8. Buildings

Draft New York State Energy Plan

July 2025

Key Findings

- **Energy efficiency, efficient electrification, and demand management are core strategies to drive energy savings in New York's residential, commercial, and institutional buildings, keep buildings comfortable, and support reliability of the grid and gas system.** As the buildings sector transforms, the use of efficient heat pumps will increase, such that heat pumps could outpace residential gas equipment sales and make up a meaningful share of space conditioning by 2040. As the prohibition on the use of fossil-fuel equipment and building systems goes into effect for new construction in New York State, heat pumps, thermal energy networks, and other electrified equipment will be the default for new buildings. Increased levels of energy efficiency and weatherization measures will result in lower per capita energy usage across the sector, helping to provide energy savings for many residents and businesses. In addition, distributed solar generation and energy storage can provide a dependable source of electricity for buildings, help reduce costs, and improve resiliency. Collectively, these strategies will bring about a modern, low-carbon building stock that delivers a multitude of public health, safety, affordability, and resiliency benefits to New Yorkers.

- **The clean energy transition offers an opportunity to invest in and expand access to affordable and quality housing that is comfortable, energy efficient, and resilient.** State support for low- to moderate-income (LMI) households and buildings in disadvantaged communities (DACs) to make energy-related upgrades will help make homes and communities healthier places to live. New York must accelerate new housing development and new construction under advanced energy codes to enable lower energy costs and more resilient buildings.

- **Financial incentives and affordable financing will continue to be necessary to reduce upfront costs and motivate New Yorkers to make energy upgrades in buildings.** New York State currently invests over $1 billion annually in public funds for State- and utility-administered customer incentives, market development programs, and financing offerings that help make energy efficiency and efficient electrification solutions more affordable. A strategic priority for State- and ratepayer-funded incentives is supporting building energy upgrades that help building owners reduce energy load, displace fossil-fuel based consumption, and lower energy bills through energy efficiency and efficient electrification. In the near-term, funding should continue to focus on energy efficiency and weatherization projects as well as replacing oil, propane, or electric resistance heating with efficient heat pumps while helping to make the switch from gas equipment where it is financially viable as aging equipment becomes ready for replacement (though before an emergency replacement is needed).

- **In existing buildings, sequencing capital investments is often an effective way to manage the associated cost and disruption of energy and building upgrades that support climate and affordability goals.** For example, energy upgrades in a building may happen at different times to align with equipment and capital planning lifecycles and tenant turnover. State policies and programs should continue to support such sequencing of upgrades and offer flexibility in the way that buildings reduce energy use, displace fossil fuel consumption, and efficiently electrify.

- **Innovation and market transformation will expand decarbonization solutions across various building types and can help reduce equipment and installation costs over time.** Public investments, coordinated with strategic public-private partnerships, can help spur further technology innovation, demonstration, and commercialization and can bring emerging solutions to the market and lower costs, especially for hard-to-decarbonize building types or energy uses. Market development support can help expand the clean energy workforce and support existing supply chain actors and businesses in adapting business models to effectively deliver clean energy technologies, all while building awareness and confidence in clean heating solutions among consumers and contractors.

- **Expanding mechanisms to integrate flexible equipment loads** while aligning price signals to manage and shift demand will be important for managing operating costs, optimizing grid investments, and maintaining grid reliability. As energy uses like heating, hot water, clothes drying, and vehicle charging increasingly become electrified, demand on the electric grid will grow. Distributed renewable generation, including solar and storage (electric and/or thermal) at the building can help offset some of this demand and shift energy use to when it is more affordable. Technology advancements like smart panels, smart plugs, and demand response software can further facilitate the ability to aggregate and shift demand, which can help consumers reduce operating costs while optimizing grid investment needs.

- **Coordinated grid planning is needed to shift beyond building-by-building conversions to network solutions, including thermal energy networks.** Enabling efficient community-scale decarbonization will be important in unlocking strategies such as thermal energy networks, area-based thermal energy planning, and other integrated planning approaches. Integration of energy efficiency and electrification projects with neighborhood redevelopment and master planning can help ensure that decarbonization is a central component when redevelopment, replacement, and total rehabilitation occurs.

- **Regulatory frameworks are important to drive broad and sustained improvements in building energy performance and to reduce emissions from building operations, equipment, and construction materials.** New, zero-emission building and energy codes will improve comfort, indoor air quality, and resilience while shifting new buildings away from fossil fuels. Appliance and product standards are lowering energy usage as existing residential and commercial buildings upgrade their equipment, and State standards can further help promote demand flexibility for certain appliances, even with uncertainty around federal standards. Improved access to building energy consumption data provides actionable insights to identify the best opportunities for achieving energy cost savings and emissions reductions. Lessening the environmental impact of the buildings sector also requires managing refrigerants and embodied greenhouse gas emissions.

- **As buildings of all ages, functions, and locations across New York State are vulnerable to the impacts of climate change, design and investment decisions should account for long-term climate risk.** All regions of the state will experience a range of climate impacts, which can affect

building structures, systems, and operations, as well as the occupants. Making design decisions in both new and existing buildings that align buildings' and building components' life cycles with future climate projections and expected hazards will lead to more cost-effective, sustainable, and future-ready buildings that can support many generations of use.

Key Terms

- **Efficient electrification:** Electrification of a building with an adequately efficient thermal envelope to conserve energy use, keep occupants comfortable, and enable an efficient electric heat pump system to operate effectively.
- **Efficient electric heat pumps:** include ground source heat pumps and heat pump water heater systems that meet or exceed the U.S. Environmental Protection Agency's ENERGY STAR specification, and cold climate air-source heat pumps, packaged terminal heat pumps, and variable refrigerant flow products that meet or exceed standard specifications for heat pumps that are best suited to heat efficiently in cold climates.
- **1–4-unit home:** Housing with 1 to 4 residential units, including single-family, owner-occupied, and rental housing. Small residential energy efficiency programs often serve 1-4 unit homes.
- **Multifamily housing:** A building that has five or more residential housing units where the predominant building use is for residential purposes. Multifamily energy efficiency programs often serve buildings with 5+ units.
- **Low- to moderate-income (LMI) household:** A low-income household is defined as a household with an annual income of less than 60 percent of either the state or area median income, whichever is higher and adjusted for household size. A moderate-income household has an annual income of less than 80 percent of either state or area median income, whichever is higher and adjusted for household size.
- **Phased electrification:** This term refers to projects wherein the building electrification process is carried out over time. This staged approach aims to electrify most or all a building's energy systems while minimizing disruptions to building operations and occupant experience. This may be a multifamily or commercial building where certain units of the building are converted to electric heat pumps for space heating (e.g., at the time of tenant turnover), or as part of a phased more comprehensive renovation project. This may also result in instances where full electrification of the building may not be possible due to available electric capacity or limitations related to customers' capital cycles.
- **Resource Efficient Decarbonization:** A phased approach to eliminating greenhouse gas emissions from large buildings in cold climates that creates a path toward cost-effective decarbonization.

Key Terms

- **Subsidized affordable housing:** Housing that is affordable because of government subsidy. This can include, but is not limited to, housing units receiving support under the U.S. Department of Housing and Urban Development programs (e.g., Section 8 Housing Choice Voucher, tenant-based vouchers, project-based vouchers, and HOME), including units owned or overseen by Public Housing Authorities.
- **Supplemental heat:** A heating system that is installed or left in place to complement a heat pump heating system that is not sized to meet the full heating load of the building, providing heat to supplement the main heating system during the coldest hours of the year.
- **Thermal energy network:** A network of equipment and pipes that connects multiple buildings together to thermal energy sources such as geothermal, surface water, waste heat, and the air, to provide space heating cooling and domestic hot water. This technology can be an effective way to reduce energy costs and greenhouse gas emissions from a set or groups of buildings at scale.
- **Weatherization:** Protecting a building's interior from outside temperatures and moisture to cut energy use and enhance indoor comfort through measures like air sealing, insulation, and window upgrades.

1. Overview

New York State's buildings are as varied as their surrounding communities. Upgrading the structures where New Yorkers live, work, and learn offers unique challenges, as well as significant opportunities. New York State's buildings sector accounts for more than half of the net energy consumption statewide.[1] According to Climate Act emissions accounting, in 2022, the buildings sector was the largest source of emissions, responsible for 31 percent of emissions statewide, which includes the combustion of fossil fuels in residential (33 percent) and commercial (19 percent) buildings, emissions from imported fuels (32 percent), and hydrofluorocarbons (HFCs) released from building equipment and foam insulation (16 percent).[2] Investments that modernize and improve the quality of New York's buildings will therefore contribute significant impacts toward a key source of energy use.

This Plan recommends five main strategies as central to improve and decarbonize New York's buildings sector, keep occupants comfortable, prioritize affordability, and support reliability of the grid and gas system:

1. Prioritizing energy efficiency and weatherization
2. Advancing efficient electrification to reduce on-site fossil fuel use
3. Continuing innovation and market development for new and emerging clean building technologies
4. Enabling demand management and load flexibility at scale
5. Reducing embodied greenhouse gas and refrigerant emissions

Strategies that increase clean energy generation and storage, modernize the electric grid, and expand access to electric vehicle (EV) charging infrastructure (as discussed in the Electricity and Transportation chapters of this Plan) will also be important in enabling a clean and resilient building stock.

1.1. New York's Large Geography, Varied Climate, and Vibrant Economy Drives a Diverse Buildings Mix

The buildings sector encompasses over 6 million buildings across New York State, providing homes to 7.3 million households; it contains over 5 billion square feet of commercial and institutional space where New Yorkers work, learn, gather, and access essential services. New York's buildings are older than the national average, pointing to opportunities for upgrading buildings in ways that improve both quality of life and energy performance. New York's homeownership rate of 54 percent is lower than the national average and nearly half (48 percent) of households statewide are low- to moderate-income (LMI)

[1] NYSERDA, "Patterns and Trends – New York State Energy Profile," Energy Analysis Reports and Studies, December 2024, https://www.nyserda.ny.gov/About/Publications/Energy-Analysis-Reports-and-Studies/Patterns-and-Trends.

[2] New York State Department of Environmental Conservation, "2024 Statewide GHG Emissions Report," Environmental Protection – Climate change, December 2024, https://dec.ny.gov/sites/default/files/2024-12/summaryreportnysghgemissionsreport.pdf.

households, underscoring the importance of careful attention to equity and to housing and energy affordability.[3,4]

Buildings in New York State vary widely by region when it comes to their size, type, local climate conditions, development patterns, and socioeconomic conditions; therefore, multiple approaches will be required to enable a sector-wide transition to a low-carbon building stock. New York's downstate region (Long Island, New York City, and Westchester County) is characterized by dense urban areas and a mixed-humid climate zone (IECC Climate Zone 4A). The localities in this region often have higher costs for construction and real estate, with certain areas also having more multifamily rental housing and leased space, and taller buildings with denser occupancy than other parts of the region or state. Median household incomes are typically higher in downstate counties than those upstate; however, Bronx County has the lowest median household income and the highest poverty rate of any county in the state.[5] Income inequality is high in New York City, where nearly one in four residents lives in poverty.[6]

The upstate region is characterized by suburban and rural communities, as well as small and moderate-sized cities, with cooler climates (Climate Zones 5, cool-humid and Zone 6, cold-humid). These smaller cities, towns, and villages often have lower cost real estate and more single-family homes and low-rise buildings. Median incomes are typically lower than in downstate New York, with those in the Southern Tier being among the lowest in the state. In the Southern Tier and in the mostly rural and suburban counties in the Mohawk Valley and the North Country regions, low-income households are more likely to live outside the census tracts geographically designated as DACs.

