managed through a unique lease structure where users pay a monthly fee based on their building's demand, providing a model for other small rural communities seeking sustainable energy solutions (Winneshiek Energy District, 2021).

4.2.b. Troy, New York: Municipal-Led Decarbonization

Troy's approach exemplifies innovative neighborhood-scale energy transformation through a **strategic public-private partnership** between the city council and key stakeholders. The project focuses on buildings in the northern waterfront area, creating a unique revenue model that reinvests in energy efficiency. By establishing a thermal energy network in the urban core of Troy, this project serves diverse existing buildings and potentially new construction (NYSERDA, 2023).

The initiative leverages the Utility Thermal Energy Network and Jobs Act (UTENJA) framework to create a revenue stream to fund other sustainability initiatives while providing low-emissions energy to constituents. The Troy Local Development Corporation is developing a geothermal borefield to sell thermal energy to the utility for resale to network customers, representing an important advancement in

neighborhood-scale decarbonization (Upgrade NY, 2024). This approach demonstrates how **municipal ownership can redirect resources** typically lost to large corporations back into community development, particularly in underserved areas.

4.2.c. Ann Arbor, Michigan: Community Collaboration

Ann Arbor's Sustainable Energy Utility (SEU) represents a sophisticated approach to decarbonization, combining academic expertise, community engagement, and municipal resources. The SEU is an opt-in, supplemental, **community-owned energy utility** that provides 100% renewable energy from local solar and battery storage systems and networked geothermal systems installed at participating homes and businesses (City of Ann Arbor, 2025a).

Funded through a Carbon Action Millage (a request for funding to support the city's climate and equity goals), the initiative strategically addresses residential energy efficiency through innovative grant-stacking approaches that maximize impact while preventing potential gentrification. Community engagement stands at the core of Ann Arbor's strategy. Recognizing that meaningful change requires persistent interaction, the SEU focuses on personalized outreach that communicates tangible benefits. By emphasizing bill savings, health improvements, and quality of life enhancements, the initiative transforms decarbonization from an abstract concept to a concrete community opportunity (City of Ann Arbor, 2025b).

The SEU provides a range of services including improved energy reliability and resilience via solar and energy storage systems, sustainable heating and cooling through networked geothermal systems, indoor air quality improvements through appliance replacement programs, and robust energy waste reduction programs that save residents money while improving comfort, safety, and health (A2Gov, 2024).

4.3 International Cases

4.3.a. Melbourne, Australia: Collaborative Urban Decarbonization

Melbourne's Climate Change Mitigation Strategy represents an ambitious approach to urban sustainability, targeting net-zero emissions by 2040 - a full decade ahead of Australia's national timeline. The Melbourne Renewable Energy Project (MREP) exemplifies this innovative strategy by bringing together 14 organizations to collectively procure 88 GWh of renewable electricity, reducing carbon emissions by 96,800 tonnes annually (City of Melbourne, 2025).

The city's comprehensive approach extends beyond energy procurement, incorporating smart building management systems, neighborhood-scale solar microgrids, and an innovative urban forest strategy. A cornerstone of Melbourne's financing approach is their Environmental Upgrade Agreement (EUA) mechanism, which enables building owners to access **long-term sustainability loans with repayments collected through council rates** (Sustainable Australia Fund, 2023). This three-way agreement between building owners, local government, and lenders effectively overcomes traditional investment barriers by providing security to lenders through the municipal tax collection system, enabling longer loan terms and more favorable interest rates than conventional financing.

4.3.b. Vienna, Austria: Integrated Urban Transformation

Vienna's Smart City Framework Strategy presents a holistic approach to neighborhood-scale decarbonization, seamlessly integrating building efficiency, district energy systems, and innovative urban planning (International District Energy Association, 2023). The Aspern Seestadt development serves as a living laboratory, demonstrating how comprehensive urban design can embed sustainability into city infrastructure.

With an extensive district heating network serving 350,000 households, Vienna has pioneered renewable heat sources through large-scale heat pumps and innovative thermal capture technologies. Mandatory high-performance building standards exceed national requirements by 25-30%, while the city's "Klimaaktiv" building standard creates **regulatory pathways for high-performance neighborhoods**. The initiative leverages Vienna's strong social housing tradition - approximately 60% of the city's housing stock - to implement decarbonization at scale (World Green Building Council, 2023).

4.3.c. Copenhagen, Denmark: District Heating Transformation

Copenhagen stands as a global leader in neighborhood-scale decarbonization, transforming urban energy systems through a revolutionary district heating network. Initiated in the 1920s, the infrastructure now covers 98% of urban buildings across 1,500 kilometers, positioning the city at the forefront of its 2025 Climate Plan targeting carbon neutrality (C40 Cities, 2022).

The system strategically replaced coal-fired Combined Heat and Power (CHP) plants with sustainable biomass facilities, integrating large-scale heat pumps powered by wind energy. Advanced monitoring systems reduce heat losses by 6%, while capturing surplus heat from industrial processes. This transformation was achieved through

mandatory connection legislation, comprehensive government funding mechanisms, and extensive community engagement (Bean Kinney & Korman, 2021).

Copenhagen's district heating system is considered an energy efficient, low carbon system that serves 98% of buildings in the city's largest municipalities (Ramboll Group, 2023). The Danish capital is implementing an innovative strategy to further decarbonize its heating network by harnessing heat from seawater and wastewater through heat pumps, with plans to establish up to 10 strategically positioned heat pumps across the city landscape by 2033 (State of Green, 2024).

4.4 Pathways to Successful Neighborhood-Scale Decarbonization

These case studies reveal that successful neighborhood-scale decarbonization requires an intricate integration of policy, economic incentives, technological innovation, and social engagement. Key insights include:

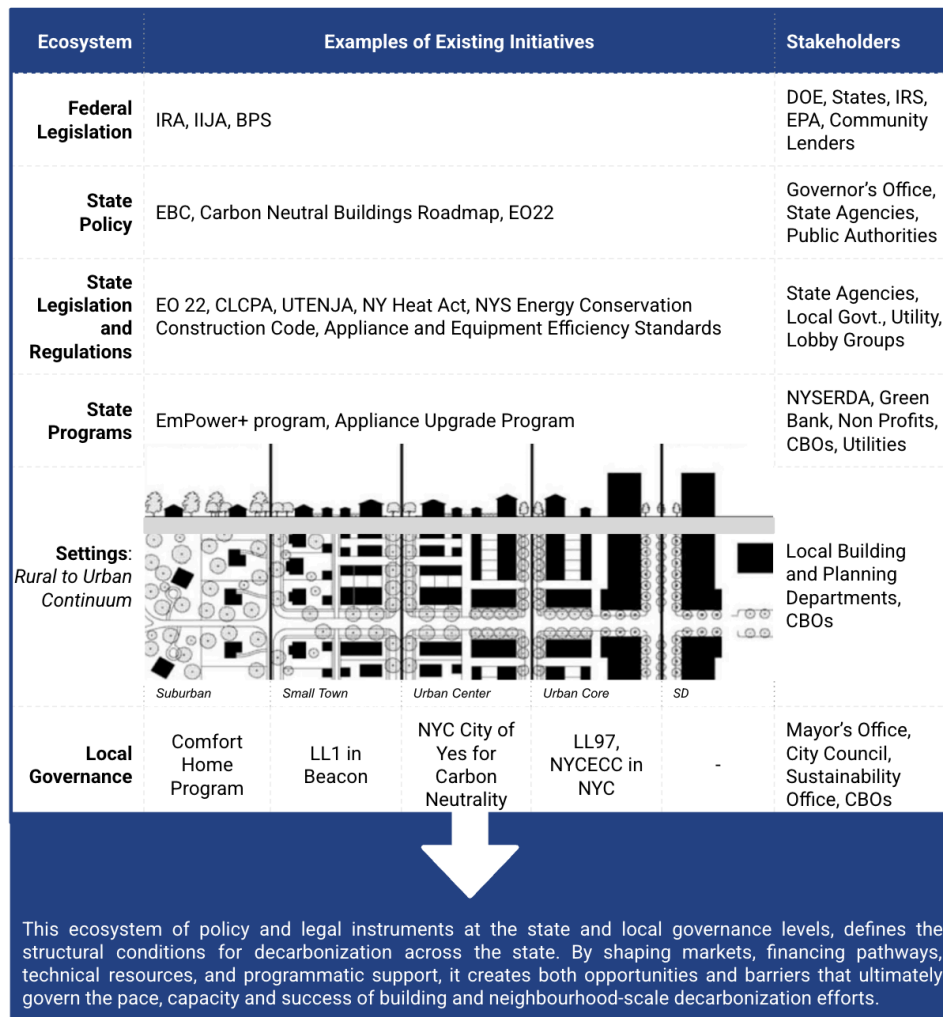
- **Regulatory Leadership:** From Copenhagen's **mandatory connection legislation** to Vienna's **regulatory pathways for high-performance neighborhoods**, strong policy frameworks establish clear expectations and enable systemic change.
- **Innovative Financing and Ownership:** Troy's model showing how **municipal ownership can redirect resources** back into communities and Ann Arbor's **community-owned energy utility** demonstrate how alternative ownership structures create more equitable economic returns. Melbourne's **Environmental Upgrade Agreement (EUA) mechanism**, which enables building owners to access long-term sustainability loans with repayments collected through council rates, overcomes traditional investment barriers by providing security to lenders through the municipal tax collection system.
- **Technical Integration with Operational Flexibility:** Vornado's phased improvements, aligned with tenant cycles prove that decarbonization can be implemented while maintaining building functionality, creating **cost-effective pathways** that work within existing constraints.
- **Strategic Partnerships:** Troy's **strategic public-private partnership** illustrates how cross-sector collaboration can accelerate implementation and align diverse interests toward shared goals.
- **Place-Based Identity Building:** West Union's transformation of **local infrastructure and community identity** shows how energy projects can strengthen community bonds and reshape local perceptions of sustainability.

5. Landscape Analysis

This landscape analysis outlines the ecosystem of policy instruments, financing mechanisms, and programs that shape building and neighborhood-scale decarbonization across federal, state, and municipal levels. As illustrated in the diagram below, these elements - ranging from federal legislation like the Inflation Reduction Act (IRA) and the Infrastructure Investment and Jobs Act (IIJA) to local laws such as NYC’s LL97 - interact across a rural-to-urban continuum to influence decarbonization pathways.

The analysis also identifies key structural gaps and risks that may hinder the scale and pace of implementation.

Figure 2. Multi-level ecosystem of policies, programs, and stakeholders currently shaping decarbonization across New York’s rural-to-urban continuum.



5.1 Description of Instruments

5.1.a Federal Level

Federal policies supporting decarbonization of buildings form a wide landscape of incentives, standards, and technical assistance, each with distinct objectives, timelines, and mechanisms.

The Inflation Reduction Act (IRA)

IRA, enacted in August 2022, is the cornerstone of federal climate and energy action, aiming to reduce greenhouse gas emissions, lower energy costs, and accelerate building electrification (NYSERDA, 2025g). It provides **tax credits and rebates for electrification upgrades in residential buildings** (up to \$14,000), and Clean Energy Credits for commercial and public facilities, with enhanced incentives for Disadvantaged Communities (NYSERDA, 2025f; Internal Revenue Service, 2024). IRA rebates and tax credits lower the capital barriers for envelope improvements, system optimization, and electrification - the core of RED's initial "reduce" and "reconfigure" phases. Through the Greenhouse Gas Reduction Fund (GGRF), the IRA also supports large-scale infrastructure upgrades like grid modernization (U.S. Environmental Protection Agency, n.d.).

However, the IRA relies heavily on tax credits that are susceptible to regulatory and market uncertainties. For example, changes in local building codes or utility rates can erode the value of these credits, potentially discouraging private sector participation (U.S. Department of the Treasury, 2023).

The Infrastructure Investment and Jobs Act (IIJA)

IIJA, signed in November 2021, complements the IRA by focusing on infrastructure and technical capacity. Its Weatherization Assistance Program (WAP) supports **low-income home upgrades**, while EECBG and Energy Efficiency Revolving Loan Fund (EE RLF) assist **municipalities and multifamily retrofits** through grants and loans (U.S. Department of Energy, 2025c; U.S. Department of Energy, 2025d; National League of Cities, 2022). These programs support technical assistance and workforce development, crucial for implementing RED's comprehensive retrofits, especially in disadvantaged and hard-to-electrify buildings.

Despite its positive impact, WAP faces challenges due to per-household funding caps and struggles to meet high demand (U.S. Department of Energy, 2023g; American Council for an Energy-Efficient Economy, 2020; New York State Homes and Community

Renewal, 2022; NYHousingSearch.gov, 2025). Similarly, EECBG program is hindered by limited technical capacity within smaller municipalities (U.S. Department of Energy, 2023c; National League of Cities, 2023b; United States Conference of Mayors, 2017). Furthermore, EE RLF experiences low participation rates, largely attributed to complex application processes and capital barriers (Duke University, 2024; SolarRoadmap, 2024).

The Federal Building Performance Standard (BPS)

It mandates **fossil fuel phase-out in federal buildings** by 2029–2030 and emphasizes lifecycle emissions and electrification (White House Council on Environmental Quality, 2022). The DOE National Blueprint for Building Decarbonization (2024) expands this vision, **setting sector-wide emissions targets** of 65% by 2035 and 90% by 2050 through electrification, low-carbon technologies, and technical assistance (U.S. Department of Energy, 2024a).

Gaps and Remaining Challenges

Federal programs face significant structural limitations in supporting neighborhood-scale decarbonization. Most funding mechanisms and policies are designed for individual buildings rather than coordinated district approaches, creating a siloed implementation model that misses potential efficiencies and system-wide benefits. This building-by-building approach particularly disadvantages renters and low-income multifamily households, who often face split incentives where landlords bear upgrade costs while tenants receive energy savings benefits (World Resources Institute, 2024). Without coordinated planning between electrification initiatives and utility infrastructure investments, widespread building electrification could potentially destabilize local grids.

More fundamentally, federal climate policy instability presents a significant barrier to sustained decarbonization efforts. Recent history demonstrates this volatility: the Biden administration mobilized over \$450 billion in private clean energy capital through the IRA and Bipartisan Infrastructure Law while establishing aggressive emissions reduction targets (America Is All In, 2025; The White House, 2024). However, the subsequent Trump administration reversed course dramatically, withdrawing from the Paris Agreement and implementing Project 2025's deregulatory framework, which significantly reduced institutional capacity at key agencies including EPA and DOE (Friedman, 2025; Gelles et al., 2025; Shah, 2025). This policy oscillation creates planning uncertainty for long-term investments and highlights the critical need for resilient, community-based decarbonization strategies that can withstand federal policy fluctuations.

5.1.b State Level

New York State has established ambitious climate policies that require navigating legal, infrastructural, and regional dynamics for implementation.

Pathway for Deep Decarbonization of Buildings: Fuel Switching

Direct combustion of oil and natural gas in New York’s homes and businesses remains one of the largest sources of CO₂ emissions, accounting for approximately 32% of the state’s total greenhouse gas output (Department of Environmental Conservation, n.d.). Transitioning away from on-site fossil fuel combustion to low-carbon alternatives or all-electric alternatives, offers a pathway to deep and sustained emissions reductions. Despite the Climate Leadership and Community Protection Act (CLCPA) setting ambitious emissions reduction targets, **current laws and regulatory structures continue to support the expansion and entrenchment of fossil fuel systems** (The New York State Senate, n.d.). For example, provisions in the Public Service Law (Sections 30 and 31) and the Transportation Corporations Law (Section 12) legally obligate utilities to provide gas service to new residential and commercial customers, reinforcing the growth of gas infrastructure even when misaligned with climate goals (The New York State Legislature, n.d.; Payne, 2021a). Mechanisms like the “100-foot rule” further exacerbate this trend by shifting expansion costs to existing ratepayers. Recent measures, such as green roofing requirements and the All-Electric Buildings Act, which phase out fossil fuel connections in most new residential and commercial construction starting in 2026 and 2029 respectively, signal a growing commitment to electrification (All-Electric Building Act, 2023). However, these efforts primarily address new construction, leaving behind the vast stock of existing buildings that continue to rely on gas and oil systems (Payne, 2021a).

