NextGeneration NYCHA Sustainability Agenda

The City of New York
Mayor Bill de Blasio
Alicia Glen, Deputy Mayor for
Housing & Economic Development

NEW YORK CITY
HOUSING
AUTHORITY

Table of Contents

LETTER FROM CHAIR AND CEO SHOLA OLATOYE

Dear New Yorkers,

A safe, clean, and healthy home is the right of every individual regardless of zip code. Yet for too long more than 400,000 residents in New York City's public housing have lived in aging buildings plagued by quality of life issues, often in areas with more than their fair share of industrial, municipal and commercial pollution.

Over half of NYCHA's residents are children and seniors, already vulnerable to the harmful effects of airborne pollution in many of their neighborhoods and already suffering higher rates of respiratory illness. Climate change predictions suggest that low-income populations will suffer disproportionately from extreme weather and rising temperatures, incurring higher rates of physical and mental illness, and heat-related illnesses and deaths. Clearly the time to act is now.

As the City's largest low-income housing provider and the nation's largest public housing authority, NYCHA is taking the lead in transforming low-income urban housing into sustainable, healthy communities. When we released NextGeneration NYCHA, our ten–year strategic plan, nearly a year ago, we pledged to create safe, clean and connected communities for our residents. Our Sustainability Agenda defines the Authority's environmental health and sustainability goals for the next ten years and the strategies we will use to achieve those goals within the framework of our strategic plan; many of the strategies are already well underway.

Our Sustainability Agenda is both a commitment and an invitation. NYCHA is committed to creating healthy, comfortable homes for our residents that will withstand the challenge of climate change. But we cannot do it alone. To re-create the future of our communities and blunt the impact of climate change, we must first work with our residents, as active change agents; housing and environmental advocates, community-based organizations, and other government agencies. Our long-term vision of equity, sustainability and resiliency must be a shared vision if we are to accomplish our goals.

In partnership,

Shola Olatoye
Chair and CEO, New York City Housing Authority

EXECUTIVE SUMMARY

NextGeneration NYCHA

NYCHA's public housing portfolio serves 400,000 of New York City's lowest-income households: those who are employed, on a fixed income, and those who are emerging from poverty. For these households, there are few or no housing alternatives. Like other infrastructure created for the public good—water and sewers, transit, parks, and roads—public housing is an asset that must be preserved for future generations of New Yorkers.

Yet the future of New York's public housing is threatened by decades of disinvestment. In the past 15 years alone, federal funding for NYCHA has fallen short by almost $2.5 billion. Combined with the aging buildings that make up the NYCHA portfolio, these shortfalls have resulted in a need for $17 billion in capital improvements. Absent a fundamental transformation in funding and operations, there is a real possibility that NYCHA could fall into U.S. Department of Housing and Urban Development (HUD) receivership.

NextGeneration NYCHA is the Authority's 10-year roadmap to end the downward spiral. The plan outlines 15 strategies driven by a simple vision: **safe, clean, and connected communities**. The four goals designed to achieve this vision are:

1. Achieve short-term financial stability and diversify funding for the long term
2. Operate as an efficient and effective landlord
3. (Re)build, expand, and preserve public and affordable housing
4. Engage residents and connect them to best-in-class social services

With the success of NextGeneration NYCHA, the Authority will become a financially solvent organization, free from hundreds of millions of dollars of annual shortfalls. A balanced budget will be evidence of organizational stability; NYCHA will then be able to attract investment to restore its buildings to a state of good repair and livability.

The NextGeneration NYCHA Sustainability Agenda

The Sustainability Agenda, an extension of NextGeneration NYCHA, expresses NYCHA's commitment to create healthy and comfortable homes that will withstand the challenge of climate change. It is also an invitation to residents and surrounding communities to work with NYCHA to realize a shared long-term vision of equity, sustainability, and resiliency.

It is imperative that NYCHA, as New York's largest low-income housing provider and the largest public housing authority in the nation, acts now to blunt the impact of climate change on its portfolio and on its residents. The vast majority of NYCHA developments are located in areas subject to more than their fair share of polluting industrial, municipal, and commercial infrastructure. Further, NYCHA serves thousands of vulnerable residents, including children and

seniors whose health is threatened by airborne pollution. Many NYCHA neighborhoods are asthma "hotspots" that generate the highest rates of asthma-related emergency room visits in the city. Climate change is expected to exacerbate health risks of all types; if the aftermath of Superstorm Sandy is any indication, low-income people will suffer from climate change disproportionately.

The Sustainability Agenda details the commitments that NYCHA will make over the next 10 years to improve resident well-being and operate as an effective and efficient landlord. By communicating these priorities and goals clearly, NYCHA seeks to establish a firm foundation for partnerships with residents and the communities surrounding them to work together towards a sustainable and resilient city.

Focusing on resident health and comfort, and working hand-in-hand with sister agencies and community partners, NYCHA aims to achieve the following by 2025:

- Eliminate the **root causes of mold** by fixing leaks in roofs, façades, and pipes and by modernizing ventilation systems;
- Eliminate **overheating** and **unplanned heat and hot water outages;**
- Start on the path to meeting the City's goal of **reducing greenhouse gases** by 80 percent by 2050;
- Address **climate adaptation and resiliency** in all capital planning; and
- Incorporate **sustainability into day-to-day management** of all properties.

Climate adaptation is the set of actions taken to cope with changing climate conditions.

The Strategies

Each strategy in the Sustainability Agenda is a 10-year goal supported by actions that NYCHA will begin today.

Goal 1: Achieve short-term financial stability and diversify funding for the long term

Attract investment for capital improvements. NYCHA will attract $300 million in private capital to fund large-scale retrofits through Energy Performance Contracts, and tap energy-efficiency incentive programs to reduce the capital needs of scattered-site developments by $30 million.

Raise revenues through clean and distributed energy projects. NYCHA will develop a pipeline of commercial-scale solar projects for third-party solar developers. NYCHA will also develop a resilient microgrid and district energy system at Red Hook East and West Houses and support the City in identifying other opportunities for community-scale clean and distributed energy systems.

Goal 2: Operate as an effective and efficient landlord

Create healthy indoor environments. NYCHA's most important responsibility in sustainability is to provide healthy and comfortable apartments free of mold, pests, asthma-triggering materials, external odors, and second-hand smoke. To that end, NYCHA will implement a comprehensive mold response plan; require low- and no-volatile organic compound caulks, paints, coatings, and adhesives; provide Integrated Pest Management; reduce exposure to second-hand smoke; and follow a healthy home-focused vacancy turnover protocol.

Efficiently provide comfortable and reliable heat and hot water. Most NYCHA buildings are chronically overheated in the winter, but NYCHA residents also experience unplanned heating and hot water outages. NYCHA will improve heating and hot water systems through smart building technology, thoroughly test and tune all building systems, and invest in the training and professional development of heating operations staff.

Improve water management. NYCHA will support the City's goal of reducing water demand by 5 percent by 2020 by working with the City's Department of Environmental Protection (DEP) to meter all developments by 2018; studying the patterns of water use to identify conservation opportunities; updating purchasing standards; and installing water-efficient fixtures.

Adopt a comprehensive waste management plan. NYCHA will develop a comprehensive waste management plan to identify infrastructure improvements, changes in building operations, and construction waste management standards needed to support the City's goal of sending zero waste to landfills by 2050. NYCHA will install recycling infrastructure throughout the portfolio by 2016, and complete a waste composition study by 2017.

Goal 3: (Re)build, expand, and preserve public and affordable housing

Adopt sustainability standards. Stringent and well-enforced sustainability standards make buildings more efficient and construction techniques more effective. All new construction projects will be required to meet the NYC Overlay to the Enterprise Green Communities Criteria, the City's green standard for affordable housing since 2011. All substantial renovation projects will be required to meet an aggressive minimum energy performance standard. Moderate rehabilitation projects will follow updated standards and specifications, consistent with the NYC Overlay.

Eliminate roof, façade, and plumbing leaks. An important step in eliminating mold and pests is to prevent water from entering buildings from the exterior. Forty-five percent of NYCHA developments need immediate roof replacements, but have no source of funds, and interior plumbing leaks must also be addressed wherever they are found. NYCHA will continue to seek funds for roofs, exterior repairs, and interior plumbing upgrades.

Retrofit master-planned developments. Eighty-seven percent of NYCHA apartments are part of master-planned developments, each home to an average of 2,700 residents. These developments use 40 to 50 percent more energy per square foot than the average multifamily building in New York. NYCHA will pursue a series of HUD Energy Performance Contracts to provide brighter and more efficient lights, consistent and comfortable heating, new water-conserving fixtures, and working ventilation in all buildings with mechanical exhaust systems.

An **Energy Performance Contract** finances upgrades in units by the long-term energy and water savings they generate.

Since the EPC program began in the early 1990s, 249 public housing authorities have completed 319 EPC projects.

Retrofit scattered-site developments. NYCHA's portfolio includes 659 standalone buildings and 1-4 family homes, housing 45,000 residents. These scattered-site developments require different financing tools and construction approaches. NYCHA will tap the New York State Weatherization Assistance Program and utility-run energy efficiency programs to provide energy- and water-efficiency upgrades.

Build green infrastructure. With 2,500 acres of land, NYCHA has a unique asset to contribute to the City's green infrastructure and water quality. NYCHA will partner with DEP to install green infrastructure at NYCHA developments within the Combined Sewer Overflow priority areas, and seek funds to implement the "Stormwater Management Through Placemaking" initiative at Superstorm Sandy-affected developments.

Incorporate climate change resiliency into capital planning. Adaptation to climate change will become increasingly important in the effort to preserve the NYCHA portfolio, and to blunt the potential impacts on the safety and quality of life of residents. NYCHA will assess the risks presented by a Sandy-like storm and develop specific resiliency retrofit plans for all developments in the 100-year floodplain. NYCHA will also identify and assess hazards associated with excessive heat and other climate change-related disturbances.

The **100-year flood plain** is the area with a 1 percent or greater chance of flooding in a given year.

Goal 4: Engage residents and connect them to best-in-class services

Support resident- and community-led sustainability. NYCHA's commitments as a landlord in the Sustainability Agenda provide a starting point for resident engagement and partnership. Residents make countless daily decisions that influence how sustainable NYCHA developments can become, and sustainability at NYCHA and in the surrounding neighborhoods are also intertwined. NYCHA will launch an "ideas marketplace" for resident- and community-led sustainability initiatives; make Resident Green Committees independent and self-sustaining by 2018; promote healthy food access by directing public and private investments in resident-led urban agriculture; and educate, inform, and engage residents on NYCHA sustainability initiatives.

Connect residents to green jobs. NYCHA connects residents to economic opportunities by creating jobs and by improving job readiness and access. NYCHA will require resident hiring and training plans in third-party clean and distributed energy projects that would not otherwise be required to develop such plans. NYCHA will prepare residents for future work in energy and sustainability by enhancing existing programs, and use NYCHA's purchasing power to create resident-owned business opportunities.

80 x 50: Working towards 80% reduction in greenhouse gases by 2050

Create an 80 x 50 roadmap. The City estimates that meeting the ambitious goal of reducing greenhouse gases 80 percent by 2050 would require buildings to reduce emissions 30 percent by 2025 and 60 percent by 2050. Through the energy conservation initiatives in the Sustainability Agenda, NYCHA expects to meet the 2025 reduction target; however, 82 percent of NYCHA's buildings will be more than 50 years old by 2025, and are not likely to achieve further reductions without substantial changes in fundamental building systems. NYCHA will determine how much additional reductions must be generated, and estimate the costs and benefits of various "deep retrofit" pathways.

Greenhouse gases like carbon dioxide and methane contribute to the "greenhouse effect", the leading cause of global warming.

Create incentives to encourage new low-energy buildings. New buildings providing 17,000 new apartments—13,500 of them affordable apartments—will be constructed over the next 10 years on NYCHA-owned land as part of the City's 200,000-unit affordable housing plan. NYCHA will work with the City's Department of Housing Preservation and Development to favor new construction proposals that commit to ultra-low-energy buildings.

Test "deep" energy retrofit technologies. By 2025, NYCHA will need to know how to implement "deep retrofits" that involve replacement of fundamental building systems. Before 2025, NYCHA will test new and emerging technologies and construction methods; participate in deep retrofit pilot programs; identify test cases for envelope retrofits and heating system replacements; and launch a "Call for Innovations" to solicit promising ideas.

INTRODUCTION

A Commitment and an Invitation

The NextGeneration NYCHA Sustainability Agenda expresses NYCHA's commitment to create healthy and comfortable homes that will withstand the challenge of climate change. It is also an invitation to residents and surrounding communities to work with NYCHA to realize a shared long-term vision of equity, sustainability, and resiliency.

NextGeneration NYCHA is the Authority's 10-year plan to preserve public housing for the future.

Public housing serves 400,000 of New York City's lowest-income households: those who are employed, on a fixed income, and those who are emerging from poverty. For these households, there are few or no housing alternatives. NYCHA provides almost three quarters of the rental apartments that cost less than $500 per month, and more than half of those that rent for less than $800 per month. Like other infrastructure created for the public good—water and sewers, transit, parks, and roads—public housing is an asset that must be preserved for future generations of New Yorkers.

Yet the future of New York's public housing is threatened by decades of disinvestment. In the past 15 years alone, federal funding for NYCHA has fallen short by almost $2.5 billion. Today, NYCHA has only enough emergency cash to operate for four weeks, and making do with less has sometimes translated into lower quality of life for residents, fewer services, and lower staffing levels. Combined with the aging buildings that make up the NYCHA portfolio, these shortfalls have also resulted in the need for $17 billion in capital improvements. Absent a fundamental transformation in funding and operations, there is a real possibility that NYCHA could fall into U.S. Department of Housing and Urban Development (HUD) receivership.

NextGeneration NYCHA is the Authority's 10-year roadmap to end the downward spiral. The plan outlines 15 strategies driven by a simple vision: **safe, clean, and connected communities**. The four goals designed to achieve this vision are:

1. Achieve short-term financial stability and diversify funding for the long term
2. Operate as an efficient and effective landlord
3. (Re)build, expand, and preserve public and affordable housing
4. Engage residents and connect them to best-in-class social services

With the success of NextGeneration NYCHA, the Authority will become a financially solvent organization, free from hundreds of millions of dollars of annual shortfalls. A balanced budget will be evidence of organizational stability; NYCHA would then be able to attract investment to fund the restoration of its buildings to a state of good repair and livability.

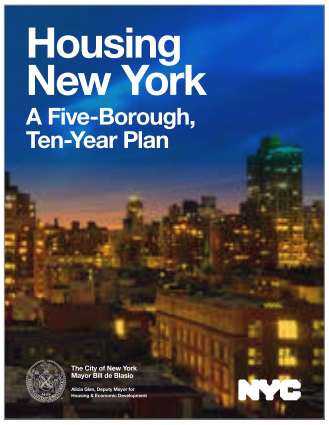
Public housing plays an important role in climate justice.

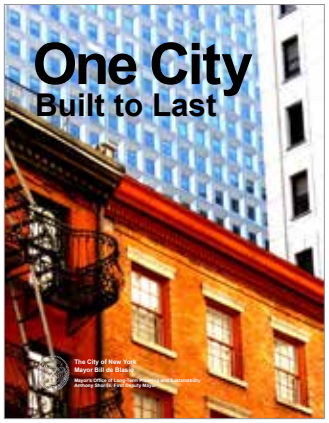
Most NYCHA developments are located in areas subject to more than their fair share of polluting industrial, municipal, and commercial infrastructure. Further, NYCHA disproportionately serves vulnerable residents: 110,000 residents are children under 18, and 77,000 are seniors 62 or older (most of them heads of households). Thirteen percent are people under 65 with disabilities, nearly double the citywide average of 7.3 percent. Studies show that children and seniors are more vulnerable to the harmful health effects of airborne pollution, and low-income children and seniors in pollution-burdened areas are particularly so. Many of these communities are asthma "hotspots" that generate the highest rates of asthma-related emergency room visits in the city.

Climate change is expected to exacerbate health risks of all types, and post-Superstorm Sandy analyses suggest that low-income people will suffer disproportionately. More extreme weather, rising temperatures, and rising sea level may cause physical injury and mental distress; increase air pollution, allergens, pests, and ground-level ozone; and lead to more heat-related illnesses and deaths. While the specific impacts are as yet unknown, already health-burdened, low-income communities and residents may suffer even more as climate change increases in severity.

NYCHA, as New York's largest low-income housing provider and the largest public housing authority in the nation, must lead by example. NYCHA must partner with residents and surrounding communities, sister agencies, and housing and environmental advocates to blunt the impact of climate change.

Photo credit: Robert van Waarden
survivalmediaagency.com





Housing New York, One City: Built to Last, and OneNYC

In May 2014, Mayor de Blasio unveiled **Housing New York: A Five-Borough, Ten-Year Plan**, a comprehensive plan to build or preserve 200,000 affordable units over the coming decade to support New Yorkers with a range of incomes, from the very lowest to those in the middle class. Similarly, NextGeneration NYCHA is a comprehensive plan to transform how NYCHA rebuilds, operates, and is funded, enabling the preservation of approximately 178,000 units of public housing for the coming generation.

NYCHA has already played a key role in advancing Housing New York's goals: since 2014, NYCHA has facilitated the creation and preservation of 1729 affordable housing units, and released an RFP for the creation of an additional 500 units on underutilized NYCHA land.

NextGeneration NYCHA is also informed by the Mayor's sweeping energy-efficiency and emission-reduction plan for City buildings, **One City: Built to Last**. This plan, released in September 2014, commits to an 80 percent reduction in the City's 2005 greenhouse gas emissions by 2050. The NextGeneration NYCHA Sustainability Agenda outlines the steps the Authority will take to meet the first milestone: a 30 percent reduction in building emissions by 2025.

Lastly, NextGeneration NYCHA is a part of **One New York: The Plan for a Strong and Just City**, the Mayor's plan for growth, sustainability, resiliency, and equity released in April 2015. As New York City heads into its fifth century and tackles the challenges of a growing population, an evolving economy, and growing inequality, NextGeneration NYCHA plays an important role in ensuring the vision of a thriving, just, equitable, sustainable and resilient city.

Prior NYCHA Plans and NYCHA's History of Sustainability

NextGeneration NYCHA builds upon prior strategic planning work and initiatives. Previous NYCHA reform efforts include The Plan to Preserve Public Housing (2006) and Plan NYCHA (2010). The Plan to Preserve Public Housing gave rise to much-needed rent reform, an increase in the shelter allowance for public assistance families in NYCHA, and the conversion of more than 3,300 formerly City- and State-funded public housing units to Section 8 to permanently subsidize their operations. Plan NYCHA helped guide a reduction in work orders and service times, the hiring of additional staff for customer-facing operations, an increase in safety and security through installations of closed-circuit television (CCTV) and layered access, and transformation of Section 8 annual income recertification from manual to online.

The NextGeneration NYCHA Sustainability Agenda builds on a history of enegy-efficiency and sustainability programs that date back to the 1973 oil embargo.

Closed-Circuit Television systems provide video surveillance.

Layered access provides secure keyless entry.

NYCHA responded to the embargo by initiating a large-scale conversion of equipment to burn both fuel oil and cheaper and cleaner-burning natural gas. In the ensuing years, this dual-fuel system allowed NYCHA to manage utility costs, and by 2011, when the City began to phase out heating oil, NYCHA was already using gas in all but a few developments.

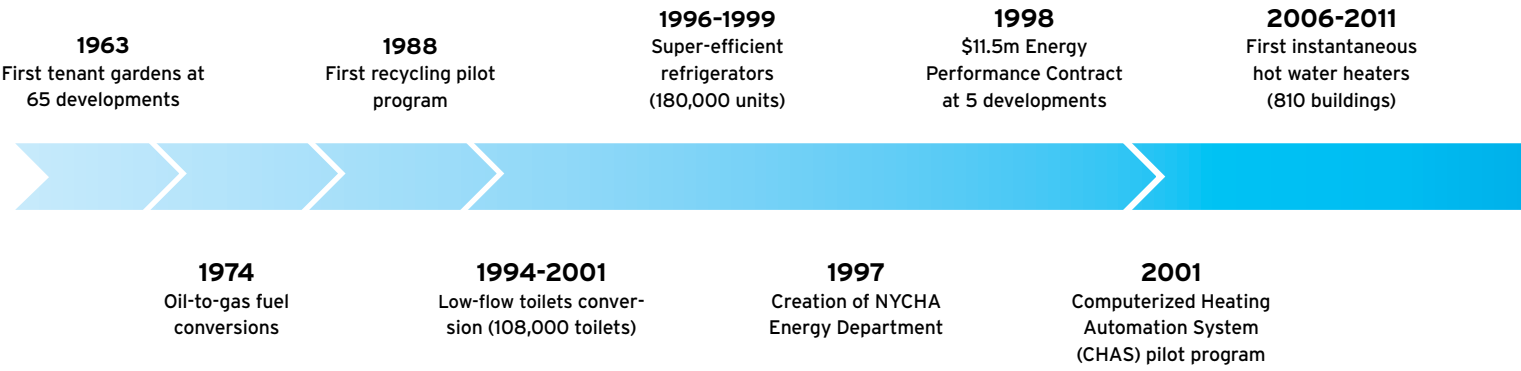
During this time NYCHA also upgraded specific building systems throughout the portfolio as economically beneficial technologies matured. In the 1980s, NYCHA replaced 1.2 million steel casement windows with double-glazed aluminum windows. In the 1990s, NYCHA replaced 3 gallon per flush (gpf) and 5 gpf toilets with low-flow 1.6 gpf models, and through an innovative collaboration with the New York Power Authority (NYPA), installed 180,000 super-efficient refrigerators. By creating a large market that had not previously existed, the refrigerator program benefitted not only NYCHA and its residents, but also many other low-income housing owners and apartment dwellers.