1.2. Most of New York's Buildings Rely on Fossil Fuels

Typical buildings use energy for space heating, ventilation, and air conditioning (HVAC), water heating, lighting, refrigeration, cooking, computer and office equipment, and other appliances. The building thermal envelope (roof, walls, windows, doors, and floor) acts as a barrier, regulating the exchange of air, heat, water, vapor, fire, smoke, dust, sound, and light between the inside and outside of the building. For residential buildings, the typical thermal envelope has roughly a 30 percent to 40 percent impact on the

[3] Napoli, Thomas, "Homeownership Rates in New York," Office of the NY State Comptroller, Office of Budget Policy and Analysis, October 2022, https://www.osc.ny.gov/reports/homeownership-rates-new-york#:~:text=In%20the%20second%20quarter%20of%202022%2C%20homeownership%20rates%20were%2053.6,and%20Nevada%20(59.1%20percent).

[4] NYSERDA, "New York State Low- to Moderate-Income Census Population Analysis Tool," https://www.nyserda.ny.gov/About/Publications/Evaluation-Reports/Low--to-Moderate-Income/LMI-Census-Population-Tool.

[5] U.S. Census Bureau, "New Statistics Available from the 2016-2020 American Community Survey 5-Year Estimates," U.S. Census Bureau Newsroom, March 17, 2022, https://www.census.gov/newsroom/press-releases/2022/acs-5-year-estimates.html.

[6] Columbia University Center on Poverty with Robin Hood, "The State of Poverty and Disadvantage in New York City," Robin Hood Annual Report, February 2025, https://robinhood.org/news/robin-hood-annual-poverty-tracker-report-shows-25-overall-poverty-rate-in-new-york-city-climbing-beyond-record-highs-observed-in-2022/

building's energy consumption for heating and cooling.[7] Space heating, air conditioning, and water heating collectively comprise roughly 77 percent of a home's total average energy use.[8]

More than eight out of ten of New York State's occupied housing units rely on gas, distillate/fuel oil, or other fossil fuels for their main source of heating. Among those homes heating with electricity, the majority use inefficient electric resistance heating. Hot water heating in New York's residential buildings is likewise dominated by gas and fuel oil. A majority (62 percent) of homes in New York also have gas cooking appliances.[9] An estimated 160,000 homes, or a little over 2 percent of all households, use wood for primary or supplemental heating. Across New York, just over 250,000 homes, or around 3.5 percent of all households, use an electric heat pump as their main source for space heating.[10]

The commercial and institutional sectors are notably diverse and span many different building types, customer types, and energy needs, including office, government, education, retail, warehouse, health services and hospitals, lodging and hospitality, food service, grocery, and mixed-use buildings. Most of New York's commercial and institutional buildings rely on fossil fuels for space conditioning, with over 85 percent of commercial building square footage using fossil fuels for heating. Electricity is used for heating in 10 percent of all commercial floor area, but as of 2020, mostly inefficient electric resistance heating and supplementary heating using dual fuels is prevalent in commercial buildings. Additionally, roughly 7 percent of commercial square footage in New York is heated by district steam systems, including many large buildings in New York City.[11]

1.3. Modernizing and Decarbonizing Buildings Will Deliver Multiple Benefits to New Yorkers

Energy efficiency and decarbonization investments in buildings provide a transformative opportunity to improve the many spaces of New Yorkers' everyday lives. Weatherization, electrification, and other energy-related upgrades directly improve occupant comfort in homes, schools, and workplaces; provide better indoor and outdoor air quality; contribute to lowering energy usage and associated energy bills; and offer better access to heating and cooling amidst increasingly variable weather conditions. Modernized and decarbonized building infrastructure brings value to New Yorkers across multiple areas, including:

- **Public health benefits**, because reducing on-site fossil fuel combustion decreases outdoor air pollution and improves neighborhood outdoor air quality. Indoor air quality and safety improvements also result from electrification of space conditioning, cooking, proper ventilation, and air-sealing, with reduced risk of carbon monoxide exposure and gas leaks.

[7] NYSERDA, "New York's Carbon Neutral Buildings Roadmap (New Buildings Institute et al. for NYSERDA)", December 2022, https://www.nyserda.ny.gov/All-Programs/Carbon-Neutral-Buildings, and Energetics Incorporated for U.S. DOE, "Windows and Building Envelope Research and Development: Roadmap for Emerging Technologies," Building Technologies Office, 2014, https://www.energy.gov/sites/default/files/2014/02/f8/BTO_windows_and_envelope_report_3.pdf.

[8] EIA Residential Energy Consumption Survey (RECS), "Annual household site end-use consumption in United States homes by state—totals and averages", Energy Information Administration, 2020. https://www.eia.gov/consumption/residential/data/2020/state/pdf/ce3.1.st.pdf.

[9] EIA Residential Energy Consumption Survey (RECS), "Highlights for appliances in U.S. homes by state," Energy Information Administration, 2020, https://www.eia.gov/consumption/residential/data/2020/state/pdf/State%20Appliances.pdf.

[10] See the Pathways Analysis chapter of this Plan.

[11] See the Pathways Analysis chapter of this Plan.

- **Better comfort** from energy efficiency and weatherization upgrades that make buildings' indoor environments and temperature more stable and comfortable, as well as from versatile heat pump systems that offer dehumidification in the summer, along with filtered indoor air.
- **Improved access to cooling** by transitioning from heating-only systems to heat pumps that provide cooling and heating, which is especially critical to health, safety, and equity as temperatures rise.
- **Energy bill savings** from energy efficiency and other load reduction measures, and highly efficient heat pump systems (when compared to heating with fuel oil, propane, or electric resistance heating equipment) as well as less variable energy costs.
- **Climate Resiliency**, because well-designed efficiency measures such as improved insulation, air sealing, orientation, and load reduction improve passive survivability and maintenance of safe indoor temperatures; and load flexibility measures can improve reliability in grid-constrained areas. Buildings built to withstand and recover from climate impacts are more likely to perform as intended throughout their useful lives in a changing climate.

Energy efficiency and weatherization, along with efficient electrification, will immediately reduce energy use overall and emissions from buildings, providing benefits to the energy system and to the broader economy. Efficient electrification will enable buildings to be able to operate with increasingly lower emissions as the State advances toward a zero-emissions electric grid. Growth in demand for energy efficiency, weatherization services, and heat pump systems will provide new and incumbent workers with opportunities in the clean energy economy and encourage economic development as design professionals, installers, and manufacturers expand their capacity to serve the growing regional market.

1.4. The Energy Transition Highlights the Opportunity to Improve Buildings in Disadvantaged Communities and Low- to Moderate-Income Housing

Though LMI households and residents in DACs are among those who stand to benefit the most from modernizing New York's building stock, ensuring energy investments and their associated benefits equitably reach these populations will require intentional effort . These households and residents face barriers including limited access to affordable capital, lower home ownership rates, and disproportionate energy burdens. Similarly, affordable housing property owners operate on tight margins and may have limited access to capital to make energy-related improvements. Among low-income housing and in DACs in particular, there is a higher proportion of homes and buildings with structural deficiencies and other health and safety issues, which can inhibit energy efficiency and weatherization, as well as electrification measures. Investments in these communities will be critical to successful transformation of the buildings sector.

2. State of the Sector

2.1. New York is Advancing Statewide Goals

New York has a statewide energy efficiency target of 185 trillion BTUs (TBtu) of end-use energy savings by 2025—relative to forecasted energy consumption. This is the equivalent to fueling and powering over

1.8 million New York homes annually. The 185 TBtu target is set on an all-fuels basis, covering buildings and industrial facilities (while excluding the transportation sector) and aggregating energy efficiency achievement from across electricity, natural gas, and delivered fuels.

State agencies and authorities, electric and gas utilities, and private sector businesses have made significant progress toward this target. Across the supply chain, market actors have collaborated to scale and innovate energy efficiency and electrification activities, improve cost effectiveness of energy efficiency and electrification solutions, foster public-private partnerships, and encourage greater leverage of public funds with private capital. By the end of 2024, over 80 percent of the targeted efficiency savings had been achieved, meeting nearly 150 TBtu of New York's target. Energy efficiency programs administered by the investor-owned utilities and LIPA have installed over 91 TBtu of savings while NYSERDA programs delivered statewide have driven another nearly 42 TBtu. Energy codes and federal appliance standards have also contributed over 6 TBtu of savings. State-owned and operated facilities are leading by example in their operations and construction activities to deliver 11 TBtu of the statewide target and have achieved over 9 TBtu of installed energy efficiency.

Even with the progress that has been accomplished, significant opportunities for cost-effective energy savings and greenhouse gas emissions reductions remain in the buildings sector. An Assessment of Energy Efficiency and Electrification Potential in New York State Residential and Commercial Buildings underscored that energy efficiency incentive programs must transition away from lighting and toward deeper savings measures (namely building envelope and space heating improvements) to drive savings above federal standards.[12] The study found that heat pump installation and building envelope improvement packages are highly responsive to incentives, in particular for single-family homes. Concurrently, the study also found that, for a set of low-cost energy efficiency measures that offer reasonable returns on investment (including higher-efficiency boilers and furnaces, HVAC tune-ups, commissioning and distribution improvements, and thermostats and boiler controls), providing incentives does not significantly increase market adoption. This statewide study suggests that strategic opportunities to drive energy savings with public incentives include residential building envelope improvements, efficient electrification of space and hot water heating in residential and commercial buildings, and certain non-thermostat HVAC controls in the commercial sector.

2.2. New York Has a Strong Foundation of Policy and Programs to Build Upon

2.2.1. Major Programs/Initiatives in Place or Underway

New York State currently invests over $1 billion annually in public and ratepayer funds for State- and utility-administered customer incentives and financing offerings that help make energy efficiency and electrification solutions more available and affordable. Well-established policies and programs, further described below, are in place to help New Yorkers lower energy use and save on energy bills, assist residents and business owners understand, plan, and pay for energy upgrades, and stimulate innovation, market transformation, and private investments to advance efficient and low carbon buildings.

[12] NYSERDA, "Assessment of Energy Efficiency and Electrification Potential in New York State Residential and Commercial Buildings," Building Stock and Potential Studies, February 2023, https://www.nyserda.ny.gov/About/Publications/Evaluation-Reports/Building-Stock-and-Potential-Studies/Assessment-of-Energy-Efficiency-and-Electrification-Potential.

Continuing on the successes of the existing Clean Energy Fund and New Efficiency: New York, in May 2025, the Public Service Commission (PSC) issued orders approving non-LMI and LMI portfolios for energy efficiency and building electrification programs administered through NYSERDA and the State's large investor-owned utilities, reflecting a total annual budget of $1 billion from 2026 through 2030.[13] The PSC adopted a Strategic Framework for the ratepayer-funded energy efficiency and building electrification program portfolios, establishing that a minimum of 85 percent of the funding must be dedicated toward "strategic" measures, such as heat pumps and building envelope improvements, that reduce energy load and advance electrification and electrification-readiness, signaling a clear commitment to align investments with the State's clean energy goals. These portfolios will work in concert with other State and federal resources—including RGGI and the Environmental Bond Act—to advance a transformation of the buildings sector.