To address this gap, the proposed New York Home Energy Affordable Transition (HEAT) Act represents a critical next step. The **NY HEAT bill would phase out subsidies for gas infrastructure expansion, require utility planning to align with the CLCPA**, and institute protections that cap energy burdens for low-income households. In particular, it would give the Public Service Commission (PSC) explicit statutory authority to pursue climate justice through equitable ratemaking strategies and a mandated statewide gas transition plan focused on reducing reliance on fossil fuels and enabling the decommissioning of gas systems where appropriate (The New York State Senate, 2023).

Pathway for Deep Decarbonization of Buildings: Electrification

Electrification has emerged as a central pillar of the state’s long-term climate strategy. CLCPA sets ambitious greenhouse gas (GHG) reduction targets of 40% by 2030 and 85% by 2050 (below 1990 levels) (The New York State Senate, n.d.). To operationalize these goals, Section 7 of the CLCPA imposes strict requirements on state agencies. Section 7 (2) & (3) of the CLCPA empower state agencies to undertake actions that are inconsistent with emission reduction pathways as well as to prohibit any decision burdening disadvantaged communities.

CLCPA also operates alongside older statutory regimes that reflect a fossil fuel–based status quo. This causes CLCPA to be in contradiction with the New York Public Service Law (PSL). While the CLCPA pushes toward an electrified and decarbonized future, the PSL continues to treat natural gas service as a public good. **Utilities are still required to provide gas service upon request, recover infrastructure costs from ratepayers, and earn returns on capital investments** (Gundlach & Stein, 2020; Payne, 2021a). This legal commitment to expand and maintain gas infrastructure directly clashes with CLCPA goals, which necessarily require a phasedown of fossil gas.

A further complication in New York’s decarbonization agenda is the **energy siting process**. Section 94C framework aims to streamline the approval of large-scale renewable energy projects. It centralizes authority in the Office of Renewable Energy Siting, ostensibly to fast-track projects aligned with CLCPA goals (Office of Renewable Energy Siting, n.d.). Even under this new regime, local opposition sometimes couched in environmental terms can still derail project timelines (Fields, 2020).

Fourthly, an emerging source of legal tension is Article I, Section 19 of the New York State Constitution, also known as the Green Amendment. Passed in 2021, it guarantees every New Yorker the right to “clean air and water, and a healthful environment.” (Green Amendment, 2021). **While this constitutional provision is aligned with the goals of the CLCPA, it has opened new legal avenues for challenging clean energy development.** This reveals a broader tension between local concerns pertaining to property tax and the systemic benefits of statewide decarbonization (Fisher, 2024).

Fifthly, the CLCPA places significant emphasis on equity by requiring at least 35% (with a goal of 40%) of clean energy investments to benefit disadvantaged communities (DACs) (The New York State Senate, n.d.). While this aligns with the principles of the environmental justice movement, it may also expose the law to constitutional challenges, particularly under equal protection doctrine (Payne, 2021b).

If electrification is to succeed as a statewide decarbonization strategy, these structural conflicts need to be resolved. Aligning legacy energy statutes with the CLCPA, developing clear targets for electrification by sector, and embedding equity into every stage of implementation from rate design to investment tracking will be essential (Gundlach & Stein, 2020).

Pathway for Deep Decarbonization of Buildings: Energy Efficiency

As energy demand shifts toward electricity, it becomes increasingly critical to reduce overall energy consumption in buildings and industrial processes. In line with this, New York has enacted ambitious new legislations, such as, the Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022. This Act expands the State's authority to drive energy efficiency through regulation. It integrates the goals of the Climate Leadership and Community Protection Act (CLCPA) into the State Energy Conservation Construction Code by way of raising baseline energy and water efficiency standards for products ranging from air purifiers and EV chargers to restaurant equipment. This Act broadens the lens to consider lifetime energy savings and incorporates societal benefits, including reductions in greenhouse gas emissions. Additionally, it allows New York to establish building codes that exceed national model standards such as the IECC and ASHRAE, paving the way for more aggressive efficiency measures in both residential and commercial construction (ASHRAE, 2022).

Gaps and Remaining Challenges

New York State faces significant challenges in implementing its ambitious decarbonization goals. A fundamental obstacle is the policy misalignment between the Climate Leadership and Community Protection Act and the Public Service Law, which contradictorily treats natural gas as a public good (Gundlach & Stein, 2020; Payne, 2021a).. This statutory contradiction undermines the foundation for meaningful transformation of the building sector.

The state's focus on new construction through policies like the All-Electric Buildings Act creates a critical gap in addressing existing buildings, which represent the majority of emissions sources (Payne, 2021a). This imbalanced approach severely limits the state's ability to meet its climate targets. Implementation is further hampered by administrative bottlenecks in permitting and environmental reviews, while the "Green Amendment" to the state constitution has paradoxically created new avenues for legal challenges to clean energy development (Fisher, 2024).

Perhaps most critically, **New York lacks comprehensive, sector-specific electrification targets with corresponding implementation pathways** (Payne, 2021b). Without clear roadmaps that align incentives, regulations, funding, and technical assistance across multiple stakeholders, market conditions remain insufficient to drive widespread adoption of electrification technologies, particularly where split incentives between property owners and occupants persist.

5.1.c Municipal Level

Municipalities across the United States, and particularly in New York State, are increasingly using a variety of policy tools to promote decarbonization at the neighborhood scale. These tools generally fall into the following categories: strategic and master planning, zoning and building code reforms, tax policy changes, direct funding programs, and regulatory reforms.

Much of the public funding available for infrastructure and redevelopment projects has historically been made available by the federal government and to a lesser extent, state governments. However, cities and municipalities retain primary control and influence over certain governance matters including local laws, zoning codes and building codes. In New York specifically, the state constitution's home rule provision provides local governments power over their own "property, affairs and government" (New York State, n.d.).

Municipal approaches also exist in the context of and may be influenced by the global agenda-setting and coalition building of actors like the Carbon Neutral Cities Alliance and C40 Cities (Carbon Neutral Cities Alliance, n.d.); C40 Cities Climate Leadership Group, 2025b). C40, for instance, is a network of nearly 100 cities (including New York City) worldwide committed to confronting climate change - they offer strategies for embedding decarbonization in urban development, particularly across sectors like energy, waste, and transportation (C40 Cities Climate Leadership Group, 2025b). Similarly, the Global Covenant of Mayors fosters knowledge-sharing, technical assistance, and collective goal setting, helping cities build political momentum and access best practices for urban decarbonization (Global Covenant of Mayors for Climate & Energy, n.d.).

Strategic and Master Planning

Municipalities, like other governmental entities, use strategic and master plans to set and communicate policy agendas across disciplines. In New York state, these plans

have helped municipalities align specific policy changes like zoning reforms, funding priorities, and regulations to broader sustainability goals. An early example is New York City's PlaNYC, launched in 2007, which addressed climate resiliency, energy, housing, and transportation issues holistically (Mayor's Office of Climate and Environmental Justice, 2025). It was updated as OneNYC 2050 eight years later, explicitly targeting carbon neutrality and social equity (Feifel, 2025). Similarly, the Rensselaer Rising Revitalization Plan demonstrates how smaller cities are leveraging planning tools to communicate their prioritization of sustainability issues, for example here by emphasizing “energy-conscious” development (New York State Department of State, 2025). These plans often lay the groundwork for more targeted changes, such as zoning reform or incentive programs, by establishing decarbonization as a core municipal priority.

Regulations

Municipalities are increasingly using regulations, including fines and penalties, to require specific building decarbonization outcomes, sometimes backed by fines for noncompliance (Braverman, 2024). New York City's Local Law 97, enacted in 2019 as part of the Climate Mobilization Act, mandates that buildings over 25,000 square feet reduce their greenhouse gas emissions by 40% by 2030 and 80% by 2050 (NYC Accelerator, 2025a). This law targets existing buildings, requiring owners to invest in energy efficiency upgrades and retrofits. Penalties for those that fail to meet targets begin this year and will be calculated based on 2024 emissions and energy use. Other municipalities, such as Ithaca, have adopted local codes that limit the amount of emissions that new buildings can produce (U.S. Green Building Council, 2022).

Direct Funding Programs

Some municipalities have deployed direct funding programs to support neighborhood-scale decarbonization. Much funding in New York flows through state programs from groups like NYSERDA or from federal agencies and is administered by cities and towns. Cities may sometimes establish their own grant and rebate programs, but it is rarer. For example, New York City's REDi program which provides incremental funding for retrofitting and electrification of existing subsidized multi-family buildings is a joint project between NYSERDA and their department of Housing Preservation and Development (NYC Housing Preservation & Development, 2025).

Zoning and Building Codes

Zoning and building codes traditionally serve as barriers to decarbonization because technical requirements like height limits and parking mandates can inhibit much needed changes like the addition of renewable energy systems, adaptive reuse of existing buildings, and the retrofitting of older structures. As a part of a larger movement to simplify and update zoning and building codes to reflect the societal changes that have occurred over the last decade, municipalities have begun to systematically reform these laws to either facilitate or incentivize decarbonization efforts. New York City's Zone Green update, which was passed in 2012, amended zoning regulations to exempt rooftop solar panels, external insulation, and stormwater reuse systems from height and floor area ratio (FAR) restrictions (NYC Planning, 2012). More recently, NYC's proposed City of Yes zoning change, which passed City Council in December of 2023, aims to streamline approvals for energy retrofits and remove parking minimums to allow more compact, lower-carbon development (NYC Planning, 2025). Albany, New York State's capital, used to provide a height incentive for green or blue roof additions, but repealed it in recent years to focus on other issues like affordable housing (Fries, 2019).

Tax Policy Changes

Tax policy is another critical lever. Municipalities use abatements, exemptions, and penalties to encourage private investment in energy efficiency and renewable energy. New York State, Senate Bill S9852, enabling legislation which was introduced in the 2023-2024 session, would allow cities with populations over one million to offer property tax abatements for capital improvements that reduce carbon emissions (The New York State Senate, 2023). For example, Philadelphia established a green roof tax credit and in 2015, doubled it in response to insufficient uptake, from 25% of cost to 50% of cost, up to \$100 K. (City of Philadelphia, n.d.; Kall, 2015). Boulder, Colorado established a carbon tax that is levied on residential, commercial, and industrial property carbon emissions (City of Boulder, 2025). Residents are charged this tax via their electricity and natural gas bills, raises approximately \$6.5 M a year, and creates a dedicated funding stream that the city can also bond against, allowing them to borrow funds to invest in climate related infrastructure (City of Boulder, 2025).

Gaps and Remaining Challenges

Despite these evolving policy landscapes, several gaps persist. Brookings found in 2022 that many cities across the United States were struggling to meet the climate goals and emissions targets they had set out (Kane, Tomer, George, & Russell Black, 2022). Many cities lack the technical and administrative capacity to implement or enforce ambitious decarbonization policies effectively, and funding is a pain point with

only 16% of city decarbonization strategies having identified specific funding sources for their efforts (Kane, Tomer, George, & Russell Black, 2022). Strategic planning processes, while essential, are frequently disconnected from binding implementation mechanisms. Financial incentives like tax benefits often do not reach smaller property owners or marginalized communities without explicit equity frameworks, and without technical assistance many are not sophisticated enough or have enough time to navigate applying for them. Additionally, zoning reforms tend to be incremental and take a long time to pass; similarly, applications for significant remodels and appeals for code exemptions can take years to get approved, delaying construction. Overall, while municipal-level decarbonization efforts are growing, additional technical assistance, collaborative approaches, and dedicated funding incentives are needed to achieve the scale of change required.

5.1.d Summary of Federal, State and Local Regulations and Policies

Federal Level

On the federal level, key decarbonization policies include:

- Inflation Reduction Act (IRA): Provides tax credits and rebates for electrification upgrades in residential and commercial buildings
- Infrastructure Investment and Jobs Act (IIJA): Supports weatherization, retrofits, and workforce development through programs like WAP, EECBG, and EE RLF
- Federal Building Performance Standard (BPS): Mandates fossil fuel phase-out in federal buildings by 2030 with electrification goals

However, these federal efforts face significant limitations:

- Focus on individual buildings rather than coordinated district approaches creates implementation silos
- Split incentives between property owners and tenants remain unaddressed
- Coordination gaps between electrification initiatives and utility infrastructure investments risk grid destabilization
- Federal climate policy instability creates planning uncertainty for long-term investments
- Complex application processes and fragmented agency oversight limit program effectiveness

State Level

At the state level, New York has established ambitious climate policies including:

- Climate Leadership and Community Protection Act (CLCPA): Sets GHG reduction targets of 40% by 2030 and 85% by 2050
- HEAT Act (Proposed): Would phase out gas infrastructure subsidies and align utility planning with climate goals
- All-Electric Buildings Act: Phases out fossil fuel connections in new construction
- Advanced Building Codes and Efficiency Standards Act (2022): Raises baseline energy standards beyond national models

Nevertheless, the state faces substantial implementation challenges:

- Fundamental policy misalignment between CLCPA and Public Service Law, which treats natural gas as a public good
- Focus on new construction rather than existing buildings, which represent most emissions sources
- Administrative bottlenecks in permitting and environmental reviews delay implementation
- "Green Amendment" has created new legal avenues for challenging clean energy projects
- Lack of comprehensive, sector-specific electrification targets with clear implementation pathways

Municipal Level

Municipal governments have deployed various decarbonization tools, including:

- Strategic planning initiatives like NYC's PlaNYC/OneNYC 2050
- Building emissions regulations such as NYC's Local Law 97, requiring large buildings to reduce GHG emissions
- Zoning reforms like NYC's Zone Green and City of Yes, removing technical barriers to implementation
- Tax incentives such as the proposed Senate Bill S9852 for carbon-reducing capital improvements

Despite these efforts, significant gaps remain at the municipal level:

- Limited technical and administrative capacity to implement ambitious policies
- Only 16% of cities have identified consistent funding sources for climate initiatives
- Strategic planning often disconnected from binding implementation mechanisms
- Financial incentives frequently fail to reach small property owners and disadvantaged communities

- Lengthy approval processes for zoning reforms and code exemptions delay implementation
- Persistent access barriers for disadvantaged communities

5.2 Programs

Most current programs are geared toward individual buildings, with few tools to assess or coordinate at the neighborhood scale. Economic development programs like DRI and NY Forward have begun encouraging sustainability, but could go further by mandating decarbonization in state-funded projects – much like MWBE participation is required under Empire State Development (ESD). Design and build-phase programs tend to favor high-profile or standalone projects, missing the opportunity for bundled retrofits, neighborhood-scale demand response programs or shared systems like thermal networks. In the maintenance phase, support remains limited for long-term operations, particularly around transitioning workforce who are certified to operate and maintain technology like boilers, to say hundreds of heat pumps, as well as resident engagement at the community level.

5.2.a Analyze Phase Programs

EmPower+ (NYSERDA, 2025d): Provides free energy assessments and upgrades for income-eligible households.

- **Gap:** The scope of the EmPower+ program could be expanded to include whole-building assessments and bundled retrofits across blocks or clusters.

FlexTech (New York State, 2024): Shares the cost to produce a study that will detail how a clean energy and/or energy efficiency technology will be implemented in buildings.

- **Gap:** While this program is recommended by economic development programs like **the Downtown Revitalization Initiative (DRI)**, these initiatives could be an entry point for stronger enforcement of decarbonization initiatives at the neighborhood scale.

NY Energy Manager (NYPA, n.d.b): Provides real-time energy data and analytics to identify inefficiencies and prioritize upgrades.

- **Gap:** Limited application for community-wide or multi-building assessment approaches.

5.2.b Design Phase Programs

Buildings of Excellence (NYSERDA, 2025a.): Recognizes and supports the design of low- or zero-carbon multifamily buildings.

- **Gap:** Incentives could be broadened to include retrofits for existing buildings, not just new construction, at neighborhood scale.