In the late 1990s, after 24 years of steady progress, NYCHA created an Energy Department dedicated to pursuing energy cost savings. NYCHA implemented its first Energy Performance Contract (EPC) and began to deploy a Computerized Heating Automation System (CHAS) to provide remote monitoring and management of 210 large central heating plants.

NYCHA has used its large portfolio to try out new and emerging energy-efficiency technologies. In addition to the refrigerator program, NYCHA has deployed indoor-temperature-based heating controls in six developments and in 2013 installed ground source heat pumps (GSHP) at 344 East 28th Street.

Through the years NYCHA has worked closely with many public and private partners, including its main energy providers NYPA, Con Edison, and National Grid. NYCHA has also partnered with the City's Department of Environmental Protection (DEP) on stormwater management and water

Sustainability Milestones at NYCHA



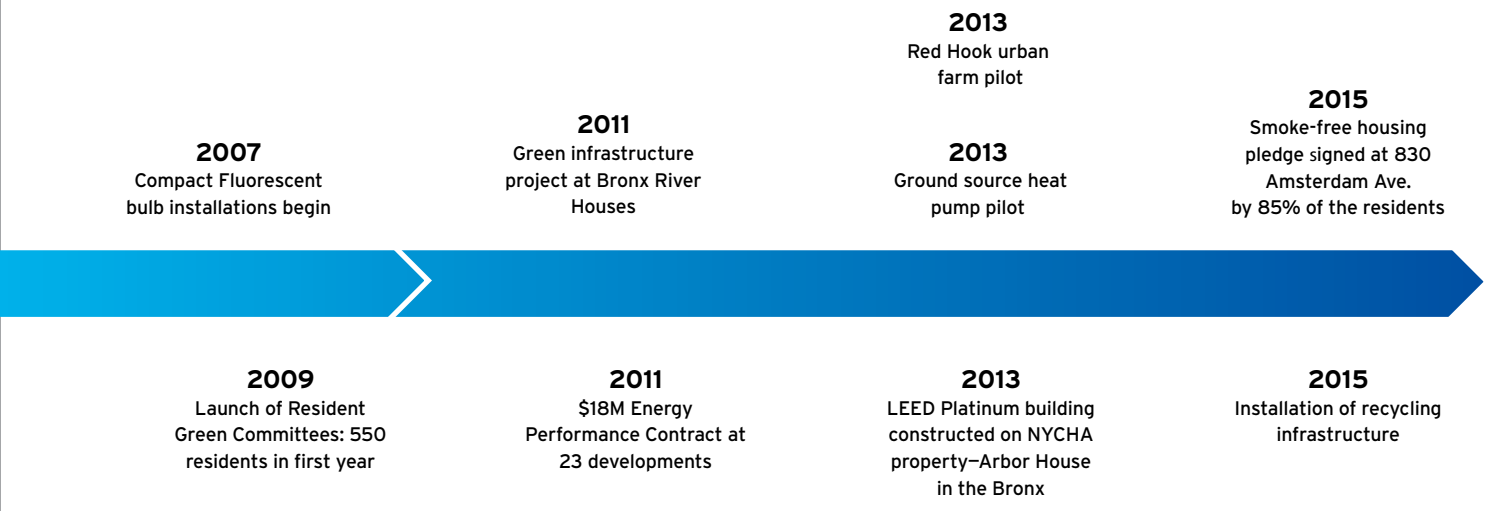
conservation, the Department of Sanitation (DSNY) on recycling, the NYC Cool Roofs program, and MillionTrees NYC, and numerous community organizations on resident- and community-led programs.

NYCHA Today: Sustainability Challenges

NYCHA is the largest residential landlord in the City. Its public housing stock comprises 178,000 apartments housing more than 400,000 people in all five boroughs. The Authority also administers the country's largest Section 8 program, the federally subsidized rental voucher program, which serves another 213,000 low-income individuals. If it were a standalone city, NYCHA would rank as the 30th largest city in the United States, larger than Las Vegas, Atlanta, or Miami. Its scale and breadth are incomparable: 328 developments made up of 2,550 buildings containing over 175 million square feet of space. NYCHA's public housing units comprise 8 percent of New York City's rental housing stock and are in such high demand that they boast an average vacancy rate of less than one percent.

NYCHA's dated technologies, aging equipment, and deferred maintenance degrade energy and environmental performance

More than 60 percent of NYCHA's buildings are 50 years old or older. Since 2001, when federal disinvestment in NYCHA began, so much capital equipment replacement has been deferred that today, NYCHA faces a five-year unmet capital need of approximately $17 billion. Forced to adapt, NYCHA stretched its limited resources thinly across its vast real estate portfolio, spending capital improvement funds only for selective upgrades at developments with the highest density of residents—a fraction of the systems or structures that had failed or were on the verge of failure.



Lacking capital, NYCHA has continued to repair and maintain mechanical systems that reflect the technologies available at the time of their original construction. Most apartments (92 percent) are heated by a steam system, an early-20th-Century technology that is both less efficient and much more difficult to control than modern systems. Steam boilers also provide most of the domestic hot water, again using substantially more energy than newer equipment.

NYCHA's average energy performance is about 40 percent worse than the citywide average for multifamily buildings. Despite this, overall energy consumption has been flat for the past decade, which suggests that conscientious operations and energy retrofits made during that time have partially made up for the drop in performance from aging systems and deferred maintenance.

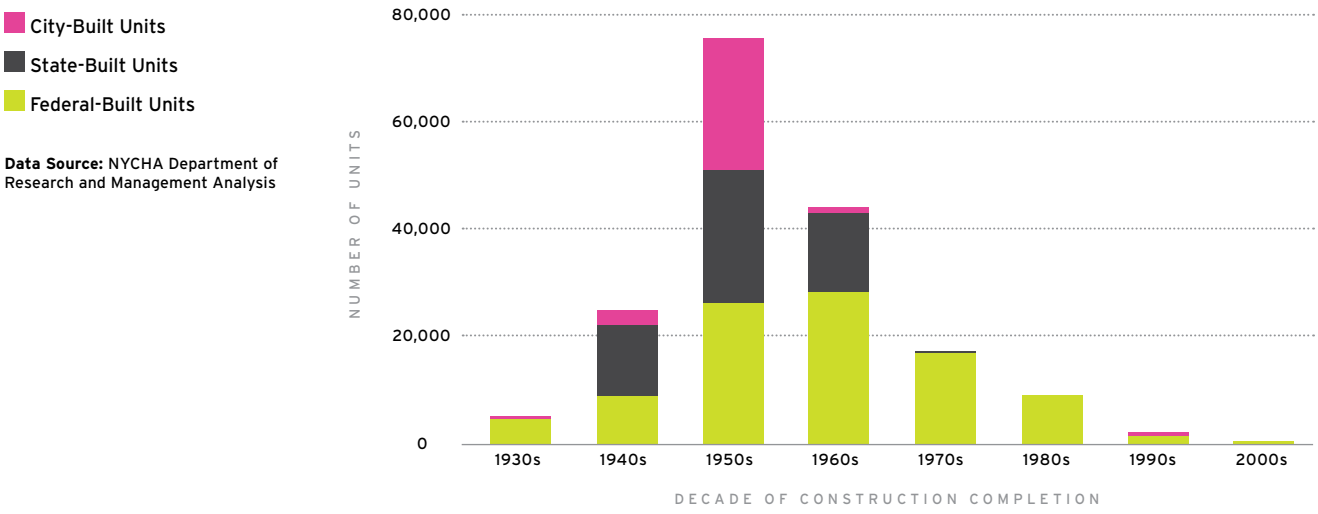
As buildings age and capital improvements are deferred, another inevitable result is a higher incidence of mold and pests, which exacerbate chronic respiratory illnesses. Infestations of both mold and pests can result from leaks in plumbing, roofs, drainage pipes, and exterior walls.

Built-in obstacles hamper electric and water efficiency efforts

One of the best ways to encourage energy conservation is to provide consumers with feedback on how much they are using—by sending them a monthly bill. At most NYCHA developments, however, this important feedback loop is missing in two areas: electricity and water.

All but 6 percent of the portfolio is master-metered for electricity; NYCHA, instead of the resident, pays the electric bill. A comparison of NYCHA's

By 2025, 92% of NYCHA apartments will be in buildings 50+ years old.



Data Source: NYCHA Department of Research and Management Analysis

master-metered and direct-metered buildings showed that residents in master-metered developments use almost 4 times as much electricity as residents who pay their own electricity bills.

The situation with water is similar. Most NYCHA developments pay a fixed fee for water no matter how much they use. Despite steady progress in water fixture upgrades, consumption at NYCHA developments continues to be high; data from a sample of NYCHA developments show it to be 30 percent above the citywide multifamily average. This high consumption may be the result of leaks, but the in-apartment consumption may also play an important role.

Finally, restrictions on how housing authorities can combine different sources of capital pose a challenge to funding energy and sustainability improvements. For private owners, the energy cost savings go straight to the bottom line. HUD created the EPC program to provide a similar benefit to housing authorities, but the program has one important limitation: EPC funds cannot be combined with HUD capital funds. This precludes the use of EPC money to boost the energy savings potential of most capital projects and creates a disincentive to invest in sustainability in those projects.

HUD provides NYCHA with **capital funds** to improve and modernize public housing buildings.

Operating funds, in contrast, pay for operations and maintenance.

NYCHA's Ten-Year Sustainability Agenda

Sustainability can mean different things to different people. For NextGeneration NYCHA, sustainability means creating healthy and comfortable homes—by managing energy, water, and waste effectively and efficiently.

The Sustainability Agenda, an extension of NextGeneration NYCHA, details the commitments that NYCHA will make over the next 10 years to improve resident well-being and operate as an effective and efficient landlord. By communicating these sustainability priorities and goals clearly, NYCHA seeks to establish a firm foundation for partnerships with residents and the communities surrounding NYCHA's developments to work towards a sustainable and resilient city.

Focusing on resident health and comfort, and working hand-in-hand with community partners, NYCHA will aim to achieve the following goals by 2025:

- Eliminate the **root causes of mold** by fixing leaks in roofs, façades, and pipes and by modernizing ventilation systems;
- Eliminate **overheating** and **unplanned heat and hot water outages;**
- Start on the path to meeting the City's goal of **reducing greenhouse gases** by 80 percent by 2050;
- Address **climate adaptation and resiliency** in all capital planning; and
- Incorporate **sustainability into day-to-day management** of all properties.

Work We Will Begin Today

Each strategy in the Sustainability Agenda is a 10-year goal supported by actions that NYCHA will begin today. Each numbered strategy begins with the letter 'S' for Sustainability, to distinguish them from the NextGeneration NYCHA strategies.

The strategies are grouped by the NextGeneration NYCHA goals they support:

Goal 1: Achieve short-term financial stability and diversify funding for the long term

S1: Attract investments for capital improvements
S2: Raise revenues through clean and distributed energy projects

Goal 2: Operate as an effective and efficient landlord

S3: Create healthy indoor environments
S4: Efficiently provide comfortable and reliable heat and hot water
S5: Improve water management
S6: Adopt a comprehensive waste management plan

Goal 3: Rebuild, expand, and preserve public and affordable housing

S7: Adopt sustainability standards
S8: Eliminate roof, façade, and plumbing leaks
S9: Retrofit master-planned developments
S10: Retrofit scattered-site developments
S11: Build green infrastructure
S12: Incorporate climate change resiliency into capital planning

Goal 4: Engage residents and connect them to best-in-class services

S13: Support resident- and community-led sustainability
S14: Connect residents to green jobs

Working towards 80 x 50

S15: Create an 80 x 50 roadmap
S16: Create incentives to encourage new low-energy buildings
S17: Test "deep" energy retrofit technologies

Guiding Principles

Implementation of the Sustainability Agenda will be guided by these principles:

1. Make improvements to **resident quality of life** the top priority and the key measure of success. Sustainability strategies often embrace multiple goals, including reducing utility costs and mitigating climate change. NYCHA will give first priority to achieving improvements that residents can see and feel in their daily experience.

2. Adopt rigorous **evidence-based practices**. NYCHA will measure the impact of the Sustainability Agenda across its entire portfolio to see what works and what does not. Performance goals will become more stringent over time, in tandem with citywide sustainability goals.

3. Communicate goals, metrics, and methods **clearly and transparently.** In 2015, NYCHA made it much easier for the public to obtain consumption and cost information, eliminating the previously required Non-Disclosure Agreement and providing an online information request form. NYCHA will continue this trend by making all utility consumption and cost information publicly available on NYC Open Data as a first step towards sharing the challenges, achievements, and shortcomings of its pursuit of greater sustainability.

4. Work in a **spirit of partnership** with sister agencies, residents, community organizations, and research institutions. The Sustainability Agenda outlines NYCHA's commitments in its role as a landlord, but NYCHA's actions alone will not achieve sustainability. NYCHA intends to be an open and effective partner in a shared pursuit of sustainability in the communities it serves. NYCHA will proactively and transparently identify opportunities for sustainability, and welcome resident-led and community-led initiatives.

GOAL #1

ACHIEVE SHORT-TERM FINANCIAL STABILITY AND DIVERSIFY FUNDING FOR THE LONG TERM

GOAL 1: FUND

Government disinvestment has resulted in a nearly $2.5 billion loss in operating and capital funding since 2001; a deficit that will grow to a cumulative $5 billion in 15 years; and aging buildings that require $17 billion in funding for major capital repairs. The Authority must operate in the black to become fiscally sound and attract outside financing to fund vital building repairs. Collectively and with HUD support, NextGeneration NYCHA strategies will reduce NYCHA's operating deficit by $1 billion over the next 5 years, putting the Authority in a stronger position to deal with the uncertain future of funding from the federal government.

The Sustainability Agenda will contribute to this goal in two ways. First, it will reduce unmet capital needs. Second, it will tap the emerging market for clean energy to develop a new source of long-term revenue.

Strategy S1: Attract investment for capital improvements that promote resident health and comfort

NYCHA will attract $300 million in private capital to fund large-scale retrofits through Energy Performance Contracts, and tap energy-efficiency incentive programs to reduce the capital needs of scattered-site developments by $30 million.

Strategy S2: Raise revenue through participation in clean and distributed energy projects

NYCHA will develop a pipeline of commercial-scale solar projects for third-party solar developers. NYCHA will also develop a campus-scale resilient microgrid and district energy system at Red Hook East and West Houses and support the City in identifying other opportunities for community-scale clean and distributed energy systems.

"NYCHA faces tremendous challenges—financial, operational, and in climate change resiliency. In an era of decreasing federal support, NYCHA will need to harness the private sector and community and philanthropic partners to once again become a ladder that vulnerable families can utilize to join in the prosperity of the greatest city on the planet."

—Donnel Baird, CEO, BlocPower

Strategy S1
Attract investment for capital improvements that promote resident health and comfort

Existing Conditions

Today, residents live through the day-to-day reality of almost $17 billion in unmet capital needs: leaky roofs, mold, unreliable heating systems, broken elevators, and the like. These problems are the result of decades of disinvestment, including a nearly $2.5 billion shortfall in federal funding since 2001.

NYCHA now invests 60 percent of its annual capital outlay to assure that building exteriors are free of leaks and falling bricks. The remaining 40 percent is devoted to emergency repairs and a small number of projects that both repair building exteriors and modernize interiors. These repairs are important and necessary, but they leave less money available for other much-needed upgrades that improve health and comfort, like heating, hot water, and ventilation systems.

Implementation

To make the most effective use of its limited funds, NYCHA will develop revenue sources to pay for energy-efficiency measures.

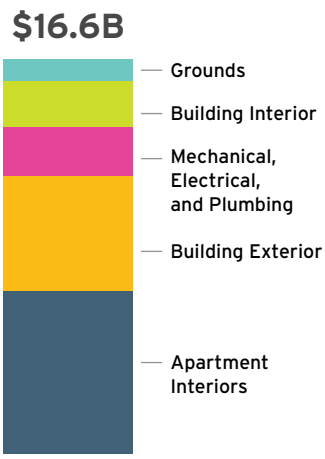
Energy Performance Contracts and Private Capital

NYCHA will attract $300 million in private capital to fund large-scale retrofits through EPCs by 2025. In an EPC, a private lender provides construction funds and the debt is paid back by the savings generated by the work. In April 2015, NYCHA announced its intention to launch a series of large-scale EPCs in partnership with HUD. Construction on the first of these will begin by summer 2016. NYCHA has begun to plan three additional large EPCs.

Energy Efficiency Incentive Programs

In 2015, NYCHA began to work with energy-efficiency programs that specialize in upgrades to small buildings—single homes, walk-up multifamily buildings, and small elevator buildings. Con Edison and National Grid provided $3 million in rebates and equipment installations during the 2015-2016 program year. NYCHA is also working with the New York State Weatherization Assistance Program (WAP) to deliver $1.3 million in upgrades to two pilot developments. By 2025, NYCHA will have garnered $30 million in these incentives for small buildings.

5-Year Unmet Capital Needs



Data Source: Calculations based on NYCHA Physical Needs Assesement, 2011. NYCHA will complete a new PNA in 2017.

Strategy S2
Raise revenue through participation in clean and distributed energy projects

Existing Conditions

Clean and distributed energy projects generate energy from naturally replenishing sources very close to the point of use—like solar panels on a building roof.

Renewable energy is derived from naturally replenishing sources such as sunlight and wind.

New York's renewable power is notably produced by solar, wind and hydroelectric generation.

Such projects are poised for significant growth. Already 22 percent of New York State's electricity is generated by renewable energy sources and the 2015 State Energy Plan seeks to raise the proportion to 50 percent by 2030. New York State has also committed to reform utility regulations to tip the industry toward clean, resilient, and distributed energy generation. Congress, also, extended federal investment tax credits for clean electricity generation in late 2015, enabling continued private investment in clean energy projects.

Power outages resulting from Superstorm Sandy triggered a surge in interest in resilient power systems and microgrids. A microgrid is an electrical network serving a small geographic area that has its own means of generating electricity and can be disconnected from the electrical grid when necessary. Sandy highlighted the risk of prolonged electrical outages caused by extreme weather, but even small voltage reductions that occur a few times per year can disrupt operations.

One megawatt is roughly the energy needed to power 260 New York City households.

NYCHA is well-positioned to earn revenue from these two areas. NYCHA can provide host sites throughout the five boroughs, and is often the largest residential user in a given neighborhood. The City University of New York (CUNY) estimates there is up to 55 megawatts (MW) of developable solar potential in the NYCHA portfolio. Of this total, roughly half is from sites that can each accommodate commercial-scale solar installations. Several private for-profit and community-based developers have already expressed interest in funding projects on NYCHA properties. Of the nine New York City-based projects that were recently awarded grants for the New York Prize community microgrid competition, seven include NYCHA properties in their plans.

Implementation

Clean and distributed energy can provide financial benefits to NYCHA and more reliable power to the community. The financial benefits to NYCHA include revenue from rooftop leases, capital work like roof repairs (which could

Utilities use **demand response** programs to incent buildings and facilities to reduce their power needs, to avoid running "peaker" plants, which only run during times of high demand and are more expensive than base-load plants.

be folded into a solar electricity project), or revenue from demand-response and other utility programs. The benefits to the NYCHA community could be just as important —reliable electrical power during Sandy-like storms, access to low-cost renewable power, and resident employment opportunities.

Solar Power

By 2017, NYCHA will develop a pipeline of commercial-scale (50 kW or more) solar projects and issue the first solicitation for developers. Solar developers privately finance and build solar electric facilities, own and operate them, and sell power at competitive prices, typically over a 20-year term.

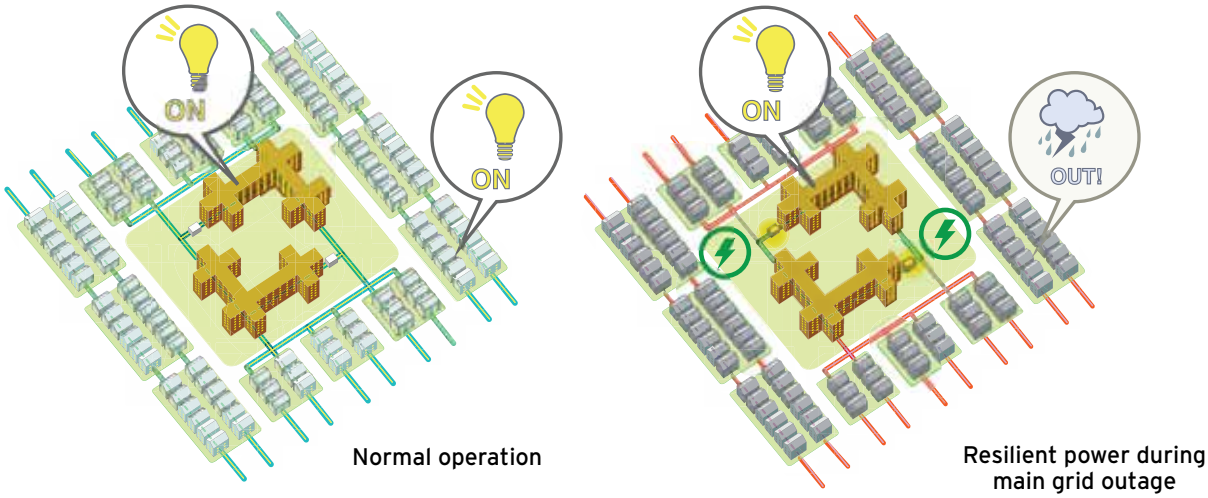
In parallel, NYCHA will also develop small-scale and community solar opportunities for non-profit developers. A community solar project allows individuals and businesses to be co-owners on solar installations that may not be on their own property. NYCHA will work with residents and community-based organizations on these projects.

Microgrids

NYCHA will develop a campus-scale resilient microgrid and district energy system at Red Hook East and West Houses, home to more than 6,250 residents in 2,891 apartments. NYCHA will issue a Request for Proposals in May; proposals will be evaluated over the summer of 2016.