Central to New York's energy transition is the State's policy commitment to prioritizing LMI residents and those residing in DACs. The PSC's Energy Affordability Policy sets a goal of ensuring that low-income households will pay no more than six percent of annual household income toward energy bills, with major electric and gas utilities providing low-income customers with energy bill payment assistance through monthly tiered discounts. Additionally, ratepayer-funded LMI programs dedicated to improving energy affordability and access to clean energy solutions have been in place since the inception of the System Benefits Charge (SBC) and continue to be a cornerstone of New York's residential energy efficiency and building electrification portfolios. NYSERDA, HCR, and LIPA—in coordination with the utilities and OTDA—provide State leadership in administering ratepayer, RGGI, federal, and State funding across a multitude of programs serving LMI households, as described below and in Section 4.1.2.

Key initiatives include:

- **The NYS Clean Heat program** broadly advances clean heating and cooling solutions statewide. The collaborative is led by New York's electric utilities and NYSERDA, providing upfront customer incentives for heat pumps while supporting broader market development aimed at strengthening the heat pump supply chain and helping contractors and consumers better understand clean heating options. Comparable programs on Long Island are run by LIPA.
- **NYSERDA's Comfort Home Pilot Program** currently offers seal and insulate weatherization packages throughout New York State to improve building envelopes and support peak load reduction in 1–4-unit homes. As part of the 2026 to 2030 ratepayer-funded energy efficiency and building electrification portfolio, electric and gas utilities will develop regional weatherization programs to serve 1–4 family homes in the upstate and downstate regions.
- **NYSERDA's Empower+, LIPA's Home Comfort Plus, the Weatherization Assistance Program, and the utility administered Affordable Multifamily Energy Efficiency Program (AMEEP), along**

[13] Cases 14-M-0094 et al., Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Order Authorizing Non-Low- to Moderate-Income Energy Efficiency and Building Electrification Portfolios for 2026-2030 (issued May 15, 2025); and Order Authorizing Low- to Moderate-Income Energy Efficiency and Building Electrification Portfolio for 2026-2030 (issued May 15, 2025.

with other programs support energy efficiency and electrification solutions that will help LMI New Yorkers save energy and money, increase comfort, and improve the quality of their homes.

- **New York State Homes and Community Renewal (HCR)** is working to produce high-quality affordable housing with improved building envelope performance and significantly lower (or zero) greenhouse gas emissions from fossil-fuel-burning appliances. HCR is carrying out the State's $25 billion, five-year housing plan to create or preserve 100,000 affordable homes across New York. The housing plan also provides for electrification and energy efficiency work to be ready for electrification in an additional 50,000 homes.
- **Green Jobs – Green New York (GJGNY)** offers energy assessments and low-interest financing to help residential customers, small businesses, and not-for-profit organizations make energy efficiency upgrades. Created in the 2009 Green Jobs – Green New York Act, the program also supports workforce training for clean energy careers, with funding support provided through proceeds from the sale of carbon emission credits under the Regional Greenhouse Gas Initiative (RGGI).
- **Executive Order 22, Leading by Example,** directs state agencies to accelerate efforts to make State facilities and State operations more sustainable. NYPA, through its BuildSmart 2025 program, plays a leadership role in coordinating compliance and helping improve the energy performance of State-owned buildings.
- **Design standards** set by HCR are leading the industry in sustainable construction and require affordable multifamily housing to be constructed to zero-emission standards. Additionally, a new first-of-its-kind interim "Decarbonization and Climate Resiliency Design Guide" for State buildings standardizes recommendations for increasing energy efficiency, designing for zero emissions, and designing for climate resiliency in State buildings. These guidelines will begin integration into State projects in 2025 and will ensure State investments are reducing emissions and serving New Yorkers well into the future.

2.2.2. Recent Policy Accomplishments

New York State has enacted several key policies to significantly advance pathways to an efficient and decarbonized building stock.

- **Zero-emission codes for new buildings.** Part RR of Chapter 56 of the Laws of 2023 directs the New York State Fire Prevention and Building Code Council (Code Council) to adopt codes that prohibit building systems or equipment used for the combustion of fossil fuels and encourage high energy performance. These codes will apply statewide, beginning in 2026 for most buildings less than 7 stories in height and to other new buildings beginning in 2029 with exceptions. The

Code Council is in the process of updating State codes based on and exceeding the minimum requirements of the latest edition of the model codes.[14]

- **The Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022** directed the adoption of advanced State building codes and appliance and equipment standards to improve energy efficiency. NYSERDA has accordingly promulgated minimum efficiency standards for 21 product categories, which help maintain performance and quality while reducing energy and/or water consumption, reduce utility bill costs, and lower greenhouse gas emissions.[15]

- **New York's Utility Thermal Energy Networks and Jobs Act of 2022** allows gas and combined gas and electric utilities to become holistic thermal energy providers. It requires New York's seven largest investor-owned gas and electric utilities to propose thermal energy network pilot projects for PSC review and approval, with an emphasis on serving DACs. It also directs the PSC, which initiated a proceeding in September 2022, to establish a regulatory framework for these networks that protects customers, supports fair market access and third-party competition/participation and exempts non-utility-owned small-scale networks while promoting the training and transition of utility workers impacted by the Climate Act.

- **A $1 billion climate investment in the FY 2026 Enacted Budget** dedicates more than $450 million to reducing building emissions – investing in energy efficiency and clean heating technologies like heat pumps. It also advances next-generation infrastructure, with over $200 million for thermal energy networks, including projects at SUNY and CUNY campuses and state and municipal facilities.[16]

3. Outlook (2025 – 2040)

The next fifteen years will be a period of significant transition for the buildings sector as end-users increasingly move away from a reliance on fossil fuels. Advanced and zero-emission codes will make all-electric construction the standard in new, highly efficient buildings. In existing buildings, replacing aging appliances presents meaningful opportunities to drive improved energy performance through more efficient building envelopes and efficient, electrified technologies. Federal, State, and local actions are already helping to support this early market evolution as described in Section 2 and though the impacts of these existing policies will become more evident over time, State leadership will be important to continue building the momentum that is needed to drive a full transformation of New York's buildings.

[14] New York Department of State, "State Uniform Fire Prevention and Building Code (19 NYCRR Parts 1219 to 1229) and State Energy Conservation Construction Code (19 NYCRR Part 1240)," Notice of Proposed Rule Making, March 19, 2025, https://dos.ny.gov/notice-proposed-rule-making.

[15] NYSERDA, "Current Standards," New York State Appliance and Equipment Efficiency Standards, December 28, 2022, https://www.nyserda.ny.gov/All-Programs/New-York-State-Appliance-and-Equipment-Efficiency-Standards/Current-Standards.

[16] Hochul, Kathy, "Governor Hochul Announces Historic Investments to Secure a Sustainable Future for All New Yorkers and Support Our Agriculture Industry as Part of the FY 2026 Budget," Office of Governor Kathy Hochul, May 9, 2025, https://www.governor.ny.gov/news/governor-hochul-announces-historic-investments-secure-sustainable-future-all-new-yorkers-and.

The State Energy Plan Pathways Analysis shows that additional governmental and private action will help lower energy usage and support gradual market penetration of clean energy technologies. Under the Additional Action scenario, the residential sector is expected to see a total of 630,000 heat pumps and 950,000 efficient building envelopes in place by 2030. Beyond 2030, continued investment, innovation, and policy progress will further accelerate energy efficiency and heat pump installation such that by 2040, heat pumps are projected to make up 45 percent of HVAC sales, outpacing new gas equipment sales and resulting in 1.7 million heat pumps and 3.3 million efficient building envelopes in place across single-family and multifamily homes. Similarly in the commercial sector, heat pump installations are expected to grow to reach 9 percent sales share by 2030 and 20 percent sales share by 2040. Overall, total energy demand in the commercial buildings sector will see reductions of more than 10 percent by 2040 as buildings prioritize load reduction, more efficient equipment, and a transition away from less-efficient heating with fossil fuels.

Notably, the Pathways Analysis highlights that across all sectors and throughout the Energy Plan timeframe, energy efficiency and weatherization and other load reduction measures consistently outpace heat pump adoption. Thus, while meaningful adoption of heat pumps and other efficient electric appliances will transform the energy profile of the buildings sector, energy efficiency and load reduction remain central to a reliable and affordable transition for energy consumers and suppliers alike. Similarly, phased electrification and supplemental heating strategies will remain important approaches to decarbonizing existing buildings through 2040. Approaching mid-century, as more buildings begin to fully electrify and as RD&D advances, some hard-to-decarbonize building typologies may be served by alternative fuels (as discussed in the Low-Carbon Alternative Fuels chapter of this Plan). Throughout this transformation, LMI households and disadvantaged communities will need to be protected from potential displacement and affordability risks.

Achieving the level of transformation described under this Additional Action scenario requires a stable market and clear policy signals. The Pathways Analysis assumes existing policies, incentives, and financial assistance remain intact, though the current federal and global economic context is one of great uncertainty, which impacts long-term planning, investment decisions, and the pace of transition. Regardless, the scale of investment needed to modernize and decarbonize the buildings sector requires that New York State continue and expand upon current publicly supported initiatives that help animate the broader market.

With these needs and uncertainties in mind, the themes and recommendations discussed in the remainder of this chapter reflect ambitious, yet achievable, approaches that are expected to promote a consistent, gradual transition and put New York on a path of achievement that resembles the Steady Progress scenario and lays a market foundation for even more ambition. However, full realization of Climate Act targets by 2050, as portrayed in the Net Zero Scenarios, will require significant additional investment and market adoption for efficient electrification, backed by strong policy commitments such as new regulatory mandates, early retirement of existing fossil fuel equipment, as well as substantial technological progress that helps to bring more affordable, advanced technical solutions to market for even the hardest-to-electrify building types.

4. Themes and Recommended Actions

4.1. Making Energy Efficiency and Electrification Upgrades More Affordable

4.1.1. Mitigating and Reducing Cost Barriers to Efficiency and Electrification

Energy efficiency and decarbonization deliver significant value to building owners and occupants, but the cost of energy upgrades often outweighs the benefits that can be monetized in the marketplace. At the same time, political and market instability in the wider economy creates an uncertain investment environment. High inflation and persistently high interest rates continue to put upward pressures on wages as well as equipment and installation costs, while diminishing the purchasing power of consumers. Additional shocks to the global economy from international conflicts, trade policies, and energy delivery disruptions have increased uncertainty and strained budgets.

Successfully enabling the energy transition of the buildings sector will require addressing upfront and operating cost barriers. Continued incentive programs, such as upfront rebates and tax credits, play an important role in reducing costs as the clean energy market develops, and must be combined with access to affordable financing. Additionally, public support will be needed to drive medium- and long-term cost reductions through scale and innovation, as further described in Section 4.2.

An important strategy for managing the cost and disruption of energy upgrades within existing buildings is by sequencing improvements, where different upgrades in a building happen at different times to align with equipment and capital planning lifecycles and tenant turnover. For large buildings, Resource Efficient Decarbonization (as described in the call-out box below) is a proven strategy to leverage load reduction and phased electrification.[17] Similarly, a homeowner may sequence upgrades by replacing a gas-fired hot water heater with an efficient heat pump appliance before it is time to replace the space heating and cooling equipment, or vice versa.