Carbon Neutral Buildings Roadmap (NYSERDA, 2022.): Provides a strategic framework to guide building decarbonization across New York State.

- **Gap:** The roadmap could be operationalized into direct design support for neighborhood projects and can be used as guidance for projects receiving funding through programs like DRI and NY Forward.

Clean Energy Solutions (NYPA, n.d.a): Offers engineering and project development services to help tailor energy strategies to specific site needs.

- **Gap:** Limited focus on district-scale or multi-building system design.

5.2.c Build Phase Programs

NYS Clean Heat Program (NYS Clean Heat, n.d.): Offers incentives for the installation of heat pumps in residential and commercial buildings.

- **Gap:** Incorporate neighborhood-scale incentives for bulk heat pump deployment and shared infrastructure.

RetrofitNY (NYSERDA, 2025h): Scales up deep energy retrofits in multifamily buildings through high-performance standards.

- **Gap:** Expand RetrofitNY to support bundled multi-building retrofits across neighborhoods, not just individual sites.

NY Forward (New York State, n.d.): Revitalizes smaller and rural communities, sometimes including energy and sustainability projects.

- **Gap:** Introduce mandates for state-funded programs around development, redevelopment and waterfront revitalization to include neighborhood-scale decarbonization process and compliance.

5.2.d Maintain Phase Programs

Home Energy Assistance Program (HEAP) (OTDA, n.d.): Offers financial help for heating

and cooling bills to maintain system operations.

- **Gap:** Move beyond bill assistance to fund coordinated energy efficiency upgrades at the neighborhood-scale that reduce long-term energy burden.

Strategic Energy Management (SEM) Program (NYSERDA, 2025i): Supports organizations in establishing ongoing energy management practices.

- **Gap:** Extend SEM support to residential neighborhoods and multi-building energy management strategies.

NYPA Energy Performance Monitoring: Enables long-term energy performance monitoring, supporting continuous optimization and sustained savings.

- **Gap:** Limited application for community-scale operation and maintenance needs.

5.2.e Cross-Phase Institutional Support

The New York Power Authority (NYPA) can also play a critical role in enabling neighborhood-scale decarbonization across all phases of implementation. In the **Analyze** phase, NYPA's *NY Energy Manager* (NYPA, n.d.) platform provides real-time energy data and analytics to identify inefficiencies and prioritize upgrades (NYPA, n.d.). During the **Design** phase, NYPA offers engineering and project development services through its *Clean Energy Solutions* (NYPA, n.d.) program, helping tailor energy strategies to specific site needs (NYPA, n.d.). In the **Build** phase, NYPA manages capital project implementation and provides low-interest financing to municipalities, reducing the barrier of upfront costs. Finally, in the **Maintain** phase, NYPA could help enable long-term energy performance monitoring via NYEM, supporting continuous optimization and sustained savings over time. This end-to-end support positions NYPA as a key institutional partner for scaling decarbonization across New York's neighborhoods.

5.2.f Summary of Programs and Challenges

New York State offers several programs across the building decarbonization lifecycle:

- Analysis programs like EmPower+ and FlexTech provide assessment support for individual buildings
- Design programs including Buildings of Excellence and the Carbon Neutral Buildings Roadmap offer frameworks for planning
- Implementation support through NYS Clean Heat, RetrofitNY, and community

revitalization initiatives

- Operation programs such as HEAP and SEM assist with ongoing energy management
- NYPA offers cross-phase support through data analytics, engineering services, and project implementation

Despite these programs, significant challenges remain:

- Limited programming for neighborhood-scale assessment, planning, and coordination
- Focus on standalone buildings rather than bundled retrofits or shared infrastructure systems
- Insufficient integration with economic development initiatives and state-funded projects
- Weak mandates for decarbonization in community revitalization efforts
- Inadequate support for workforce transition and community engagement during operations
- Limited assistance for coordination across multiple buildings and ownership types
- Insufficient incentives for bulk equipment deployment and shared thermal networks

5.3 Financing Mechanisms

Neighborhood-scale decarbonization requires significant upfront capital investment, presenting a key challenge for implementation. Based on stakeholder interviews and case studies, several financing mechanisms have emerged as viable pathways for funding these complex initiatives across New York State.

5.3.a C-PACE Financing

Commercial Property Assessed Clean Energy (C-PACE) financing functions as a real estate tax assessment, enabling property owners to finance energy efficiency improvements with long-term repayment through property taxes. According to C-PACE lending experts, mortgage holder consent remains the primary obstacle to widespread adoption, as the financing takes a senior position similar to property taxes (NYC Accelerator, 2025b). Despite this challenge, C-PACE offers substantial benefits by extending payments over 15-20 years, transforming improvements with traditional 2-3 year payback periods into immediately cash-flow positive investments (NYSERDA, 2025b).

Program requirements vary significantly between jurisdictions; New York State primarily focuses on energy efficiency improvements, with water conservation measures qualifying only when they reduce energy consumption. Building size appears to be a critical factor in feasibility, with experts noting that buildings under 25,000 square feet are generally more suitable candidates for comprehensive electrification financing through C-PACE (Utility Dive, 2025).

NYC's C-PACE program, launched under the Climate Mobilization Act, offers long-term, fixed-rate financing covering up to 100% of project costs with no upfront cash for energy efficiency and renewable energy upgrades in commercial and multifamily buildings (Builders Patch, 2025). The program supports compliance with Local Law 97, helping property owners meet climate goals while enhancing building value and sustainability (Urban Green Council, 2024).

5.3.b Waterfall Financing Approach

A notable municipal-scale approach implemented in Ithaca, New York demonstrates how creative financing can make decarbonization economically viable. This model employs a comprehensive financing stack estimated at \$300 million for citywide decarbonization, with risk mitigation strategies engaging multiple stakeholders (CNBC, 2021). New York State government resources cover "first loss" through loan loss reserves, with philanthropic organizations addressing the next tier of potential losses (Eclipse & Davis, 2022).

The strategic risk redistribution enabled substantial interest rate reductions, which when combined with federal and state incentives, effectively enabled the buy-down of interest rates to effectively 0% for LMI households, and significantly below market rates for every other household in the city (Fast Company, 2021). By extending loan terms to 20 years, monthly payments decreased from approximately \$200 to \$99, fundamentally transforming affordability (Utility Dive, 2022). This model's strength lies in its ability to combine private capital, public guarantees, and philanthropic support to create accessible financing for building decarbonization.

Ithaca's approach has attracted national attention with its innovative financial model designed to back its ambitious goal of carbon neutrality by 2030. The city has secured \$100-150 million in private equity funding for the first phase of its decarbonization project, which will be used to finance low-cost loans for building owners (The Washington Post, 2021). This funding structure helps address the estimated \$600 million total cost of upgrading the city's 6,000 buildings, making the initiative

economically feasible despite Ithaca's relatively small \$80 million annual budget (ArchDaily, 2024).

5.3.c Municipal Bond Financing and Revenue Generation

Municipal bonds represent a foundational financing mechanism highly relevant to neighborhood-scale projects in New York State. Energy finance experts note that many New York municipalities have developed sophisticated capabilities to secure bond-backed financing at favorable rates, which can be self-administered (Environmental Finance, 2020). This approach becomes particularly powerful when coupled with ownership models that return revenue generation potential to municipalities rather than transferring it to external entities.

Projects like those in upstate New York demonstrate how municipal ownership of thermal energy resources can create broader social and economic benefits by keeping revenue streams within the community, potentially funding additional climate initiatives or reducing costs for residents (Environmental Protection Agency, 2025). The New York State Energy Research and Development Authority (NYSERDA) has pioneered innovative approaches with green bonds, becoming the first US municipal bond issuer to securitize a portfolio of residential solar and energy efficiency loans (Environmental Finance, 2020).

In 2020, NYSERDA issued Residential Solar and Energy Efficiency Financing Green Revenue Bonds to finance loans through the Green Jobs-Green New York Program, providing a model for other municipalities to follow (NYSERDA, 2025e). Additionally, New York's Clean Water, Clean Air, and Green Jobs Environmental Bond Act of 2022 allocates funding for climate-smart communities, supporting local governments in implementing climate adaptation and mitigation projects (NYSDEC, 2024).

5.3.d Strategic Grant Utilization and Incentive Stacking

For affordable housing and lower-income neighborhoods in New York State, strategic combination of multiple funding sources proves essential. Decarbonization practitioners recommend "stacking money from as many different grants as possible," allocating restricted funds (e.g., those designated solely for insulation and air sealing) first, reserving more flexible funding for comprehensive improvements.

Consumer protection mechanisms must accompany these investments, including restrictions on rent increases or property sales following improvements to prevent gentrification. New York-specific programs like Green Jobs Green New York offer

concessionary lending at significantly below-market rates (2-3%), providing critical access to capital for underserved communities at terms more favorable than those available in neighboring states like Connecticut, where program costs are generally lower but interest rates may be higher.

The NY Green Bank's Community Decarbonization Fund, launched in 2023, is directing \$250 million in capital to clean energy projects, building decarbonization, and related small businesses that benefit disadvantaged communities (NYSERDA, 2025e). This fund provides flexible concessionary financing through community development financial institutions and nonprofits, expanding clean energy financing opportunities, especially for smaller projects in communities across New York.

5.3.e Summary of Financing Mechanisms

New York State currently offers several financing mechanisms to support decarbonization efforts:

- Commercial Property Assessed Clean Energy (C-PACE) provides long-term financing for commercial buildings through property tax assessments
- Waterfall financing approach demonstrated in Ithaca combines private capital, public guarantees, and philanthropic support
- Municipal bonds offer favorable rates for community-scale projects
- Green Jobs Green New York delivers below-market concessionary lending
- Strategic grant utilization and incentive stacking maximizes available resources, particularly for affordable housing
- Utility partnerships through UTENJA and on-bill recovery financing present emerging opportunities

Despite these mechanisms, the current financing landscape reveals several key gaps:

- No Residential PACE programs for single-family and small residential properties
- Strict savings-to-investment ratio requirements for C-PACE limit comprehensive electrification
- Lack of resilience measures provisions in current C-PACE programs
- Economic viability challenges for models like Ithaca's in today's higher interest rate environment
- Nascent utility thermal energy network financing despite UTENJA legislation
- Absence of structured financial products for institutions seeking to offset Scope 3 emissions

- Limited technical expertise and coordination capacity in many communities to integrate multiple financing mechanisms
- Persistent split incentives between property owners and occupants, especially in rental housing

5.4 Overall Gap and Risk Analysis

Across federal, state, and municipal levels, current policies and programs remain misaligned and insufficiently scaled to support neighborhood-level decarbonization. While investments have increased, **most instruments remain focused on individual buildings**, leaving multi-owner and district-scale retrofits under-supported.

At the federal level, programs like the IRA and IIJA offer substantial incentives and technical support, but lack mechanisms for neighborhood-scale approaches such as thermal networks. **Tax credit structures under the IRA are vulnerable to regulatory and market uncertainties, while complex application processes, fragmented agency oversight, and insufficient coordination across programs limit effectiveness.**

Furthermore, funding programs often exclude renters or low-income multifamily households due to eligibility criteria or split incentives between landlords and tenants.

At the state level, despite ambitious mandates such as the CLCPA and new policies like the All-Electric Buildings Act, structural gaps persist - particularly with conflicting statutes like the Public Service Law. **Most new instruments tend to focus on new construction rather than the large stock of legacy buildings**, while delays in siting, permitting, and environmental review remain major implementation bottlenecks.

At the municipal level, a few cities have led with strong building laws, but most local governments face capacity and authority constraints. **Only 16% of U.S. cities report having identified a clear and consistent source of funding for their climate plans. Zoning and permitting remain siloed, funding is inconsistent, and disadvantaged communities face persistent access barriers, while private sector actors struggle with uncertain timelines and high transaction costs.**

While financing instruments such as C-PACE, green banks, and municipal bonds are growing, many remain inaccessible or underutilized. Many models struggle with affordability, transaction costs, and multi-owner complexity. Residential PACE is still unavailable, and current tools are not well-matched to aggregated or Scope 3 retrofit strategies.

Overall, while New York has made significant progress in building a multi-level decarbonization ecosystem, the current landscape remains fragmented,

under-resourced, and ill-equipped to achieve equitable, neighborhood-scale implementation. Without aligned governance, targeted technical assistance, and financing tools suited to the scale and structure of neighborhood interventions, implementation risks will continue to limit the state's ability to meet its decarbonization goals.

6. Theory of Change

Building on insights from our landscape analysis, policy review, case study evaluations, and stakeholder interviews, it is evident that while technical pathways for building and neighborhood-scale decarbonization exist, the conditions necessary for scaling these solutions are currently incomplete. Our stakeholder interviews further highlighted that intentional coordination across multiple levers is required to establish a coherent, supportive environment that enables widespread, equitable, and resource-efficient neighborhood-scale decarbonization (RED).

6.1 Ownership and Decision-making Capacity as a Framing Condition

Ownership structures fundamentally shape the feasibility, financing, and coordination of decarbonization efforts. In New York State, neighborhoods comprise a diverse array of ownership models, including single-family homes, co-operatives, public housing, and large commercial portfolios, that directly influence who can make investment decisions, access financing, and coordinate multi-building retrofits.

Policies and programs often inadvertently favor easily aggregated ownership, such as large landlords or corporate entities, while small, fragmented, or community-based ownership models face greater barriers. This complexity is not simply administrative: it determines which properties receive decarbonization upgrades and which are left behind, with serious implications for equity and emissions reduction goals.

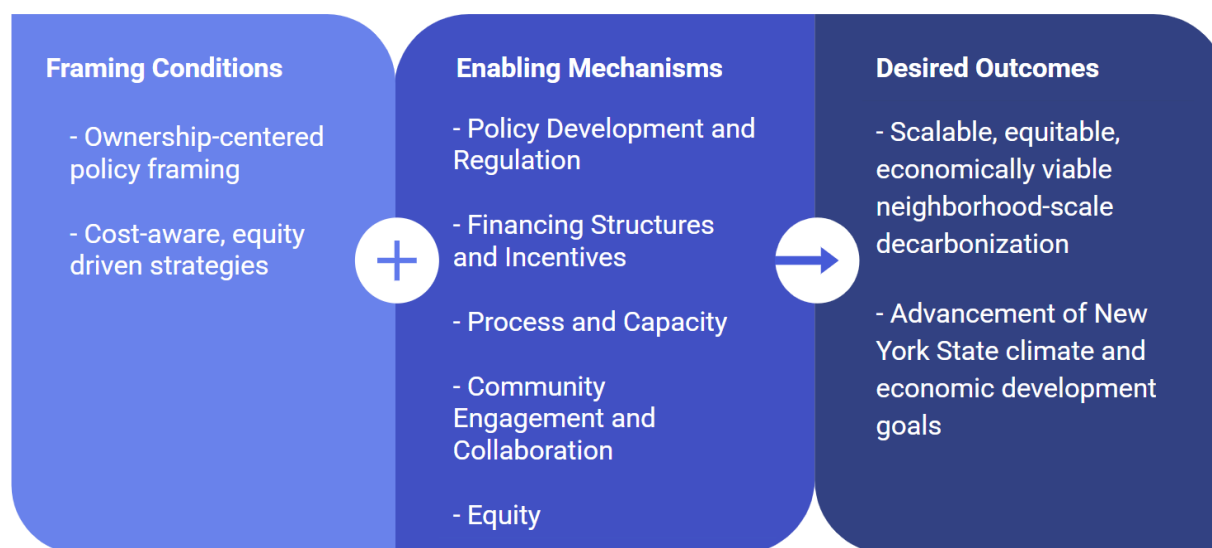
One critical ownership-related barrier is the problem of "split incentives," particularly in rental properties. In these cases, building owners bear the costs of retrofits, while tenants receive the resulting energy savings. Without mechanisms to realign benefits and costs, owners have limited financial motivation to invest in decarbonization without passing costs onto tenants through higher rents, risking affordability and displacement concerns.