In recognition of the need to dramatically reduce the use of fossil fuels to achieve the 80 x 50 carbon reduction goal, NYCHA will also help the Mayor's Office of Sustainability develop a community energy map to identify the most promising sites for community-scale clean and distributed energy systems.

In case of a power outage, a microgrid can be disconnected from the main grid and provide backup power



NYCHA commitments to HUD Sustainability Challenges

NYCHA has joined two HUD sustainability challenges. The Better Buildings Challenge, which sets ambitious portfolio-wide energy performance goals, and Renew300, which does the same for adopting clean, onsite energy generation.

Better Buildings Challenge

For the Better Buildings Challenge, NYCHA has committed to reduce the energy intensity of its portfolio by 20 percent by 2025. This commitment aligns with the City's goal of reducing greenhouse gases from buildings by 30 percent by 2030. NYCHA's participation increases the number of apartments benefitting from the Challenge by 50 percent.

The Better Buildings Challenge is a voluntary leadership initiative that asks building owners, developers, and managers to make a public commitment to energy efficiency. Through the multifamily component of the Better Buildings Challenge, HUD and the Department of Energy (US DOE) are partnering with leaders that have committed to cutting energy waste across their portfolios, and providing their energy savings data and strategies as models for others to follow.

Better Buildings Challenge participants commit to:

- Conduct an energy efficiency assessment of their building portfolio and pledge an organization-wide energy savings goal of at least 20 percent within 10 years
- Take action by showcasing energy efficiency projects and implementation models
- Report results by sharing energy performance data that demonstrates success

Renew300: Advancing Renewable Energy in Affordable Housing

NYCHA has pledged to develop 25 MW of renewable energy capacity by 2025 as a participant in the HUD Renew300 initiative.

HUD launched Renew300 in partnership with US DOE and the White House to install 300 MW of renewable energy capacity at federally assisted housing by 2020.

Federally assisted housing includes HUD's rental housing portfolio (Public Housing, Multifamily Assisted) and US Department of Agriculture's Rural Development Multifamily Programs, as well as rental housing supported through Low Income Housing Tax Credits.

Renew300 seeks to make use of millions of federally subsidized roofs with on-site solar photovoltaic generation potential. Also encouraged are other types of renewable energy, including solar thermal, wind, geothermal, biomass, combined heat and power, and small-hydro projects.

"NYCHA's participation in the Better Buildings Challenge represents a nearly 50% expansion of the multifamily buildings sector and proves that deep change is desirable and achievable—even in the largest and most complex housing stocks in the nation."

—Harriet Tregoning, Principal Deputy Assistant Secretary
Office of Community Planning and Development, HUD

GOAL #2

OPERATE AS AN EFFECTIVE AND EFFICIENT LANDLORD

GOAL 2: OPERATE

NYCHA is first and foremost a landlord. The Authority must provide better customer service and property management for its residents.

In striving for more effective and efficient operations, NYCHA will prioritize the health and comfort of residents by creating healthy indoor environments; providing comfortable and reliable heat and hot water; and improving water and waste management.

Strategy 3: Create healthy indoor environments

NYCHA will implement a comprehensive mold response plan; require low- and no-volatile organic compound caulks, paints, coatings, and adhesives; provide Integrated Pest Management; reduce exposure to second-hand smoke; and follow a healthy home-focused vacancy turnover protocol.

Strategy 4: Efficiently provide comfortable and reliable heat and hot water

NYCHA will improve heating and hot water systems through smart building technology, thoroughly test and tune all building systems, and invest in the training and professional development of heating operations staff.

Strategy 5: Improve water management

NYCHA will meter all developments by 2018; study the patterns of water use to identify conservation opportunities; update purchasing standards, and install water-efficient fixtures.

Strategy 6: Adopt a comprehensive waste management plan

NYCHA will develop a comprehensive waste management plan to identify infrastructure improvements, changes in building operations, and construction waste management standards needed to support the City's zero waste goal. NYCHA will install recycling infrastructure throughout the portfolio by 2016, and complete a waste composition study by 2017.

"Sustainability for NYCHA and its residents goes well beyond being 'green' and addressing climate risk; it's about ensuring that NYCHA remains an affordable housing resource for generations to come and that its residents can live in healthy homes."

—Michelle de la Uz, Executive Director, Fifth Avenue Committee

Strategy S3
Create healthy indoor environments

Existing Conditions

NYCHA's most important responsibility in sustainability is to provide healthy and comfortable apartments free of mold, pests, asthma-triggering materials, external odors and second-hand smoke all of which exacerbate chronic respiratory illnesses.

Implementation

NYCHA will pursue creating healthy indoor environments by addressing mold comprehensively, minimizing toxic chemicals in the home, reducing second-hand smoke exposure, and by effectively controlling pests. A close partnership with residents and community organizations will be essential to achieveing lasting solutions.

Implement a Comprehensive Mold Response Initiative

NYCHA residents file some 20,000 mold-related maintenance work orders per year. Many of these work orders are for recurring mold, because the underlying cause—the source of moisture—was not found and eliminated.

To prevent mold, the most important task is to eliminate sources of moisture. Mold grows when spores find both food and water. Mold spores and organic material mold food are everywhere, but mold is only able to thrive in the presence of water. Water can enter an apartment through cracks and gaps in roofs, walls, and seals around windows. Moisture can also be generated inside the apartment by cooking, showers, or even clothes drying.

Steps in Successful Mold Remediation

Most efforts focus on the last two steps, but without eliminating the root cause, these steps will have to be repeated until the root cause is addressed.

Eliminate Root Cause

- Eliminate water infiltration
- Correct drainage issues
- Fix leaking pipes
- Improve ventilation
- Control condensation on surfaces

Abate/Clean

- Remove all visible mold
- Apply biosides, as needed
- Remove and dispose of damaged building material
- Check for hidden mold (i.e. in wall cavity)

Restore

- Replace damaged building material with mold resistant material
- Plaster walls and paint
- Perform housekeeping

NYCHA lacks the funds to eliminate mold through capital upgrades alone; however, experience shows that comprehensive unit inspections and coordinated repairs can work in tandem to identify and address root causes.

In 2015, NYCHA tested a new, root-cause-focused approach to mold elimination at Clinton Houses, a 749-unit development in Harlem built in 1965. Numerous resident complaints led to comprehensive inspection and testing of roofs, walls, drains, ventilation systems and apartment units. The inspections found mold in 16 percent of the apartments and revealed the patterns of how and where moisture entered them.

This comprehensive approach determined that the root causes of mold included inadequate ventilation and water leaks originating in bathrooms. NYCHA then began to repair rooftop fans, clean ventilation ducts, replace shower bodies, replace toilets and replace the pipes that connect toilets to waste lines.

Building on the lessons learned at Clinton Houses, NYCHA will test a new approach to mold response that combines coordinated inspections and repairs with complete case histories for each affected apartment or building. With the mold history in hand, repair crews can follow patterns in mold outbreaks to the sources of water and moisture. For example, several apartments in a line reporting mold at different times could indicate a problem that is migrating along a particular exterior wall or interior plumbing chase.

NYCHA will also repair bathroom and kitchen exhaust ventilation systems throughout the portfolio as part of the EPC program. Mechanical ventilation was introduced at NYCHA in the 1960s, and about 65 percent of all NYCHA apartments have mechanical ventilation in bathrooms. Advances in technology have made it possible to seal and balance these ventilation systems, and to provide fans that use less energy and require fewer repairs.

Require low- and no-VOC caulks, paints, coatings and adhesives

Volatile Organic Compounds (VOCs) are chemicals that easily become airborne and are harmful when inhaled. They are found in caulks, paints, varnishes, adhesives, and cleaning products. NYCHA will specify and purchase only low- and no-VOC versions of such products by 2017. NYCHA has already begun to move from high-VOC oil paints to low-VOC water-based paints.

Fully adopt comprehensive Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is a prevention-based pest management approach that provides long-lasting pest control and is less harmful to residents and pets than traditional methods. IPM uses knowledge of pests' life cycles to target the underlying causes of pest infestations and minimize the application of pesticides. IPM protocols include frequent monitoring and simple pest-proofing strategies such as fixing leaks, plugging holes, and managing garbage to deprive pests of food, water, and shelter. If pesticides must be used, IPM uses the least-toxic chemicals, applied in the safest manner.

38% Of NYCHA Residents See Pests Daily

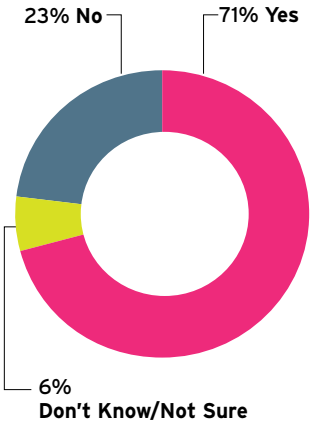
Successful IPM requires coordination among capital improvements, repairs, and responses to pest infestations. Factors as diverse as the design of kitchen cabinets, roof, wall, and plumbing leaks, and floor and wall penetrations around pipes and risers influence the ability to minimize pesticide use. As with mold, attacking the root causes creates the best opportunity for lasting solutions.

NYCHA has been committed to IPM since 1999, when it conducted a pioneering demonstration project in Lehman Village Houses. The project's success led to a City Council-funded expansion to serve six more developments. NYCHA has also worked closely with the City's Department of Health and Mental Hygiene (DOHMH) to provide IPM treatment in apartments with asthmatic children. NYCHA and DOHMH also provided IPM training to residents and gardening groups, and in conjunction with Cornell University, developed an IPM Refuse Room Pilot to address rodent infestations.

Today, NYCHA's 150 exterminators, many of them NYCHA residents, regularly address a range of insect and rodent problems including mice, cockroaches, bedbugs, rats, and mosquitos—using methods that are based on IPM protocols and with the least-toxic chemicals available. NYCHA will incorporate IPM principles into the design of renovation projects, vacancy turnovers, and repair calls. NYCHA will also further reduce pesticide exposure in apartments, and include IPM in staff training.

Reduce exposure to secondhand smoke at home

71% of NYCHA Residents Prefer to Live in a Smoke-Free Building



Source: 2012 survey by DOHMH / NYCHA

Secondhand smoke can lead to stroke, heart disease, cancer, and respiratory illness. The Centers for Disease Control and Prevention has established smoking as the leading cause of preventable death in the nation, especially for seniors and children, who comprise nearly half of NYCHA's residents. There is no safe level of exposure to secondhand smoke.

NYCHA is committed to reducing exposure to secondhand smoke and improving access to support for residents who smoke and want to quit. In 2012, NYCHA conducted a study with DOHMH and Baruch College that found that a strong majority of residents, both smokers and non-smokers, preferred to live in a smoke-free environment. In 2015, HUD proposed a policy change that would prohibit smoking in public housing, including within individual units. NYCHA will work with residents to improve compliance with existing rules and establish an advisory group to help develop new programs and policies should HUD establish a final smoke-free housing rule.

Implement a healthy home-focused vacancy turnover protocol

NYCHA will develop a healthy home turnover checklist in 2016 and begin a trial run in 2017. Although the portfolio-wide vacancy rate averages less than 1 percent, vacancy turnover presents a prime opportunity to improve the energy efficiency and indoor environmental quality of apartments. NYCHA's vacancy

Ventilation Improvements and Healthy Homes Study at Surfside Gardens

From 2012 to 2015, the National Center for Healthy Housing (NCHH) and Steven Winter Associates (SWA) studied the health implications of improved ventilation at Surfside Gardens in Coney Island.

Surfside Gardens is a 600-unit development of five 14 to 15-story buildings. As at many NYCHA buildings, rooftop fans draw air and moisture up from and out of apartment bathrooms through ventilation shafts. SWA made detailed measurements of roof fan flows and individual apartment exhaust flows to determine baseline conditions.

The project team cleaned the shafts, installed Constant Airflow Regulators—devices that automatically regulate airflow—and repaired the roof fans for half the apartments in the three buildings participating in the study. For the other half, the team provided the same upgrades and in addition, leaks in the shafts were sealed up, and fans were replaced.

NCHH collected and analyzed air samples, and with the help of Green City Force, interviewed almost 100 residents both before and one year after the work to assess changes in housing conditions and health.

An auditor measures exhaust ventilation from roof top fans to determine if the line is over- or under-ventilated.
Photo: Steven Winter Associates

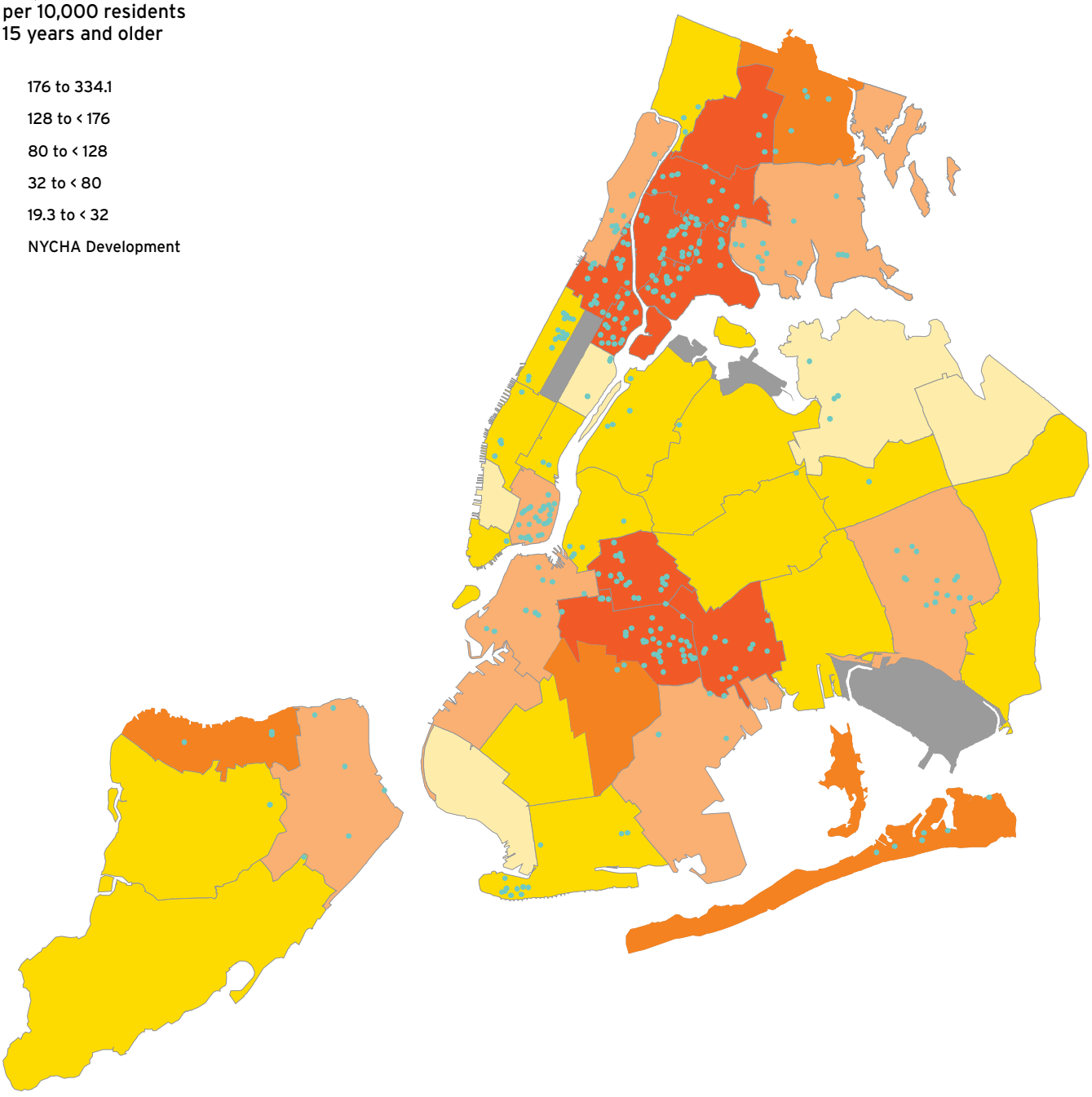
According to the preliminary findings, improved ventilation reduced observed water and dampness, musty odors and adult sinus infections (see table below). NCHH is working on the final report and will be sharing the full findings in 2016.

	Before Ventilation Work	After Ventilation Work
Reported housing conditions		
Observed dampness	60%	29%
Mildew or musty odors	53%	33%
Reported health conditions		
Adult sinus infections	35%	24%
Child multiple ear infections	11%	3%

150,000 NYCHA residents, including 35,000 children under 15 years old live in developments located in asthma hot spots

Rate of emergency hospitalization for asthma per 10,000 residents 15 years and older

- 176 to 334.1
- 128 to < 176
- 80 to < 128
- 32 to < 80
- 19.3 to < 32
- NYCHA Development



Data Sources: NYC Department of Health and Mental Hygiene - Environment and Health Data Portal / United Hospital Fund Boundaries; NYCHA Department of Research and Management Analysis

turnover protocol includes inspecting for signs of pests, and testing for and remediating lead-based paint in apartments identified as having lead paint risk.

An empty apartment is much easier to inspect, repair, and upgrade. Staff can close pathways for cold air, odors, and pests. They can clean and seal ventilation registers so that stale and polluted air and excessive moisture are removed. Leaking pipes, drains, and fixtures can be repaired. Basic, low-cost energy-conserving upgrades can be made: efficient lighting, low-flow water fixtures, radiator maintenance, steam trap replacement, and new window balances.

Train property managers in practices that promote healthy homes

NYCHA launched the Optimal Property Management Operating Model (OPMOM) pilot (NextGeneration NYCHA Strategy 6) in January 2015, empowering local property managers to manage their own budgets, hire staff, and purchase materials. With the new model, NYCHA seeks to improve property management efficiency and improve customer satisfaction.

OPMOM property managers are revisiting their work methods and tools. NYCHA will incorporate basic sustainability training into the program to ensure that the investments made in healthy indoor environments are reinforced through daily operations and resident communications. Trainings will focus on healthy housing, energy and water management, and waste management.

NYCHA and DOHMH: Public Housing and Health

In 2015 NYCHA and DOHMH created a new office that reports to both agencies and aims to create programs and policies to improve the health of NYCHA communities. Its goals include:

- Reduce illness and promote healthy lifestyles through resident engagement and leadership development
- Tailor DOHMH and NYCHA policies to the self-identified health priorities of the community
- Advance prevention-focused health initiatives that offer health career paths for NYCHA residents

"Housing quality—and practices like integrated pest management and mold remediation that promote it—can have a significant impact on health. The Health Department is excited to continue to partner with NYCHA to improve the health of residents."

—Deborah Nagin, Director
Healthy Homes, DOHMH

Strategy S4
Efficiently provide comfortable and reliable heat and hot water

Existing Conditions

Like most multifamily buildings in the city, NYCHA buildings are chronically overheated in the winter: the average apartment temperature is consistently in the mid-70s to low-80s. Paradoxically, NYCHA residents also experience significant underheating and interruptions in hot water service because of equipment failure or gas supply interruptions.

NYCHA's operations staff face many challenges: an increasing need for minor repairs and maintenance at aging facilities, more emergency repairs of equipment that is at or past the end of its useful life, a lack of familiarity with new technologies, and a transitioning workforce where inexperienced staff outnumber veterans.

These factors highlight a critical need to invest in NYCHA operations staff by providing the up-to-date equipment, improved protocols, and on-going training that they need to perform well.

Modern technology can provide centralized monitoring and control of heating, ventilation, and lighting. A building automation system (BAS) can improve performance by operating equipment consistently and responsively. Energy management systems, when used in conjunction with BAS, can analyze energy data and translate it into actionable information.

"I really love my job, working with tools, working with my hands, being busy. I like raising the pipes, replacing radiator valves. When residents have heat and hot water and there are no complaints and everybody's happy, I'm happy."

Lillian Hernandez is one of the 300 Heating Plant Technicians (HPT) who make NYCHA residents have heat and hot water. As a resident of Red Hook Houses (Brooklyn), she began her career at NYCHA as a caretaker and became an HPT in 2010.

NYCHA's BAS and energy management systems are poorly integrated and require labor-intensive manual input, data manipulation, record matching, and analysis. NYCHA's platforms for fuel oil monitoring, utility bill management, and work order tracking cannot talk to each other. These gaps in integration make it more difficult to have essential data available when critical decisions are made in the field.

NYCHA began experimenting with remote monitoring and heating system automation in 1998; deployed a basic BAS, the CHAS, throughout the portfolio in 2001; and began to add indoor temperature controls in 2009. But even the most modern control systems cannot provide better comfort and reliability unless it is coupled with regular and rigorous testing and tuning.

When a new system is installed (a new boiler control, for example), it should then be commissioned—that is, thoroughly checked and put through its paces to insure it operates as designed. An existing system that is more than a few years old should be retro-commissioned, and for the same reason, every 2 to 5 years. Retro-commissioning can identify low-cost measures to improve performance, extend equipment life, and prevent outages and emergency repairs. In addition to assuring that building systems are in good working order, regular retro-commissioning provides a framework for training building staff to higher levels of skill, while keeping the operator, heating plant technician, site supervisor, and field supervisors up to date about the entire plant.

Training is also critically important. NYCHA has historically hired entry-level staff and successfully invested in their professional growth over many years, both through formal training programs and through informal mentorship. Now, however, as experienced staff members are promoted to other responsibilities or retire, there is a corresponding loss of institutional memory. NYCHA must

Left to Right:
Plumbers Helper Deanna Gonzalez;
A maintenance worker at Morris Houses

attract, train and retain qualified people or risk wholesale system breakdown; a more formalized professional development program is needed.

Implementation

Improve heating and hot water systems through smart building technology

In NextGeneration NYCHA Strategy 5 "Transform to a digital organization", NYCHA committed to use smart building technology to improve service and efficiency. In March 2016, NYCHA engaged the CUNY Building Performance Lab to complete a BAS needs assessment by the end of 2016.

Based on the results of the assessment, NYCHA will upgrade or replace the existing building automation and energy management systems so that they are integrated with the utility billing and work order tracking systems.

