

Recovery to Resiliency: How NYCHA is Reinventing itself through Sandy Recovery

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ABSTRACT

When Hurricane Sandy hit New York City on October 29, 2012, approximately 60,000 residents in 423 New York City Housing Authority (NYCHA) buildings lost many essential services, including electricity, working elevators, heat, and hot water. Nearly 300 NYCHA buildings across four boroughs sustained physical damage that required extensive repairs. NYCHA's recovery costs are estimated to be over \$3 billion.

However, the damage Hurricane Sandy inflicted has a silver lining: It provided NYCHA with the opportunity to not just repair housing but to rebuild better and smarter, significantly improving structural resiliency and better protecting residents from future disasters and climate change. With FEMA funding in excess of \$3 billion – the largest single FEMA grant ever awarded – NYCHA will build upon the great Sandy recovery work already underway by the State of New York, New York City, HUD, and numerous private and nonprofit groups. The Recovery to Resiliency program can create a more sustainable future for NYCHA, its residents, and the surrounding community – one that includes safer, greener housing plus more efficient operations, new jobs, and additional revenue streams.

Introduction

NYCHA is working alongside Mayor Bill de Blasio and his administration to ensure that Recovery to Resiliency (NYCHA's *Recovery to Resiliency* Report, 2015) adopts the bold initiatives set forth in OneNYC (OneNYC, 2015), which build on previous sustainability plans, as well as on initiatives regarding affordable housing, the fight against climate change, bolstering our coastal communities, reducing greenhouse gas emissions, and economic development. NYCHA's resiliency efforts are part of a \$20 billion initiative to make New York City more resilient to climate change and other 21st century threats (NPCC, 2015).

In order to understand how NYCHA is contributing to resilient and sustainable communities, it is important to understand the broader context of its recovery program. The Recovery to Resiliency program is organized into three elements aimed at recovering safer, stronger and smarter:

- Protecting People and Property
- Moving Beyond the Disaster
- Ensuring Success.

This paper will examine how Recovery to Resiliency is serving as a positive and sustainable roadmap in the recovery process for NYCHA residents, New York City, and the environment for years to come.

Protecting People & Property

Figure 1: Vulnerable Populations

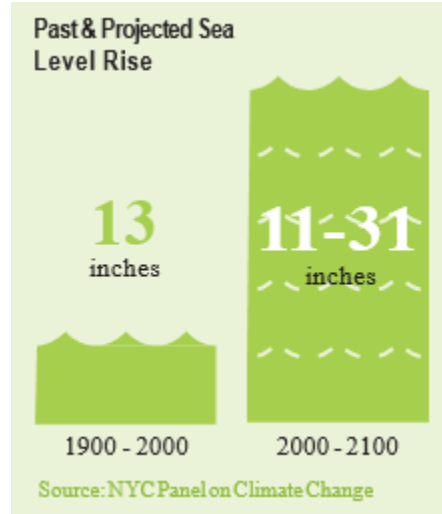


The damage Hurricane Sandy inflicted provides NYCHA with an opportunity to rebuild better and smarter, improving structural resiliency to protect residents from future disasters and climate change. This is being accomplished through three primary initiatives: building reinforcement, surge protection, and infrastructure upgrades. NYCHA is incorporating innovative design practices and features - whenever possible - in Sandy repairs and upgrades, with the intention of expanding the best features across its entire portfolio.