Enabling broad participation across all ownership types is therefore essential. If decarbonization is confined only to properties with simple ownership or strong financial capacity, the state will not meet its emissions reduction targets. Moreover, disadvantaged communities would miss out on the critical benefits of the clean energy transition including lower energy costs, healthier indoor environments, increased climate resilience, and local economic opportunities. Without targeted support, these communities risk being locked into high-emissions, high-cost, and increasingly

vulnerable building stock, missing the opportunity to access these benefits and deepening long-term disparities.

These foundational insights informed the conceptual framework illustrated in Figure 3, which connects the framing conditions, mechanisms, and desired outcomes necessary to support scalable, community-centered decarbonization efforts.

Figure 3. Key framing conditions and enabling mechanisms for achieving equitable neighborhood-scale decarbonization across the state.



Stakeholder interviews reinforced these findings, identifying high cost and policy barriers as the most frequently cited challenges. Together, these insights establish the rationale for our approach: effective neighborhood-scale decarbonization must address ownership diversity, overcome cost barriers, build technical and organizational capacity, foster community collaboration, and center equity from the outset.

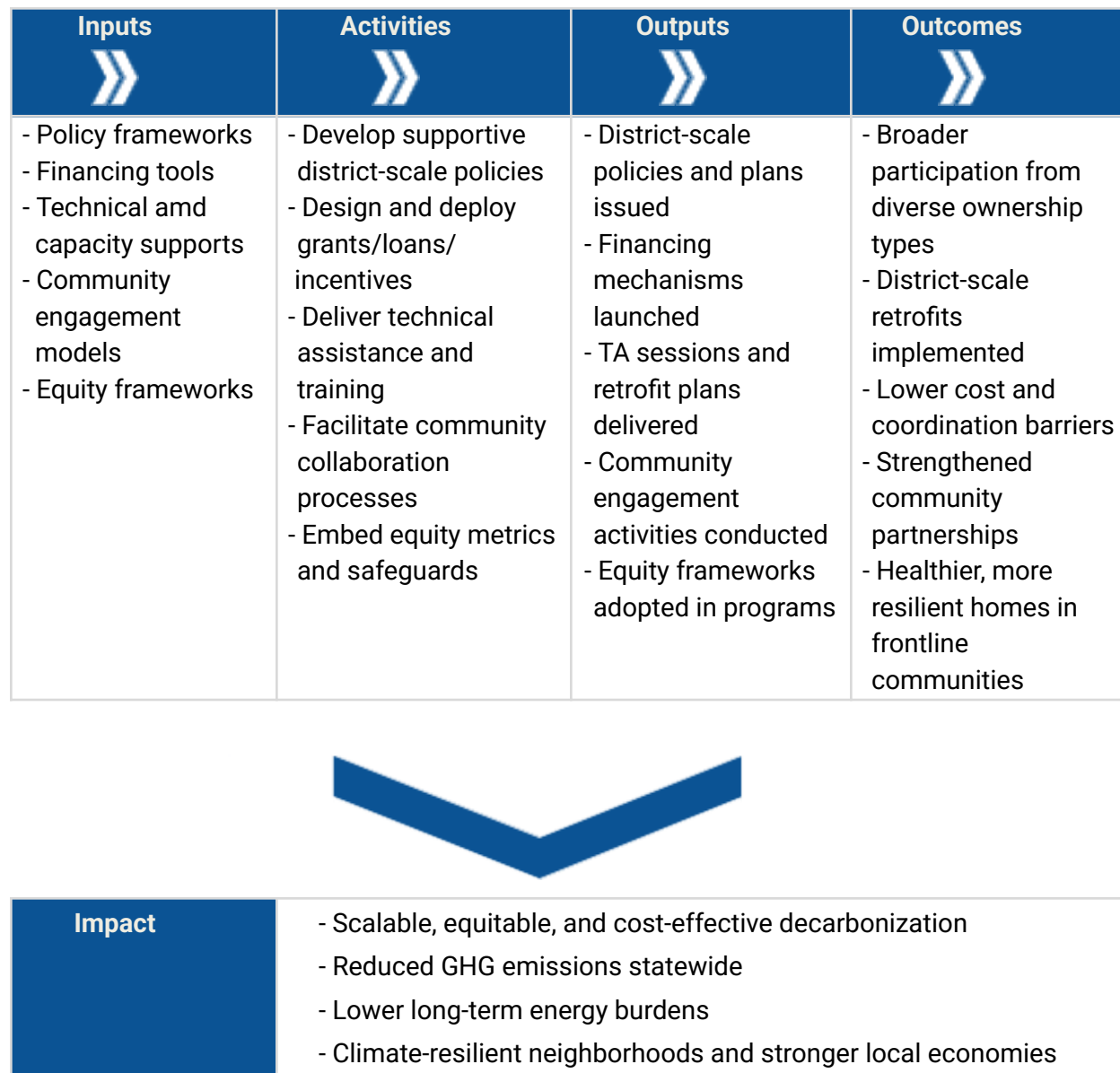
Thus, the theory of change underpinning this report is as follows:

If community-centred policies, financing mechanisms, process and capacity supports, community collaboration pathways, and equity frameworks are jointly created in response to context-specific needs and integrated across multiple levels of ownership and governance, then neighborhood-scale decarbonization can be achieved in a scalable, equitable, and economically viable manner.

6.2 Theory of Change

The high-level logic of change is illustrated in Figure 4, outlining the key inputs, activities, outputs, and outcomes required to drive resource-efficient, equitable decarbonization at the neighborhood scale.

Figure 4. Theory of Change for neighborhood-scale decarbonization, from foundational inputs to long-term impact.



This theory of change provides the high-level logic for achieving scalable, equitable neighborhood-scale decarbonization. But realizing this vision requires translating these

enabling mechanisms or levers of change into actionable strategies. The following policy framework outlines and elaborated on the levers, tools, and interventions needed to activate this change across New York State's varied ownership and community contexts.

7. Policy Framework

Neighborhood-scale decarbonization is technically feasible, but our stakeholder interviews and literature review revealed that fragmented ownership, high upfront costs, limited local capacity, and underdeveloped engagement pathways all pose significant barriers. To address this, our policy framework is built on five mutually reinforcing levers: policy and regulation, finance, process and capacity, community collaboration, and equity. When tailored to local contexts, these elements create the conditions for decarbonization across New York’s diverse neighborhoods.

Figure 5. Five key levers to enable neighborhood-scale decarbonization

Aim	To achieve neighborhood-scale decarbonization across the different settings, contexts and ownership models across New York State.
Objective	To define the actions required to enable the framework, including setting community-centered policies, regulations, financing options, processes and collaboration, while embedding inclusive principles at every stage.
Levers	Actions
Policy & Regulations	Inform, shape and support policies, regulations, standards, and incentives - that explicitly support district-scale retrofits, collaborative energy planning, and shared thermal or electrical systems. Policies set the intention; regulations operationalize them - through tools like building codes, zoning changes, permitting processes, and utility requirements.
Finance	Bridge upfront cost barriers and enable actors to build funding stacks that align with their goals and capacity by securing resources through grants, loans, tax credits, sustainable business models, or public-private investment.
Process & Capacity	Build local capacity by identifying gaps in skills, services, and institutional support (among owners, managers, and municipalities), across all phases - Assessment, Design, Build-out, and ongoing Maintenance.
Community Collaboration	Use a local champion, trusted messengers, tailored messaging, and participatory methods like charrettes to align stakeholders around shared goals and local priorities particularly across fragmented ownership landscapes.
Equity	Embed place-based strategies that recognize diverse geographies - from tribal lands to urban DACs – ensuring benefits (from cost savings, to health improvements, to job creation) flow to frontline communities.

7.1 Policy and Regulatory Recommendations

Policies establish the vision, while regulations put them into action through various mechanisms. However, the current building by building compliance approach falls short of speed needed to meet New York's climate goals. It's clear that replacing one appliance at a time isn't enough. To enable deep decarbonization, New York State along with local governments should design innovative laws and policies should design innovative laws and policies that enable neighborhood-scale coordination.

7.1.a. State Level Recommendations

At the state level, policy reform should go beyond incremental efficiency to unlock systemic, neighborhood-scale decarbonization. The recommendations below focus on solutions that cater to scale, density, ownership and equity parallel to transitioning to cleaner energy.

Facilitate Neighborhood-Scale Infrastructure Development

The current legal and policy landscape as under Climate Leadership and Community Protection Act (The New York State Legislature, 2019) as well as New York City's Climate Mobilization Act, focus on one building at a time along with one appliance at a time. Even while incorporating a systems approach, acts like Utility Thermal Energy Network and Jobs Act (UTENJA) (Upgrade NY, 2024), only allow for utilities to operate thermal networks (District Energy, 2023). We need to shift the decarbonization model from fragmented building-by-building upgrades to coordinated neighborhood-scale transitions and explicitly support district-scale retrofits, collaborative energy planning, and shared thermal or electrical systems. Clear regulatory structures can create the conditions for collective action and investment.

- ***Dedicated Pathway for Non-Utility Thermal Energy Network Projects:*** Authorize community groups, co-ops, and water utilities to own and sell thermal energy under UTENJA (Upgrade NY, 2024). Enable tenants and small building owners to participate through shared infrastructure rather than relying on individual retrofit decisions.

Scale Up Standards and Requirements for Widespread Adoption

Strategies like appliance standards, replacement cycles, market transformation rules, and reforming Clean Heat programs to mandate widespread electrification of space and water heating can help scale energy efficiency. While the Energy Policy and Conservation Act (EPCA) preempts state standards for federally regulated products,

states can lead by regulating unregulated categories, optimizing performance for local needs. The Advanced Building Codes and Appliance Efficiency Act of 2022, which added 16 product categories, is a strong example (Advanced Building Codes Act, 2022). States may also seek EPCA waivers in specific cases (ASHRAE, 2022). Though focus should remain on areas outside EPCA's scope, stricter state standards - with strong justification - are still a viable tool.

- **Mandate AC-to-Heat-Pump Swaps at Time of Replacement:** New York State should model a heat pump replacement mandate at time of AC replacement, similar to Denver's 2022 Energy Code, which requires partial electrification in existing buildings when cost-effective (Denver Energy Code Amendment, 2022).
- **Shorten the NYC heating season (Oct 1–Apr 30) to accelerate installation timelines in multifamily buildings:** New York State Property Maintenance Code outlines the heating season to be from September 15th until May 31st (New York State Property Maintenance Code, 2020). Align the heating season with shifting climate patterns by moving it to Oct 1–Apr 30, giving building owners more time to plan and implement energy system upgrades.
- **Integrating with Air Quality Regulations by developing a "Zero-Emission Space and Water Heating Standard":** The State of California is addressing emissions from space & water heating appliances by way of air quality regulations. For instance, the South Coast Air Quality Management District has recently passed zero-NOx rules for residential & commercial appliances. (South Coast AQMD Rules 1111 & 1121, 2023).
- **Update construction and appliance codes to prohibit new one-way ACs by 2027** (ASHRAE, 2022).
- **Scaling Incentives under Existing Programs:** Pair duct upgrade incentives with NYS Clean Heat and EmPower+ rebates, prioritizing homes replacing central AC or fully electrifying. Scale incentives (e.g., \$5,000+) for heat pumps sized for full winter loads, and link air sealing and envelope upgrades to ductwork improvements for optimal load reduction (NYSERDA, 2023).
- **Focus mandates on Climate Zones 4 and 5:** In Zone 4, promote heat pumps as the primary solution with balanced design for year-round efficiency; in colder Zone 5, prioritize cold-climate heat pumps and consider hybrid systems for reliability (ASHRAE, 2022).

Target High-Impact Areas Where Emissions and Inequity Intersect

Low Income Neighborhoods, at the intersection of energy efficiency and equity, can have an inverse relationship, reaping negative externalities at the cost of disadvantaged communities.

- **Define Priority Zones:** UTENJA does promote the proposal of a thermal network energy to include areas with disadvantaged communities. However a more proactive approach would be to use city or regional data (building energy use, age, income levels) to map neighborhoods with the highest emissions per square foot and greatest need (Utility Thermal Energy Networks and Jobs Act, 2022; District Energy, 2023).

Align Energy Systems with Climate Goals

- **Set Sectoral Emissions Targets for the Gas System:** Require the Department of Environmental Conservation to include medium- and long-term gas sector targets under ECI effective in 2024 emissions rulemaking.
- **Update Public Service Law to be in consonance with CLCPA:** Amend Public Service Law §§ 30 & 31 and Transportation Corporations Law §12 to repeal the “obligation to serve” gas and eliminate the 100-foot rule, which mandates subsidized hookups (Public Service Law, 2023; Transportation Corporations Law, 2023).
- **Update the Benefit-Cost Analysis Framework to Reflect Decarbonization Priorities:** The current framework under NYCRR pertaining to Cost Benefit Analysis only values CO2 emissions, leaving out other pollutants like methane. The CLCPA’s use of methane’s 20-year warming potential underscores the need to update frameworks based on the 100-year metric.
- **Support NY Heat Act:** It supports climate-aligned utility planning by phasing out subsidies for gas infrastructure expansion, capping energy burdens for low-income households, and empowering the Public Service Commission to develop a statewide gas transition plan (Home Energy Affordable Transition Act, 2023).

7.1.b. Municipal Level Recommendations

The survey and analysis of municipal efforts undertaken to date, along with insights gleaned from interviews with local actors, uncovered key areas where local governance can help further encourage and facilitate decarbonization at the neighborhood scale. These recommendations attempt to address identified gaps and also raise discussion lessons learned from other domestic cities and towns.

Capitalize on Strategic Planning Efforts as Opportunities to Prioritize Decarbonization, Align Incentives, and Identify Implementation Pathways

Strategic and master planning efforts are recurring but not frequent practices, meaning they are unique opportunities that can be seized and used to bring about strategic change. They offer entry points to plan disruptive energy and construction projects, and serve as convening tools to align stakeholders and identify shared incentives and cost savings. However, they should clearly articulate practical and viable pathways to achieving their goals, including by identifying viable funding sources (Kane, Tomer, George, & Russell Black, 2022).

Combine Regulations with Investments in Technical Assistance and Administrative Capacity

Regulations are powerful tools to help bring about change but their effectiveness depends on the respondent's ability to comply and the authority's ability to enforce. Expanding both technical assistance capacity, to help respondents understand the new rules and work towards compliance, and enforcement capacity, to help ensure that government entities can fulfill their promised penalties and effectively carry out their mandates, is essential. In many cases, like New York City's ongoing scaffolding issues, weak enforcement has made noncompliance cheaper than adherence (NYC Council, 2025).

Centralizing technical guidance, knowledge, funding, and support could be a compelling way for municipalities to simplify following and enforcing new regulations. Moreover, having a singular public or quasi-public entity serve as a one-stop shop for groups of property owners and other stakeholders seeking to undertake decarbonization related projects could mitigate confusion and prevent projects from being abandoned due to perceived complexity (and save associated costs and time).

Establish Financial Incentives and Create Dedicated Funding Streams for Decarbonization Projects

Federal and state government funding have historically been the primary funders of large infrastructure projects in the United States. They are a core policy tool for those entities to push policy priorities at the local level, especially as municipal funds are limited in comparison. Without sufficient funding from those sources, local governments can explore creative strategies to redirect local funds to encourage these types of projects.

Streamline Zoning and Building Codes to Facilitate Retrofits and Incentivize Energy-Efficient Practices

- ***Reduce Restrictions that Impede Energy Retrofits*** : Municipalities should capitalize on any upcoming zoning modernization efforts to update codes in a way that makes energy-efficient construction, both on new buildings and retrofits, less onerous. Exempting energy retrofits from restrictions on building height, floor-to-area ratio (FAR), setback restrictions, or parking requirements can make these projects easier to undertake. Similarly, expediting approvals for adaptive reuse projects targeting energy efficiency upgrades that would otherwise, as a change of use, require a more extensive exception or permitting process, will make energy retrofits more affordable for property owners and developers.
- ***Incentivize Energy Upgrades and Energy-Efficient Infrastructure***: They should also use this as an opportunity to proactively incentivize energy-efficient improvements or technologies. Practices like allowing additional height or FAR for meeting energy or electrification targets or employing certain desirable practices can increase decarbonization efforts. If tied to underinvested communities, these incentives can also encourage energy-efficient changes in an equitable way. Creating special zoning districts is one way of bringing this about.
- ***Encourage Density in Rural and Suburban Areas***: For smaller towns and rural or suburban areas, zoning changes that allow for or encourage more density can be a productive decarbonization practice. Bigger-unit buildings are harder to electrify when they already exist, but newer construction can incorporate greener energy infrastructure. Taller buildings are more energy efficient, and denser areas are associated with lower energy use per household (MIT Climate Portal Writing Team, 2023; Popovich, Rojanasakul, & Plumer, 2022).