Thoroughly test and tune all building systems regularly

NYCHA will adopt a three-pronged approach to commissioning and retro-commissioning:

An **energy audit** is an assessment of the energy consumption of a building to identify cost-effective energy improvements and operational changes that will result in energy savings.

A **Physical Needs Assessment** is an accounting of the short-term and long-term capital upgrades.

1. Complete Local Law 87 retro-commissioning by 2020
   Local Law 87 (LL87) requires energy audits and retro-commissioning of systems once every 10 years for all NYC buildings 50,000 square feet or larger. In December 2015, NYCHA proposed a compliance plan that makes the most of limited resources by integrating LL87 compliance into requirements of existing HUD programs, such as the 5-year Physical Needs Assessment to be completed in 2017, and the energy audits for the forthcoming HUD EPCs. The new plan will mean that the entire NYCHA portfolio will complete LL87 requirements ahead of the original schedule, and at lower cost.
2. Extend post-construction commissioning to include a 6-month return visit
   NYCHA's heating systems are currently commissioned at the end of construction. Retro-commissioning the system six months after installation (within the warranty period) provides a chance to find and address any deviations from optimal operation that may have developed. Retro-commissioning also helps identify additional staff training needs.
3. Incorporate retro-commissioning into regular inspections
   NYCHA's senior heating management staff conducts regularly scheduled and spot inspections of boiler plants. NYCHA will incorporate the LL87 retro-commissioning checklist into the inspection protocols so that it is included as an integral part of the regular inspections.

Create a skills-based professional development path for Heating Plant Technicians

Heating Plant Technicians (HPTs) play a critical role in delivering comfortable and reliable heat to NYCHA residents. They are charged with keeping equipment in good repair: monitoring fuel levels, responding to alarms, treating boiler feedwater, and seasonal cleaning and tuning of equipment. Because HPTs are often hired without field experience, in the first year of employment they receive 48 days of training in operations and maintenance of the equipment most commonly found at NYCHA.

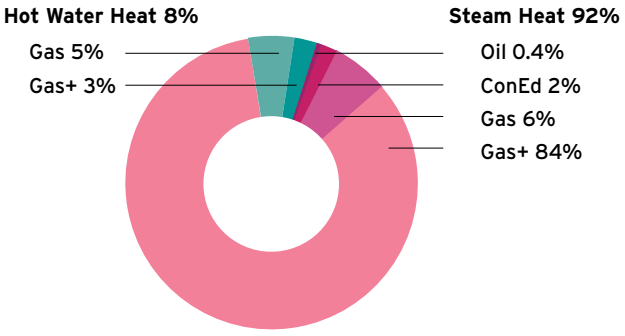
Although NYCHA's heating plant training is well-known in the industry for its high quality, a technician with little or no prior mechanical experience also needs a chance to apply training lessons in real-world situations. To that end, NYCHA has partnered with CUNY's Building Performance Lab to assess the training needs for HPTs, not only in the first year of work, but over the first three to five years as well. By the end of 2016, NYCHA and CUNY will develop a curriculum that balances classroom work with in-field training so that the knowledge is immediately applicable to the day-to-day tasks of HPTs.

Create a retro-commissioning training program for Heating Administrators and Field Supervisors

Heating administrators, field supervisors, and assistant field supervisors are senior staff responsible for the proper delivery of heat and hot water. Each Heating administrator oversees an average of 45 developments and more than a hundred HPTs. Field supervisors and assistant field supervisors jointly oversee teams of 35 HPTs. These senior staff members have substantial specialized knowledge, particularly of large steam heating systems.

By complementing this expertise with retro-commissioning capability, NYCHA will be able to improve the reliability and efficiency of its heating system operations. NYCHA and the CUNY Building Performance Lab will assess needs in 2016 and propose a training/certificate program to be implemented in 2017.

92% of NYCHA Apartments Use Steam



Gas+ is firm gas with duel fuel burners
Source: NYCHA Energy and Sustainability

Strategy S5
Improve water management and support the City's goal of reducing water demand by 5 percent by 2020

Existing Conditions

According to the City's Department of Environmental Protection (DEP), NYCHA developments consume 38 million gallons of water every day, accounting for 4 percent of the City's total. Reducing NYCHA's consumption thus plays an important part in meeting the goals of DEP's Water for the Future program.

Despite steady progress in water management, consumption at NYCHA developments continues to be high—data from metered NYCHA developments show it to be 30 percent higher than the citywide multifamily average—but the reasons why are not well-understood.

The **Water for the Future** program will fix leaks in the Delaware Aqueduct, one of two main aqueducts that supply drinking water to New York City.

Reducing water demand will facilitate the temporary shutdown and repair of the aqueduct.

Implementation

NYCHA has a long history of collaboration with DEP on conservation initiatives, including the 1994 Toilet Rebate Program. NYCHA will continue this partnership and will:

Meter all developments by 2018

Water meters are installed in 75 percent of the NYCHA portfolio. In 2014, DEP began meter installations for the 114 developments remaining unmetered; this effort is scheduled to complete in 2018. NYCHA and DEP are also identifying missing or failed meters from prior meter installations.

These meters will enable DEP to know how much water NYCHA uses and identify sites of excessive consumption. They will also allow NYCHA to document water and sewer cost savings and incorporate them into financing programs, and thus make additional funds available to invest in conservation.

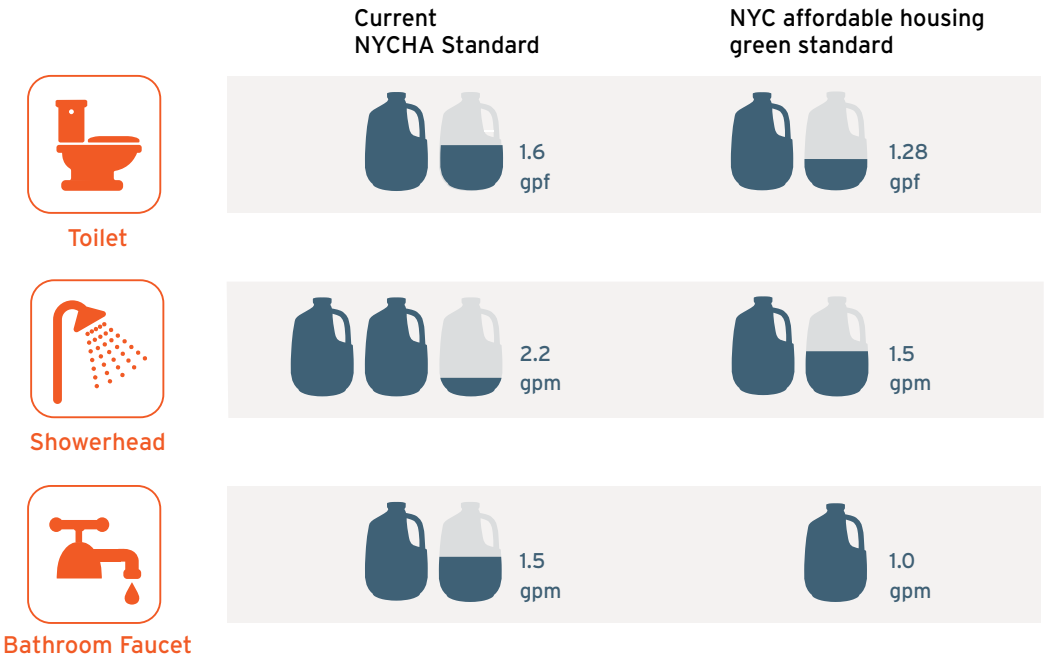
Understand the patterns of water consumption and identify conservation opportunities

A detailed understanding of how water is used or wasted will help NYCHA and DEP design more-effective conservation programs. NYCHA consumes 30 percent more water than the NYC multifamily average, but because development-wide meters can't distinguish between water used by people and water lost through system inefficiencies, a detailed study is needed.

1. **Conduct a water consumption baseline study.** In 2016, NYCHA and DEP will launch a detailed water consumption study in a small number of metered buildings. The study will attempt to quantify water use by installing temporary meters on apartment-line supply risers and individual fixtures.
2. **Connect boiler feedwater meters to the Energy Management Information Systems.** When water leaks out of a boiler or its distribution pipes, new "makeup" water is needed. NYCHA meters this boiler makeup water to detect leaks, but the meters are not remotely monitored. As the results of the Smart Building study are finalized and a plan put in place (Strategy S3), the makeup meters will be linked to the automated monitoring system.
3. **Submeter non-residential water use on NYCHA property.** NYCHA hosts a variety of non-residential water loads, ranging from community centers to retail spaces. With the exception of large commercial laundries, these loads are not separately metered. Submetering these spaces will provide more complete knowledge about water use on NYCHA property.

Replace outdated fixtures with water-efficient fixtures and update purchasing standards

NYCHA will match the citywide requirements for water conserving fixtures in affordable housing. Between 1994 and 2001, NYCHA replaced thousands of 3.5 to 5.0 GPF toilets with efficient 1.6 GPF models, but not all developments were upgraded through this program. NYCHA will work with DEP to identify and replace any remaining toilets of this type.



DEP and NYCHA partner to save water and energy in southeast Queens

South Jamaica I & II

Built between **1940 and 1954**
2,347 residents
1,048 apartments
Water consumption:
161 million gallons
Source energy use intensity:
195 kBtu/sf

DEP and NYCHA will work together over the next three years to combine energy- and water-efficiency upgrades with stormwater management at Jamaica Houses I and II in southeast Queens. The project, led by DEP and NYCHA with support from Enterprise Community Partners, includes a DEP investment of $1 million, a $736,000 grant from the New York State Energy Research and Development Authority (NYSERDA), and HUD EPC-funded energy efficiency upgrades.

Southeast Queens suffers from a high water table, which has been a contributor to frequent local flooding for more than 40 years. DEP has already spent $438 million on water and wastewater infrastructure upgrades in this part of the city since 2002.

The project will help alleviate local flooding and create additional capacity in the sewer networks for high intensity rain storms. It will also add grounds ammenities, including upgraded playground spray showers.

The project will begin with a robust community engagement process in Fall 2016.

The goals of the project are:

Extend the impact of NYCHA's EPC through a holistic approach for water and energy

By using the EPC work as an applied research opportunity for water and stormwater, NYCHA and DEP will lay the foundation for water efficiency and energy efficiency to go hand in hand in the future.

Quantify the residential end-uses of water

Only by knowing where water is used (and wasted) will it be possible to substantially reduce water consumption. This project will measure water use in individual fixtures, apartments, and risers to help determine the best places to invest in water-saving technology.

Measure and analyze the impact of onsite stormwater management.

This new project will measure stormwater flow at the development and then install several measures to control stormwater. After installation, the measures will be monitored to learn how well they are working. The lessons learned will inform how similar projects are designed and implemented.

Strategy S6
Develop and implement a comprehensive waste management plan

Existing Conditions

In OneNYC, the City set the ambitious goal of sending zero waste to landfills by 2030, and made a committment to "Give every New Yorker the opportunity to recycle and reduce waste, including at NYCHA housing."

NYCHA's 2,800 building caretakers—a quarter of NYCHA's employees—spend one third of their time collecting, transporting, and storing trash. Traditional manual handing methods expose caretakers to many health and safety risks, including lacerations.

NYCHA properties lack the waste-handling infrastructure of new high-density residential buildings. Refuse chutes, state of the art in the mid-20th Century, are too small to accommodate the volume of garbage generated today. NYCHA buildings also lack dedicated rooms on every floor and dedicated recycling collection areas accessible to residents. Compactor rooms are too small to accommodate modern, high-volume equipment. As a result, residents discard trash in spaces that are not designed or designated for it, which creates rodent infestations and safety challenges if left unaddressed.

John de Carlo Award winner Caretaker Victor Cortez moves trash.

Implementation

Despite the physical constraints that make modernizing waste handling difficult, NYCHA is committed to meeting the City's waste management goals.

The NYCHA comprehensive waste management plan will identify infrastructure improvements, changes in building operations, and construction and demolition waste management standards needed to achieve the City's waste-reduction goals, including ways to shrink the carbon footprint of waste. The plan will define how NYCHA will implement the waste management goals articulated in the OneNYC plan:

- Expand the New York City organics program to serve all New Yorkers;
- Reduce the use of plastic bags and other non-compostable waste;
- Expand opportunities to reuse and recycle textiles and electronic waste; and
- Develop an equitable blueprint for a Save-As-You-Throw program to reduce waste.

Install recycling infrastructure throughout NYCHA's portfolio

In the spring of 2015, NYCHA began to equip developments with recycling bins and partnered with DSNY and GrowNYC to provide recycling educational sessions to residents. As of December 31, 2015, NYCHA has installed recycling infrastructure in 99 NYCHA developments housing more than 150,000 residents. All developments will have recyling infrastructure by the end of 2016.

Complete a waste composition study by 2017

The success of programs to divert waste from landfills hinges on detailed understanding of what materials residents throw away. A citywide study by DSNY in 2005 showed that residential solid waste comprises 39 percent organics, 30 percent paper, 4 percent plastic, 5 percent metal and 4 percent glass. NYCHA's residential waste stream may contain different proportions of organics, recyclable materials, and trash. The first step in devising new diversion programs is to conduct a waste composition study, a detailed examination of what residents throw away. In tandem with the study, NYCHA will work with residents and community-based organizations to devise strategies on achieving high resident participation in diversion programs.

Through **diversion programs**, waste is recycled, composted, transformed into energy, reused or repurposed.

Environmental Ambassadors: Neighbors Helping Neighbors Recycle

The NYCHA Recycles! Program, created in partnership with the Department of Sanitation, will ensure that all 328 developments are recycling by the end of 2016. NYCHA is working with GrowNYC, an environmental non-profit, to train resident volunteers to help their neighbors learn the ins and outs of the City's recycling program.

Volunteers learn about the importance of recycling, which items to recycle, and how to encourage their neighbors and community members to recycle. Ambassadors also make field trips to see the City's recycling program behind the scenes. After completing their training, Ambassadors will spend at least 12 hours on recycling efforts at their developments.

Meet two of NYCHA's new Environmental Ambassadors:

"Taking care of the environment is a community effort and it begins at home. I decided to do this program to inspire someone in my neighborhood—someone my age, older, my little sister—to really take pride in their neighborhood." —Joy Junious

"This green thing is kind of infectious! If recycling is the least thing I could do to help out the planet, then I'll do it. Just think, if a fraction of us do it, we'd be surprised at how much we could change." —Pamela Azore

Brownsville Houses resident Joy Junious, 20, says her interest in the environment began when she was a high school student at The New York Harbor School, which features a marine-themed academic program. After high school, Joy joined Green City Force and worked on numerous projects, including weed removal from a garden at Lillian Wald Houses and home reconstruction with Friends of Rockaway.

After Green City Force, she joined NYCHA as a Recycling Project Outreach Coordinator and worked to engage residents and organize recycling kick-off events at NYCHA developments citywide. But Joy wanted to do even more for her community, so she signed up to become an Environmental Ambassador.

Pamela Azore first learned about the importance of recycling in 2010 when she joined the Resident Green Committee at Pomonok Houses. She's a proud recycler now and says the blue and green recycling bins at her development are a beautiful sight. She hopes "to become really proficient in delivering the message to residents and neighbors that we're going green! I want to help them do this as simply as possible—they care about the planet and want their children and grandchildren to grow up in a healthy environment."

A resident of Pomonok Houses for 23 years and a RGC leader, Pamela educates fellow residents about tree care and garden planting, and helps plan special projects and events, like Pomonok's third annual Resident Green Committee Palooza, which combines recycling, green activities, and family fun.

GOAL #3

(RE)BUILD, EXPAND, AND PRESERVE PUBLIC AND AFFORDABLE HOUSING

GOAL 3: (RE)BUILD

NYCHA's extensive portfolio, including buildings and open spaces, holds enormous untapped potential to improve the lives of residents, strengthen the Authority's financial position, and provide more affordable housing.

A commitment to sustainability as an inseparable part of housing construction and preservation will ensure that NYCHA's investments will result in quality housing both for today's residents and for future residents who will call NYCHA home when the effects of climate change have become even more severe.

The integration of sustainability into NYCHA's daily operations will require adoption of aggressive standards, improvements in health and comfort, and investment in energy and water efficiency and climate resilience.

Strategy S7: Adopt sustainability standards

NYCHA will align sustianability standards for new construction and renovations to the NYC Overlay to the Enterprise Green Communities Criteria, the City's green standard for affordable housing since 2011.

Strategy S8: Eliminate roof, façade, and plumbing leaks

An important step in eliminating mold and pests is to prevent water from entering buildings from the exterior. Interior plumbing leaks must also be addressed wherever they are found.

Strategy S9: Retrofit master-planned developments

NYCHA will pursue a series of EPCs to provide brighter and more efficient lights, consistent and comfortable heating, new water-conserving fixtures, and working ventilation in all buildings with mechanical exhaust systems.

Strategy S10: Retrofit scattered-site developments

NYCHA will tap the New York State Weatherization Assistance Program and utility-run energy efficiency programs to provide energy- and water-efficiency upgrades.

Strategy S11: Build green infrastructure

NYCHA will partner with DEP to install green infrastructure at NYCHA developments within the Combined Sewer Overflow priority areas, and seek funds to implement the "Stormwater Management Through Placemaking" initiative at Superstorm Sandy-affected developments.

Strategy S12: Incorporate climate change resiliency into capital planning

NYCHA will assess the risks presented by Sandy-like storms, develop resiliency retrofit plans for developments in the 100-year floodplain, and assess hazards associated with excessive heat and other climate change-related disturbances.

Strategy S7
Adopt sustainability standards

Existing Conditions

Stringent and well-enforced sustainability standards make buildings more efficient and construction techniques more effective. NYCHA's existing design guidelines and specifications are out of step with current standards.

Implementation

In 2015, NYCHA committed to creating design principles, resident-focused guidelines, and standards and specifications that promote excellence (NextGeneration NYCHA Strategy 12). As part of this effort, NYCHA will adopt sustainability standards for all new construction and rehabilitation projects.

NYCHA is providing underutilized NYCHA-owned land to support the creation of affordable housing units (NextGeneration NYCHA Strategy 10). All new construction projects will be required to conform to the NYC Overlay to the Enterprise Green Communities Criteria. Since 2011, all City-financed affordable housing projects have been required to meet this standard; NYCHA's participation will create a consistent policy for all affordable housing programs.

Through **RAD** public housing developments can receive comprehensive rehabilitation and be preserved as affordable housing.

All substantial rehabilitation projects, including Rental Assistance Demonstration (RAD) projects (NextGeneration NYCHA Strategy 11), will be required to meet an aggressive minimum energy performance standard.

Single-system and moderate rehab projects executed by NYCHA will also follow more rigorous standards and specifications consistent with the NYC Overlay to the Enterprise Green Communities Criteria.

East Harlem Center for Living and Learning, designed to meet the NYC Overlay to the Green Communities Criteria, sits on a former parking lot at Washington Houses.

It includes 88 affordable apartments; office space for Harlem RBI, a non-profit specializing in after-school programs for students; and the new DREAM Charter School, serving grades K-8.

Image: Harlem RBI

Strategy S8
Eliminate roof, façade, and plumbing leaks

Existing Conditions

An important, but costly, step in eliminating mold and pests is to prevent water from entering buildings from the exterior. From 2011 to 2015, NYCHA invested $700 million in roof repairs in an effort to eliminate moisture infiltration. The current estimate for bringing all NYCHA roofs, parapets, and facades to a state of good repair and eliminate the current backlog of roof replacements is $1.8 billion, or $450 million per year over four years. In other words, fixing all currently failed roofs would take twice the amount of capital subsidy that NYCHA receives from HUD annually.

Yet eliminating roof leaks is only one step in stopping mold. In 2015 NYCHA estimated, based on the 12 developments with the highest number of mold-related complaints, that an additional $7.6 million per building would be required to comprehensively stop mold. This is because of the need to fix leaking parapets and leaking hot and cold water lines, abate interior mold, and restore apartments to their pre-mold condition.

Implementation

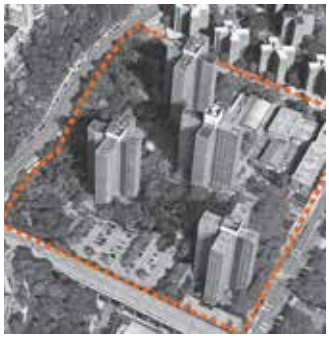
In NextGeneration NYCHA Strategy 9 "Devise a capital planning strategy to address portfolio-wide needs", NYCHA committed to raising resources to fund roof repairs. With a 3-year commitment of $300 million by the City, NYCHA began roof repairs in June 2015 at Queensbridge Houses (3,147 apartments), the first of a group of 66 buildings to benefit. The 66 buildings were selected because they had the highest numbers of mold-related maintenance repair requests.

Despite this investment, 45 percent of NYCHA developments need immediate roof replacements, but have no source of funds. Some 90 percent of the apartments that are affected are in master-planned developments, and comprise more than half of all NYCHA units. Further, roof replacements and façade repairs only address part of the problem; interior plumbing leaks must also be addressed wherever they are found.

NYCHA will continue to seek funding for roofs and exterior repairs and interior plumbing upgrades, especially at the buildings where roofs have been replaced in the past five years.

Strategy S9
Retrofit all master-planned developments by 2025

Existing Conditions



Master-Planned sites at Polo Grounds in Harlem and Williamsburg Houses in Brooklyn.

Master-planned developments consist of several multi-story buildings on one large, usually contiguous area.

Some 87% of NYCHA apartments are in master-planned developments. The number and size of the buildings varies from site to site.

For example, Williamsburg Houses, one of NYCHA's oldest master-planned sites, was built with 20 four-story walk-up buildings; Polo Grounds was built with four 31-story towers.

Eighty-seven percent of NYCHA apartments are part of master-planned developments, each home to an average of 2,700 residents. These developments use 40 percent to 50 percent percent more energy per square foot than the average multifamily building in New York.