Building Reinforcement

For the purposes of Recovery to Resiliency, building reinforcement includes retrofitting existing structures so that they are less susceptible to the impacts of extreme temperatures, high winds, and flooding. 200 of NYCHA's 328 developments are located within one mile of the coast, and 47 percent of NYCHA's 400,000 residents meet the Social Vulnerability Index for the United States (NYC Open Data, 2015), which assesses socioeconomic variables which contribute to reduction in ability to prepare for, respond to, and recover from shocks. Although many NYCHA residents were ordered to evacuate prior to Hurricane Sandy making landfall, most sheltered in place due to health problems, restricted ability to travel, fear, and lack of a place to go. As a result, Sandy left more than 60,000 people without essential services such as electricity, elevators, heat, hot water and plumbing (NYCHA's *Department of Research and Management Analysis*, 2015). These realities, coupled with the ever-increasing risks of sea level rise and natural disasters, mean that NYCHA facilities must be able to withstand and remain operational during extreme events. For this reason, building reinforcements include dry and wet floodproofing, roof replacements, window and door upgrades, and recladding.

Figure 2: Past & Project Sea Level Rise



Surge Protection

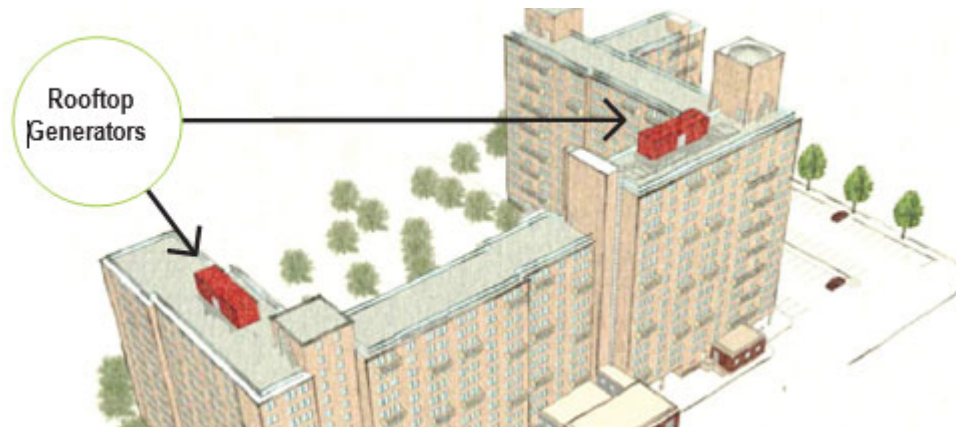
Storm surge is the abnormal rise in coastal water level, above the regular tide, caused by a severe storm such as Hurricane Sandy. Surge poses a threat to everything in its path: trees, vehicles, equipment, playgrounds, site lighting, buildings and lives. Surge protection is designed to prevent storm surge from flooding the protected area behind it. For NYCHA, site-wide surge protection can only be accomplished through the use of defensive perimeter barriers. Larger alternatives at the City scale are being considered when selecting the appropriate surge protection solution for individual sites and campuses. For coastal threats, including intense storms and sea level rise, man-made berms and other permanent surge protection with gates entrances at street openings will protect against surge. For individual sites, protection systems can be augmented by temporary, rapidly-deployable barrier protection systems that will prevent surge damage to the site and buildings.

Infrastructure Upgrades

Infrastructure upgrades, in addition to building reinforcements and surge protection, will improve the physical components of interrelated systems which provide essential services, including electrical, mechanical, plumbing, security, and water management. These improvements will improve the resilience of NYCHA developments and allow the buildings to function better for residents. NYCHA is using the latest energy efficient and smart technology, innovative practices and products to ensure the reliability of systems residents depend on every day and in times of emergency. Infrastructure upgrades include emergency backup power, integrated security upgrades and green infrastructure for stormwater management.

After Sandy, some residents were without power until temporary generators could be deployed to each effected location. Future emergency energy needs are being addressed through the installation of standalone, natural gas-powered, backup generators. These generators will provide resilient power to NYCHA developments during emergencies and assist with demand-side management to improve overall grid resiliency.