7.2 Financing Recommendations

The financing landscape analysis identified several gaps in New York State's current mechanisms for funding neighborhood-scale decarbonization. The following recommendations address these gaps while drawing lessons from successful domestic and international cases.

Implement Residential PACE (R-PACE) in New York State

New York State should establish a Residential PACE program to address the significant gap in financing options for single-family and small residential properties. Based on successful implementation in six other states including California and Florida, R-PACE

would provide long-term financing for residential decarbonization through property tax assessments, helping overcome the high upfront cost barrier for homeowners (PACENation, 2023). To address federal concerns about R-PACE, implementation should include strong consumer protections, adopt California's enhanced underwriting standards, and establish standardized technical criteria for efficiency, electrification, and resilience.

Expand C-PACE Eligibility Criteria

Current C-PACE programs in New York State have restrictive savings-to-investment ratio requirements that limit comprehensive electrification projects. Following California and Florida's examples, eligibility criteria should be expanded to include climate resilience measures such as flood mitigation and wildfire hardening, new construction projects incorporating significant carbon reduction measures, and projects with longer payback periods when part of comprehensive decarbonization efforts (NYCEEC, 2022). Expanded technical assistance should be provided for complex, multi-measure projects. These expansions would maximize C-PACE's impact while maintaining fiscal responsibility through updated underwriting standards.

Advocate for Property Tax Incentives and Support Senate Bill S6169 Carbon Reduction Tax Abatement

The New York State Senate has introduced legislation (S6169) that would establish "an abatement and exemption from real property taxes for capital improvements to reduce carbon emissions" in cities with populations over one million (The New York State Senate, 2025). This proposed legislation, now in its third introduction to the legislature, represents a significant opportunity to incentivize decarbonization through the property tax system. The legislation should be expanded beyond New York City to include other municipalities with consistent implementation guidelines and clear technical standards. A coalition of stakeholders including property owners, community organizations, and environmental groups should be formed to advocate for passage of this bill. Complementary technical assistance programs should be developed to help property owners navigate the application process. As proposed, this legislation would exempt increases in assessed value resulting from eligible improvements for up to 20 years, addressing a major barrier to deep carbon retrofits, including full or partial building electrification, building envelope improvements, onsite clean energy generation and storage, and EV charging..

Create Standardized Green Municipal Bond Framework

Based on lessons learned from Troy, NY and international examples like Vienna, New York State should develop a standardized green municipal bond framework specifically designed for neighborhood-scale decarbonization projects. This framework should establish consistent metrics for carbon reduction impact, create transparency requirements for project selection and implementation, lower transaction costs through standardized documentation, include provisions for community benefits and equity considerations, and provide technical assistance to smaller municipalities wanting to issue such bonds (Climate Bonds Initiative, 2022). The standardization would help municipalities access the rapidly growing green bond market while ensuring high environmental integrity of funded projects.

Enable Revenue-Generating Municipal Ownership Models

Building on Troy's innovative approach, New York State should develop legislative and technical support for municipal ownership of thermal energy resources that can generate revenue while providing low-emissions energy to constituents (NYSERDA, 2023). This model has proven successful in Troy, where energy resource ownership by the municipality creates a revenue stream that is reinvested in energy efficiency and weatherization programs. The utility maintains the customer interface, leveraging existing billing infrastructure, while future expansion is enabled through the revenue generated from the initial project phases. This ownership structure aligns with the objectives of the Utility Thermal Energy Networks and Jobs Act, providing communities with greater control over their energy infrastructure.

Develop Strategic Grant Coordination Framework

The state should address the challenge of navigating multiple grant programs by creating a comprehensive coordination framework that maps available federal, state, and philanthropic grants applicable to neighborhood-scale projects. This framework should provide standardized application templates and technical assistance, create a clearinghouse for matching projects with appropriate funding sources, and establish protocols for stacking grants to maximize impact while maintaining compliance with various program requirements (U.S. Department of Energy, 2024b). The coordination framework would help communities leverage multiple funding sources from the Inflation Reduction Act and Infrastructure Investment and Jobs Act, which together provide unprecedented but highly fragmented funding for clean energy initiatives.

Create Multi-Partner Climate Block Grant Program

Drawing from Melbourne's Environmental Upgrade Agreements (EUA) model, New York should establish a Climate Block Grant program specifically designed for neighborhood-scale initiatives. Melbourne's EUA mechanism enables building owners to access long-term sustainability loans with repayments collected through council rates, effectively overcoming traditional investment barriers (City of Melbourne, 2022). New York's program should similarly incentivize formation of multi-stakeholder partnerships, reward projects with higher density and greater emissions reduction potential, prioritize disadvantaged communities for funding, include support for both technical planning and implementation phases, and feature a simplified, streamlined application process to reduce administrative burden on applicants.

Adapt Innovative Financing Mechanisms such as the Waterfall Financing Model for Current Economic Conditions

The Ithaca waterfall financing model effectively combined private capital, public guarantees, and philanthropic support. However, given the changed economic conditions since 2020-2021, an updated approach is needed with higher levels of first-loss reserves to offset increased interest rates (Abramowitz et al., 2022). The model should expand the role of utility on-bill recovery for longer payback measures, create a state-level interest rate buydown program specifically for neighborhood-scale projects, and establish risk pooling across multiple neighborhoods to improve financing terms and reduce costs for individual property owners. These modifications would preserve the innovative structure of the original model while adjusting for the current higher interest rate environment.

Develop Financial Products for Scope 3 Emissions Reduction

The state should facilitate creation of structured financial products enabling financial institutions to invest in residential decarbonization to offset their Scope 3, Category 15 emissions. This approach should establish clear carbon accounting methodologies for financial institutions, create standardized investment vehicles with verified carbon reduction impacts, include consumer protection provisions to ensure fair lending practices, and prioritize investments in disadvantaged communities to maximize social benefit alongside environmental returns (Carney et al., 2021). Financial institutions are facing increasing regulatory pressure to address these emissions, creating an opportunity to align their compliance needs with community decarbonization goals through innovative financial products.

Implementation and Integration

For these financing recommendations to achieve maximum impact, they must be integrated with policy frameworks and technical assistance. Key integration points include aligning eligibility criteria across financing programs to reduce confusion and creating a single technical reference point for multiple financing mechanisms. The state should establish coordination mechanisms between state agencies, utilities, and financial institutions to streamline implementation (American Council for an Energy-Efficient Economy, 2022). Developing capacity building programs for community-based organizations will help them access these financing tools more effectively. Regular evaluation and adaptation of financing programs based on market feedback and implementation experience will ensure continuous improvement of the financing ecosystem.

By implementing these recommendations, New York State can address current gaps in the financing landscape while creating a more integrated, accessible, and effective ecosystem for funding neighborhood-scale decarbonization.

7.3 Process & Capacity Recommendations

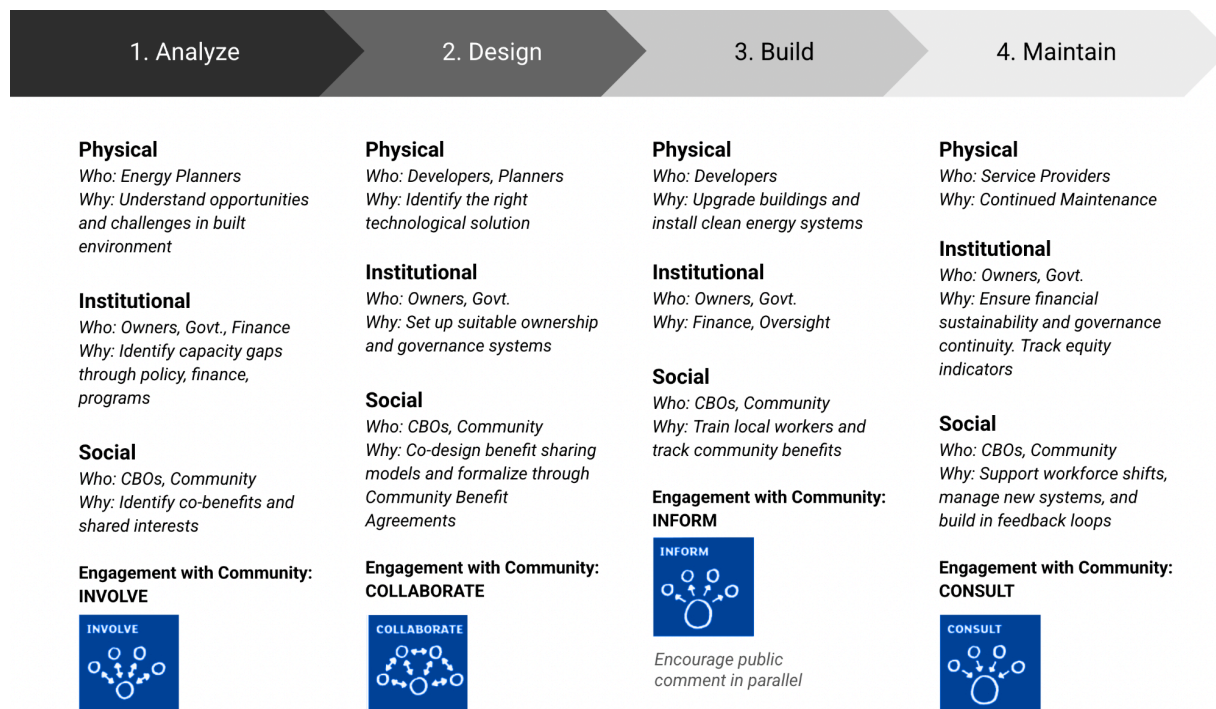
Implementation Framework Across Project Phases

To better understand how these recommendations apply across the decarbonization process, we've developed an implementation framework that maps some of the key activities and responsibilities that surfaced during our interviews. Figure 6 below outlines some of the roles and responsibilities that need to be considered across four key phases of neighborhood-scale decarbonization: **Analyze, Design, Build, and Maintain**. The first three phases align with implementation pathways observed in programs like **PON 4614** and the **Empire Building Challenge (EBC)**. Each phase engages physical (technical), institutional, and social actors, highlighting that success depends not only on infrastructure, but also on **process and capacity**. Here, **capacity** refers to the time, skills, and organizational ability needed to deliver projects, and **process** refers to structured, repeatable actions (like annual energy audits or 5-year retrofit plans) that make implementation possible.

While maintenance has not consistently emerged as a challenge across case studies and interviews, we include it here as a necessary fourth phase, one that raises questions around responsibility for long-term system performance, sustaining co-benefits, and creating feedback loops for continuous improvement. Of note, is the

transitioning of labor who are typically in charge of maintaining boiler systems, but may now be responsible for the operation and maintenance of hundreds of heat pumps.

Figure 6. Insights that emerged on people and processes required across each phase



Icon source: IAP2 Spectrum of Public Participation

Throughout our interviews, one of the most consistent insights was the need for **clear institutional ownership at each phase** of the decarbonization process. While early-stage efforts often depend on **community-based organizations (CBOs)** or **local champions** to convene stakeholders and build trust, later phases require handoff to entities with technical, legal, or financial capacity, such as **city agencies, utilities, or energy service providers**. Mapping "who leads" across each phase helps clarify roles, ensure continuity, and prevent key functions from falling through the cracks. For example, CBOs might lead community engagement and data collection during the Analyze stage, while city agencies take the lead during Design to align with planning and permitting processes. Utilities or third-party providers often lead during Build, with shared responsibility for Maintenance depending on ownership models. This evolving leadership structure underscores the importance of coordination mechanisms, such as formal partnerships or memoranda of understanding, to ensure a smooth transition across project phases.

Community engagement evolves across phases: from involvement in early analysis, to collaboration in design, information-sharing during implementation, and consultation in

maintenance. This approach draws on the **Ladder of Citizen Participation theory** (Arnstein, 1969), recognizing that equitable decarbonization requires not only delivering technical outcomes, but also building trust, shared governance, and durable systems for community voice.

Refer to the Appendix for a more detailed process chart on Roles, Responsibilities, and Outcomes Across Phases of Neighborhood-Scale Decarbonization.

7.4 Community Collaboration Recommendations

Neighborhood-scale decarbonization isn't just a technical challenge – it's a social and political one. Whether the goal is electrification, efficiency upgrades, or thermal energy networks, these efforts rely on diverse actors working together across ownership structures, jurisdictions, and lived experiences.

Identify and Support Local Champions

Neighborhood-scale decarbonization - both in the U.S. and globally - often hinges on the leadership of local champions: individuals with deep community ties, political credibility, and the drive to get projects off the ground. These champions play a critical role in aligning technical goals with local priorities. To sustain and scale this leadership, NYSERDA could establish **programs that support the development of community leader cohorts**, where participants are compensated for their time and leadership. These would blend individual capacity-building, peer-to-peer learning, and community organizing through targeted training, recognition, and long-term support, helping amplify their influence and effectiveness over time.

Improve Education around Change Management

Organizational change is critical to enabling neighborhood-scale decarbonization, but it doesn't happen automatically. Municipal leaders, staff, and partners need accessible, action-oriented resources to shift institutional practices. NYSERDA could support this by **designing user-centered toolkits and knowledge hubs** tailored to the needs and capacity of local actors. Paired with targeted trainings for diverse stakeholders – including policymakers, financiers, municipal staff, and local champions – these resources can build a shared understanding of neighborhood-scale decarbonization and energy systems to catalyze innovation in regulation, financing, and governance that reflects local realities.

Align Diverse Stakeholder Interests through Strategic Messaging

Use trusted messengers, tailored messaging, and participatory methods to align internal and external stakeholders around shared goals and local priorities particularly across fragmented ownership landscapes. Neighborhood-scale decarbonization isn't just a technical challenge – it's a social and political one that relies on diverse actors working together across ownership structures, jurisdictions, and lived experiences. Municipalities and partners must **frame decarbonization in terms that resonate with different stakeholders**: lower bills, healthier homes, energy justice, and economic opportunity. Motivations differ for each stakeholder - a property manager may be motivated by operating cost savings, while a tenant may care more about indoor comfort, and a local nonprofit may prioritize co-benefits like jobs or cleaner air.

Figure 7. For this report, we have classified interests by Economic, Health, Consumer Protection and Sustainability triggers which seem disparate but have helped align stakeholders in the case studies we have analyzed.