Much of this energy is used to keep buildings at uncomfortably high temperatures. DOHMH recommends winter indoor temperatures of 68 to 75 degrees. NYCHA apartments are consistently above 75 degrees, often reaching the 80s.

Another contributor to high energy consumption is high electricity use in apartments. Almost all of NYCHA's developments are master-metered for electricity, meaning that NYCHA, rather than the resident, pays the cost. Independent studies and NYCHA's own data show that residents who are not billed directly use much more electricity than residents who are billed directly. As long as developments are master-metered, NYCHA must minimize the electric use associated with apartment lighting and NYCHA-supplied appliances.

Implementation

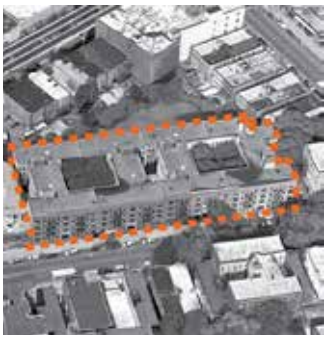
At the moment EPCs are NYCHA's best opportunity to improve energy and water efficiency. EPCs are well-suited to the scale of NYCHA's master-planned developments because they pool savings from multiple developments in a single project, which maximizes the scope of work at each development.

In April 2015, NYCHA announced the first of a series of large-scale $40 million to $100 million EPCs. NYCHA has worked closely with the City and HUD to streamline and expedite the first EPC, and to lay the groundwork for three more EPCs to launch in 2016.

EPCs will fund improvements that provide brighter and more efficient lights, consistent and comfortable heating, and new water-conserving fixtures. NYCHA will also upgrade ventilation in all buildings with mechanical exhaust systems, ensuring that stale air and excess moisture are removed from apartments.

Strategy S10
Retrofit apartments in scattered-site developments

Existing Conditions



Scattered-site developments on Hunts Point Avenue in the Bronx and Ralph Avenue in Brooklyn.

Scattered-site developments are typically composed of walk-up or low-rise elevator buildings spread throughout a given neighborhood and mixed in with non-NYCHA buildings. NYCHA acquired the scattered-site buildings in the 1970s.

Because these two development types differ fundamentally in locational patterns and building form, their operation and renovations require different strategies and programs

NYCHA's portfolio includes 659 stand-alone buildings and 1-4 family homes, housing 45,000 residents. These developments differ from master-planned developments in size, construction type, and building systems. They are difficult for NYCHA's capital and maintenance programs to address, but existing energy efficiency programs are well-suited to provide energy and water efficiency upgrades to scattered-site developments.

New York State's WAP program, managed by New York State Homes and Community Renewal (HCR), is the largest and oldest low-income energy retrofit program in the country, with a typical annual budget of $60 million. The program serves single-family and multifamily buildings, using a State-wide network of non-profit agencies. Over its 39-year history, the program has weatherized 688,000 homes and apartments across the state.

WAP projects typically achieve 15-20 percent energy use reduction, and have been shown to improve indoor comfort and air quality. A typical project includes air infiltration reduction, heating system repair, hot water tank and pipe insulation, window and outside door repair or replacement, roof and wall insulation where needed, and the correction of ventilation problems.

Utility-sponsored energy efficiency programs that provide basic, low-cost upgrades can work well in conjunction with WAP. Past programs have provided room-by-room temperature controls to reduce overheating; new showerheads and faucet aerators, smart power strips, and energy-efficient lights. Since 2015, utility-sponsored programs have served 8,356 NYCHA apartments.

Implementation

To address the need for moderate rehabilitation of these buildings to enhance resident health, safety, and comfort, NYCHA will tap WAP and utility programs to make sure that NYCHA residents benefit.

In 2015 HCR started a pilot program to allow two developments in Brooklyn to benefit from WAP. The work is being done by Sunset Park Redevelopment Committee, a community-based non-profit WAP agency, in conjunction with additional funding from Con Edison.

NYCHA has committed to pre-qualifying up to 5,000 apartments and making them available for WAP assistance, contingent on funding availability.

Green Infrastructure

Stormwater runoff from impervious surfaces like streets, sidewalks, roofs, and parking lots can overwhelm New York's combined sewer system. Green infrastructure uses natural systems to delay the flow of runoff so it seeps slowly into the ground.

Green infrastructure is a cost-effective way to beautify neighborhoods, improve drainage and air quality, and to reduce local air temperature during hot weather.

Right of Way Bioswales and Stormwater Greenstreets are planted areas in a sidewalk or roadbed that capture curb runoff. They are installed over a layer of broken stone with engineered soil and topped with appropriate plants and trees.

Rain Gardens are similar to bioswales but are more spread out and are located within a property rather than in a public thoroughfare. Like a bioswale, they include a stone layer, engineered soil, and planted area. The plants in this application must be able to tolerate both dry and wet conditions.

Subsurface Infiltration Systems are installed underneath parking lots or other large paved surfaces. They include a bed of broken stone and a storage system, such as storm chambers or perforated pipes.

Porous Paving can be configured to either allow water to infiltrate through the paver joints or through the paving itself. As with the other systems described above, porous paving is installed over a base of broken stone.

Photos: New York City Department of Environmental Protection

Strategy S11
Build green infrastructure for stormwater management

Existing Conditions

In 60 percent of New York City, the sewer pipes carry both rainwater and wastewater away from buildings. When these combined sewers experience higher than normal flow during heavy rain or snow, treatment plants are unable to handle the excess, and a mix of stormwater and untreated wastewater discharges directly into the city's waterways. This is called a combined sewer overflow (CSO). The wastewater may contain untreated sewage that could harm people and wildlife in the surrounding areas.

Since 2010, the City has reduced the amount of rainwater that goes into the sewers during heavy rains by installing "green infrastructure"--bioswales, green roofs, subsurface detention systems, and porous paving. DEP plans to use green infrastructure to manage one inch of runoff from 10 percent percent of the impervious surfaces (roofs, streets, etc.) in combined sewer areas by 2030.

With 2,500 acres of land, NYCHA has a unique asset to contribute to the City's green infrastructure and water quality goals. At the same time, green infrastructure can help improve site drainage and prevent rainwater from infiltrating into basements and contributing to in-building moisture and mold.

Implementation

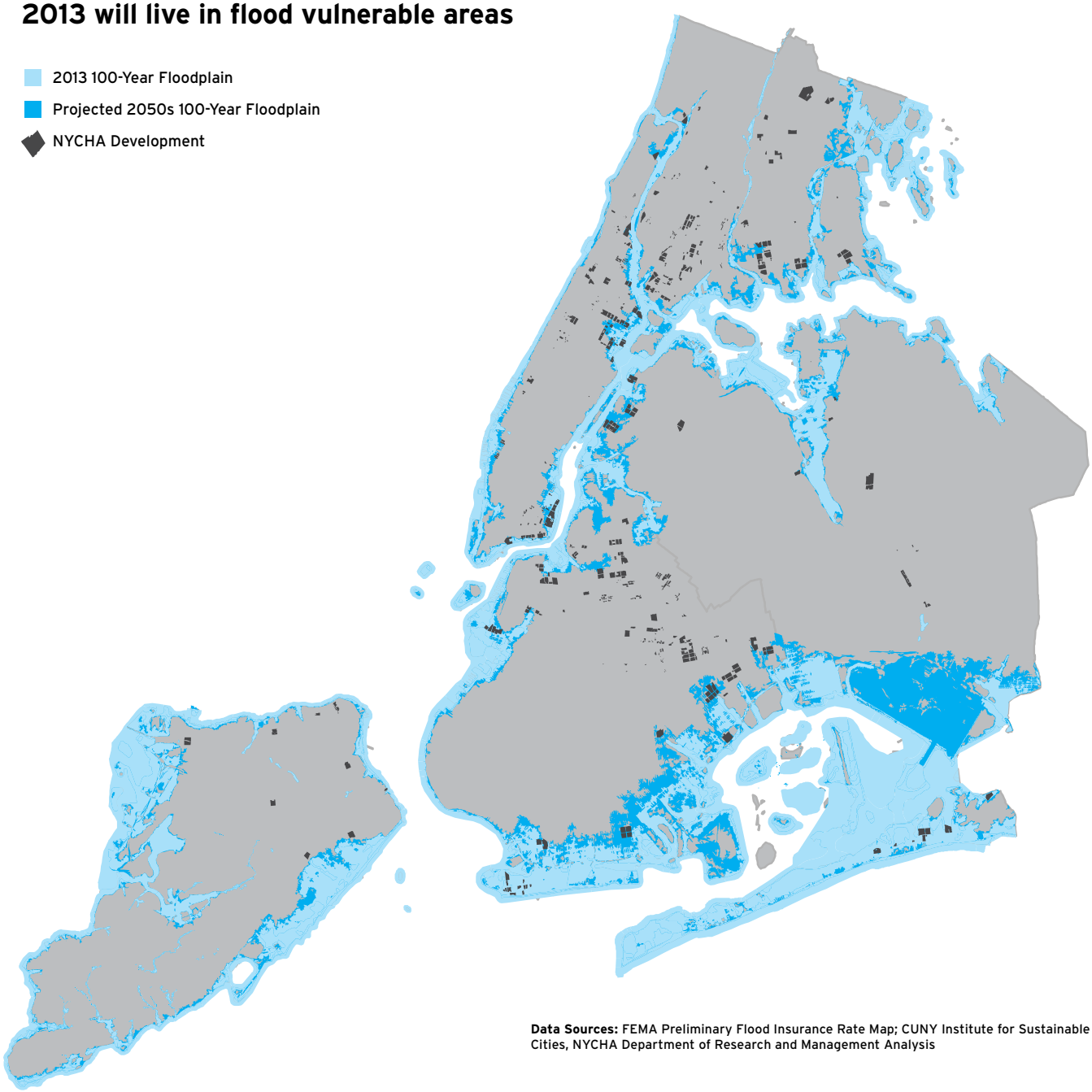
Install green infrastructure at NYCHA developments in the CSO areas

In 2010 and 2013, NYCHA and DEP partnered on green infrastructure pilot installations at Bronx River Houses, Hope Gardens, and Seth Low Houses. DEP is currently constructing green infrastructure at Edenwald Houses and Gowanus Houses, and evaluating opportunities at 31 developments in Brooklyn and the Bronx.

Manage stormwater at developments affected by Superstorm Sandy

NYCHA's "Stormwater Management Through Placemaking" initiative is designed to manage a 6 to 8-inch, 24-hour rainstorm by detaining, storing, and absorbing water. The program is currently unfunded, and NYCHA has applied to Federal Emergency Management Agency (FEMA) for 404 Hazard Mitigation funds to begin installation at eight Sandy-damaged developments. This effort has the potential to manage millions of gallons of water in a way that will alleviate substantial stress on the city's stormwater system.

By the 2050s, twice as may residents as in 2013 will live in flood vulnerable areas



Data Sources: FEMA Preliminary Flood Insurance Rate Map; CUNY Institute for Sustainable Cities, NYCHA Department of Research and Management Analysis

The 100-year floodplain is the land area with a 1 percent chance of flooding in any given year. As climate change causes the sea level to rise, the floodplain area widens and more buildings and people become vulnerable.

To estimate how much larger the floodplain area would be by 2050, CUNY added projected sea-level rise values to the existing floodplain map. CUNY selected the high-estimate (90th percentile) projection of sea-level rise (31 inches) provided by the New York City Panel on Climate Change.

Strategy S12
Incorporate climate change resiliency into capital planning

Existing Conditions

Adaptation to climate change will become increasingly important in the effort to preserve the NYCHA portfolio, and to blunt the potential impacts on safety and quality of life. According to the New York City Panel on Climate Change, by the 2050s, New York will experience 4.1° to 5.7° F higher average temperatures, 4 to 11 percent more precipitation, and 11 to 21 inches of sea level rise. New York may have as many above-90° F days per year as Birmingham, Alabama does today. Costly weather disasters are already becoming more frequent, and sea level rise will cause coastal flooding to be both more frequent and intense.

The New York City Panel on Climate Change is an independent body comprising leading climate and social scientists and risk management experts. It produces climate projections specific to New York City and advises the Mayor on climate risk and resiliency.

Superstorm Sandy showed that many NYCHA buildings are vulnerable to coastal flooding. More than 60,000 residents lost essential services, including electricity, elevators, heat, and hot water for at least a few days, and in some cases as long as several weeks. But many developments that were not damaged during Sandy remain equally vulnerable. Currently, an estimated 54,000 residents live in some 250 buildings that are in the 100-year flood plain. By 2050, that number is expected to double, to 106,000 residents in 530 buildings. NYCHA cannot wait until the next superstorm, or other climate disaster, to start planning.

Implementation

Develop detailed flood resiliency retrofit plans.

For all developments in the 100-year floodplain, NYCHA will assess the risks presented by a Sandy-like storm and develop specific resiliency retrofit plans in anticipation of future funding. The resiliency plans will incorporate lessons learned from the $3 billion Sandy Recovery and Resiliency program. NYCHA will also look for guidance in the many design guidelines and toolkits that have been developed post-Sandy.

Conduct climate hazards assessments

Climate change will also bring hazards other than floods and storms. NYCHA will identify and assess hazards associated with excessive heat and other climate change-related disturbances. As these hazards will have impacts beyond NYCHA properties, NYCHA will seek external partners and will participate in community-based planning efforts.

Recovery to Resiliency: NYCHA's Sandy Recovery Program

In October 2012 Superstorm Sandy crippled much of New York City, including 10 percent of NYCHA's developments. Eighty thousand residents in more than 400 buildings in Brooklyn, Queens, Manhattan and Staten Island were significantly affected by the storm, and many still feel the impact today.

When the storm hit, 402 NYCHA buildings lost power—including elevator and trash compactor service. Three hundred and eighty-six buildings lost heat and hot water. Sandy uprooted hundreds of trees at NYCHA developments and piled up sand 4 feet at basement doors. Saltwater destroyed boilers, electrical panels, underground electrical conduits, trash compactors, and playgrounds. The storm crammed vehicles into corners of parking lots and carried away 30-foot-long trash compactors.

NYCHA pumped tens of millions of gallons of water from electrical and gas meter rooms, boiler rooms and other basement spaces. More than 20 temporary boilers and approximately 100 generators were brought in to restore heat, hot water, and electricity.

Baruch Houses' flood wall that functions as a public amenity bench.

Surge protection in the form of berm blend into the landscape.

Progress to date

Immediately after the storm NYCHA began the laborious process of documenting the damage and began negotiations with FEMA. After passing through many layers of FEMA approval, NYCHA received the largest grant in FEMA history—more than $3 billion. Final approval was received in December 2015.

NYCHA has begun permanent repairs at Lower East Side Rehab V in Manhattan. The project includes the restoration of mechanical, electrical and plumbing systems, dry flood-proofing and the installation of a back-up generator. Work is expected to be complete by the end of Summer 2016; Rehab V will be the first development made more resilient for future storms.

Repairs have also begun at the Red Hook Senior Center in Brooklyn. Boiler demolition, asbestos abatement, and electrical conduit replacements are underway in preparation for the major permanent repair projects in the pipeline.

Opportunity From Disaster

Despite its destructiveness, Sandy did yield something positive: it provided NYCHA with an opportunity to improve structural resiliency and better protect residents from future disasters.

NYCHA is working with a diverse team of architects, engineers, and designers to create more resilient housing for its residents. NYCHA test several approaches to resiliency as part of the Sandy Recovery projects and select the most successful for implementation across the entire portfolio. Innovative design features are being considered for community centers, childcare centers, senior centers, and common areas. Outdoor spaces will be dramatically upgraded with better connectivity, signage and visual enhancements.

Looking ahead

As of April 2016, NYCHA has released 6 projects for bid: Ocean Bay Oceanside, Smith, Astoria, Coney Island Houses Sites 4/5, Carleton Manor, and Coney Island Site 1B. These projects have either been awarded or are in the process of being awarded and work is expected to begin in Spring and Summer of 2016. NYCHA aims to have all Sandy recovery projects out for bid by the end of 2016.

Repairs and Upgrades at Sandy-Damaged Developments

While the scope of work will vary from building to building, many of the repairs and upgrades will be similar at each Sandy-damaged site:

- Raise vulnerable systems like mechanical, electrical and plumbing out of basements and relocate above the design flood elevation.
- Install natural gas-fired back-up generators.
- Install dry-floodproofing. Dry-floodproofing renders an area watertight below flood level by sealing walls with a waterproof coating, adding watertight fittings on electrical pull boxes and installing floodproof doors, flood panels, or flood logs.
- Install wet-floodproofing. Wet-floodproofing allows a space to intentionally flood without damage through the use of flood-resistant materials. The decision to use wet- versus dry-floodproofing is based on local conditions and by raising critical building systems above the flood elevation.
- Replace and enhance security systems through the installation of CCTV and layered access.
- Restore playgrounds and recreation areas damagd by the storm.

GOAL #4

ENGAGE RESIDENTS AND CONNECT THEM TO BEST-IN-CLASS SERVICES

GOAL 4: ENGAGE

NYCHA's mission includes facilitating residents' access to social and community services, but the lack of a dedicated funding source makes it financially unsustainable for NYCHA to continue directly providing these services and programs. As NextGeneration NYCHA is implemented, more NYCHA residents will access services, including sustainability-related programs, through partner organizations.

NYCHA's commitments as a landlord in the Sustainability Agenda are a starting point for engagement and partnership. The newly launched Fund for Public Housing, a nonprofit 501(c)(3) that seeks to raise funds to aid the Authority, and NYCHA's Community Programs and Development department will support resident- and community-led sustainability initiatives and connect residents to green jobs.

Strategy S13: Support resident- and community-led sustainability

NYCHA will launch an "ideas marketplace" for resident- and community-led sustainability initiatives; make Resident Green Committees independent and self-sustaining; promote healthy food access through resident-led urban agriculture; and deeply engage residents on NYCHA sustainability initiatives.

Strategy S14: Connect residents to green jobs.

NYCHA will require resident hiring and training plans in third-party clean and distributed energy projects that would not otherwise be required to develop such plans. NYCHA will prepare residents for future work in energy and sustainability by enhancing existing programs, and use NYCHA's purchasing power to create resident-owned business opportunities.

"Sustainability must include access to quality food and transit, and support the capacity of residents to become resilient in the face of climate change. NYCHA should undertake a robust resident engagement process to understand residents' critical needs."

—Peggy Shepard, Executive Director, WE ACT

Strategy S13
Support resident- and community-led sustainability initiatives

Existing Conditions

As a landlord, NYCHA is committed to tackling the challenges that can and should be addressed through capital improvements and effective and efficient building operation. But NYCHA's investments on their own will not create sustainable communities.

Residents make countless daily decisions: where and how to dispose of trash, when to open or close windows, and when and how much air conditioning to use. Each decision may be small, but accumulated across an entire development, they greatly affect how sustainable each NYCHA development can become.

Sustainability at NYCHA and in the surrounding neighborhoods are also intertwined. Community organizations already work together with NYCHA residents on projects ranging from recycling and sustainability-conscious living to community-wide resiliency planning and healthy food access.

Implementation

NYCHA has committed to transitioning from direct service provision to a partnership-based model (NextGeneration NYCHA Strategy 13). During the transition, NYCHA will support its existing sustainability programs and create new ways for resident- and community-led programs to partner with NYCHA, raise funds, and connect with one another.

Launch an Ideas Marketplace for resident- and community-led sustainability initiatives

Resident- and community-led sustainability programs respond to specific on-the-ground conditions informed by local priorities, cultures, and needs. Such programs tend to be small and isolated, and run the risk of competing against each other when they seek philanthropic support.

An online Ideas Marketplace, sponsored by the Fund for Public Housing and modeled on crowdfunding websites like Kickstarter, Crowdrise, and ioby, would provide resident- and community-led programs a platform to raise individual donations, seek volunteers, and find like-minded partners in other NYCHA communities to jointly raise philanthropic support. It will enhance the ability of the Fund for Public Housing to identify grass-roots projects and provide a transparent framework for working with NYCHA and with the Fund.

Make Resident Green Committees independent and self-sustaining

Since their inception in 2009, Resident Green Committees (RGCs) have mobilized residents to implement 22 projects addressing energy and water conservation, healthy eating, waste reduction, recycling, and gardening. In 2015, 1,165 residents participated in 13 committees in four boroughs.

Despite their successes, RGCs are available to only a small fraction of NYCHA residents. An acute lack of dedicated resources and program management staff makes it difficult to extend RGCs to all NYCHA developments.

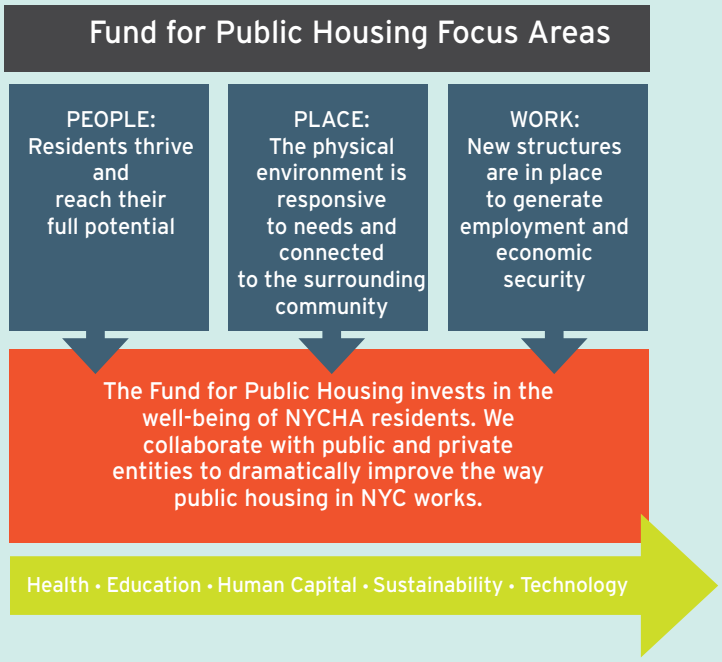
Over the next two years, NYCHA will strengthen the existing RGCs and facilitate the creation of new ones by offering leadership training to RGCs; by partnering with sister agencies that can provide on-going and scalable technical assistance; and by soliciting administrative sponsorship by community-based organizations.