Resource Efficient Decarbonization

Resource Efficient Decarbonization (RED) is an incremental methodology, coupled with integrated design and strategic capital planning, that creates a path towards efficiently decarbonizing buildings. It offers a strategic, phased approach to eliminate greenhouse gas emissions from tall buildings, making decarbonization technically and economically feasible. Applying this model provides a repeatable process to help alleviate space constraints, optimize peak thermal capacity, increase operational efficiencies, utilize waste heat, and reduce the need for oversized electric thermal energy systems, creating retrofit cost compression. The model contains four steps:

1. **Reduce** energy loads as much as possible
2. **Reconfigure** systems to create thermal networks and enable low temperature distribution
3. **Recover** as much heat as possible from air, water, and wastewater sources
4. **Replace** equipment incrementally over time until full decarbonization is reached

[17] NYSERDA, "Building Decarbonization Insights," Empire Building Challenge, https://www.nyserda.ny.gov/All-Programs/Empire-Building-Challenge/Building-Decarbonization-Insights.

Addressing Upfront Cost Barriers

Upfront project costs for efficiency and electrification can be significant. The cost of efficient electric equipment, such as heat pumps, is typically higher than a like-for-like equipment replacement of fossil-fuel-fired systems, while the project return varies depending on a building's existing heating fuel, as discussed below. As the technology driving low-carbon energy solutions is relatively new, particularly in larger buildings and those with hard-to-electrify energy loads, costs may remain higher than traditional fossil fuel solutions.

Beyond the cost of equipment, the ancillary work needed to retrofit a building to enable a heat pump installation or other low-carbon energy solution adds to project costs. For example, new duct work and upgrades to a building's electrical service also may be needed to support heat pumps and all-electric appliances. In some cases, a building may also require remediation work related to health and safety issues before any efficiency and/or electrification work can commence.

Additionally, despite recent growth trends in heat pump sales and installations, the New York market has not yet started seeing a decline in the installation costs for efficient electrification retrofits in existing buildings. A 2024 study found that total project costs in the residential sector for HVAC replacement increased by an average of 20 percent from 2021 to 2024. Roughly half of these project costs are driven by "soft costs", which increased by 24 percent in the same time period. Soft costs include installation labor costs, project design, marketing and customer acquisition, and transaction costs (e.g., permitting, certifications, etc.).[18] Although a number of factors, including COVID-19-related supply chain disruptions, resulted in high inflation across the economy during and after this time (the national Producer Price Index increased from July 2021 to July 2024 by 15 percent for residential construction and 14.7 percent for non-residential construction), the relative novelty of heat pumps within New York and nationwide make these technologies more susceptible to cost changes. Reducing both the hard and soft costs of energy projects will be key to expanding the market.

Affordable Operating Costs

Another challenge that can impede building upgrade projects is the potential impact on operational energy costs. Energy efficiency is an established means of reducing household and business spending on energy by lowering usage. Continuing to prioritize efficiency and load reduction measures will be an important strategy to support energy affordability and manage the costs of decarbonization retrofits. Still, electrification projects can be challenging with respect to their impact on on-going costs given the current relative costs of energy. In particular, the cost of gas, as compared to electricity, is a barrier to electrification as switching from gas to heat pumps can result in higher operating costs. Switching to heat pumps can reduce energy bills when they are replacing systems that use oil, propane, and/or electric baseboard heating, particularly when paired with thermal efficiency measures. But electricity prices in New York State are currently well above gas prices, creating uncertainty as to whether heat pump investments can offer an economic return on investment when they replace gas boilers and furnaces,

[18] Cadmus Group LLC, "2024 Update: Energy Efficiency & Electrification Soft Costs in New York." Evaluation Reports, March 31, 2025, https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Publications/PPSER/Program-Evaluation/2024-Soft-Costs-in-NY-market-Evaluation-Executive-Summary-and-Final-Report.pdf

despite heat pumps operating at two to three times the efficiency of combustion-based gas heating systems. Converting a building from gas heating to a highly efficient, cold climate heat pump may result in lower or comparable energy costs in some cases while increasing bills in others. Large buildings that pay commercial electricity rates for central systems also need to factor in whether adopting heat pumps will result in higher electricity demand charges.

Initiatives Underway (e.g., Policy Processes, Programs)

- The PSC's portfolio for energy efficiency and building electrification includes several of New York State's core incentive programs, such as the residential Comfort Home pilot, which offers rebates for air sealing and insulation packages, and the statewide heat pump program, NYS Clean Heat. The State likewise has established programs that focus on improving efficiency and decarbonization of the commercial and institutional sectors, including the Empire Buildings Challenge, P-12 Schools, and Buildings of Excellence, which are described further in Section 4.2.1.

- NYS Clean Heat (NYSCH) is a collaborative effort led by the New York electric utilities and NYSERDA, intended to drive the adoption of heat pump technologies in new and existing buildings. The program provides upfront customer incentives while supporting broader market development. From its inception in April 2020 to April 2024, NYSCH has supported over 57,000 full-load home-heating projects, with most of the projects being served by ccASHPs. The program has primarily supported the 1-4 family sector and will do so exclusively from 2026 onward. In addition to customer incentives, NYSCH has supported market development for heat pumps as described in Section 4.2.1.

- New York State also administers several programs specifically dedicated to helping income-eligible homeowners and renters adopt climate-friendly housing improvements, as described further in Section 4.1.2.

- Green Jobs-Green NY offers New Yorkers—including LMI—access to low- and no-cost energy assessments, low-interest financing, and work readiness pathways to participate in the energy transition.

- Federal and state tax credit certainty would help New Yorkers undertake key upgrade with confidence including:

    - Tax credits enacted under the Inflation Reduction Act of 2022, available for a variety of home energy upgrades, would provide market certainty and make it more affordable for New Yorkers to make home investments and install decarbonization technologies including energy efficiency upgrades, high efficiency electric appliances, solar panels, and battery storage systems. As of June 2025, federal tax credits for geothermal heat pump system installations extend through 2032 at rates of 30 percent of the installed cost, with an additional 10 percent domestic content bonus credit, stepping down in 2033 and 2034. Changes in the federal tax structure which reduce these credits could have a dampening effect on the market and lead to less action by homeowners.

- New York enacted a State Geothermal Income Tax Credit equal to 25 percent of geothermal system equipment expenditures. The FY 2026 Enacted Budget increased the tax credit to $10,000 for eligible geothermal systems installed beginning in July 2025 and also makes this tax credit refundable.

Recommendations

- **The State and utilities should continue to offer financial incentives to reduce upfront costs and motivate New Yorkers to make energy upgrades in buildings,** supporting strategic measures that result in energy load reduction and reduction or elimination of fossil fuel consumption through energy efficiency and weatherization, heat recovery, and electrification. NYSERDA, LIPA, HCR, NYPA, and the PSC/DPS should collectively ensure that these incentives offered by State- and utility-administered programs are tailored by market segment and designed to support flexibility in the way that buildings reduce energy use and efficiently electrify.

- **State- and ratepayer-supported incentives should prioritize support for energy upgrades in existing buildings that are likely to deliver both energy and cost savings.** For example, residential heat pump programs could focus outreach to homes that are heating with oil, propane, or electric resistance equipment to encourage near-term heat pump adoption, as well as continue to have incentives available that help make switching from gas equipment financially viable as aging equipment becomes ready for replacement (though before an emergency replacement is needed).

- **NYSERDA should explore expanding access to affordable financing programs** such as Green Jobs-Green New York (GJGNY) and continue offering zero-cost and below-market-rate predevelopment lending options to affordable housing building owners. It should also continue offering high-impact credit enhancements to community development financial Institutions, credit unions, and specialized community-focused financial intermediaries, with the objective of unlocking local private capital and enabling below-market-rate consumer lending programs.

- **DPS should ensure the efficient and effective rollout of the three-part rate design** (customer charge, contract demand charge, daily as-used demand charge) adopted by the Commission under the standby rate proceeding. This includes the development and availability of tools necessary to evaluate the impact of such rates on various use cases. This roll-out should include implementation approaches that align with the PSC's rate design principles of being practical, understandable, and promoting customer choice while advancing the goals of electrification and affordability.

4.1.2. Prioritizing an Affordable and Equitable Transition for Low-to-Moderate Income Housing and Buildings in Disadvantaged Communities

The cost of energy upgrades as well as energy and housing costs in general are acute challenges for LMI households, affordable housing property owners, and building owners in disadvantaged communities who lack financial and capital resources to make these investments. Many LMI homes and buildings in DACs will need to address costly health and safety hazards such as mold or asbestos remediation or

other structural repairs before they are ready to undertake weatherization, efficient electrification, or other energy upgrades. Electrifying these buildings often also requires expensive upgrades to electric infrastructure that are challenging to fund through existing programs, such as upgrading electric panels, and in some old homes, replacing knob and tube wiring. The accumulation of these costs, along with the relatively limited funding sources that are available to help residents and building owners offset them, often makes building energy upgrades prohibitive to LMI households and other disadvantaged community populations unless they can access incentives and/or subsidized financing. The financial assistance opportunities that do exist are not without their own challenges, as home and property owners frequently must go through multiple State or utility-administered programs to access incentives for various aspects of a building upgrade project.

Prioritizing energy efficiency and weatherization as a primary strategy for permanent load reduction and to support energy affordability while investing in LMI homes and buildings in DACs will be critical. Attention to how building electrification may impact ongoing energy costs is also a particularly important policy concern for low-income households, who experience disproportionately high energy burdens. State and utility-administered programs can help manage these considerations by ensuring weatherization and other load-reducing measures are implemented prior to or in conjunction with electrification of LMI homes and other energy-burdened buildings.

For homes that are owner-occupied or where heating costs already are paid by residents, a key consideration is how to structure and expand bill assistance and participation in community solar programs in a manner that helps manage energy costs for low-income households especially as they electrify their homes with heat pumps. Existing low-income energy bill discount programs are not currently able to serve all households with needs. Additionally, affordable housing providers—who frequently pay a portion of LMI households' energy costs—are not eligible for these bill discount programs. Though electrification may make managing energy affordability challenging at present given current gas and electricity prices, these dynamics must be carefully monitored and re-assessed as what drives energy cost burden over time for an LMI household may change due to a variety of reasons, including potential increases in gas costs as more and more customers electrify and transition away from gas over the long-term (as discussed in the Natural Gas chapter of this Plan).

In rental housing, there is an additional need to consider potential cost-shifting risks that may lead residents to bear new costs. Electrification of residential buildings can lead to changes in metering and the potential for a transfer in operating costs between building owners and residents. For example, many multifamily buildings in New York City have centralized gas heating systems and individual electric meters for each apartment. Costs associated with heating are included in the rent while residents pay individual electricity bills. If the building is electrified using a heat pump system connected to the apartments' electric meters, heating costs would be transferred from the owner to the residents, leading to higher overall housing and energy costs if rent is not adjusted to account for this transfer. While housing policies may manage these impacts in certain circumstances, such as in regulated or subsidized affordable housing, other LMI renters currently do not have any protection against housing cost increases or cost shifting that may occur because of building electrification. Advancing electrification of LMI housing therefore warrants careful consideration of the potential impacts across different types of

segments of the population, and continued examination of policies that can help to enable equitable electrification for regulated affordable housing.

Finally, while access to the cooling benefits of heat pumps is an important part of the opportunity to improve the quality of LMI homes in a warming climate, this may introduce added costs. Incentive offerings and energy bill assistance structures should be designed to accommodate costs associated with new or additional cooling load.