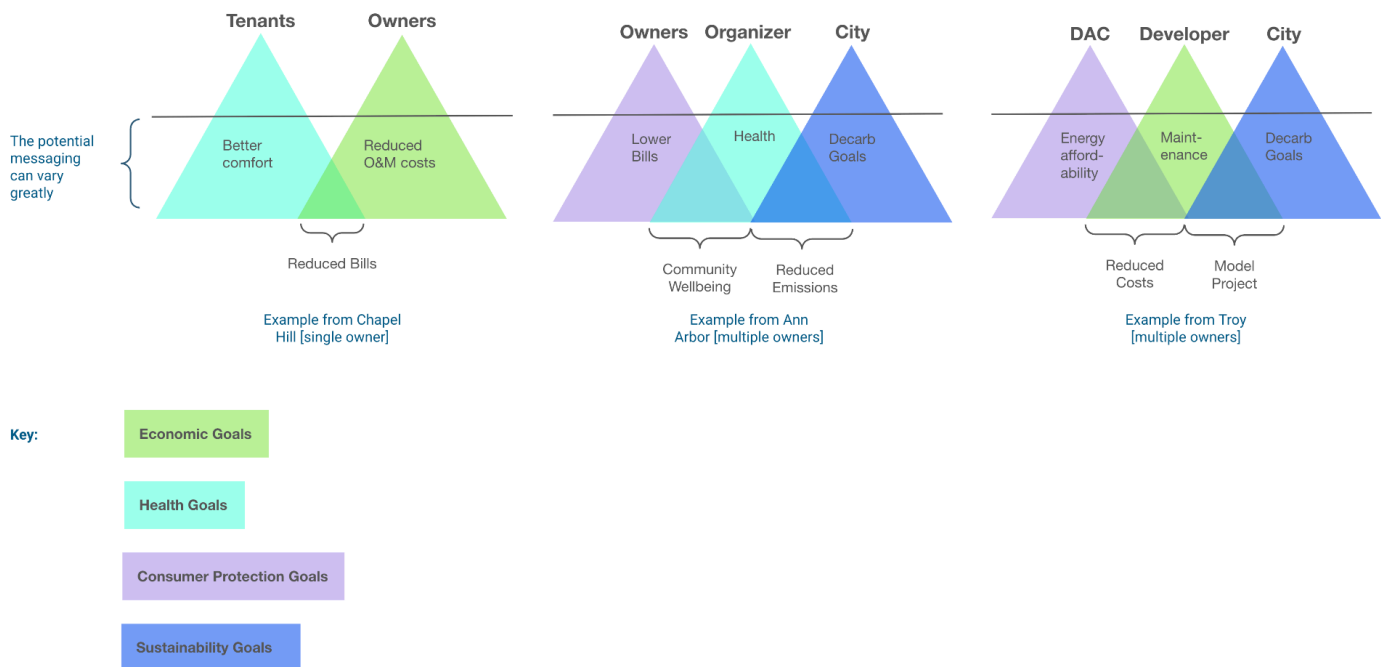
Interests	Economic	Health	Consumer Protection	Sustainability
Triggers	Downtown revitalization, stormwater issues, tourism, self-funded sustainability initiatives	Mold, air quality, extreme heat or cold	Energy affordability, energy credits, reselling energy to utilities. Impending utilities rate hike	Municipal climate goals
Stakeholder	Municipalities, economic development agencies (EDC/ESD), property managers	Local nonprofits and community-based organizations (CBOs) focused on community well-being	Often underrepresented due to utility monopolies; advocacy space unclear	State – stark difference between CLCPA and policies by other states like Vermont, New Jersey Municipality – stark difference between NYC's approach and Ann Arbor (Michigan)

Implement Interest-Based Coalition Building Approaches

Build durable coalitions, and identify who takes ownership of systems and activities across different phases of a project by understanding each stakeholder's underlying interests rather than just their stated positions. Drawing on the theory of **interest-based bargaining** (Fisher & Ury, 2011), successful neighborhood-scale decarbonization hinges

on meeting people where they are rather than forcing superficial alignment. Our illustrations [Figure 8] of case studies in Chapel Hill (single owner), Ann Arbor (multi-owner), and Troy (mixed actors) show that coalitions succeeded not by convincing everyone to care about the same thing, but by designing interventions that unpacked and addressed overlaps in priorities.

Figure 8. Illustrations of cases where we have seen incentives align among varied actors to embed neighborhood-scale decarbonization into a development or energy initiative based on the theory of interest-based bargaining.



From Engagement to Agreement: Tools for Durable Collaboration

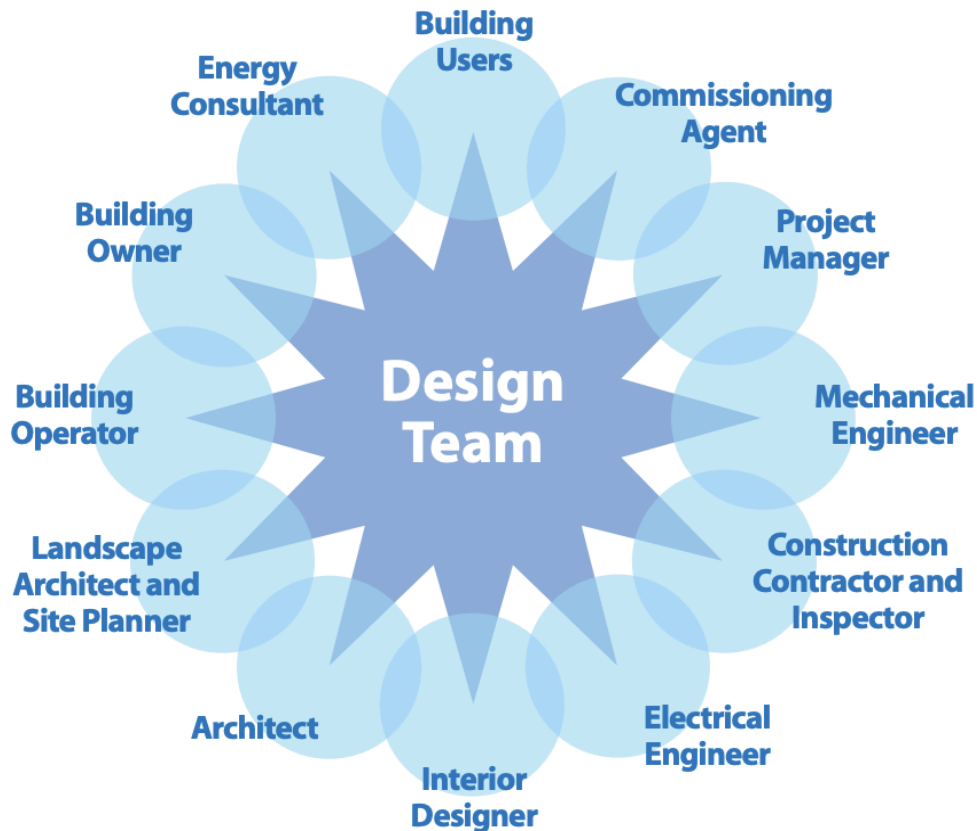
To turn early-stage engagement into long-term collaboration, communities need structured tools that help navigate competing interests, clarify roles, and keep coalitions accountable. Three such tools are:

1. Charrettes

Charrettes are intensive, facilitated workshops that bring together residents, planners, technical experts, and decision-makers to co-create solutions. Unlike traditional consultation, charrettes prioritize **early input and joint ownership**, allowing stakeholders to shape not just what is built, but how and why. They are especially powerful in surfacing lived experiences, identifying practical barriers,

and establishing shared design principles that can guide the project from concept through implementation (NREL, 2009).

Figure 9. Collaborative energy planning (source: NREL, 2009)



2. **Inter-agency and Intra-agency Collaboration**

Many projects fail not due to lack of funding or technical feasibility, but because city departments and public agencies operate in silos. Inter-agency collaboration is critical to aligning timelines, funding streams, and goals across entities like housing, planning, sustainability, and workforce. This collaboration can take the form of **joint planning processes, shared performance targets,** or cross-departmental **steering committees**. When done well, it streamlines project delivery and creates institutional backing that lasts beyond political cycles (GAO, 2024).

Figure 10. Considerations for inter-agency collaboration (source: GAO, 2024)

Collaboration Practices	Selected Key Considerations
 Define Common Outcomes	<ul style="list-style-type: none"> • Have the crosscutting challenges or opportunities been identified? • Have the short- and long-term outcomes been clearly defined?
 Ensure Accountability	<ul style="list-style-type: none"> • What are the ways to monitor, assess, and communicate progress toward the short- and long-term outcomes? • Have the means to recognize and reward accomplishments related to collaboration been established?
 Bridge Organizational Cultures	<ul style="list-style-type: none"> • Have strategies to build trust among participants been developed? • Have participating agencies agreed on common terminology and definitions?
 Identify and Sustain Leadership	<ul style="list-style-type: none"> • Has a lead agency or individual been identified? • How will leadership be sustained over the long term?
 Clarify Roles and Responsibilities	<ul style="list-style-type: none"> • Have the roles and responsibilities of the participants been clarified? • Has a process for making decisions been agreed upon?
 Include Relevant Participants	<ul style="list-style-type: none"> • Have all relevant participants been included? • Do participants represent diverse perspectives and expertise?
 Leverage Resources and Information	<ul style="list-style-type: none"> • How will the collaboration be resourced through staffing and funding? • Are methods, tools, or technologies to share relevant data and information being used?
 Develop and Update Written Guidance and Agreements	<ul style="list-style-type: none"> • If appropriate, have agreements regarding the collaboration been documented? • Have ways to continually update or monitor written agreements been developed?

Source: GAO. Vector icons, GAO. | GAO-23-105520

3. **Model Community Benefit Agreements (CBAs)**

CBAs are legally binding agreements that formalize what the community gets out of a project - whether it's local hiring commitments, utility bill protections, or public reporting. They help ensure that the project delivers on its promises, that co-benefits are clearly defined and trackable, and that community organizations have the standing to enforce those commitments. A model CBA (UC Berkeley School of Law, n.d.), can help residents navigate the negotiation process, and also signals to residents that their voices matter not just during engagement sessions, but in the structure of the deal itself. CBAs can also **formalize the roles, responsibilities, and shared commitments of coalition members across each phase of the project** - ensuring that co-benefits are clearly defined,

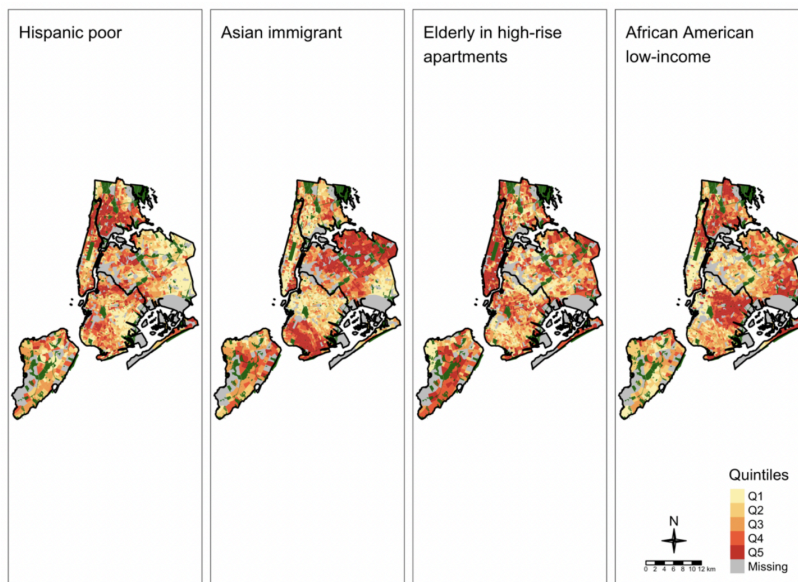
transparently delivered, and jointly enforced by those who helped shape the project. (Initiative for Energy Justice, 2024)

7.5 Equity Recommendations

Neighborhood-scale decarbonization efforts necessarily need to take into account community characteristics ranging from histories with energy projects to demographic details. True equity requires designing engagement efforts that are not extractive, but empowering. Too often, community input is solicited late in the process or framed narrowly around predefined options. The community engagement approaches outlined in sections 7.3 and 7.4 in this report attempt to embed equity and community voice in every step of the process, and align decarbonization efforts with community priorities.

The Climate Leadership and Community Protection Act (CLCPA) directs that at least 35% of clean energy investments flow to Disadvantaged Communities, with a goal of 40% (New York State Senate, 2019; New York State Climate Action Council, n.d.). However, the current DAC criteria, based on 45 indicators, may miss key forms of vulnerability. As an example, the public comments on NYC Mayor's Office of Climate and Environmental Justice's Environmental Justice Report noted that condensing over 100 indicators to 45 caused key vulnerabilities to be overlooked (Mayor's Office of Climate and Environmental Justice, 2024).

Figure 11. Research capturing how vulnerabilities can differ from neighborhood to neighborhood in New York City (Anand & Marcotullio, 2024)



Mandate Meaningful Community Involvement Through Policy

Strengthen provisions in key legislation like UTENJA, the HEAT Act, and CLCPA to require community involvement across all phases of neighborhood-scale initiatives. Current policies often lack explicit mandates for participation, resulting in projects that fail to address local priorities or create equitable outcomes. By embedding community engagement requirements in legislation, policymakers can ensure that frontline communities have a voice in decisions that affect their energy future. This approach transforms community input from a procedural checkbox to a substantive part of decision-making, creating more durable and equitable outcomes.

Center Community Ownership in Financing Structures

Develop financing mechanisms that enable community ownership and shared benefits from decarbonization investments. Centering community engagement in financial structures can create more sustainable and affordable outcomes in the long run. Approaches like participatory value modeling allow for consensus-building and shared ownership of results (McGookin et al., 2021), while representing the true costs and benefits as experienced by communities. These models can unlock funds based on health outcomes, economic outcomes, and other co-benefits that conventional financing often overlooks, creating more comprehensive and equitable investment pathways.

Expand Program Design to Include Culturally Relevant Engagement

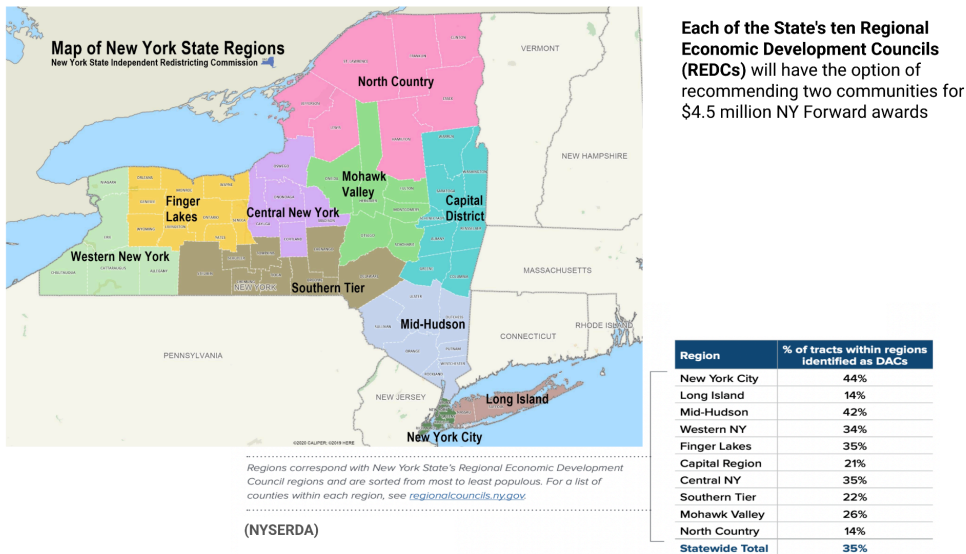
Redesign existing programs to build meaningful engagement into every phase, from analysis to maintenance, with particular attention to language, cultural relevance, and accessible participation modes. Current programs often take a one-size-fits-all approach that fails to recognize the diverse needs and communication preferences across communities. By adapting outreach methods, materials, and decision-making processes to local contexts, programs can achieve much higher levels of participation and better outcomes. Communities must be recognized not just as stakeholders, but as co-creators - providing compensation for time and expertise, adapting engagement formats to local preferences, and creating feedback loops so that priorities shape both immediate outcomes and long-term system improvements.

Strengthen Regional Implementation of Disadvantaged Communities Investments

Leverage Regional Economic Development Councils (REDCs) to ensure new investments benefit Disadvantaged Communities (DACs) while respecting local priorities. REDCs have a strong role to play in addressing gaps in assessing DAC needs

by strengthening data collection, evaluation, and regional implementation. They can help ensure that investments in areas like data centers and tech hubs incorporate neighborhood-scale decarbonization from the outset, while addressing the specific needs of diverse communities, including indigenous communities who face disproportionate energy burdens due to historical land dispossession and limited infrastructure access (NYSERDA, 2022).