Promote healthy food access through resident-led urban agriculture

Since the first resident gardening program started in 1963, NYCHA has consistently supported resident-led gardening projects. With growing recognition of the opportunity to use gardening as a means to provide access to healthy fruits and vegetables, NYCHA has expanded its support to include urban agriculture.

The Fund for Public Housing

The Fund for Public Housing is an independent not-for-profit organization established in 2015 to invest in the well-being of NYCHA residents. It will collaborate with public and private entities to dramatically improve the way public housing works. The flexibility of its nonprofit structure will allow the Fund to provide resources to NYCHA communities to an extent that has not been possible with NYCHA's already insufficient operating funds. The Fund will work closely with NYCHA residents and community stakeholders to determine its specific funding priorities, and it will ensure that its investments bring concrete improvements in the areas of People, Place, and Work. As it matures, the Fund will provide a platform for discussion, building consensus, and thought leadership regarding public housing.



Through the NYCHA Urban Agriculture Initiative, Green City Force and other community-based partners will establish five new farms in Brooklyn, Manhattan, the Bronx, and Staten Island to advance healthy food access and youth workforce and leadership development.

NYCHA is managing relationships with the key program partners and with City agencies to connect the Urban Agriculture Initiative to the citywide Building Healthy Communities Initiative, launched by the Mayor's Office in December 2015. NYCHA will work with the Mayor's Office of Strategic Partnerships, the Fund for Public Health in New York, and other city agencies to address inequities and improve community health.

These new projects build on the success of the Red Hook Houses Urban Farm, which produces four tons of fresh produce each year. Over a three-year period nearly 100 young NYCHA residents age 18-24 will be trained in farm management and community programming.

Deeply engage residents on NYCHA sustainability initiatives

NYCHA is focusing on engaging four key groups: youth, seniors, adults and parents, and elected resident leadership. NYCHA will ensure residents are informed about, and have an opportunity to shape, the Sustainability Agenda strategies in and around their homes.

Every strategy will incorporate resident outreach and consultation, with an emphasis not only on how NYCHA's actions will affect the quality of life during and after the implementation of specific initiatives, but also on creating opportunities for resident- and community-led initiatives that ensure lasting benefits from NYCHA's sustainability investments.

Photo: Green City Force
Children tour Red Hook Farm

Strategy S14
Connect residents to green jobs and economic opportunities

Existing Conditions

Strategy 15 of NextGeneration NYCHA speaks to NYCHA's commitment to connecting residents to quality workforce opportunities. NYCHA is subject to a federal policy known as Section 3, a provision of the HUD Act of 1968 that helps foster local economic development, neighborhood economic improvement, and individual self-sufficiency. The Section 3 program requires that recipients (contractors, vendors, and suppliers) of certain HUD financial assistance, to the greatest extent feasible, provide job training, employment, and contracting opportunities for low- or very low-income residents in connection with projects and activities in their neighborhoods. In 2015 NYCHA and its partners secured jobs for more than 3,200 residents; 1,500 of these jobs were generated through Section 3 covered assistance.

In 2009, NYCHA's Board created the Office of Resident Economic Empowerment and Sustainability (REES) to expand economic opportunity for residents through programs, policy and partnerships. REES focuses on employment and advancement, financial literacy and asset building, adult education and training, and resident-owned businesses. Through its "Zone Model," REES works with more than 50 high-quality organizations to provide both locally-based and citywide services for NYCHA residents.

Sustainability is already an important component of NYCHA's job readiness programs. The 8-week NYCHA Resident Training Academy construction curriculum, for example, already includes 18 hours of general sustainability content, including energy efficiency, renewable power, solid waste management, and indoor environmental quality. In addition, several of the REES zone partners—including Green City Force, WeACT, and City Tech's Green Building Maintenance program—provide training for sustainability-related jobs.

Implementation

Require resident hiring and training plans in clean and distributed energy projects

NYCHA will mandate that proposers of renewable and distributed generation projects on NYCHA property submit resident hiring and training plans as part of the selection process, even when the project would not usually be subject to

Section 3. Once an award is made, NYCHA will use existing protocols to support recruitment and monitor compliance.

Prepare residents for future work in energy and sustainability

NYCHA is committed to incorporating energy efficiency, sustainability, and resiliency curricula into existing and new training programs to prepare NYCHA residents for opportunities in sustainability-related jobs.

In 2016 Green City Force received a planning grant under the Young Adult Sectoral Employment Project sponsored by JobsFirstNYC. Green City Force and NYCHA, along with Con Edison, L&M Development Partners, and other participants, will develop a model for job training and placements in green, high-performance green buildings.

REES will also incorporate sustainability into the NYCHA Resident Training Academy (NRTA), a public/private partnership funded by the Robin Hood Foundation. Through the NRTA, residents take classes from some of the city's premier vocational training providers. The program has provided employment-linked training opportunities and job placement assistance in the construction, pest control, maintenance, and janitorial fields since 2010.

The NRTA curriculum is designed to ensure that residents graduate with useful skills. Since the launch of the program, over 1,332 residents have graduated from the NRTA, and of these, 88 percent have secured employment with NYCHA, with NYCHA contractors or with affordable housing developers.

"A bold vision of sustainability will drive good jobs, healthy homes, accessible and productive green spaces, and resiliency and security. NYCHA's young residents have a central role to play in informing and implementing this vision, as leaders and professionals."

—Lisbeth Shepherd, Executive Director, Green City Force

Photo: Green City Force
CGF members on a solar PV installation training with Grid Alternatives

NRTA evaluation in progress

Use NYCHA's purchasing power to create resident-owned business opportunities

NYCHA will make every effort to connect resident-owned firms with business opportunities created by NYCHA's sustainability initiatives.

A REES survey of resident business owners in 2013 revealed that their key needs included business education, incubator space, and access to capital. Since then, REES has connected more than 500 NYCHA residents to organizations that can help meet these needs.

In 2015 REES launched Food Business Pathways (FBP)—an innovative accelerator program. FBP is a collaboration among the NYC Department of Small Business Services, the NYC Economic Development Corporation, Citi Community Development, Hot Bread Kitchen, Start Small Think Big, and other kitchen incubators and REES zone partners around the city. Eighty residents have graduated from FBP and 67 businesses have been formed to date.

REES now seeks to adapt the FBP model to other industries, based on relevant market opportunities. REES will also connect resident-owned sustainability businesses to technical assistance and capacity-building programs.

NYCHA will also encourage all resident-owned businesses that have a sustainability focus to register as vendors with the agency so they may be connected to NYCHA's Section 3 Business Concern and Minority, Women, Small, Business Enterprise efforts.

80 X 50

WORKING TOWARDS 80 PERCENT REDUCTION IN GREENHOUSE GASES BY 2050

80 x 50

In One City Built to Last, the City identified global climate change as the challenge of a generation and proposed an ambitious plan to mitigate climate change by reducing greenhouse gases 80 percent by 2050 (80x50). NYCHA will do its part to contribute to achieving this ambitious goal.

The City estimated that meeting this goal would require buildings to reduce emissions from a 2005 baseline by 30 percent by 2025 and by 60 percent by 2050. NYCHA has partnered with HUD and DOE on the Better Buildings Challenge and has committed to reducing its per-square-foot energy use by 20 percent by 2025. This reduction would result in a 27 percent reduction in GHG emissions, very nearly meeting the 30 percent reduction goal for buildings.

Even with these reductions, however, the NYCHA portfolio will still trail other multifamily buildings in the city in 2025, because NYCHA's average building currently consumes about 40 percent more energy than the average multifamily building. To bridge this gap by 2050, NYCHA must explore far-reaching and fundamental changes in how it heats, cools, and provides water and other basic services to its buildings.

Strategy S15: Create an 80 x 50 roadmap

Beyond 2025, NYCHA is unlikely to achieve further reductions without substantial changes in fundamental building systems. NYCHA will determine how much additional reductions must be generated, and estimate the costs and benefits of various "deep retrofit" pathways.

Strategy S16: Create incentives to encourage new low-energy buildings

NYCHA will work with the City's Department of Housing Preservation and Development to favor new construction proposals that commit to ultra-low-energy buildings.

Strategy S17: Test "deep" energy retrofit technologies

NYCHA will take advantage of every opportunity to test new deep retrofit technologies, and launch a "Call for Innovations" to solicit promising ideas.

"Under an 80 by 50 scenario, our aging buildings will need to be transformed into highly energy efficient structures and powered by renewable sources of energy, and new buildings will need to meet the highest possible energy performance standards."

—One City: Built to Last

Getting to 80 x 50: Deep Retrofits

Traditional energy retrofits, particularly those that use cost savings to finance them, are typically limited to upgrading existing systems without fundamentally changing them. Common measures like lighting replacement, water-saving fixtures, heating system controls, replacement of hot water heaters, and weather sealing, when performed simultaneously, can reduce energy use by 10 to 30 percent.

Deep retrofits, by contrast, change basic building systems—like walls and windows, and heating systems—dramatically in an effort to achieve energy savings on the order of 50 to 90 percent. Deep reductions enabled by this type of approach will be necessary to reach the goals of 80 x 50.

For some of the developments in the Sandy Recovery project, NYCHA and the project teams included deep retrofits as part of initial design explorations. Ultimately, the deep retrofits were not financially feasible in the short term, but the exercise showed what could be achieved in future projects.

Traditional vs Deep Retrofits at Red Hook East and West Houses

	Pre-Retrofit	Traditional Retrofit	Deep Retrofit
Total Energy Use (kbtu)	378,176,000	253,000,000	125,253,000
Energy Use Intensity (kbtu/sf)	163	109	54
% Improvement		33%	67%
Estimated Cost		$271 million	$644 million
Per square foot		$116	$286
Per unit		$94,000	$230,000
Scope of work			
Building Envelope	Standard roof and façade	• White roofs • Roof insulation	• White roofs • Roof insulation • Façade reclad + insulation • Window replacement
Heating System	Low-pressure steam	• New medium pressure steam distribution • New controls • New Boilers • Combined heat and power	• Convert to hot water heat • Ground source heat pump • New controls • New radiators
Electrical System	Original electrical system	• Resilient electrical system • New common area and outdoor lighting	• Resilient electrical system • New common area and outdoor lighting • New apartment lighting • Upgraded interior electrical system
Water/Stormwater	Some water-efficient fixtures	• Water-saving fixtures • Accessory structure green roofs	• Water-saving fixtures • Accessory structure green roof
Other		• PV-ready	• Rooftop PV

Strategy S15
Create an 80 x 50 roadmap

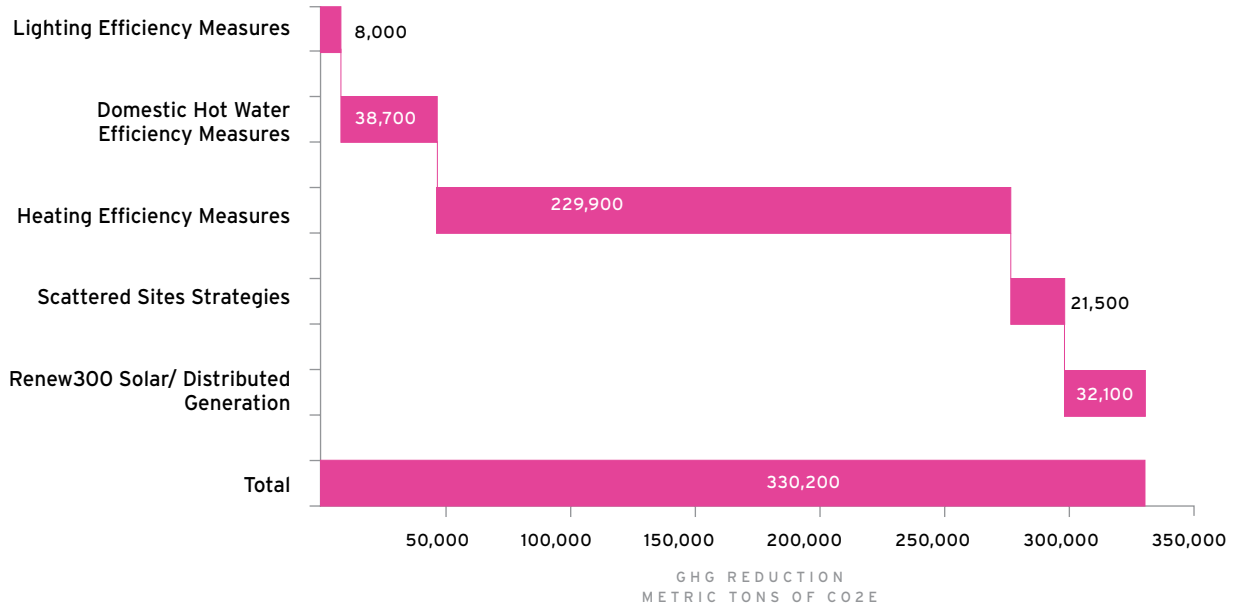
Existing Conditions

In 2025, 82 percent of NYCHA's buildings will be more than 50 years old, and are not likely to achieve further GHG reductions without substantial changes in fundamental building systems. NYCHA has pursued a variety of incremental improvements over the years, but rarely replacement of entire building systems. A detailed understanding of likely alternatives is critical.

Implementation

Following the lead of the Mayor's Office of Sustainability, NYCHA will analyze the technical limits of the improvements that can be made using existing building envelopes, building systems, and incentive structures; calculate how much additional reduction will be needed from as-yet unidentified strategies; and estimate the costs and benefits of "deep retrofit" measures like building envelope upgrades and heating system replacement.

GHG emissions reduction through 2025 by energy conservation measure



Source: NYCHA Dept. of Energy and Sustainability

Passive House Affordable Housing

New construction offers the best opportunity to design super-energy-efficient buildings. Several new affordable housing projects have already chosen to adopt Passive House standards, which can result in buildings that are up to 90 percent more efficient than conventional buildings.

Passive House is an international building standard developed in the 1990s by the Passive House Institute of Darmstadt in Germany. A building constructed to Passive House standards must meet strict energy-efficiency criteria for insulation, space heating and cooling, and ventilation.

The Mennonite
424 Melrose St., Brooklyn
Architect: Chris Benedict, R.A.
Owner: Ridgewood-Bushwick Senior Citizens Council
Year: 2014
Units: 24

Knickerbocker Commons
803 Knickerbocker Avenue, Brooklyn
Architect: Chris Benedict, R.A.
Owner: Ridgewood-Bushwick Senior Citizens Council
Year: 2014
Units: 24

HANAC Corona Senior Residence
54-15 101st Street, Queens
Architect: Think Architecture and Design
Owner: Hellenic American Neighborhood Action Committee (HANAC), Inc.
Year: 2017 (est.)
Units: 68

Beach Green North
44-19 Rockaway Beach Blvd., Queens
Architect: Curtis + Ginsberg Architects
Owner: The Bluestone Organization, L+M Development, Triangle Equities
Units: 101

3365 Third Ave., Bronx
Architect: Curtis + Ginsberg Architects
Owner: Bronx Pro Group
Units: 30

Strategy S16
Create incentives to encourage new low-energy buildings

Existing Conditions

Between 2004 and 2014, some 6,000 affordable apartments were built or readied to be built on NYCHA-owned sites by affordable housing developers. Many of these new buildings were much more efficient than the existing buildings surrounding them.

Forward-looking developers and designers have been improving the energy efficiency of new construction for more than a decade, and are now poised to make the leap to ultra-low-energy buildings. In fact City-supported ultra-low energy buildings have already been constructed, and other are in the planning and design phases.

Implementation

Developers will build 17,000 new apartments on underutilized NYCHA-owned land over the next 10 years as part of the City's Housing New York: A Five-Borough Ten-Year Plan (NextGeneration NYCHA Strategy 10). 13,500 of these will be housing affordable to low-income residents.

NYCHA and the City's Department of Housing Preservation and Development will work together to establish competitive criteria that favor new construction proposals that commit to ultra-low-energy performance. This sends a strong signal that City-supported new construction should try to meet 80 x 50 goals.

Strategy S17
Test "deep" energy retrofit technologies

Existing Conditions

By 2025, NYCHA needs to know what it must do between 2026 and 2050 to meet the 80 x 50 goals. Reducing energy use 50 to 90 percent will require new approaches and technologies. Conventional renovations simply will not save enough energy. Replacing building systems in an occupied building is costly, disruptive, and complex even for a single building; it is truly daunting to contemplate at the scale of NYCHA. NYCHA must begin today to prepare for the difficult decisions that lie beyond 2025.

Implementation

Before 2025, NYCHA will test deep retrofit technology and construction methods to learn which work best, disrupt residents the least, and are the most cost-effective.

Call for Innovations

In partnership with the Mayor's Office of Technology and Innovation (MOTI), NYCHA will launch a Call for Innovations, an open solicitation for pilot programs that test new approaches and technologies.

The NYCHA sustainability Call for Innovations will build on the model developed by MOTI for its Call for Innovations on Broadband, which solicited ideas and innovations to help bring high speed Internet access – and the opportunities that come with it – to all New Yorkers. MOTI provided data and background materials on the state of broadband in the city, and applicants were encouraged to submit specific proposals for policy changes or demonstration projects relating to new uses for existing infrastructure, community-scale models of service provision, or deployment of new technologies. Over 11 weeks, 50 applicants submitted some 70 ideas ranging from mesh networks to using TV spectrum to expand broadband access.

For the sustainability Call for Innovations, NYCHA will solicit pilot projects that maximize efficiency in heating and hot water systems, substantially reduce energy loads and water consumption, or streamline waste diversion and waste management.

Envelope retrofits and heating system replacements

NYCHA will identify test cases for envelope retrofits and heating system replacements among the many projects in its capital plan. The ideal candidates will be projects that plan to address energy efficiency through conventional methods, but with a modest premium, would be able to fund deep savings.

Deep Retrofit Design Competitions

Both the State and the City have announced plans to sponsor deep-retrofit design competitions to drive market innovation. As these programs take shape, NYCHA will take advantage of any opportunity to participate, so that the needs of low-income communities and public housing are included. Projects should be replicable, directly benefit low-income residents, and make a meaningful long-term contribution to creating an equitable city.

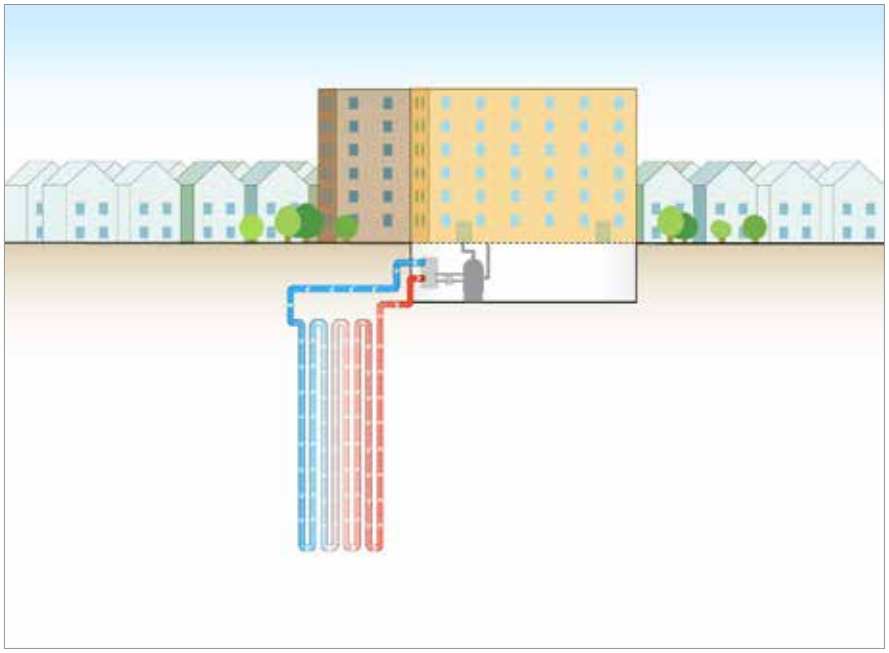
NYCHA will contribute purchasing power, scale, high-visibility, and ubiquity in low-income communities. Competition applicants have already taken notice: in the $40 million NY Prize competition, 7 of 9 proposals focusing on New York City included one or more NYCHA developments in their proposals.

Ground Source Heat Pump Retrofit Pilot
344 East 28th Street

In 2013, NYCHA installed its first ground-source heat pump (GSHP) system at 344 East 28th Street in Manhattan.

A GSHP takes advantage of the fact that the temperature of the ground below basement level is remarkably constant—about 55 degrees—year-round.

NYCHA's pilot system uses a network of fluid-filled pipes to absorb this underground heat and use it to make domestic hot water. GSHPs can also be used for cooling; in that case the fluid-filled pipes are used to transfer excess heat into the ground.



IMPLEMENTATION

2017 Milestones

NYCHA is committed to transparency in implementing the strategies of NextGeneration NYCHA. The Authority will remain accountable to its many partners by publishing quarterly progress reports on each NextGeneration NYCHA goal.