Initiatives Underway (e.g., Policy Processes, Programs)

- NYSERDA's **EmPower+** program provides no-cost and discounted energy efficiency and electrification solutions that will help income-eligible New Yorkers save energy and money, increase comfort, and upgrade their homes through a phased, efficiency-first approach. Comparable assistance is offered through LIPA's Home Comfort Plus program.
- **The Weatherization Assistance Program**, administered by HCR, helps income-eligible homeowners and renters reduce energy costs and improve comfort through energy efficiency and weatherization, direct installation of electricity savings measures, and mechanical system improvements.
- **The PSC's Energy Affordability Policy,** established in 2016, sets a goal to ensure that low-income households will pay no more than six percent of annual household income toward energy bills. The Energy Affordability Program supports this goal and is administered through major electric and gas utilities to provide low-income customers with energy bill payment assistance through monthly tiered discounts. In July 2025, the PSC adopted an Enhanced Energy Affordability Policy to extend energy bill discounts to additional households below median income.
- **Through the PSC's Energy Affordability Guarantee Pilot**, a first-in-the-nation pilot program, low-income homes that fully electrify through NYSERDA's EmPower+ program will pay no more than six percent of their annual income on electricity.
- The **Affordable Multifamily Energy Efficiency program (AMEEP)** is administered through the investor-owned utilities to support energy efficiency upgrades in affordable multifamily homes.
- **The Climate Friendly Homes Fund, administered by HCR,** provides 0 percent interest and grant financing for smaller multifamily properties between 5 and 150 units in DACs to support electrification measures.
- **In subsidized affordable housing, funding embedded within current Housing Plans** (e.g., HCR Housing Plan, HCR Climate Friendly Homes Fund) and design guidelines are enabling the development of efficient and electrified units as housing agencies help support creating and preserving affordable homes.
- **The Green Affordable Pre-Electrification Program**, newly established in the FY 2026 Enacted Budget, provides $2 million administered through HCR to support health and safety remediation

upgrades needed prior to homes and apartments being eligible for energy efficiency and weatherization, electrification, and insulation incentive programs.

- **The Clean Green Schools program** serves public schools that traditionally lack resources to invest in infrastructure improvements. This program aims to improve the environmental sustainability of those schools by reducing school energy loads, decarbonizing their building portfolio, and creating healthier and more productive learning environments.
- **NYSERDA's Regional Clean Energy Hubs** are a multidisciplinary network of community- based organizations that are charged with establishing partnerships with local government, human service, housing, and workforce training organizations to connect residents and disadvantaged communities with programs and resources to undertake clean energy upgrades or to otherwise participate in and benefit from the clean energy economy.

Recommendations

- **New York State, in partnership with local agencies and utilities, should continue to prioritize and coordinate public support across energy and housing programs to address energy performance and housing quality for LMI housing and buildings in DACs,** with State leadership from HCR, NYSERDA, LIPA, PSC and DPS, and OTDA.
- **Through administration and oversight by NYSERDA, HCR, LIPA, and the PSC/DPS,** State and investor-owned utility programs that support energy upgrades in LMI housing should focus on weatherization in the near-term. LMI programs should take an "efficiency-first" approach when supporting electrification, where energy efficiency and load reduction measures are required to be completed prior to or in conjunction with a heat pump installation.
- **New York State should explore new and expanded funding sources that can support non-energy building improvements including health and safety upgrades that are necessary before the installation of energy measures, as well as increased funding for energy upgrades in LMI housing.** The State should consider how existing funding for emergency replacement and deferred maintenance can be leveraged to help enable decarbonization.
- **NYSERDA, HCR, LIPA, OTDA, and the PSC/DPS should continue to simplify and streamline access** to LMI programs, including those administered by the investor-owned utilities. This should include streamlining program application processes to help support New Yorkers' ability to smoothly access eligible services across agencies and leveraging the Regional Clean Energy Hubs.
- **The State should consider opportunities to expand or modify energy bill assistance.** This should include continuing to expand opportunities to participate in community solar or other clean energy projects that provide electric bill savings to income-eligible households and/or that benefit affordable housing or buildings in disadvantaged communities.
- **NYSERDA, HCR, the PSC/DPS, LIPA, and NYPA should continue to support opportunities for LMI residents and buildings in DACs to pair electrification with solar energy** to benefit both the

building owner and residents. Though there is particular benefit for LMI and DAC residents, such opportunities may have broader applicability, including for market rate residential and other buildings.

- **The State, including HCR should consider updates to policies that enable equitable electrification for regulated affordable housing.**

4.2. Transforming the Market for Efficient and Low-Carbon Building Technologies

4.2.1. Supporting Marketing Development

State support for market development is important to deliver affordable, effective, and value-enhancing building upgrades that reduce and/or eliminate fossil fuel consumption. These initiatives are necessary to address market barriers and gaps, working alongside financial incentive programs to drive long-lasting, sustainable change. Market development strategies aim to address key barriers, including a limited clean building technology supply chain, lack of industry and consumer awareness about available technology or its benefits; limited availability or variety of affordable products; perceived risks of new technology; skilled workforce shortages; and limited access to capital by consumers and/or product manufacturers.

Market development support also includes key technical assistance and other activities that deliver robust information and insights to building owners to directly support decision-making, including showing how measures that reduce and eliminate fossil fuel consumption can become standard "business-as-usual" considerations when undertaking energy and capital planning. Delivering market insights about project cost, performance and other key factors in a transparent manner helps build confidence in decarbonization solutions and shows building decisionmakers and the industry-at-large that such solutions are replicable and reliable. Such information also encourages supply chain actors to adapt to deliver clean energy technologies. Ultimately, to drive widespread adoption of clean energy solutions will require building awareness and confidence among contractors and consumers and providing streamlined technology and equipment solutions, while equipping the clean energy workforce with the skills to confidently install and service low-carbon solutions in New York.

Initiatives Underway (e.g., Policy Processes, Programs)

- Through the Clean Energy Fund, NYSERDA has advanced $2.7 billion in investments within its market development portfolio from 2014 to 2025, enabling the delivery of energy efficiency and clean energy solutions by providing financial support, technical knowledge, data, and education/workforce training to service providers and customers. This portfolio also specifically supports initiatives that benefit low-and-moderate income households.

- Clean Heat market development initiatives drive heat pump adoption through promotion and pricing discounts offered by contractors and solution providers, installer training, quality control, marketing, and education to help customers understand the products and make informed choices.

- The Empire Building Challenge illustrates resource-efficient pathways for retrofitting buildings in hard-to-decarbonize segments, such as large residential and commercial buildings and hospitals, while NYSERDA's Buildings of Excellence program provides ongoing support for the design, construction, and operation of the next generation of carbon-neutral new construction, including affordable housing.
- Through Clean Heat Connect, NYSERDA has developed a voluntary network of 26 heat pump manufacturers and distributors that are active in the New York State market, through which NYSERDA provides easy-to-use technical and educational resources to help contractors promote and install air source heat pumps, with the goal of growing overall market capacity and interest in heat pumps and to reach contractors at scale.
- The Experience Clean Heat initiative is a communication and engagement campaign focused on promoting direct access to and experience with heat pumps to build consumer and contractor confidence and boost demand through publicly accessible pilot sites where heat pumps are currently operating.
- The Flexible Technical Assistance Program (FlexTech) shares the cost to produce objective, site-specific, and targeted studies on how best to implement clean energy and/or energy efficiency technologies. This program supports commercial, institutional, industrial, agriculture, and multifamily customers to chart their course for reducing and eliminating fossil fuel consumption and upgrading buildings. As of 2025, FlexTech also serves P-12 schools, with additional funding for schools located in Disadvantaged Communities.
- Workforce development programs offered by NYSERDA, the New York State Department of Labor, and other state agencies and industry partners, including the Talent Pipeline and On-the-Job Training programs, are supporting workers and businesses to help build a trained workforce that is available and skilled in implementing high quality, efficient clean energy solutions, as described in the Clean Energy Jobs and a Just Transition chapter of this Plan.

Recommendations

- **NYSERDA, through existing GJGNY requirements, should continue to provide free audits for single family residential and small business applications, and consider opportunities to scale virtual remote audits.** These audits are valuable engagement opportunities to assist building owners to identify and prioritize projects that reduce energy consumption and learn how they can start planning for and implementing decarbonization retrofits. They provide homeowners and business-owners with a roadmap to guide their building investment planning as well as initial connections to energy service programs.
- **NYSERDA should continue to cost-share technical assistance and energy planning that provides actionable information for how larger, more complex buildings can cost-effectively decarbonize over time following the Resource Efficient Decarbonization model.** NYSERDA demonstration programs, as well as projects at SUNY campuses and other State facilities, can help to demonstrate how Resource Efficient Decarbonization can be executed across large, hard-

to-decarbonize typologies in the commercial, institutional, and multifamily sectors, yielding valuable market insights on how to scale and replicate approaches across various subsectors.

- **NYSERDA, DOL, industry, and institutional and community partners should continue to support workforce development and training for critical growing building occupations,** including energy auditors, weatherization technicians, and HVAC installers, as described in the Clean Energy Jobs and a Just Transition chapter of this Plan.
- **NYSERDA and utility program administrators should continue working with the industry to streamline and standardize the delivery of weatherization measures and heat pumps,** including focusing on the sale, design, installation and customer engagement process. This could include piloting different weatherization and heat pump delivery models that could reduce custom installation and design costs, piloting an Owner's representative service for under-resourced sub-sectors to help with project development and implementation, providing targeted educational resources and technical tools, and identifying opportunities for customer aggregation to help reduce costs and support community-scale transformation.
- **NYSERDA, NYPA, and utility program administrators should continue to engage key heat pump supply chain actors**—including manufacturers, distributors, and contractors—to help build confidence in heat pump products while improving access and availability of heat pump products for both residential and larger-scale heat pumps in New York State.
- **NYSERDA should explore providing product stocking incentives to motivate local distributors of heating and air conditioning equipment to stock a range of efficient heat pump products** at affordable prices, increasing availability and consumer choice to support sales of efficient heat pumps for homes, small- and mid-sized businesses, and public buildings.

4.2.2. Accelerating Technology Innovation and Business Model Development

Continued innovation and new business models will be needed to help bring new and emerging electrification solutions to the market. Though heat pumps are available and can be configured for nearly every type of residential building, there are limited pathways for harder-to-decarbonize buildings. In typologies such as in existing multifamily buildings, large commercial buildings, and subsectors such as hospitals, laundromats, and restaurants that are reliant on gas for substantial process loads (e.g., functions that are not space heating and/or domestic hot water) there is a pressing need for equipment that is more affordable, easier to operate and install, and more effective.

State support for technology and business innovation should help to identify, consider, and design solutions by sub-sector that address the unique challenges in hard-to-decarbonize typologies. State innovation funding should be coordinated with strategic public-private partnerships in a manner that helps catalyze and leverage further investment from private or other governmental sources. Strategic partnerships that can effectively support replication of clean building technologies at scale are critical to drive deployment and cost compression of emerging solutions over time, while helping demonstrate the potential of these solutions in New York State. For example, technology-based partnerships with

portfolio owners and affordable housing agencies that can aggregate demand and have significant purchasing power has been a promising approach to-date.