Figure 12. DAC tracts classified by regions in New York State, each with a corresponding Regional Economic Development Council



Neighborhood-scale decarbonization presents a concrete opportunity to center equity not just in outcomes, but in process: by co-creating solutions with the communities most affected and ensuring long-term benefits like health, affordability, and resilience are equitably distributed.

8. Recommendation for NYSERDA

Based on our research, we offer the following recommendations to NYSERDA to advance neighborhood-scale decarbonization in New York State.

NYSERDA is positioned to act as a catalyst for neighbourhood scale decarbonization by convening cross-sector stakeholders. As a trusted intermediary, NYSERDA can help align fragmented actors—state and local agencies, utilities, building owners, and communities—around common goals. Through targeted programs, technical assistance, and policy innovation, NYSERDA can operationalize CLCPA at the neighborhood level, bridging the gap between policy ambition and local implementation.

Policy & Regulatory: Use pilot-based evidence and strategic convening to shift regulations toward scalable, neighbourhood-level models

- ***Develop a new regulatory path for bundled retrofits***
Collaborate with DOBs and local municipalities to pilot streamlined permitting and approval pathways for multi-building retrofits. Use pilot results to advocate for broader regulatory reform at the state level.
- ***Lead demonstration projects for non-utility thermal networks***
Partner with community organizations and municipalities to implement pilots under the UTENJA, showcasing how non-utility actors can own and operate shared thermal infrastructure. Use findings to inform PSC deliberations.
- ***Support municipal integration of electrification codes***
Provide municipalities with templates, technical support, and cost-effectiveness analyses to adopt advanced appliance standards (e.g., AC-to-heat-pump swaps at replacement) modeled after cities like Denver.

Financing: Design and align funding instruments to enable neighborhood-scale projects from planning to implementation

- ***Establish a pre-development grant program***
Support key early steps such as feasibility studies, coalition formation, legal structuring, and community engagement.
- ***Enable project bundling for financing access***
Create protocols for grouping small buildings into collective financing vehicles (e.g., pooled C-PACE or block grants), making participation viable for under-resourced owners.

- **Support state and municipal financing innovation**
Assist in structuring green municipal bonds, climate block grants, and revenue-generating public ownership models through guidance, templates, and technical assistance.
- **Advocate for sustained state-level appropriations and philanthropic partnerships**
To address the need for raising funding for programs, NYSERDA should work with the Governor's Office and legislature to secure dedicated multi-year appropriations for neighborhood-scale decarbonization programs, while also building strategic partnerships with mission-aligned philanthropic foundations to co-fund planning, community engagement, and equity-focused interventions.

Process & Capacity: Build institutional, technical, and workforce capacity to deliver multi-actor, multi-building decarbonization

- **Fund "one-stop" municipal hubs**
Support local governments or quasi-public entities to serve as integrated service hubs offering permitting support, technical advice, and access to incentives for groups of property owners.
- **Invest in local design and implementation capacity**
Provide funding for local consultants, energy modelers, and community-based technical service providers who can support place-based retrofit planning and cross-property coordination.
- **Expand training for long-term system operation**
Develop curricula and certification programs for heat pump and shared system maintenance, targeting building superintendents, local contractors, and union workers transitioning from boiler systems.

- **Adapt the framework to local context**

Use the four-phase framework as a flexible guide, not a fixed model. Refine roles, leadership structures, and engagement strategies based on local governance, workforce realities, and community needs.

Community Collaboration: Empower community-based leadership and coalition governance to align stakeholders

- **Invest in local champions to lead from within**
Create programs that identify, train, and sustain community leaders with deep

local credibility. Support their long-term impact through peer learning, organizing tools, and recognition pathways.

- **Build institutional capacity for change**

Develop user-centered toolkits and targeted trainings to help municipal staff, policymakers, and partners understand and operationalize neighborhood-scale decarbonization.

- **Align diverse interests through tailored engagement**

Use trusted messengers and interest-based messaging to bring together stakeholders with varied motivations, from landlords to tenants to nonprofits, around shared outcomes like health, cost savings, and resilience.

- **Formalize collaboration through durable tools**

Adopt mechanisms like charrettes, inter-agency steering committees, and model Community Benefit Agreements (CBAs) to move from early engagement to long-term coalition accountability and shared ownership.

Equity: Operationalize equity mandates through program design, metrics, and frontline engagement

- **Mandate inclusive community engagement**

Strengthen legislation like the CLCPA and HEAT Act to require meaningful community involvement across all project phases, not just consultation, but shared decision-making rooted in local priorities.

- **Center equity in financing models**

Design funding mechanisms that support community ownership and value co-benefits like health, housing stability, and economic inclusion, unlocking more comprehensive and just investment pathways.

- **Adapt program design to local context**

Ensure engagement strategies reflect the cultural, linguistic, and structural realities of each neighborhood. Compensate community time and embed participation throughout planning, implementation, and maintenance.

- **Leverage regional councils to close DAC investment gaps**

Empower REDCs to strengthen data collection and ensure that DAC-directed investments reflect local needs, especially for historically excluded groups like Indigenous communities.

9. Conclusion

The transition to a decarbonized built environment in New York State represents both an urgent climate imperative and a significant economic opportunity. However, as this report has demonstrated, the current building-by-building approach to decarbonization is insufficient to meet the state's ambitious climate goals. Neighborhood-scale decarbonization offers a promising alternative - one that can accelerate emissions reductions while delivering broader community benefits.

Our research, spanning literature review, case study analysis, landscape assessment, and stakeholder interviews, has identified both the challenges and opportunities inherent in scaling decarbonization efforts. The fragmented ownership landscape, high upfront costs, limited local capacity, and underdeveloped engagement pathways collectively impede progress. Yet, as our case studies from New York State and beyond illustrate, these barriers can be overcome through coordinated, multi-faceted approaches.

The policy framework we've developed - encompassing recommendations across policy, finance, process and capacity, community collaboration, and equity - provides a roadmap for enabling neighborhood-scale initiatives that are flexible, scalable, and inclusive. By implementing these recommendations, New York can create the conditions necessary for communities to pursue decarbonization pathways that align with their unique contexts, priorities, and resources.

Critically, this framework recognizes that effective decarbonization is not merely a technical challenge but a social one. It requires bringing diverse stakeholders together around shared incentives, building local capacity to implement and maintain solutions, and ensuring that benefits flow equitably to those most affected by climate change and energy burden. By framing climate action in terms that resonate locally - whether that's lower energy bills, healthier homes, resilient infrastructure, or economic development - we can transform abstract emissions targets into tangible community investments.

As New York State continues to lead on climate action, neighborhood-scale decarbonization represents a powerful tool for bridging the gap between ambitious goals and on-the-ground implementation. By creating the policy environment, financing mechanisms, technical capacity, collaborative processes, and equity safeguards outlined in this report, the state can position neighborhoods as key drivers in its transition to a low-carbon future - one that is not only more sustainable but also more equitable, resilient, and economically vibrant.

The path forward requires coordinated action across multiple levels of governance and diverse stakeholders. But by aligning incentives and leveraging the power of collective action, New York can demonstrate that climate solutions need not be approached building by building, but can be scaled to create transformative change across entire communities.

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11. Appendices

11.1 Methodology

Our research began with desk-based analysis of existing literature on decarbonization and on neighborhood-scale decarbonization efforts. This helped us identify initial gaps and design an interview protocol aligned to six exploratory themes: social dynamics, policy context, financial structures, zoning and regulatory environments, organizational capacity, and available technologies. Interviewees were also identified through a stakeholder mapping activity that was conducted in collaboration with NYSERDA, based on which interviews were conducted, and further interviewees were identified based on the insights that emerged.

While conducting this series of interviews with 31 practitioners across government, utilities, engineering firms, and community organizations, these interviews were live-synthesized using the six initial themes as coding anchors. In parallel, we conducted case study analysis of neighborhood-scale projects across both U.S. and international contexts, focusing on implementation models, institutional actors, and contextual barriers.

As we completed our interviews and case analyses, five cross-cutting themes consistently emerged as foundational for an actionable policy framework:

- **Policy**
- **Finance**
- **Community Collaboration**
- **Process & Capacity**
- **Equity**

While technology remained a vital enabler, we found that specific technology mixes varied based on local conditions. Success hinged not on prescribing a uniform technical solution, but on creating the **right enabling environment**, one that fosters **community buy-in, supports iterative learning, and allows for place-based technology adoption**.

From this synthesis, we mapped the key barriers and pain points raised by stakeholders and began crafting targeted recommendations to address them. Throughout, we refined our **Theory of Change** through multiple iterations to ensure it was grounded in both practitioner experience and system-level strategy.

Finally, we shared our emerging policy framework with a municipality representative unaffiliated with the interview cohort. They validated the thematic synthesis and

strategic levers captured, while also flagging a persistent gap: the need for a clear **business case** to unlock broader implementation and investment.

11.2 Policy

This section outlines key policy barriers, synthesizing insights and takeaways from the interviews conducted.

11.2.1 Synthesis Notes

On Fragmented Policy Authority

- “There’s no clear mandate for who owns neighborhood-scale decarb... it falls between the cracks of city planning, utilities, housing departments.” – *Planner*
- “Some cities try to regulate building standards, but utilities are state-regulated and don’t follow local priorities.” – *Developer*
- “District systems are identified as potentially the best solution to neighborhood scale decarbonization but require utility and government leadership rather than neighborhood-driven initiatives.” - *Developer*
- “It needs to be a collaboration. If it's entirely government led, you get less buy-in, because people don't trust the government. If you're just a group of residents you don't have the knowledge, but the government certification can back up your project when going after loans and grants.” - *Energy Analyst*
- “No overarching framework or strategy through energy master plans, some are being developed now in NY.” - *Policy Analyst*

On Utility Role and Regulatory Challenges

- “Con Edison sees its role as enabling electrification... but not necessarily leading on district-scale systems unless they’re clearly in the utility’s interest.” – *Utility*
- “Utilities have the technical and financial capacity, but unless there’s a mandate or incentive, they won’t act.” – *Consultant*
- “Community-owned solar was explored, but permitting and compliance processes were too complicated for most groups.” – *Developer*

On Codes, Incentives, and Enforcement

- “You need codes with teeth – most green building codes are voluntary or loosely enforced.” – *Developer*
- “Financing tools exist, but they’re scattered across agencies... Heat Smart, Solarize, WAP, utility rebates. No one knows how to combine them.” – *Financier*

On the Role of Local and State Government

- “The local government can’t force building owners to connect unless there’s a legal or financial hook... We need enabling ordinances.” – *Municipality*
- “West Union succeeded because they used state-level grant matching – 100% funding, very few strings attached.” – *Engineer*

On Permitting and Project Timelines

- “Permitting is often a bottleneck... especially when projects are novel. No one wants to be the first one to say yes.” – *Consultant*
- “We lost time on paperwork and duplicative compliance – permitting took longer than construction in some cases.” – *Municipality*

On Long-Term Market Signals

- “We need durable programs that last longer than one administration... climate policy shouldn’t be so vulnerable to political change.” – *Planner*

11.2.2 Takeaways

1. Policy Authority Is Diffuse and Misaligned

No single agency or jurisdiction currently owns neighborhood-scale decarbonization. City agencies, utilities, and state energy offices often work in parallel without coordination. This leads to program fragmentation and lost momentum at the local level.

2. Utilities Are Pivotal but Poorly Aligned with Local Goals

Investor-owned utilities (IOUs) have capital and capacity but limited incentive to pursue neighborhood-scale solutions unless profits, mandates, or regulatory frameworks compel them. Public policy must clarify their role in enabling – or owning – shared energy infrastructure.

3. Local Governments Need Enabling Legal Tools

Without mandatory connection ordinances, clear cost recovery structures, or legal enforcement mechanisms, municipalities cannot require participation in shared systems. Policy innovation is needed to create pathways for voluntary and mandatory uptake.

4. Incentives and Compliance Pathways Are Disjointed

Households and developers face a dizzying array of uncoordinated incentives and compliance rules, from LIHEAP and WAP, to utility rebates and local energy codes. Streamlining and stacking these tools into a single policy framework would dramatically improve uptake.

5. Code and Standard Gaps Undermine Ambition

Green building codes are often optional, inconsistently enforced, or preempted by state regulations. More robust policy mechanisms – including performance-based requirements, retrofit mandates, and enforcement capacity – are needed to raise the floor.

6. Permitting Delays Undermine Demonstration Projects

Projects introducing district-scale or shared systems often face protracted approval timelines due to novelty and risk aversion. Jurisdictions need policy playbooks and expedited permitting for first-mover projects to de-risk innovation.

7. State-Level Leadership Is a Force Multiplier

Programs with full or flexible state funding (e.g., Iowa's grant-matched pilot) have enabled bold action where local government capacity was limited. State climate agencies and green banks can use funding criteria to drive coordinated local action.

8. Long-Term Stability Is Crucial for Market Confidence

The uncertainty of federal or state programs expiring with each administration inhibits private sector participation and local planning. Durable, bipartisan-backed policies are essential to create sustained investment signals.

11.3 Finance

This section outlines key financial barriers, synthesizing insights and takeaways from the interviews conducted.

11.3.1 Synthesis Notes

On Upfront Costs and Capital Access

- “Technology change needs to be profitable. Fuel change to electricity from gas is fundamentally unprofitable when it costs 4x as much.” – *Engineer*
- “The initial capital is the hardest. After that, savings can carry the rest, but you need someone to bridge the gap.” – *Consultant*
- “Subsidy layering is a nightmare... we lost people mid-process trying to stack incentives from WAP, LIHEAP, IRA, utility rebates.” – *Financier*

On Business Models and Repayment Structures

- “Our approach was: no upfront cost, only on-bill repayment. That way, residents felt safe. And the program still pays back.” – *Municipality*
- “District systems are hard to finance unless there’s an anchor tenant or long-term customer agreement.” – *Developer*
- “City took on the bond and repaid it through utility rates. Easier for residents, but required full city buy-in.” – *Engineer*

On Who Pays and Who Benefits

- “Split incentives in rentals kill everything. Landlord doesn’t pay the bill, so they won’t upgrade. Tenant won’t pay for the building.” – *Consultant*
- “Community ownership sounds great, but few groups can carry the insurance and cash flow needed to own a utility-scale system.” – *Developer*

On Grant vs. Investment Mentality

- “We need blended capital – some grants, some loans, some philanthropy. Purely market-rate capital doesn’t work in these communities.” – *Financier*

- “Projects get killed when they have to go full utility-scale financial model from day one. Start smaller, build confidence.” – *Municipality*

On the Role of Public Institutions

- “Green banks should be underwriting first loss or credit enhancements – otherwise no private capital comes in.” – *Financier*
- “State support can mean the difference between pilot and scale. 100% state funding [helped] the thing [get] built.” – *Engineer*

11.3.2 Takeaways

1. Upfront Capital Remains the Primary Barrier

Even in high-savings potential projects, the initial investment – especially for retrofits on aging housing stock – remains a dealbreaker without bridge financing or full subsidies. This is particularly true in low-income or rental settings.

2. Financing Must Be Matched with Housing Conditions

Many homes are ineligible for energy upgrades due to pre-existing structural issues. Financing programs must either include remediation funds or partner with broader housing and community development initiatives.

3. Repayment Models Matter for Participation

On-bill financing and other low-friction repayment structures can dramatically increase uptake by reducing perceived risk. These models work best when payments are tied to savings and don’t require upfront cash or credit checks.

4. Financial Design Must Account for Split Incentives

Decarbonization efforts in rental properties face inherent disincentives unless policies or financing explicitly align benefits for both tenants and landlords. This may require mandates, shared savings models, or direct-to-tenant benefits.

5. Community Ownership Is Ideal but Often Infeasible

While community ownership structures promote equity and long-term control, most grassroots groups lack the insurance coverage, technical capacity, and working capital

to manage utility-scale assets. Supportive intermediaries or co-ownership models may be needed.

6. Blended Capital Approaches Are Essential

No single source of funding like market-rate capital, philanthropy, or state grants, is sufficient on its own. Layered finance, including first-loss coverage from public entities and flexible capital from mission-driven lenders, is critical to unlocking private participation.