NYCHA will meet the following sustainability milestones by the end of 2017:

Foundational Commitments

- Join the HUD Better Buildings Challenge to reduce the energy intensity of NYCHA's portfolio by 20 percent by 2025
- Develop performance metrics for all sustainability agenda commitments and make them public
- Release all NYCHA energy and water consumption and cost data on NYC Open Data

GOAL #1: Achieve short-term financial stability and diversify funding for the long term

- Secure private financing for three EPCs (Strategy S1)
- Secure $2 million in WAP and utility-sponsored retrofit program funds (Strategy S1)
- Issue the first Request for Proposals for a commercial-scale solar PV project (Strategy S2)
- Issue a Request for Proposals for a district energy system at Red Hook East and West Houses (Strategy S2)

GOAL #2: Operate as an efficient and effective landlord

- Develop sustainable mold and vacancy turnover protocols and begin a pilot project in the OPMOM portfolio (Strategy S3)
- Institute new purchasing policy to require low- and no-VOC caulks, paints, coatings and primers (Strategy S3)
- Expand the Integrated Pest Management (IPM) program to OPMOM (Strategy S3)
- Provide sustainability training for OPMOM development staff (Strategy S3)
- With CUNY, complete smart building technology needs assessment (Strategy S4)
- With CUNY, create training curriculum for heating plant staff (Strategy S4)
- Eliminate overheating at 20 percent of master planned developments, providing average indoor temperatures of 68-74 degrees (Strategy S4)
- With DEP, install 500 main service water meters (Strategy S5)

- With DEP, conduct water consumption study (Strategy S5)
- Update procurement standards for water-saving kitchen and bath fixtures (Strategy S5)
- Conduct waste composition study (Strategy S6)

GOAL #3: (Re)build, expand, and preserve public and affordable housing stock

- Require NYC Overlay to the Enterprise Green Communities Criteria for all major rehabs and new construction (Strategy S7)
- Establish minimum performance criteria for substantial renovation RFPs (Strategy S7)
- Invest $200 million in eliminating exterior moisture penetration (Strategy S8)
- Launch three Energy Performance Contract projects (Strategy S9)
- Complete construction on first NY State WAP pilot at Howard Avenue and Belmont Sutter developments (Strategy S10)
- With HUD, qualify 500 units for NY State WAP funds (Strategy S10)
- With DEP, begin evaluation, design, and construction of green infrastructure at 18 sites (Strategy S11)

GOAL #4: Develop best-in class resident services and resident engagement models

- Launch an Ideas Marketplace for resident- and community-led sustainability projects (Strategy S13)
- Require resident hiring plans in renewable energy projects (Strategy S14)
- Graduate 6 cohorts of the NYCHA Resident Training Academy with Department of Sanitation recycling curriculum included (Strategy S14)
- Recruit at least 100 NYCHA young adults into partner energy and sustainability trainings (Strategy S14)
- Complete JobsFirstNYC planning grant as part of green jobs collaborative (Strategy S14)
- Connect NYCHA residents to at least 30 percent of new jobs through NYCHA's Energy Performance Contracts (Strategy S14)

Working towards 80 x 50

- Create a roadmap of technical options (Strategy S15)
- Create incentives for low-energy new construction (Strategy S16)
- With MOTI, launch the Call for Innovations for pilot projects (Strategy S17)
- Identify at least one opportunity to test "deep" retrofit technologies (Strategy S17)

NYCHA will launch two online platforms to encourage new partners to help advance the NextGeneration NYCHA Sustainability Agenda.

Ideas Marketplace	Call for Innovation
What is it? An online platform to connect resident- and community-led sustainability initiatives to each other, to philanthropic support and resources, and to NYCHA.	**What is it?** A structured process for submitting pilot project proposals that address core landlord responsibilities.
A successful project would: • Increase volunteer participation • Learn faster by connecting with other sustainability projects in other NYCHA developments • Raise more philanthropic support by partnering for greater impact • Create a replicable intervention and expand to serve more residents	**A successful project would:** • Test a replicable solution to a technical problem in capital improvements or building operations • Demonstrate success through rigorous outcomes evaluation • Demonstrate financial feasibility for future projects
Roles: • Residents and community-based organizations design, manage and implement, and measure impacts • Fund for Public Housing connects to philanthropic support • NYCHA coordinates access	**Roles**: • Proposers design, manage and implement projects • NYCHA provides design input, selects pilot sites and assists with implementation • NYCHA, proposer, and/or third party evaluator assess project success
Goals for residents and community-based orgs: • Promote sustainability in day-to-day living • Connect with potential partners • Increase participation • Increase funding and resources	**Goals for proposers:** • Demonstrate performance under real-world conditions • Demonstrate financial feasibility
Goals for NYCHA: • Provide a consistent and transparent framework to foster effective partnerships	**Goals for NYCHA:** • Transparently solicit pilot projects and share pilot outcomes • Test and evaluate innovative solutions
Examples of potential projects: • Projects to divert food waste and recyclable materials from going to landfills • Campaigns to reduce resident electricity use through competitions and incentives • Campaigns to help residents access healthy food options • Quit-smoking campaigns	**Examples of potential technical pilots:** • Onsite electric generation technologies • New technology solutions to improve comfort, reliability, or efficiency of campus and district steam systems • New technology solutions for water conservation, management, or re-use • High-efficiency cooling

SUMMARY OF IMPACTS

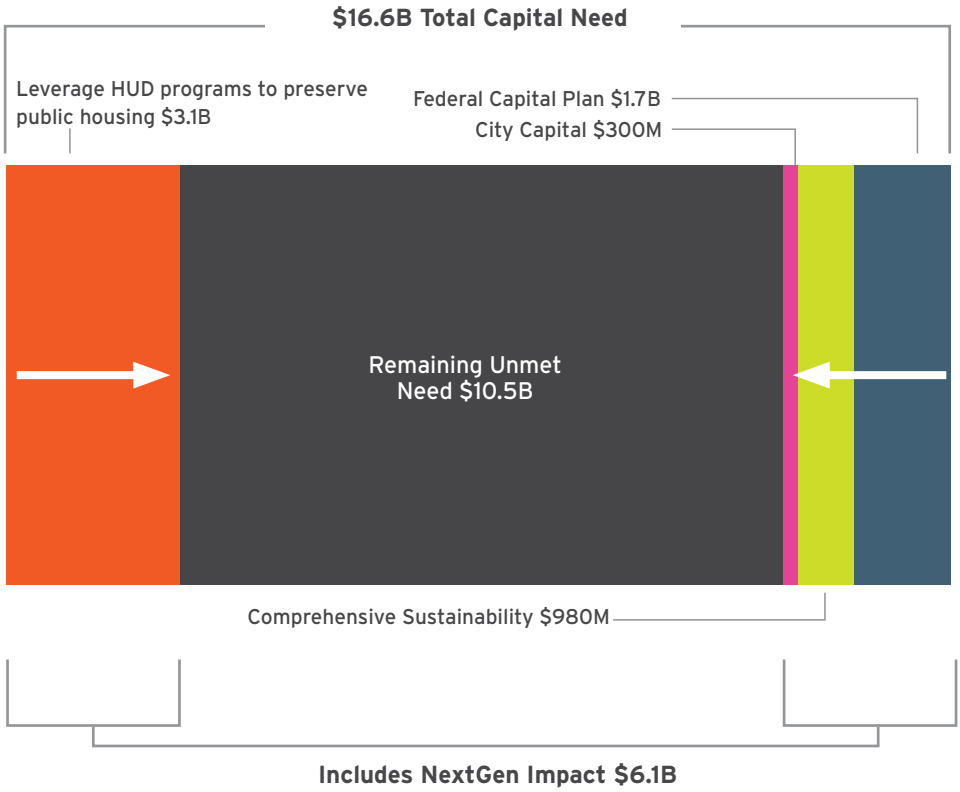
Summary of Impacts

NextGeneration NYCHA outlines how NYCHA will fundamentally change how it looks, how it operates, and how it is funded to ensure public housing is preserved for the next generation of New Yorkers. Without NYCHA, New York's low-income households would have no alternative to call home.

Financial Impacts

NextGeneration NYCHA seeks to eliminate projected operating deficits and make the Authority financially stable so that it can address its unmet capital needs. NextGeneration NYCHA has the potential to bring the Authority into the black and invest approximately $6.1 billion in the people and public housing stock of NYCHA to fix roofs, reduce mold and vermin, and achieve a better quality of life for many NYCHA residents.

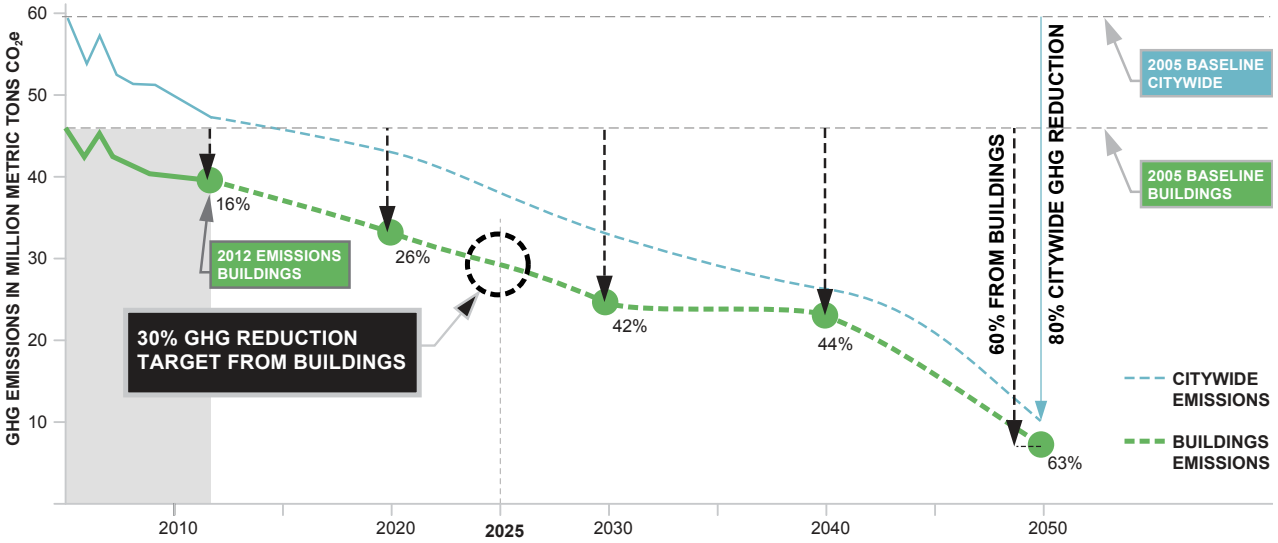
Reduction of 5-year Unmet Capital Needs



Greenhouse Gas Impacts

In One City Built to Last, the City identified global climate change as the challenge of a generation and proposed an ambitious plan to reduce greenhouse gases (GHG) from all sources by 80 percent by 2050 (80 x 50). The City estimated that meeting this goal would require buildings to reduce emissions from a 2005 baseline by 30 percentby 2025 and by 60 percentby 2050.

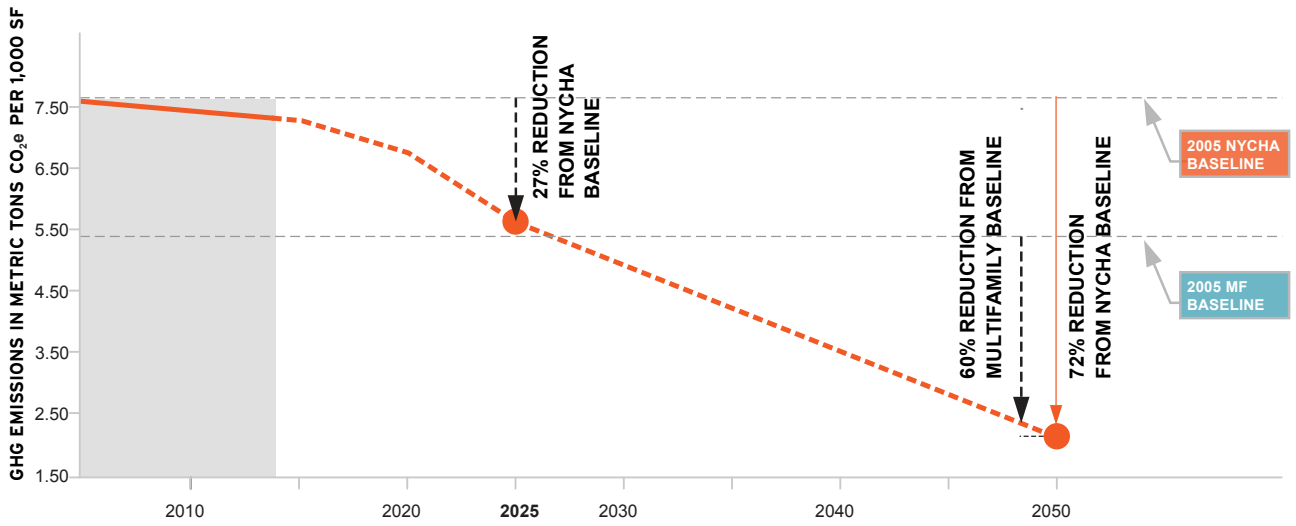
Pathway for Reductions in Greenhouse Gas Emissions from Buildings



Source: New York City Mayor's Office of Long-Term Planning and Sustainability

By implementing the Sustainability Agenda, NYCHA will place its portfolio on the path to achieving the 80 x 50 goal. NYCHA's preliminary estimate of the cumulative effect is expected to be a 27 percent reduction in GHG emissions, very nearly meeting the 30 percent reduction that the One City plan requires of buildings by 2025.

Pathway for Reductions in Greenhouse Gas Emissions from NYCHA Portfolio



Source: Mayor's Office of Sustainability and NYCHA Dept. of Energy and Sustainability

INFOGRAPHICS

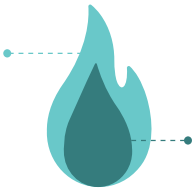
NextGeneration NYCHA Sustainability Agenda

Improve Comfort and Energy Efficiency

85% NYCHA apartments built before 1980

15%
Built after 1980 when the first energy code was developed

40% more energy used by NYCHA units



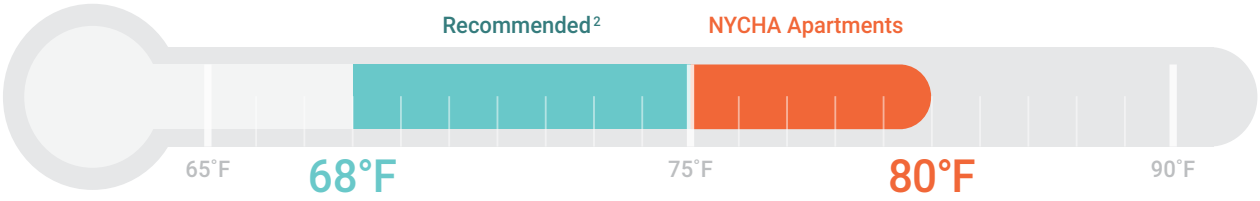
120 kBtu/sf
New York City's average energy use for multi-family buildings[1]

92% **of apartments are heated with steam,** the most inefficient way to heat buildings.

1,379 **boilers provide NYCHA's heat.**
Each has a life expectancy of 30 years. 45% are already 25+ years old.

Apartments are overheated because outdoor temperature sensors can't tell when it's hot inside—only that it's cold outside.

Winter-time indoor temperature



That's like keeping the lights on inside because it's dark outside—even when you're sleeping or not home.

NYCHA will **Upgrade Heating, Hot Water and Lighting**

$300 Million
Investment to retrofit **master planned developments**

$30 Million
Investment to retrofit **5,000 apartments in small buildings**

Eliminate unplanned heat and hot water outages

Regularly test and adjust settings
of boilers, hot water heaters, ventilation and lighting to optimize performance

Eliminate overheating
by installing control systems in

8 **developments by 2016**

230 **developments by 2025**

NEW YORK CITY HOUSING AUTHORITY

on.nyc.gov/nextgeneration

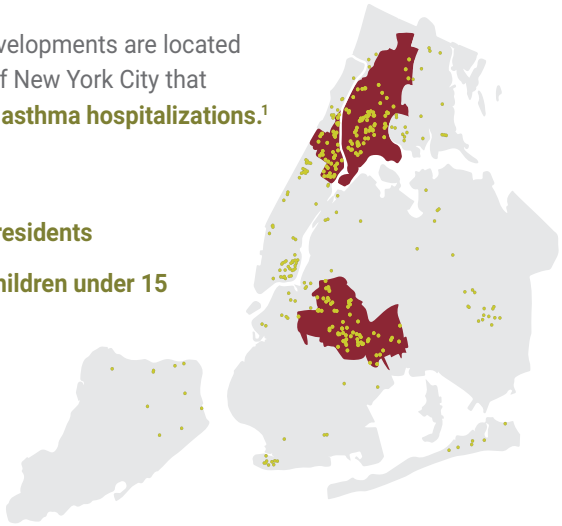
1. Source Energy Use Intensity 2. DOHMH recommendation

NextGeneration NYCHA Sustainability Agenda

Improve Indoor Air Quality

43% of NYCHA developments are located in the areas of New York City that **see the most asthma hospitalizations.**[1]

They house **151,000 residents**
38,000 children under 15



New York City plans to have the **best air quality** among all large US cities by 2030.

NYCHA can't control outdoor air pollution, but its sustainability strategies can improve indoor air quality.

- Highest rate of asthma hospitalizations in NYC
- NYCHA development

NYCHA will **Comprehensively Approach Indoor Air Quality**

VOCs

Volatile Organic Compounds are chemicals found in some maintenance products.

Caulks · Cleaners · Paints · Varnishes · Primers

By 2017, new purchases will be low-VOC or **VOC-free.**

Mold

The presence of water is required in order for mold to thrive.

Water and moisture + **Lack of ventilation** + **Leaky pipes, roofs & windows** = Mold

Case-management approach Thorough inspections and integrated solutions to eliminate the root cause.

Improve the health of staff and residents

Pests

Develop a comprehensive pest management approach and reduce the use of toxics.

Mice · Mosquitoes · Rats · **Cockroaches** · Bedbugs

23% of all New York City households reported seeing at least one cockroach daily in the span of a month in 2014.

Smoke

Smoking is banned in common areas, yet 50%+ residents report smelling second-hand smoke in their homes.

85%

Residents of 830 Amsterdam who took the first step by signing a pledge to keep their building smoke-free.

NEW YORK CITY HOUSING AUTHORITY

on.nyc.gov/nextgeneration

1. Based on DOHMH highest rates of admission to the emergency department for asthma (people 15 years and older)

NextGeneration NYCHA Sustainability Agenda

Meet the Challenge of Climate Change

90°F days per year in New York City[1]

1970–2000: 18

By the 2050s *(As many as Birmingham, AL)*: 39–57

6"–8" **of rain is an extreme rain event**

New York State has seen 71% more of these events over the last 50 years

54,000 NYCHA residents are located in areas **subject to coastal flooding**

1 in 6 **NYCHA buildings lost power** during Superstorm Sandy

44%

of NYCHA residents are children and seniors

<18 years old (27%)

65+ years old (17%)

vs. New York City's population

(21%) <18 years old

(15%) 65+ years old

NYCHA also has almost **2x** more residents **<65 years old with disability** than the New York City average

NYCHA will **Mitigate its Impact and Adapt to Climate Change**

80 X 50

Contribute to the City's goal of reducing greenhouse gas emissions by 80% by 2050. **NYCHA will reduce its energy use by 20% in 10 years.**

That's like **removing 52,000 cars** from the road.

Developments that are subject to flooding will receive **resiliency retrofit plans** and community emergency preparedness.

2.5 **million SF of solar panels**

will provide

25 MW

of solar energy in 10 years

33 **Sandy-impacted developments** will receive back-up power

Manage stormwater through **green infrastructure (GI)**

By 2018: GI projects at **6 developments**

28 million gallons of water captured annually

30+ additional projects to come

NEW YORK CITY HOUSING AUTHORITY

on.nyc.gov/nextgeneration

1. Average per year; New York City Panel on Climate Change (NPCC)

APPENDICES

NYCHA's Building Systems and Energy Performance

Heating and Hot Water

The vast majority of NYCHA apartments (92 percent) are heated by steam distribution systems, an early-20th-Century technology that requires more energy to provide comfortable temperatures and is much more difficult to control than modern systems.

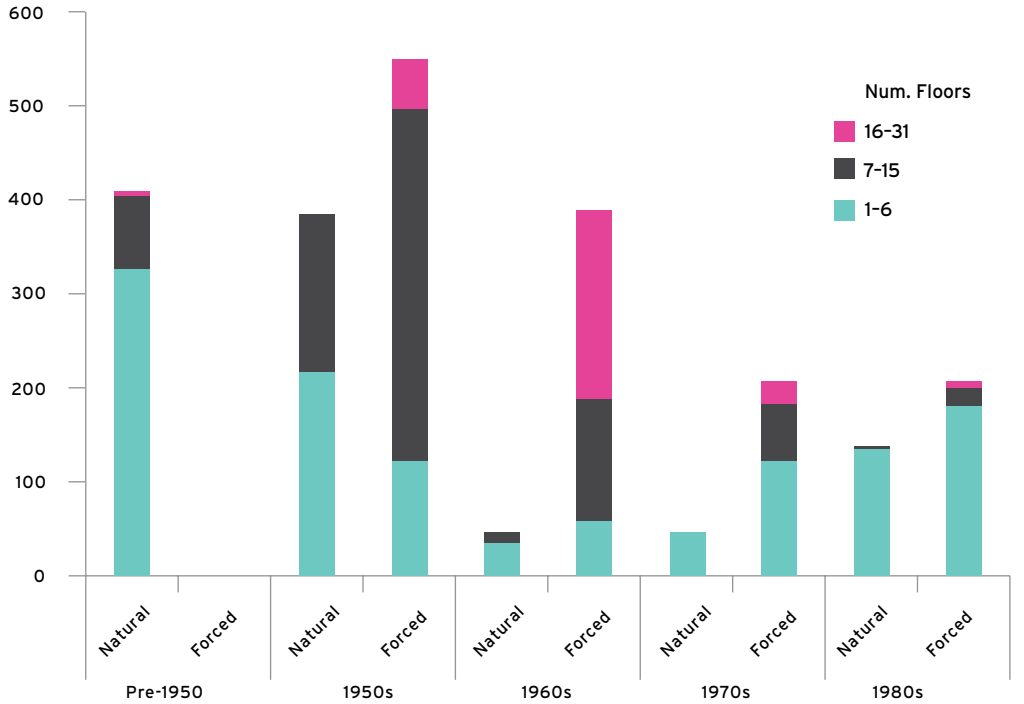
NYCHA's master planned developments have campus-scale district steam systems with central boiler plants, each serving several buildings. The distribution is vacuum steam, which in its original condition was more efficient than conventional two-pipe steam; today, leaks in the system's underground pipes and apartment riser pipes have degraded performance.