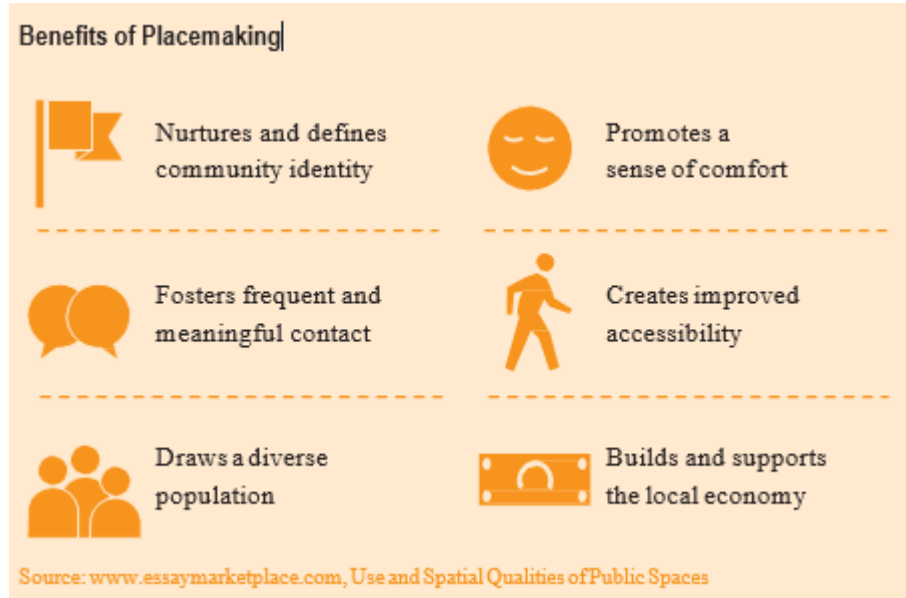
Figure 3: Rooftop generators to ensure emergency back-up power



Moving Beyond the Disaster

Becoming more resilient includes improving the quality of life at NYCHA developments. Recovery from Hurricane Sandy is an opportunity to provide improved accessibility, comfort and safety for residents. NYCHA is improving the quality of life for residents and neighbors through placemaking, expanding economic opportunities, and creating a sustainable NYCHA.

Figure 4: Benefits of Placemaking



Placemaking is a multi-faceted approach to the planning, design and management of outdoor spaces. It strengthens the connection between the people and the places they live in by capitalizing on the great parts of a community in order to create places that promote health, happiness, and well-being. When NYCHA developments become destinations to live, work and play, and when they are better connected to the surrounding communities; their value is enriched, both for residents and neighbors. By making great places, NYCHA also improvise surrounding

property values and provides easier access to essential services within walking distance. Design of these spaces will focus on placing elements next to each other in a way that encourages use. For example, if a bench, coffee kiosk and trash container are placed near a bus stop, they are convenient for waiting passengers, creating synergy and a place where people come together.

There is a critical need to leverage the recovery work happening on NYCHA sites to create new economic opportunities for NYCHA residents. Thus, a key component of Recovery to Resiliency is creating job opportunities and improving access to services that support resident employability and the organizations that serve them. NYCHA is making its jobs training program more robust with a focus on green construction practices, while layering in mentoring opportunities and ways in which residents can achieve HUD volunteer hour requirements. Furthermore, NYCHA is launching The Fund for Public Housing (NYCHA's *The Fund for Public Housing*, 2015) that will invest in NYCHA and its residents through innovative partnerships to reduce the financial burden on NYCHA, increase operational flexibility and build capacity amongst NYCHA residents. NYCHA's recovery from Hurricane Sandy will play a significant role in building a New York City which is healthier, more livable and economically vibrant.

Creating a Sustainable NYCHA

Building back safer, stronger and smarter from Hurricane Sandy includes investing in NYCHA's long-term sustainability. Creating a sustainable NYCHA means providing safe, clean, and affordable housing while managing energy and water use, and reducing NYCHA's contribution to the waste stream. Sustainability also means effective stewardship of our buildings for the future by making investments that protect them from rising energy and water costs. NYCHA is using its Recovery to Resiliency program to make investments that will result in more sustainable outcomes.