One direction that appears promising is innovation focused on drop-in/commoditized heat pump-based options that can be installed with minimal additional work (e.g., do not require custom engineering and design, electric upgrades, new piping/ducting, additional ventilation, etc.) and displace fossil fuel use. These are generally cheaper than existing solutions and significantly streamline the design/installation phase of a HVAC project. Various initiatives are underway to support innovation in this direction for heat pumps.

Initiatives Underway (e.g., Policy Processes, Programs)

- **The Empire Building Challenge (EBC) and Empire Tech Prize (ETP)** advance the market for large building decarbonization through purposeful demonstrations in partnership with the real estate industry and solution providers. The Empire Building Challenge brings in a cohort of key portfolio building owners who have committed to decarbonizing their buildings. As part of this process, they identify key areas where technological innovation is needed. Solutions are then developed through the Empire Tech Prize process. EBC has served commercial and multifamily buildings since 2020 and expanded to include hospitals in 2025. The current ETP is focused on developing a drop-in high-temperature heat pump that can provide heat to buildings currently heated with steam, primarily addressing the New York City market.

- **Clean Heat for All Challenge** seeks to develop innovative products designed for retrofitting solutions to hasten the transition to heat pump electrification & fossil-free heating sources. The initial challenge advanced a unitary, packaged window heat pump, which could be deployed with low cost and ease of installation. Following a successful demonstration in Fall 2024, NYCHA has plans to purchase and install 30,000 production models once they become available during 2025. Building on this approach, a packaged terminal heat pump challenge was launched in early 2025, awarding grants to support the development of electrified replacement equipment that is commonly used in multiple family buildings. Selection of manufacturers and recruitment of multifamily building owners as demonstration partners will occur throughout 2025.

- **Induction Stove Challenge** seeks innovative solutions for new induction stoves that can be installed in older buildings using standard 120-volt, 20-amp outlets. One or two selected manufacturers will have up to 24 months to design, prototype, and produce 100 units of the new product for testing during the challenge's pilot phase. The units will be installed in up to 100 NYCHA apartments, with new cookware provided to each participating household, with the intent of providing best-in-class comfortable cooking, as well as health and quality of life benefits to NYCHA residents.

Recommendations

- **NYSERDA should continue to fund innovation and demonstration for drop-in decarbonization solutions that can be installed with minimal additional work (e.g. electrical upgrades, new piping/ducting, additional ventilation, etc.) and displace fossil fuel use.** These solutions should

continue to be developed in partnership with portfolio owners that can deploy such equipment at scale. Ongoing innovation and deployment should focus on drop-in solutions for efficient cold-climate window heat pumps, packaged terminal heat pumps, and other opportunities.

- **The State, including NYSERDA, NYPA, and SUNY, should accelerate technology transfer, product testing, and commercialization** to make it easier to bring emerging solutions for efficient electrification to market in New York State and regionally. Key strategies could include recruiting companies with advanced technology that is being used in cold climate regions such as Northern Europe, aiding with product testing/certification and navigating the New York or U.S. market, and cost-sharing demonstration projects in New York to demonstrate the viability of these technologies in decarbonizing NYS buildings.
- **The State, including NYSERDA, ESD, SUNY, and the broader State Innovation ecosystem, should support development of growth-stage companies and capital partners to scale clean energy solutions and new business models.** This could include continuing to provide support for local and regional incubators, innovation challenges, and peer-based knowledge sharing among industry leaders, with dedicated support for minority- and women-owned business enterprises, socially responsible businesses, and solutions that benefit disadvantaged communities. Support could also focus on expanding successful demonstrations of key building energy technologies to promote economies of scale as well as investment in manufacturing facilities to meet state and regional demand**.**
- **The State, including NYSERDA, HCR, and SUNY/CUNY should continue to coordinate with the federal government, other cold climate states, incubators, and industry leaders on research, development, and demonstration (RD&D) investment areas to support development, demonstration, and technological improvement for the next generation of building decarbonization solutions.** Priority areas for public RD&D support include next-generation HVAC, building shell improvements, panelized offsite improvements, and demand flexibility.

4.3. Integrating Buildings Transformation with Gas System and Electric Grid Planning

4.3.1. Thermal Energy Networks

The term “Thermal Energy Network” (TEN) describes a network of equipment and pipes that are connected to thermal energy resources and deliver thermal energy to multiple buildings to provide space heating and potentially cooling, and domestic hot water. TENs that rely on combustion-based resources (e.g., cogeneration plants or boilers fueled by natural gas that generate steam or hot water) have existed in New York for over a century under several ownership types.[19] TENs that rely on low and carbon-free thermal resources (e.g., geothermal, surface water, waste heat, and the air) are still in early development in New York State, but play (or are planned to play) a substantive role in the decarbonization strategies of many European countries—including (but not limited to) Denmark, Sweden, Germany, Scotland, and Ireland—and Canada.

[19] Examples include those owned by utilities (e.g., Con Edison’s steam system), cooperatives (Rochester District Heating Coop), municipal utilities (Jamestown BPU), and campus environments (universities, hospitals, and industrial parks).

TENs can provide certain advantages over single-building solutions because they have the potential to more efficiently meet the aggregated thermal demand of multiple consumers (e.g., at a campus and/or community-scale location), especially when it includes a diverse set of buildings with different uses. By aggregating multiple building loads, a thermal energy network can substantively reduce peak heating needs compared to stand-alone building solutions. Networks can also integrate a variety of thermal resources, including waste heat from wastewater sewage flows and treatment facilities, data centers, and other buildings. Certain TENs can further minimize the need for additional heating equipment located within the building, saving on space and maintenance costs. TENs by default aggregate thermal load, and when combined with thermal storage, can enable significant load shifting of heating demand at scale, thereby helping reduce operating costs (energy bills) and manage grid constraints.[20] TENs also present a unique opportunity to leverage the skills and expertise of gas workers for low-carbon projects, as the pipe networks used for thermal energy delivery are similar to those used in the oil and gas sector; this overlap enables existing union labor to transition into clean energy jobs.

State-level actions will be essential to the successful development of TENs in New York State and realizing their associated energy and emissions savings, including an emphasis on prudent resource planning to diversify energy sources and delivery strategies. [21] Despite their potential benefits, TENs face a series of challenges (both in New York State and the United States) due to long planning and construction timelines, high upfront capital expenditures, and regulatory complexity from serving multiple customer types and leveraging non-traditional energy resources (like waste heat). In the near-term, single-owner networks such as campuses remain the easiest to develop and provide an opportunity to showcase the viability of TENs while attracting expertise, vendors, and services to New York.

Further analysis is needed to help identify the best path forward for New York State, including what policies are necessary to create a supportive market and policy environment for TENs. Key steps include but are not limited to: identifying where in the state, due to density of thermal demand and availability of potential thermal resources, may be most viable for TENs projects, and improving access to this data to help de-risk site identification and drilling and to catalyze private interest and investment; assessment of potential business models and policy approaches that support customer acquisition, including area-

[20] Examples from other jurisdictions, including Europe, show that networks integrated with thermal storage can shift electric production of heat by hours, days and even up to a week in some cases to align heat production when it is the cheapest and when the grid is least constrained. A core component of this load shifting opportunity is thermal storage, which is the least expensive type of energy storage: a 2021 study (Fourth Power, "Our Technology," https://gofourth.com/our-technology/) found thermal energy storage around $25/kWh, compared to a 2022 study that priced battery electric storage over $250/kWh. Such low-cost storage would not only provide huge benefits to the energy system but would allow deeper market penetration for intermittent renewable energy sources.

[21] Municipal examples outside the United States where low-carbon TENs are being deployed at scale, including in Denmark, rely on local heat planning to identify areas with characteristics that should be prioritized to be served with TENs, and align other planning and financial incentives to support development in these priority areas. Integration of heat planning into existing community-based land use planning frameworks helps build support for reasonably placed TENs while ensuring communities understand the range of options available to support their community's heating and cooling needs. Local jurisdictions will play a key role in identifying opportunities for the TENs deployment at large scale by aligning their local planning and zoning frameworks with heat planning activities. Ensuring their access to vetted codes, standards, and best practices for geothermal and thermal energy network design, construction, and operation will be vital to the deployment and operation of successful networks.

based heat planning and supportive local zoning and permitting policies, public-private partnerships with municipalities, priority connection policies, and heating-as-a-service contracts (which allow developers to lock in customers as a network is being planned and installed, and obligate provision of reliable heating prior to and during network connection); and further work on understanding tradeoffs of TENs compared to standalone building solutions.

TENs can operate by delivering hot and chilled water from a central production plant, or by delivering ambient water to customers and using on-site heat pumps to meet heating and cooling needs. Both systems will be needed to fully take advantage of the opportunity, and present different advantages (see Table 1).

Table 1: Comparison of Types of Thermal Energy Networks: Hot/Chilled Systems vs. Ambient Systems

Type	Infrastructure Types	Heat Sources and Heat Sharing	Electric System Impacts
Hot/Chilled	• Centralized plant holds most system infrastructure and distributes hot and chilled water, less equipment at the consumer site. • Require separate piping for hot and chilled water. • Much greater density of delivered thermal energy.	• Centralized production captures economies of scale when producing heated or chilled water. • Less risk for downstream customers, due to increased thermal energy density of delivered water. • System balancing is not vital to operations, and easy integration for network expansion or energy storage. • Storage in boilers and chillers can be long duration, providing backup and resiliency.	• Can alleviate demand on the electric grid, by serving heating and cooling demand separately. • Centralized infrastructure can be metered on industrial rates rather than residential. • Easy integration of cheap thermal storage through boilers and chillers. Customers only need a heat exchanger.
Ambient	• Fewer pipes and centralized equipment are needed, but additional in-building equipment is used to condition water to desired temperatures. • Pipes may need to be very large to deliver enough thermal energy to customers.	• Enables additional heat sources and heat sharing, as high temperatures are not required. • Less heat loss over long distances. • System balancing is vital to operations to ensure all customers have enough heat from ambient temperature water. • Difficult to expand networks for new customers.	• Additional on-site equipment increases electric demand, likely billed at highest electric rates (residential). • Fewer opportunities for storage.

Initiatives Underway (e.g., Policy Processes, Programs)

- **The Utility Thermal Energy Networks and Jobs Act of 2022 (UTENJA)**, as described in Section 2.2.2, allows the State's investor-owned utilities to own and operate TENs and directs the seven largest utilities to propose TENs pilot projects that include labor protections and support workforce development. It also directs the PSC to develop a regulatory framework to guide the ownership rules, market development, and rates structure for TENs.

- **The PSC's UTENJA proceeding** was initiated in September 2022 to implement the requirements of the statute.[22] Through this process, the PSC has adopted initial fair market access rules, which

[22] Hochul, Kathy, "Governor Hochul Announces Progress toward Implementing Utility Thermal Energy Network and Jobs Act to Reduce Greenhouse Gas Emissions," Office of Governor Kathy Hochul, September 15, 2022, https://www.governor.ny.gov/news/governor-hochul-announces-progress-toward-implementing-utility-thermal-energy-network-and-jobs.

will allow for utility-owned thermal energy networks to accept thermal energy; identifies small-scale thermal energy networks that will be exempt from Commission regulation at this time; promotes the training and transition of utility workers impacted by this act; and encourages third-party participation and competition where it will maximize benefits to customers. Through this process, the PSC is currently assessing eleven utility pilot proposals.[23]

- **NYSERDA** has been supporting the market development of TENs through technical assistance and support for the design and construction of new networks.
- **The Decarbonization Leadership Program** directs NYPA to develop decarbonization plans for fifteen of the highest emitting State facilities—including ten SUNY and CUNY campuses—that include consideration for thermal energy networks.[24]
- **The FY 2026 Enacted Budget includes funding for TENs construction as part of a $1 billion climate investment,** including $200 million for TENs projects at public and State-owned buildings such as SUNY and CUNY campuses, and $40 million for municipal TENs projects. This funding supports additional avenues to deploy and demonstrate the effectiveness of these networks.