In almost all cases, steam boilers also provide hot water, again using substantially more energy than current best-available technology. Some of the inefficiency is the result of heat loss from the long pipe runs between the plant and the buildings, but steam is inherently inefficient for low-temperature applications like domestic hot water.

Ventilation and Cooling

Like most apartment buildings in New York, NYCHA apartments have mechanical exhaust ventilation in bathrooms and kitchens only when there is no

65% of NYCHA Apartments have Bathroom Fans



Source: NYCHA Energy & Sustainability

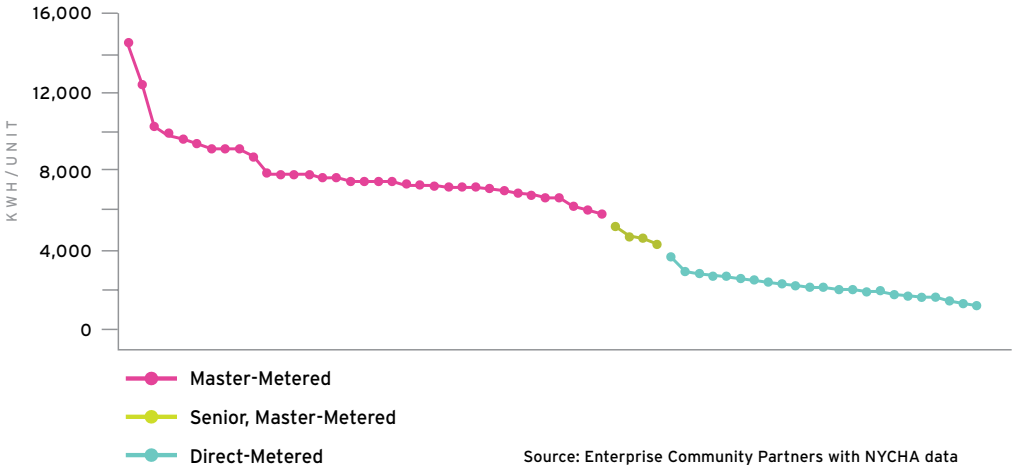
operable window to provide fresh air. Mechanical ventilation systems typically use a rooftop fan to remove stale air. These systems were introduced in the 1950's, coinciding with the boom in mid- and high-rise construction. Today, 65 percent of NYCHA apartments have mechanical ventilation in bathrooms. Cooling is provided primarily by resident-owned window AC units.

Electricity

All but 6 percent of the portfolio is master-metered for electricity; NYCHA, rather than the resident, pays the electric bills. Studies by the New York State Research and Development Authority and others have shown that residents use more electricity when they do not directly pay for it. A comparison of NYCHA's master-metered and direct-metered buildings suggests that residents in master-metered developments use about 4 times as much, on average, as residents who pay their own electricity bills.

Master-metered developments use 4 times the electricity of direct-metered developments

Comparison of electricity consumption at 62 developments in Brooklyn from August 2013 to July 2014



Source: Enterprise Community Partners with NYCHA data

Energy Use Intensity

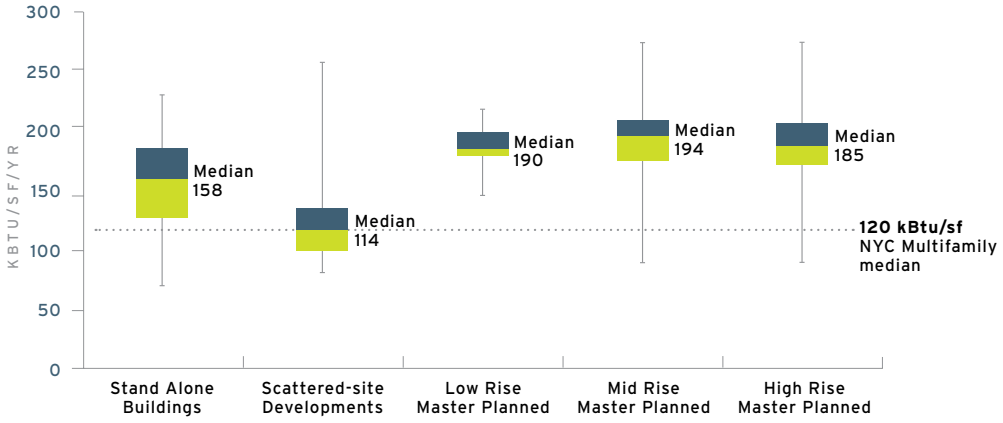
Source Energy Use Intensity (SEUI) is a measure of how much energy is used annually in a building for all purposes, including heating, hot water, lighting, and in-apartment electricity consumption, per square foot. It accounts for both energy that is used onsite, and energy used in generation and transport to the site. It is a standard index that allows comparisons among buildings of different size and construction. The median value for multifamily buildings in New York City is 120,000 Btus per square foot (or 120 kBtu/sf).

NYCHA's average energy performance is about 40 percent worse than the citywide median; however, it has been flat for the past decade, which suggests that degradations in performance due to aging systems and deferred maintenance have been offset by energy retrofits and conscientious operations.

Energy Intensity Varies by Development Type

Master planned developments use more energy on average than single buildings or scattered site developments.

Master-planned sites use campus-scale steam systems; scattered site buildings tend to use hot water heat.

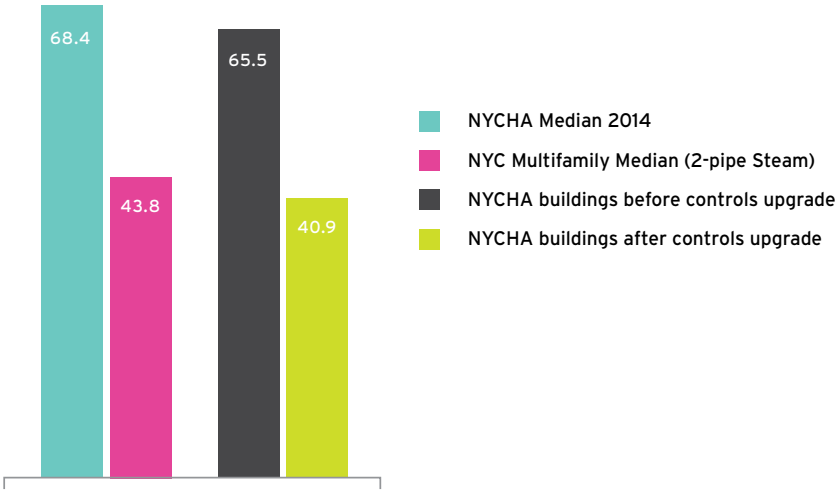


The average amount of energy used differs across building types. NYCHA's portfolio includes not only the master-planned developments that are iconic and recognizable as public housing, but also single multifamily buildings and scattered-site developments composed of row houses or small walk-up buildings on traditional residential blocks. In general, master-planned developments use more energy than stand-alone or scattered site developments.

Heating Energy Use Intensity is the energy used only for space heating, per square foot. The median value for New York City residential buildings with 2-pipe and vacuum steam systems is 43.8 kBtu/sf. NYCHA's average in 2014 was 56 percent higher, but buildings where distruibution controls have been upgraded perform slightly better than the citywide median. This suggests that there is room for cost-effective improvement in this area.

NYCHA's Heating Energy Use Intensity Can Be Improved Through Controls Upgrades

Heating Energy Use Intensity (kBTU/sf) before and after installation of indoor temperature feedback controls, compared to portfolio-wide median in 2014, and NYC multifamily median



Linkages to One City: Built to Last and One New York

	NextGeneration NYCHA Sustainability Agenda	Related Initiatives in OneNYC	Related Key Policies and Programs in One City: Built to Last
#1 Fund	Attract investment for capital improvements.	**Vision 1 "Housing":** New Yorkers will have access to affordable, high-quality housing	Improve the efficiency and quality of New York City's public housing Collaborate with local utilities to promote energy efficiency Coordinate with the State to streamline financing and incentive programs
#1 Fund	Raise revenues through clean and distributed energy projects.	**Vision 3 "80 x 50"**, Initiative 1E: Expand decentralized power production	Expand solar on City rooftops Bring solar power to new neighborhoods across New York City Provide financing options for energy efficiency and clean energy
#2 Operate	Create healthy indoor environments	**Vision 2 "Healthy Neighborhoods, Active Living"** Initiative 3: Address health hazards in homes	Train the next generation of building operators
#2 Operate	Efficiently provide comfortable and reliable heat and hot water	**Vision 1 "Housing":** New Yorkers will have access to affordable, high-quality housing **Vision 3 "80 x 50"** Initiative 4: Reduce GHG from buildings by 30 percent by 2025 and chart a long-term path away from fossil fuels	Improve building operations and maintenance in city buildings Train the next generation of building operators
#2 Operate	Improve water management	**Vision 3 "Water Management":** New York City will mitigate neighborhood flooding and offer high-quality water services	Improve energy and water efficiency in affordable housing
#2 Operate	Adopt a comprehensive waste management plan	**Vision 3 "Zero Waste"** New York City will send zero waste to landfills by 2030	
#3 (Re)build	Adopt sustainability standards	**Vision 3 "80 x 50"** Initiative 4: Reduce GHG from buildings by 30 percent by 2025 and chart a long-term path away from fossil fuels	Raise the standards for our buildings and energy code
#3 (Re)build	Eliminate roof, façade, and plumbing leaks	**Vision 2 "Healthy Neighborhoods, Active Living"** Initiative 3: Address health hazards in homes	Improve the efficiency and quality of New York City's public housing Collaborate with local utilities to promote energy efficiency
#3 (Re)build	Retrofit master-planned developments	**Vision 3 "80 x 50"** Initiative 4: Reduce GHG from buildings by 30 percent by 2025 and chart a long-term path away from fossil fuels	
#3 (Re)build	Retrofit scattered-site developments		

	NextGeneration NYCHA Sustainability Agenda	Related Initiatives in OneNYC	Related Key Policies and Programs in One City: Built to Last
#3 (Re)build	Build green infrastructure	**Vision 3 "Water Management"** Initiative 3: Expand green infrastructure and smart design for stormwater management in neighborhoods across the city **Vision 4 "Coastal Defenses"** New York City's coastal defenses will be strengthened against flooding and sea level rise	
	Incorporate climate change resiliency into capital planning	**Vision 4 "Buildings"** The city's buildings will be upgraded against the changing climate impacts **Vision 4 "Neighborhoods"** Inititiative 5: Mitigate the risks of heat	
#4 Engage	Support resident- and community-led sustainability	**Vision 2 "Healthy Neighborhoods, Active Living"** Initiative 1: Improve food access, affordability and quality, and encourage a sustainable, resilient food system **Vision 3 "Neigborhoods"** Initiative 1: Strengthen community-based organizations **Vision 3 "Neigborhoods"** Initiative 2: Improve emergency preparedness and planning	Help New Yorkers reduce energy use at home
	Connect residents to green jobs	**Vision 1 "Industry Expansion & Cultivation"** Initiative 3: Foster an environment in which small businesses can succeed **Vision 1 "Workforce Development"** Initiative 2: Leverage OneNYC investments to train and employ New Yorkers of all skills **Vision 4 "Neighborhoods"** Initiative 4: Ensure that workforce development is a part of all resiliency investments	Support emerging entrepreneurs in clean energy and energy efficiency
80 x 50	Create an 80 x 50 roadmap	**Vision 3 "80 x 50"** Initiative 4: Reduce GHG from buildings by 30 percent by 2025 and chart a long-term path away from fossil fuels	Implement deep retrofits in key city facilities Pilot new clean energy technology in City buildings Explore innovative technologies for New York City buildings Identify emerging technologies and evaluate their potential for installation across the City's portfolio Support emerging entrepreneurs in clean energy and energy efficiency
	Test "deep" energy retrofits		
	Create incentives to encourage new low-energy buildings	**Vision 1 "Housing"** Initiative 1: Create and preserve 200,000 affordable housing units over ten years	

Index of Features

ABBREVIATIONS

BAS	Building Automation System
CCTV	Closed Circuit Television
CHAS	Computerized Heating Automation System
CUNY	City University of New York
CSO	Combined Sewer Overflow
DEP	New York City Department of Environmental Protection
DOHMH	New York City Department of Health and Mental Hygiene
DSNY	New York City Department of Sanitation
EPC	Energy Performance Contract
FBP	Food Business Pathways
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gases
GPF	Gallons Per Flush
GPM	Gallons Per Minute
GSHP	Ground Source Heat Pump
HCR	New York State Homes and Community Renewal
HPD	New York City Department of Housing Preservation and Development
HUD	US Department of Housing and Urban Development
IPM	Integrated Pest Management
LL87	Local Law 87: Audit and Retrocommissioning Law
MOTI	Mayor's Office of Technology and Innovation
MW	Megawatt
NRTA	NYCHA Resident Training Academy
NYPA	New York Power Authority
NYSERDA	New York State Energy Researce and Development Authority
One City	One City: Built to Last
OneNYC	One New York: The Plan for a Strong and Just City
OPMOM	Optimal Property Management Operating Model
RAD	Rental Assistance Demonstration
REES	Office of Resident Economic Empowerment and Sustainability
RGC	Resident Green Committee
US DOE	U. S. Department of Energy
VOC	Volatile Organic Compound
WAP	Weatherization Assistance Program

ACKNOWLEDGEMENTS

The NextGeneration NYCHA Sustainability Agenda was made possible by the hard work of NYCHA staff and key contributions from many people at sister agencies and private partners. We deeply appreciate their time, insights, and passionate support of public housing and sustainability, and look forward to working together to realize the goals of the Agenda.

NYCHA Board

Beatrice Byrd, Resident Board Member
Derrick Cephas, Board Member
Zaire Dinzey-Flores, Board Member
Victor A. Gonzalez, Resident Board Member
Willie Mae Lewis, Resident Board Member
Nnenna Lynch, Board Member

Vilma Huertas, Corporate Secretary

NYCHA Citywide Council of Presidents Executive Board

Raymond Ballard, 2nd Vice President, Brooklyn West District Chair
Rose Bergin, Seargent-At-Arms, Manhattan South District Chair
Reginald H. Bowman, Member, Brooklyn East District Chair
Ann Cotton Morris, President, Queens District Chair
John Johnson, 1st Vice President, Bronx South District Chair
Lilithe Lozano, Treasurer, Bronx North District Chair
Geraldine Parker, Secretary, Staten Island District Chair
Ethel Velez, Member, Manhattan North District Chair
Carolyn Walton, Assistant Secretary, Brooklyn South District Chair

Project Coordinator Daphne Boret Camguilhem
Editor Tom Sahagian
Infographics Gabrielle Derenthal, Jae Shin
Data Analysis Edwin Mendez, Heather Nolen, and Marc Zuluaga
Photos NYCHA Department of Communications unless otherwise noted

New York City Housing Authority

Shola Olatoye, Chair and Chief Executive Officer
Michael Kelly, General Manager

Executive Committee

Karen Caldwell, Executive Vice President and Chief Financial Officer
Brian Clarke, Senior Vice President for Property Management Operations
David Farber, General Counsel
Melanie Hart, Executive Vice President for Community Programs and Development
Kerri Jew, Executive Vice President and Chief Administrative Officer
Robert Marano, Executive Vice President & Chief Information Officer
Cathy Pennington, Executive Vice President for Leased Housing
Luis Ponce, Senior Vice President for Operations Support Services
David Pristin, Executive Vice President for External Affairs and Chief of Staff
Mike Rosen, Acting Executive Vice President for Capital Projects and Vice President for Disaster Recovery

Department of Energy & Sustainability

Bomee Jung, Vice President
Shibu Mammen, Deputy Director

Sultan Akhtar, Field Inspector
Adalberto Aquino, Manager
Daphne Boret Camguilhem, Senior Advisor
Joseph Corrado, Field Inspector
Maria Lisa Cuzzo, Manager, Analysis Unit
Michael Daniel, Assist. Mechanical Engineer
Boyan Dobrev, Intern

Lidia German, Secretary
Joseph Glynn, Field Inspector
Edwin Mendez, Analyst
Valerie Pepe, Senior Analyst
Francis Redhead, Manager, Engineering
Frank Romano, Manager, Field Operations
Rekha Shah, Analyst
Harjit Singh, Senior Estimator
Joseph Testone, Field Inspector
Lee Trotman, Deputy Director, Program Management

Special Thanks

To Contributing NYCHA staff:

Janet Abrahams, Vice President for Operations Optimal Property Management Department
George Adames, Administrator, Manhattan Property Management Department
Javier Almodovar, Deputy Director of Operations
Yvette Andino, Director, Employee Engagement and Special Assistant to the Chair
David Aron, Senior Counsel, Law Department
Shana Attas, Agency Attorney, Law Department
Leticia Barboza, Photographer, Department of Communications
Robert Burke, Assistant Director, Risk Finance Department
Nathaniel Bryant, Project Manager, Enterprise Project Management Office
Shanna Castillo, Director, Resident Economic Empowerment & Sustainability
Stacey Charles, Director, Enterprise Project Management Office
Yuet Sim Cheung, Chief of GIS and Analytics
Adria Crutchfield, Senior Advisor of the Executive Vice President of Capital Projects
Ogonnaya Dotson-Newman, Assistant Director for Public Housing and Health (DOHMH/NYCHA)
Bruce Eisenberg, Deputy Director of Architecture, Office of Design
Nicole Ferreira, Vice President for Real Estate Development
Anne-Marie Flatley, Vice President for Performance Management and Analytics
Ceasare Gentile, Assistant Director, Maintenance, Repair & Skilled Trades
Chad Gholizadeh, Honors Associate, Law Department
Celeste Morgan Glenn, Vice President for Support Services and Quality Management
Jason Goldberg, Chief of Corporate Affairs, Law Department
Lauren Gray, Deputy Director, Department of Research and Management Analysis
Scott Groom, Director, Office of Design
Brian Honan, Director, Office of Intergovernmental Relations
Michael G. Johnson, Director, Customer Operations
Tarek Khalil, Deputy Director of Capital Projects Construction
Rasmia Kirmani-Frye, Director, Public and Private Partnerships
Robert Knapp, Director, Heating Management Services
Sara Kobocow, Associate General Counsel, Law Department
John Lisbon, Community Coordinator, Resident Green Committee Program
Dana Longstreet, Senior Editor at Department of Communications
Brian Loughlin, Director for New Construction
Sybille Louis, Director, Research & Management Analysis
Kelly D. MacNeal, First Deputy General Counsel
Andrea Mata, Senior Manager for Community Health Initiatives
Vinson McCrae, Emergency Services Aide
Peter Mikoleski, Senior Photographer, Department of Communications
Michele Moore, Senior Advisor for the Vice President for Disaster Recovery
Claudette Morris, Deputy Director of Analysis and Reporting, Capital Projects Division
Helga Nyanffor, Project Manager, Department of Budget and Finance Planning
Adrian Pagan, Supervisor Elevator Mechanics

Renu Pani-Chakravarty, Assistant General Counsel, Law Department
Kilsys Payamps-Roure, Chief of Staff to General Manager
Jackie Primeau, Deputy Communications Officer
Valerie Rosenberg, Senior Manager, Public and Private Partnerships
Cathy Russo, Principal Administrative Associate to the Executive Vice President for Capital Projects
Mary Rusz, Architect, Office of Design
James Scanlon, Senior Director of Capital Planning
Sideya Sherman, Vice President for Strategy and Partnership
Jae Shin, Enterprise Rose Architectural Fellow, Office of Design
Raymond Stefanowicz, Vice President for Capital Planning and Design
Farhan Syed, Vice President for Construction Programs
Elena Tenchikova, Project Manager, Management Services Department
Denise Torres, Technical Resource Advisor, Maintenance, Repair & Skilled Trades Division
Karina Totah, Senior Advisor to the Chair and Vice President for Strategic Initiatives
Aaron Trauring, Project Manager, Enterprise Technology Portfolio Management
Conrad Vazquez, Director, Manhattan Property Management Department
Michael Wagoner, Special Assistant to the Senior Vice President of Operations Support Services
Jean Weinberg, Chief Communications Officer
Patricia Zander, Director, Construction

To the hardworking staffs and experts at the following agencies and partners:

Arup
BlocPower
BrightPower
Building Energy Exchange
CB&I
Con Edison
City University of New York
Curtis & Ginsberg Architects
Deutsche Bank
Enterprise Community Partners
Environmental Defense Fund
Facility Strategies Group
Fifth Avenue Committee
Green City Force
Green Worker Cooperatives
HR&A Advisors
US Department of Energy
US Department of Housing and Urban Development
Kohn Pederson Fox Associates PC
L+M Development Partners
Lime Energy
New York City Energy Efficiency Corporation
New York City Environmental Justice Alliance
NYC Department of Citywide Administrative Services
NYC Department of Design and Construction
NYC Department of Environmental Protection
NYC Department of Health and Mental Hygiene
NYC Department of Housing Preservation and Development
NYC Department of Sanitation
NYC Mayor's Office of Sustainability
NYC Mayor's Office of Technology and Innovation
NYC Office of Recovery and Resiliency
New York Power Authority
NYS Homes and Community Renewal
NYS Energy Research and Development Authority
Phipps Neighborhoods
Related Companies
Steven Winter Associates
Sunset Park Redevelopment Committee
Urban Green Council
WE ACT for Environmental Justice

And to the former NYCHA Energy Department Directors, who laid the strong foundations that support this plan:

William Steinmann, Director 1997-2005
Lloyd Kass, Director 2005-2009
Rory Christian, Director 2010-2013
Chris Haun, Acting Director 2013-2015

http://on.nyc.gov/nextgeneration