Hurricane Sandy highlighted the increasing vulnerability of coastal cities like New York City to the impacts of climate change, and underscored the pressing need to pursue both climate change mitigation and adaptation. As the largest steward of affordable housing in New York City, NYCHA is stepping forward to take a leading role in showing that affordable housing can be green and resilient.

NYCHA's Recovery to Resiliency program (NYCHA's *Recovery to Resiliency Report*, 2015) recognizes that investments in building systems to provide better safety, convenience, and comfort while reducing energy use, water consumption, and waste production. Following sustainability best practices assures that systems work together. The Recovery to Resiliency Program uses Enterprise Green Communities criteria, the nationally-recognized green standard for affordable housing.

In residential buildings, sustainability encompasses four key responsibilities: providing a safe, comfortable, and healthy indoor environment (Indoor Environmental Quality or EQ); Energy; Water; and Waste. Using the Enterprise Green Communities Criteria (Enterprise Community Partners, Inc., 2015) as a guide, NYCHA's Recovery to Resiliency program is investing in new systems and repairing old ones to high efficiency and performance standards wherever possible.

Healthy Indoor Environments

Indoor Environmental Quality (IEQ) is improved by repairing the building exteriors (roofs and facades) and water pipes by eliminating sources of bulk water that contribute to mold and mildew. IEQ is also improved by repairing and replacing rooftop exhaust fans and cleaning ducts and registers to control moisture, prevent mold from condensation, and by removing stale air and air-borne allergens. Choosing building and finishing materials that don't have smelly fumes eliminates another trigger of asthma and allergens. Air sealing, insulation, and heating system balancing maintain comfortable indoor temperatures without wasting energy.

ENERGY

Sandy caused power outages which affected more than two million New Yorkers. Power restoration following Sandy was complicated by a subsequent nor'easter. Once power was restored, hundreds of NYCHA buildings remained without power because of water damage to wiring and conduit. Residents were without power until temporary generators could be deployed to each affected location. Future emergency energy needs are being addressed through the installation of stand-alone generators. These generators will provide grid independent power to residents during weather events or brown-outs and black-outs caused by peak demand. These generators will carry the electrical load during power outages so that residents won't experience power disruption.

In addition, NYCHA has conducted lighting audits of the Sandy-impacted developments, and existing exterior and interior lighting will be upgraded to more energy-efficient bulbs, lamps and fixtures. Air sealing and insulating the building envelope helps to keep warm air inside in winter, reducing the energy needed to heat the building. Low-flow faucets and showerheads make hot water heating systems run more efficiently. In addition to reducing energy loads, the recovery to Resiliency program is working to assure that NYCHA's back-up power systems are capable of mitigating electric outages and peaks so that the electric grid can function more reliably not only for NYCHA developments but for whole neighborhoods.

WATER

In addition to reducing in-home water use by updating fixtures, NYCHA is pursuing green infrastructure projects that will improve water runoff quality while reducing the runoff quantity. In many neighborhoods, combined sewer overflows during rainstorms releases contaminated wastewater into the rivers. These low-lying sites are also more prone to flooding. NYCHA is incorporating site features that do "double duty", by managing storm water and enhancing quality of life for residents. These features include community gardens, the planting of native species, bioswales, and permeable walking paths.

NYCHA is addressing the chronic problems of site flooding with an integrated approach to stormwater management through a combination of active and passive systems designed to maximize the health and safety of the residents while minimizing maintenance costs and demands on NYCHA staff. Stormwater management solutions will vary depending on the

hydrology and topography of each site, and will include site contouring, soil amendments, bioswales, permeable sidewalks and parking lots, underground water storage systems, blue roofs and water squares.

WASTE

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.

Existing Conditions

In OneNYC (OneNYC, 2015), the City set the ambitious goal of sending zero waste to landfills by 2030, and made a commitment 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 handling 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.