Recommendations

- **NYSERDA, DPS, and other relevant State actors should develop a Thermal Energy Network Roadmap for New York State** that lays out the market barriers currently facing TENs development in NYS, while identifying a set of holistic solutions in the near and mid-term to address these barriers. This Roadmap should be informed by experiences in Europe, Canada, and jurisdictions in the United States.
- **NYSERDA, in coordination with DPS, should advance analysis of TENs.** Topics for study should include geospatial analysis to identify areas of the state that may be most viable for thermal energy networks (based on proximity of thermal demand and available thermal resources) and improve public access to thermal resource data. Analysis should include assessment of potential business models and policy approaches that support customer acquisition, including public-private partnerships with municipalities, priority connection policies, and the potential role of heating-as-a-service contracts. Analysis should further explore the impacts, benefits, and tradeoffs for the energy system of investing in TENs versus standalone building decarbonization strategies and approaches to valuing these benefits, including thermal storage benefits.
- **The PSC should continue to develop the regulatory framework** for TENs in a manner that provides increased market understanding and certainty as to what regulations will be required and for which types of systems. This is especially integral for multi-user (non-campus) TENs.

[23] Department of Public Service, "PSC Adopts Initial Utility Thermal Energy Networks Rules," July 18, 2024, https://dps.ny.gov/news/psc-adopts-initial-utility-thermal-energy-networks-rules.

[24] Hochul, Kathy, "Governor Hochul Announces Decarbonization Leadership Program to Reduce Carbon Emissions at State Facilities," Office of Governor Kathy Hochul, October 10, 2023, https://www.governor.ny.gov/news/governor-hochul-announces-decarbonization-leadership-program-reduce-carbon-emissions-state.

Potential topics to address include customer protections, standards/guidance with respect to the sale/purchase of thermal resources, and supplier-of-last resort rules.

- **NYSERDA, DPS, and other State actors should explore the role of area-based thermal energy planning and resources that support municipalities and communities to identify locations with high potential and local support for TENs.** This could include working with municipalities to identify a package of rules/standards/benefits (e.g., planning, zoning, permitting) that apply to support prioritized TENs development. It could also include State-supported technical assistance, training, and capacity building for how to consider TENs in local planning and redevelopment.

4.3.2. Enabling a Flexible Electric Grid

Electrification of building systems and appliances (space heating, domestic hot water, drying, cooking, and electric vehicle charging) will add significant new electric demand onto the grid, changing peak load patterns and driving the need for new ways of planning. However, advancements to grid and appliance hardware/software technologies can enable better management and control of building energy loads to support more optimal grid investment and management, potentially reducing consumer operating costs. These new sources of demand can be leveraged as electric grid "flexible loads", meaning one can shift when these types of equipment use electricity to align with when there is the most grid capacity and lowest electricity costs. Aggregating these loads and managing at scale, whether through third-party agreements or via direct utility control, can substantively change how much grid infrastructure buildout is required and can save ratepayers money. Technologies like thermal energy storage and thermal energy networks can further support aggregated neighborhood-scale load shifting so that electricity can be stored and discharged at optimal times. This integration of flexible loads with storage technologies, including thermal storage, can offer additional benefits for grid-constrained areas, reduce costs for electrified buildings and improve overall grid reliability.

Initiatives Underway (e.g., Policy Processes, Programs)

- The PSC has instituted a Grid of the Future proceeding to unlock innovation and investment to deploy flexible resources, such as distributed energy resources (DERs) and virtual power plants (VPPs), to achieve New York's clean energy goals at a manageable cost and at the highest levels of reliability.[25] This proceeding takes a three-phase approach:
    - Phase 1 includes the Grid Flexibility Study, which conducted quantitative assessment of cost-effective, achievable potential for grid flexibility and identified barriers and preliminary options for addressing barriers.
    - Phase 2 uses insights from the Study to guide the development of a more expansive Distributed System Implementation Plan (DSIP) aligned with the goals of the Grid of the Future proceeding.[26]

[25] See Case 24-E-0165, Proceeding on Motion of the Commission Regarding the Grid of the Future.
[26] DSIPs are biannual filings by the six investor-owned utilities reporting on the implementation of a Distributed System Platform (DSP).

  - Phase 3 will develop a comprehensive plan for achieving long-term grid flexibility vision for New York.

- Utility demand response programs exist for both residential and commercial customers. For residential and small commercial customers with central air conditioning, load control through smart thermostats is widely available and time-varying rate options also exist. Participation in these programs is low though; only around 5 percent of eligible customers are currently enrolled in HVAC load control programs and 2 percent opt into time-of-use or peak pricing rates. Large customers have a suite of demand response programs available, including a commercial system peak shaving program (the state's largest source of utility demand response) that can reduce a customer's/aggregator's demand when the current minimum threshold of 50 kW is met. Other dynamic load management programs offer load relief at a fixed rate, and enrollment incentives for aggregators across the state.[27]

- The proposed State Energy Code update includes demand response requirements for non-residential buildings that enable flexible electric load management for certain newly installed electric equipment and appliances, where such programs exist and are voluntarily chosen by the building owner.

Recommendations

- **DOS, NYSERDA, and other State actors should continue to develop standards for flexible load capabilities** for other equipment and building types.

- **The PSC/DPS and NYISO should consider opportunities to expand utility demand response programs,** adapting them to enable mass-market participation and support load flexibility at scale.

4.4. Supporting Regulatory Frameworks

4.4.1. Improving Building Energy Data Collection and Access

A clear understanding of each building's energy usage is essential to improving the energy efficiency of those buildings. Ensuring that data on buildings' energy usage is readily available is a fundamental step in driving market-based behaviors and decisions regarding how to reduce energy consumption. This requires metered consumption data that is robust, reliable, and aggregated at the whole-building level—as well as easily shared by customers with other entities of their choice, such as energy efficiency service providers.. To achieve this, a wide range of tools and techniques are required, from advanced metering infrastructure (AMI), which can provide more granular or even instantaneous consumption data, to data infrastructure capable of automatically aggregating meter data to a particular building. Improved access to building consumption data can also facilitate benchmarking to other similar building types, which helps bring attention to potential behavioral and operational changes that can result in immediate and/or low-cost measures to achieve energy reductions, provide insight into what policy and programmatic approaches are most relevant to building sub-sectors/regions, and provide helpful

[27] Brattle, January 2025. "New York's Grid Flexibility Potential Volume I: Summary Report." Prepared for NYSERDA and NYS DPS.

information about existing heating equipment and distribution systems, age, and size of buildings, and where they are located, and type of construction.

Initiatives Underway (e.g., Policy Processes, Programs)

- **Integrated Energy Data Resource (IEDR)** – In 2021, the PSC commenced Case 20-M-0082, ordering the development of a single platform to bring together data from the State's regulated utilities, including consumption data from advanced metering infrastructure. After launching an initial platform in 2024, development work will continue in the near future to provide tools and energy-related data to renewable energy developers, governments, researchers, and the public to guide policy, investments, operational decisions, and innovative business models.
- **Building Information and Land Use Database (BILD)** – Produced by the New York State Department of Homeland Security and Emergency Services (DHSES) to support the State Hazard Mitigation Plan. This dataset, which will have a public release in 2025, leverages multiple public data sources to provide the first comprehensive picture of the building stock statewide, including attributes such as building size, age, and heating and cooling system types.

Recommendations

- **Utilities across New York State should continue efforts to provide customers with readily available access to their consumption data,** with tools to aggregate and automate the process of sharing this data.

4.4.2. Codes and Low-Carbon Product Standards to Drive Transformation At-Scale

Building and Energy Codes

As noted in Section 1.2, all-electric new Uniform and Energy codes are currently under development. Anticipated to go into effect at the end of 2025, these requirements would prohibit fossil fuel combustion in new seven-story-tall or less buildings starting in January 2026 and in new buildings of all sizes beginning January 2029, with exceptions. These codes are important in locking in cost-effective all-electric baseline requirements for all new construction. To prepare the industry and local code officials for these new requirements, training support and updated permitting tools will be important in helping local code officials to be able to effectively support code compliance in their jurisdictions.

As part of the continuous process of code improvement, the State will continue to participate in the development and review of model codes to inform the next iteration of the energy code to continue reducing energy use in new and substantially renovated buildings.

Appliance and Product Standards

Updated appliance and product standards over the medium- to long-term should work to support the installation of highly energy-efficient and low-carbon space heating and cooling, hot water, and other appliances as existing residential and commercial buildings upgrade their equipment. Such regulatory updates should help move buildings away from combusting fossil fuels, in a manner and phasing that is coordinated with integrated gas and electric system planning actions taken by the PSC and DPS. New

standards should also incorporate the ability for appliances to be managed as flexible loads, including directly by the consumer.

Initiatives Underway (e.g., Policy Processes, Programs)

- In February 2025, the New York State Fire Prevention and Building Code Council voted to advance rulemaking to update the State codes. The first phase of zero emission construction for new buildings will go into effect January 2026 and apply to small buildings (under 7 stories except for commercial and industrial buildings larger than 100,000 square feet), consistent with requirements of legislation passed in 2023 to phase out the use of fossil fuels in buildings (Part RR of Chapter 56 of the Laws of 2023) as described above in the State of the Sector section. To prepare the industry and local code officials for these new requirements, DOS and NYSERDA, in partnership with regional organizations, are developing new training resources and code enforcement tools tailored to support local code enforcement and other code users. DOS and NYSERDA are also developing tools to help local building departments modernize their permitting processes, to further support code compliance.
- The State code update currently under development also accounts for the next phase of zero emission codes provisions for all new buildings that will go into effect January 2029, consistent with requirements of Part RR of Chapter 56 of the Laws of 2023. This phase will cover the remaining buildings not included in the first phase with exceptions for specific building uses that are not yet feasible to electrify.
- Enhanced product and appliance standards are in place for 21 product categories through the requirements of the Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022, as described above in Section 2.

Recommendations

- **DOS, NYSERDA, and other State agencies should continue to support education and development of new tools for local governments** to help support successful implementation of new code requirements.
- **DOS, in partnership with other agencies, should continue to support enforcement of the zero-emissions new construction requirement as the first phase comes into effect in 2026**, including training and certification of building officials, monitoring compliance rates and market trends, providing technical support, and providing continuing education to support code enforcement.
- **DOS and NYSERDA should continue to reduce energy use intensity** as part of each iteration of the energy code to continue reducing energy use in new and substantially renovated buildings.
- **NYSERDA should continue evolving appliance standards** to incorporate improvements to energy performance and demand response capability requirements, as appropriate.