7. Simplicity and Accessibility Drive Uptake

Complex incentive structures and overlapping compliance requirements drive dropout rates and slow project pipelines. Finance programs must prioritize ease of access, predictable timelines, and clear customer pathways.

8. Public Institutions Are Catalysts for De-Risking

Green banks, state energy agencies, and city governments play an outsized role in underwriting risk, convening capital, and providing confidence to private partners. Programs that de-risk early phases or cover upfront costs enable scale.

11.4. Community Collaboration

This section outlines key barriers to community collaboration, synthesizing insights and takeaways from the interviews conducted.

11.4.1 Synthesis Notes

On the Need for Trusted Community Anchors

- “There is less incentive when many buildings have the same energy usage. Additionally less incentive to collaborate if building across the street is seen as competition.” – *Developer*
- “Nothing about neighborhood-scale decarb is easy, honestly. But the first thing is to find trusted sources in the community... not energy specific. Need to build relationships which takes a lot of work. Not easy.” – *Municipality*
- “You can never get them to coordinate – someone within the community has to be a champion to get acceptance, support.” – *Consultant*

On the Role of Local Champions

- “Key enabling factor: strong local champion... deep knowledge of local community needs... established relationships between engineering firm and city from previous projects.” – *Consultant*

On Community-Based Organizations (CBOs)

- “CBO partners need not be environmental justice groups at all, but community development groups... which have supported mobilization.” – *Municipality*

On Education and Outreach

- “Educating people is the most important thing to do in bringing a community together... especially those who don’t understand how 45-degree groundwater can heat a building.” – *Engineer*
- “Many users needed help understanding how a shared geothermal loop benefits them... education was essential to build trust.” – *Engineer*

On What Motivates People

- “DO NOT LEAD WITH DECARB... it’s about health, quality of life, economic opportunity.” – *Multiple interviewees*
- “Nobody cares about decarb if you have a hole on your roof.” – *Municipality*

On Stakeholder Coordination

- “There is no one way to get somebody interested that can be used uniformly... Every category still has a financial impact.” – *Consultant*
- “Aligning diverse stakeholders requires clear communication and incentives... We connect stakeholders through initiatives like NYC Accelerator.” – *Developer*

11.4.2 Takeaways

1. Local Champions and Anchor Institutions Are Essential

The presence of a “local champion”, whether from city government or a trusted CBO, is repeatedly identified as a make-or-break factor for building sustained community engagement and ensuring project momentum. Projects rely on individuals with deep ties to the community and an ability to bridge between stakeholders.

2. Relationship Building Comes Before Technology

Trust-building precedes technical design. Community buy-in is rooted in addressing visible needs like mould, affordability, asthma, not decarbonization. Engagement must be sustained over the life of the project, especially in multi-year timelines vulnerable to leadership turnover.

3. Coalition Building Requires Dedicated Capacity

Interviewees described the need for full-time or part-time staff to manage community outreach, with some noting reliance on AmeriCorps, development officers, or neighborhood residents turned organizers. Community engagement “takes 12 times knocking on someone’s door,” and cannot be treated as an add-on.

4. Education Is a Persistent and Multi-Stage Need

Community members often lack awareness of how district systems or indirect benefits (e.g., shared geothermal loops) impact them. Education is necessary not just for buy-in, but for understanding operations, benefits, and ongoing decisions. Tools like neighborhood energy assessments developed with residents, or home energy auditing apps, were noted as useful in participatory planning.

5. Coordinating Diverse Stakeholders Requires Role Clarity and Incentives

Stakeholders have different priorities (e.g., landlords want ROI, residents want lower bills, CBOs want housing stability), and engagement needs to reflect this diversity. Facilitators who are often engineers, consultants, or government staff, play a critical role in navigating these divergent interests and providing accessible technical support.

6. Ownership Models and Governance Structures Influence Engagement

Locally owned or cooperative models (e.g., West Union’s user board, Troy’s municipal/utility split ownership) provide avenues for long-term stakeholder control and trust. Where these are missing, coordination challenges, particularly among commercial buildings, are magnified, with few incentives for cross-owner collaboration.

7. Political Volatility Undermines Continuity

Projects reliant on specific leaders or grant cycles are vulnerable to disruption. Interviewees emphasized the need to institutionalize collaboration mechanisms (e.g., local utility partnerships, regular stakeholder meetings) to build resilience into the coalition itself.

11.5. Process & Capacity

This section outlines key barriers related to institutional processes and capacity, synthesizing insights and takeaways from the interviews conducted.

11.5.1 Synthesis Notes

On Technical Feasibility and Standardization

- “Most challenging: every building is different, even when all the homes are built by the same builder, you can't copy-paste... Energy assessment developed with the residents themselves.” – *Municipality*

On Workforce and Capacity Gaps

- “Community engagement is such a big need... We have a full-time staff person to do this, an assistant part-time, and one person two days a week... the real capacity need is here.” – *Municipality*
- “Strong workforce for civil utility construction work... if it's geothermal, we lack drillers. Major gap in mid to senior engineering level (8–12 years range).” – *Consultant*

On Implementation Complexity

- “Operating the system is actually very straightforward. Educating people is the most important thing to do.” – *Engineer*
- “The challenge with technology investments is that they can be expensive, and ultimately, ratepayers are footing the bill... exploring battery storage, demand response programs, smart grid technologies.” – *Planner*
- “Building stock needs to be analyzed by construction code era, energy code compliance, and ownership patterns.” – *Financier*

On Municipal and Organizational Capacity

- “Issues will be whose job in city government is it to do this work.” – *Planner*
- “Consultants [can] help bridge the capacity gap... Scaling requires access to technical expertise and support for underserved communities.” – *Consultant*

On Staged Project Execution

- “The main issue was the stage-gating process. With funding approvals required for each phase, there was uncertainty... everyone is still figuring it out.” – *Utility*
- “This is envisioned as a large 5–6 phase project...” – *Consultant*

On Participatory Processes

- “Participatory/collaborative energy assessment process is required so that users can understand and co-own the outcomes.” – *Municipality*
- “Need to marry visioning and energy systems understanding. Community energy planners must bridge both.” – *Planner*

11.5.2 Takeaways

1. Standardization Can Reduce Complexity but Requires Local Adaptation

While technologies like heat pumps and distributed systems are broadly feasible, each building still requires tailored intervention. Standardized contracts and audit templates help scale implementation, but must still accommodate unique site conditions.

2. Capacity Gaps Exist Across Technical, Civic, and Community Roles

A severe shortage exists in geothermal drillers and mid-senior engineering talent. Simultaneously, municipalities often lack clarity on internal ownership of decarbonization responsibilities, and CBOs lack sustained funding to staff engagement roles.

3. Phased Planning Is Common but Vulnerable to Bottlenecks

Stage-gating processes, where funding is approved in discrete tranches. can stall momentum and introduce uncertainty. Successful multi-phase examples (e.g., Troy) show that planning across phases requires clear sequencing and flexible adaptation.

4. Community Engagement is a Resource-Intensive Necessity

Outreach and education must be integrated throughout project delivery. Operating systems is often not the issue, ensuring end users understand and trust them is. This implies that “capacity” includes not just engineering but also social infrastructure.

5. Technical Assistance Must Be Institutionalized, Not Intermittent

Engineering firms, energy consultants, and CBOs are filling structural gaps in municipal knowledge and execution. Scaling decarbonization will require formalizing partnerships and long-term technical assistance models for underserved areas.

6. Building Typologies and Legacy Infrastructure Shape Feasibility

Retrofitting is harder in older or complex buildings. Mapping by construction era, energy code compliance, and ownership structure can help triage where to start and what to prioritize. Suburban and rural areas face different technical constraints than dense urban cores.

7. Integrative Planning Must Align Vision with Infrastructure

Decarbonization requires planners who can bridge policy vision with operational energy systems design. Local governments and community energy planners need to think in systems, not silos – and be equipped to manage cross-disciplinary coordination.

11.6 Equity

This section outlines key equity-related barriers, synthesizing insights and takeaways from the interviews conducted.

11.6.1 Synthesis Notes

On What People Actually Need

- “Equity is helping people with asthma, with bills, with stability. Not installing fancy tech.” – *Municipality*

On Housing Conditions and Structural Barriers

- “Deferred maintenance is the biggest issue. If you’re in a house with mold or bad wiring, you can’t start on energy upgrades.” – *Municipality*
- “Major barrier is multifamily rental housing... split incentives. Landlord doesn’t care, tenant can’t pay, no one upgrades.” – *Consultant*

On Ownership and Participation

- “Not everyone wants to be on a board. Not everyone wants to be a decision-maker... participation must be flexible.” – *Municipality*
- “Who benefits? Who owns it? That’s how you build equity.” – *Consultant*

On Financial and Regulatory Constraints

- “LIHEAP, WAP – these are great, but the stacks are too hard to navigate. We’ve lost clients halfway through.” – *Financier*
- “If utilities drive the process, it’s often inaccessible to people with limited credit or without digital access.” – *Planner*
- “Community-owned solar was explored, but the permitting and compliance process was too complicated for most groups.” – *Developer*

On CBOs and Community Gateways

- “CBOs must be compensated. They do translation, mobilization, and trust-building that no one else can do.” – *Municipality*

On Redefining Value

- “How we define value in these programs matters. It’s not just carbon. It’s asthma rates, stability, community wealth.” – *Planner*

11.6.2 Takeaways

1. Equity Starts with Everyday Priorities

Households prioritize immediate and tangible improvements like mold remediation, heating, or stable housing over abstract decarbonization goals. Projects that start with what communities identify as needs, health, safety, affordability, gain trust and traction.

2. Split Incentives and Tenure Undermine Access

Renters face the double burden of having no control over upgrades and absorbing energy costs. Solutions must grapple with how to motivate landlords and protect tenant interests. Traditional financing structures often fail here.

3. Equity Requires Flexible Models of Participation

Not everyone wants to be deeply involved. Participation options must range from governance to simple opt-in. Empowering choice, not imposing it, is key to respectful, equitable engagement.

4. Equity Requires Rethinking “Ownership”

Control over infrastructure, access to savings, and long-term benefits must flow to those most impacted. That means prioritizing community ownership structures, tenant protections, and shared savings mechanisms.

5. Community-Based Organizations must be Compensated

CBOs are essential equity infrastructure, translating technical concepts, coordinating engagement, and mobilizing participation. Yet they are often underfunded or treated as temporary partners. Long-term compensation and co-design roles are needed.

6. Redefining Value can Reshape Priorities

Traditional metrics (e.g., carbon reduction) often fail to capture what matters most to communities. Incorporating metrics like respiratory health, bill reductions, housing stability, or local wealth creation can center equity in decision-making frameworks.

11.7 Roles, Responsibilities, and Outcomes Across Phases of Neighborhood-Scale Decarbonization

Phase	Action	Who?	Key Outcomes
Pre-Project	<p>Coalition-building</p> <p>Identifying shared interests based on community or climate triggers</p>	<p>Municipal sustainability teams</p> <p>Community-based organizations</p> <p>Anchor institutions (schools, hospitals, libraries)</p> <p>Neighborhood associations</p>	<ul style="list-style-type: none"> - Internal change management and inter-agency coordination - Early identification of trusted messengers- Peer-to-peer learning between cities or neighborhoods - Awareness of existing community assets, tensions, and entry points
Pre-Project	<p>Stakeholder mapping</p> <p>Clarify roles, barriers, and influence</p>	<p>Community organizers</p> <p>Public engagement consultants</p> <p>Local economic development teams</p>	<ul style="list-style-type: none"> - Stakeholder matrix with incentives, pain points, and resources - Initial buy-in from landlords, tenant groups, or faith-based orgs

<p>ANALYZE</p>	<p>Infrastructure & Building Stock Assessment</p> <p>Audit age, typology, and systems</p>	<p>Planners</p> <p>City housing agencies</p> <p>Utilities</p> <p>Data specialists</p>	<ul style="list-style-type: none"> - Energy-use profiles- Mapping of retrofit potential - Prioritized building types (e.g., pre-war public housing, schools)
<p>ANALYZE</p>	<p>Demographic & Equity Screening</p> <p>Identify high energy burden, health vulnerability</p>	<p>Equity officers</p> <p>Health departments</p> <p>CBOs</p>	<ul style="list-style-type: none"> - Equity-weighted prioritization of interventions - Identification of ownership patterns
<p>ANALYZE</p>	<p>Urban Systems & Energy Use Mapping</p> <p>Assess DER potential, emissions hotspots</p>	<p>Energy consultants</p> <p>GIS analysts</p> <p>Transportation planners</p>	<ul style="list-style-type: none"> - Maps of thermal potential and other sources for efficiency and/or electrification - Distributed generation and storage feasibility
<p>ANALYZE</p>	<p>Policy & Market Context Review</p> <p>Zoning overlays, incentive programs, climate mandates</p>	<p>City attorneys</p> <p>Planning departments</p> <p>Green banks</p>	<ul style="list-style-type: none"> - Inventory of relevant mandates (e.g., LL97) - Policy levers and capital planning alignment - Baseline for business case development

<p>DESIGN</p>	<p>Community Asset & Opportunity Mapping</p> <p>Identify anchor sites for electrification and resilience</p>	<p>CBOs</p> <p>Planners</p> <p>Resilience offices</p> <p>Residents</p>	<ul style="list-style-type: none"> - Asset maps - Sites for early wins (e.g., clinics, schools) - Stakeholder co-ownership models
<p>DESIGN</p>	<p>Model Retrofit & Electrification Scenarios</p> <p>Design technical pathways and packages</p>	<p>Engineers</p> <p>Architects</p> <p>Contractors</p> <p>Green workforce intermediaries</p>	<ul style="list-style-type: none"> - Bundle-ready retrofit scopes - Phased investment and timeline - Costed menu of technical interventions
<p>DESIGN</p>	<p>Neighborhood Energy & Investment Case</p> <p>Quantify avoided costs, co-benefits, and risks</p>	<p>Public finance experts</p> <p>Green banks</p> <p>Health and housing departments</p>	<ul style="list-style-type: none"> - Net present value (NPV) models including social metrics - Health and displacement-related avoided costs - Targeted IRA/Green Bank funding stacks aligned

DESIGN	<p>Community Co-Design</p> <p>Workshops, participatory planning, goals alignment</p>	<p>CBOs</p> <p>ResidentsCommunity planners</p> <p>Environmental justice groups</p>	<ul style="list-style-type: none"> - Community-aligned metrics for success - Co-governance models for shared infrastructure - Trust-building through transparency and shared data
BUILD	<p>Procurement & Implementation</p> <p>Deploy retrofits, heat pumps, district energy</p>	<p>City agencies</p> <p>Developers</p> <p>Unions and workforce intermediaries</p> <p>ESPC (Energy Savings Performance) or ESCO (Energy Service Company) contractors</p>	<ul style="list-style-type: none"> - Contracts awarded to local/targeted workforce - Infrastructure buildout begins
BUILD	<p>Ongoing Resident & Small Business Communication</p>	<p>Project managers</p> <p>CBO liaisons</p> <p>Local media</p>	<ul style="list-style-type: none"> - Reduce disruption, manage expectations
BUILD	<p>Permitting & Grid Coordination</p>	<p>Utilities</p> <p>Building departments</p> <p>Energy agencies</p>	<ul style="list-style-type: none"> - Streamlined interconnection - Grid readiness for new loads

BUILD	Apprenticeship and Local Job Training Activation	Workforce boards Labor unions Training centers	- Pipeline for green trades careers
MAINTAIN (Post-Build)	Operations, Monitoring & Reinvestment Ensure reliability and continuous improvement	Property managers Utilities CBOs Community advisory boards	- Maintenance plans- System performance tracking - Ongoing job creation
	Community Feedback Loops Resident surveys, advisory committees, participatory budgeting	CBOs Tenant associations City departments	- Real-time issue identification - Adaptations for future phases - Greater civic trust
	Impact Reporting Emissions, equity, and economic metrics	City performance teams Academic partners Philanthropy and funders	- Public dashboards- Shared accountability - Case studies for replication