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 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 recycling 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 residential waste stream may contain different proportions of organics, recyclable materials, and trash (NYC Dept. of Sanitation, 2015). 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.

Figure 5: NYCHA residents & waste generation



Ensuring Success

The success of the Recovery to Resiliency program will come from building diverse partnerships, integrating community into the recovery process, and creating a financially sustainable process to maintain properties.

A critical aspect of NYCHA's Recovery to Resiliency is the active participation and input from residents and stakeholders. Ongoing, intensive community engagement has gathered valuable feedback regarding plans and designs, and NYCHA believes that engagement activities must continue beyond the implementation of the program. To ensure the engagement continues, the Recovery to Resiliency program has established guiding principles for long-term community engagement and partnership building:

- Recovery activities should be coordinated with other community-wide initiatives to maximize efficient community engagement;
- NYCHA should continue to expand opportunities for residents and stakeholders to get involved in the recovery process through traditional means and emerging technology platforms; and
- Through The Fund for Public Housing, NYCHA (The Fund for Public Housing, 2015) will build capacity and create resident-led committees that will meet regularly to discuss resident concerns, share updates, and work on community visioning.

As part of its endeavor towards continuous community engagement, NYCHA is committed to monitoring the Recovery to Resiliency program and keeping residents and the community-at-large apprised of progress and accomplishments. In order to accomplish this, NYCHA is establishing systems to track the pre-disaster conditions against the overall recovery of residents, and the repair and redevelopment of physical infrastructure, as well as health, social and community services at NYCHA developments. Two examples of newly-created tools for communicating progress include the NYCHA Interactive Sandy Transparency Map, which provides details on FEMA-funded projects, spending and contracts – updated monthly; and the MyNYCHA app, which allows residents to create and manage work tickets, as well as subscribe to alerts, from their mobile devices.

Finally, ensuring long-term resiliency requires established processes and protocols for cost-effectively operating, maintaining and upgrading NYCHA's assets. The Recovery to Resiliency asset management plan will focus on how to successfully manage billions of dollars-worth of capital improvements that are being made as a result of Hurricane Sandy, and have the ability to translate to wholesale changes in the way NYCHA is funded and operates. NYCHA will leverage the resources spent on recovery to reduce costs and create new revenue streams while creating greater value for all New Yorkers. This includes making wiser use of ground floor space and reducing central costs. Recovery to Resiliency asset management also includes focusing on opportunities for public-private partnerships so that the Sandy recovery dollars are leveraged against private funds to create the most inclusive, long-term economic benefits for NYCHA, and maximize the value of its assets.

REFERENCES

Note: Much of the paper comes from the NYCHA 2015 Recovery to Resiliency Report.

Enterprise Community Partners, Inc. 2015. *Enterprise Green Communities*. Washington, DC. <http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities>

New York City (NYC) Department of Sanitation. 2015. *Waste Characterization, 2005*. New York. <http://www1.nyc.gov/assets/dsny/about/inside-dsny/waste-characterization-2005.shtml>

New York City Housing Authority (NYCHA). 2015. *Recovery to Resiliency Report*. New York. NYCHA. <http://www1.nyc.gov/html/onenyc/index.html>

New York City Housing Authority (NYCHA). 2015. *Department of Research and Management Analysis*. New York. www1.nyc.gov/site/nycha/about/recovery-resiliency.page

New York City Housing Authority (NYCHA). 2015. *The Fund for Public Housing*. New York. <https://www1.nyc.gov/site/nycha/about/fund-for-public-housing.page>

OneNYC, 2015. *#OneNYC: The Plan for a Strong & Just City*. New York. <http://www1.nyc.gov/html/onenyc/index.html>

New York City (NYC) Open Data. 2015. *OpportunityNYCHA, Development Data*. New York. <http://www.nyc.gov/html/data/about.html>

New York City Panel on Climate Change (NPCC), 2015. *NextGeneration*. New York.