4.4.3. Managing Refrigerant Emissions

HFC refrigerants are widely used for HVAC and refrigeration applications, including heat pumps. However, as discussed in the Climate Change, Adaptation, and Resiliency chapter of this Plan, their high

global warming potential (GWP) causes significant greenhouse gas emissions when released into the atmosphere. This typically happens from refrigerant leakage, which can occur throughout an HVAC system's lifetime during installation, operation, servicing, and end-of-life decommissioning, as well as events that physically damage the system. Reducing refrigerant leakage through proper end-of-life decommissioning and refrigerant management not only reduces greenhouse gas emissions but also improves system performance and reduces electricity use. In addition, transitioning to the use of lower GWP refrigerants will significantly reduce the greenhouse gas emissions impacts of any leakage that does occur.

As New York ramps up heat pump installations, detecting and preventing leakage and transitioning to the use of low and ultra-low GWP refrigerants will be of increasing importance. While a handful of products using low-GWP refrigerants are available now, significant research, product and code development over the next 5 to 10 years will be necessary to safely bring to market ultra-low GWP technologies for building HVAC systems. The State will need to continue working with local governments, industry partners, large HVAC and refrigeration end-users, and other organizations to prepare for the coming refrigerant transition and incorporate leakage management best practices through education, technology, and regulatory initiatives such as those identified in the 2021 NYSERDA HFC Inventory and Mitigation Report, New York's Scoping Plan, and the DEC Part 494 Stakeholder Engagement materials.[28,29,30]

Initiatives Underway (e.g., Policy Processes, Programs)

- The Clean Air Act has outlined best practices to prevent refrigerant leakage. For technicians working on the refrigeration system of any HVAC and refrigeration product, EPA Section 608 and 609 requires technicians to pass a one-time EPA-approved certification exam related to proper handling and disposal of refrigerants.

- EPA established HFC supply-side production and import allowances under the AIM Act.[31] In late 2022, the EPA set a GWP limit of 700 for refrigerants used in residential and light commercial air conditioners and heat pumps, VRF systems, and chillers. The effective date for product manufacturing is January 2025 for most HVAC equipment categories, with a sell-through period until January 2026.

- In December 2024, DEC adopted an updated 6 NYCRR Part 494, "Hydrofluorocarbon Standards and Reporting," to establish similar GWP limits on a 20-year GWP basis in the near-term, with anticipated lower GWP limits from 2026 to 2034.

[28] New York State Energy Research and Development Authority (NYSERDA). "Hydrofluorocarbon Emissions Inventory in New York State," NYSERDA Report Number 21-24. Prepared by Guidehouse, Inc. 2021, www.nyserda.ny.gov/publications.

[29] New York State Climate Action Council. "New York State Climate Action Council Scoping Plan," 2022, www.climate.ny.gov/ScopingPlan.

[30] Department of Environment Conservation, "Climate Change Regulatory Revisions," Proposed, Emergency, and Recently Adopted Regulations, September 2024, https://dec.ny.gov/regulatory/regulations/proposed-emergency-recently-adopted-regulations/climate-change.

[31] Environmental Protection Agency, "Protecting Our Climate by Reducing Use of HFCs," October 1, 2024, https://www.epa.gov/climate-hfcs-reduction.

- In February 2025, the New York State Fire Prevention and Building Code Council voted to advance rulemaking to update State codes. The updates include specific regulations in the Mechanical, Residential, and Fire codes to address low-GWP refrigerants such as ammonia, A2L, and B2L refrigerants.

Recommendations

- **The State should support training and/or certifications for industry technicians, system designers, and other stakeholders on proper use of alternative refrigerants and best practices for leak detection and reclamation of refrigerants.** Although some leakage is expected over time for most systems, developing an education and outreach strategy for local industry stakeholders to support proper disposal and greater refrigerant recovery and reclamation in alignment with industry best practices can minimize annual and end-of-life leakage.

- **NYSERDA and SUNY should advance research and demonstration to enable adoption of the next generation of low and ultra-low GWP refrigerants.** Areas for research and development should include low-GWP and no GWP technologies such as low charge propane and CO_2 heat pump systems as well as development of hardware to detect refrigerant losses. Demonstration pilots should focus on encouraging adoption of ultra-low GWP refrigerants and automatic leak detection for large commercial and institutional refrigeration systems, especially in DACs.

- **DOS and NYSERDA should track and evaluate the need for further code improvements to support roll-out of ultra-low GWP refrigerants.** Continued consideration of code improvements—including comparison against European precedents—is necessary to ensure that code requirements include consideration for the safe use or storage of these new low-GWP refrigerants to support the cost-effective installation of heat pump and refrigeration systems.

4.4.4. Reducing Embodied Greenhouse Gas Emissions from Building Materials

Embodied greenhouse gas emissions are emissions that result from the extraction, production, and delivery of materials, and are associated especially with energy-intensive construction materials like steel and concrete. Steel and concrete production alone account for roughly 16 percent of global greenhouse gas emissions annually.[32] While the ratio varies by building, over a building's useful life, generally around 33 percent of a building's emissions are embodied in the materials, and the rest are generated from building operations.[33] Beyond the benefits of reducing greenhouse gas emissions, reducing embodied emissions can also promote growth for in-State industries that produce materials with lower embodied emissions than importing competitors.

There are challenges to precisely measure the quantities and emissions levels associated with construction and emissions-intensive materials used in New York State. Currently, environmental product declarations (EPDs) are the primary tool broadly available for reporting on the environmental impact of products. However, they are an optional private-sector tool—meaning EPDs are not always available and

[32] Bataille, Chris, "Decarbonizing Steel and Cement," Columbia Energy Exchange, Center on Global Energy Policy at Columbia | SIPA, August 8, 2023, https://www.energypolicy.columbia.edu/decarbonizing-steel-and-cement/.
[33] Architecture 2030, "Why the Built Environment?" https://www.architecture2030.org/why-the-built-environment/.

most high-polluting products have no incentive to produce an EPD, making it difficult to fully understand the state of the sector. As New York continues to gather data to better understand the embodied emissions of materials used in construction, coordinating with other states and jurisdictions on standardized reporting requirements and methods in EPDs could be an important initial step, which could then extend to potential collaboration on policy development and implementation.

Initiatives Underway (e.g., Policy Processes, Programs)

In December 2021, Buy Clean Concrete mandates were signed into law requiring the Office of General Services (OGS) to establish guidelines. These were released in January 2025, requiring state agencies to meet embodied emissions limits for any projects over $1 million with over 50 cubic yards of concrete ($3 million and 200 cubic yards for Department of Transportation projects). Starting in 2027, this maximum allowable emissions intensity will be reduced and gradually lowering embodied emissions over time. Executive Order 22, signed by Governor Hochul in June 2023 also established reporting guidelines, so agencies must obtain and report EPDs for a larger list of "covered materials": asphalt, concrete, steel products, and glass.[34]

Recommendations

- New York should seek to advance partnerships with other states to increase market purchasing power and demand for low-emissions construction materials, which can support diversification of product options.
- New York should support market development of technologies and the development of New York industries producing affordable, low-emission materials.
- DOS and NYSERDA should monitor and when appropriate participate in the development of embodied emissions requirements and make recommendations to the State Fire Prevention and Building Code Council for incorporation into future code updates.
- NYSERDA should integrate embodied greenhouse gas considerations into programs that are designed to bring awareness to sustainable building practices.

4.5. Ensuring a Modern and Resilient Building Stock

As New York modernizes buildings it will be important to plan and make upgrades in a manner that future-proofs these investments to withstand the effects of a changing climate and ensures that the building stock can be resilient to extreme weather. Buildings across New York State will continue to be exposed to more extreme flooding, precipitation, and heat events due to a changing climate. These challenges not only highlight the imperative of reducing carbon and other greenhouse gas emissions to help slow the pace of climate change, but also the need to embed resiliency measures in the State's residential, commercial, and institutional buildings. Climate resilience and decarbonization strategies can be mutually supportive; decarbonization strategies such as high-performance building envelopes, demand flexibility, and on-site energy generation and storage can support active resiliency and passive

[34] Office of General Services, "Guidance Summary," NYS Buy Clean Concrete Standards, June 2022, https://ogs.ny.gov/nys-buy-clean-concrete-guidelines-0.

survivability. These measures will help protect lives and infrastructure from the impacts of future climate hazards.

Initiatives Underway (e.g., Policy Processes, Programs)

- The New York State Climate Impacts Assessment identified a range of impacts that will be experienced throughout the state, including more severe storms, coastal and inland flooding, and increasing temperatures, all of which pose risk to building structures and systems, operations, and occupants.[35]

- Statewide, the recommendations of the Scoping Plan and the commitments contained in the Community Risk and Resiliency Act encourage resilient design with a focus on disadvantaged communities.

- DOS, in partnership with DEC and others, offers model local laws to help local governments be more resilient to sea-level rise, storm surge, and flooding.[36]

- The Environmental Bond Act provides $250 million to HCR to purchase private real property identified as at-risk to flooding from willing sellers, demolish and remove structures and/or infrastructure on the property, and transfer properties to land stewards to facilitate the conversion to provide beneficial open space, flood mitigation, and/or shoreline stabilization, which shall be subject to recorded land use restrictions.

- A variety of programs are available to support homeowners in proactively preparing for future climate conditions. HCR has expanded the Resilient Retrofits Program, a combination of low-interest loans and grants to LMI single-family homeowners whose homes are in flood-prone areas or have been damaged due to heavy rainfall. This program enables them to render their homes more resilient to flood damage and if, desired, to reduce energy use by improving the energy efficiency of the home and/or electrification of the home's heating and cooling systems.[37] HCR is also administering CDBG-DR funding that goes beyond damage repair to support resilient investments for future storms including housing and infrastructure programs assisting residents and communities impacted by Superstorm Sandy, Hurricane Irene, Tropical Storm Lee, and Hurricane Ida..[38] Additionally, HCR's updated Multifamily Sustainability Guidelines include a new resiliency checklist for New York-specific climate hazards, which will require all new construction projects to identify potential risks.

- NYSERDA also has begun to incorporate forward-looking climate projections into competitively awarded programs to encourage efficient and resilient buildings in multifamily, single family,

[35] Rajkovich, N. B., Brown, C., Azaroff, I., Backus, E., Clarke, S., Enriquez, J., Greenaway, B., Holtan, M. T., Lewis, J., Ornektekin, O., Schoeman, L., & Stevens, A. (). New York State Climate Impacts Assessment Chapter 04: Buildings. Ann NY Acad Sci., 1542, 214–252. https://doi.org/10.1111/nyas.15200.

[36] Department of State, "Model Local Laws to Increase Resilience," Resources, https://dos.ny.gov/model-local-laws-increase-resilience.

[37] Homes and Community Renewal, "Resilient Retrofits," January 16, 2025, https://hcr.ny.gov/resilient-retrofits.

[38] Homes and Community Renewal, "Hurricane Ida Long-Term Recovery and Resiliency," General Ida Programs, https://hcr.ny.gov/general-ida-programs.

commercial, and industrial sectors. Program examples include the Building of Excellence, Empire Buildings Challenge, and Clean Green Hospitals.

Recommendations

- **NYSERDA, HCR, LIPA, and the PSC/DPS** should explore pairing weatherization/energy efficiency measures with climate resilience measures in State and investor-owned utility building programs. Such measures should include back-up battery energy storage solutions and should inform broader community and building-level resilience strategies that can meet community safety and passive survivability needs in acute situations.
- **NYSERDA and OGS** could consider piloting a “resiliency first” energy storage incentive—prioritizing the ability of an energy system to withstand and recover from disruptions, such as power outages, natural disasters, or other emergencies—starting with critical community serving public sector facilities.