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The Intersection of New York City's Adjacent Crises:

Evaluating Affordable Housing Through an Environmental Justice Lens

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Executive Summary

New York City today faces dual challenges: an escalating affordable housing crisis and the worsening impacts of climate change. This report examines the intersection of these challenges - focusing on the lack of affordable housing supply, the City's adaptations to climate change, and the challenges inherent in creating and preserving equitable, sustainable housing, particularly for low-income New Yorkers of color and women of color - and offers potential intersectional, long-term, community-driven solutions. This report is a synthesis of extensive desk research and interviews with representatives of key stakeholders in the housing and climate space in New York City. New York Women's Foundation can use the findings from this research to guide the organization's economic justice grantmaking.

The affordable housing crisis in New York City has reached unprecedented levels, with an alarming number of households struggling to find and maintain decent housing options. The lack of supply, exacerbated by climate change, an increasing population, and rising living costs, has pushed many residents into overcrowded, unsafe, and low-quality living conditions. More than half of the 2.2 million renter households in New York City are rent-burdened, paying more than 30 percent of their income on rent. This crisis disproportionately affects lower-income households and communities of color, exacerbating existing social and economic inequalities in the City.

All people, regardless of race, gender, socioeconomic level, age, or disability status, deserve to live in safe homes and communities, free from environmental hazards that reduce their quality of life. However, histories of systemic discrimination have caused inequitable resource distribution and climate injustices that make people of color and low-income New Yorkers especially vulnerable to negative health outcomes, unsafe living conditions, and climate risks. NYC defines these communities as "environmental justice areas" - where more than a quarter of residents live under the poverty line, or the majority of residents are people of color. These communities have fewer resources, worse housing quality, and less political influence than higher-income, whiter areas of the City. Yet, they face the brunt of climate change's impacts, such as heat waves and dangerous storms. Extreme weather events worsen the existing affordable housing crisis by damaging homes, leaving some uninhabitable. Residents of environmental justice areas also suffer detrimental health outcomes due to heat vulnerability, flooding, and poor air quality. The disproportionate effects of climate change on environmental justice communities necessitate policies that equitably address environmental and health disparities in housing.

Analyzing how NYC can preserve current affordable housing, increase the housing stock, and reduce carbon emissions, this report will explore the City's demographics, recent housing history, and the current realities impacting New Yorkers' ability to access climate-resilient and affordable housing. Through a landscape analysis, the report will then examine three areas that affect affordable housing through the lens of climate change: extreme rainfall, extreme heat, and sustainable communities. Case studies on flooding risks in Queens and heat vulnerability in the Bronx give specificity to the report by providing NYWF with data and context on how these issues affect environmental justice communities. This report also provides an overview of the stakeholders, policies, organizations, and community programs that shape the sustainable housing landscape. Finally, we examine how the public, private, and nonprofit sectors can work together to build a safe, sustainable, and equitable affordable housing future for all New Yorkers.

Key Terms and Definitions

1. **Affordable Housing** - defined by the US Department of Housing and Urban Development (HUD) as housing where an individual pays no more than 30 percent of household income on housing costs, including utilities.[1] The NYC Department of Housing Preservation (HPD) and Development also stipulates that for housing to be considered affordable, rent prices do not dramatically increase over time.[2] A more comprehensive and holistic definition includes considerations of the cost of utilities, transportation, and environmental costs.[3]

2. **Area Median Income (AMI) -** a measurement of median household income in a specific metropolitan area, which is determined yearly by the US Department of Housing and Urban Development. AMI varies depending on the city. AMI levels are used to determine households' eligibility for rent-regulated and government-subsidized housing. According to NYC HPD, "the 2022 AMI for the New York City region is $120,100 for a three-person family (100% AMI)."[4] [5]

3. **Rent-Burdened** - a household that spends more than 30% of their income on housing.[6]

4. **Severely Rent-Burdened** - a household that spends more than 50% of their income on housing.[7]

5. **Housing Affordability Gap** - the difference between housing costs (whether rental rates or home prices) that households can afford to pay based on their incomes, and actual average housing costs.

6. **Market-Rate Housing** - residential units that are not regulated or restricted by affordable housing laws. Owners of market-rate housing can set rent or home prices at whatever renters and prospective homebuyers will pay.[8]

7. **Public Housing** - affordable rental housing that is owned and managed by a government entity. In NYC, the New York City Housing Authority (NYCHA) oversees a system of public housing

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[1] "Glossary of Terms to Affordable Housing," HUD, accessed April 15, 2023, https://archives.hud.gov/local/nv/goodstories/2006-04-06glos.cfm.
[2] "Affordable Housing: Do You Qualify?," NYC Department of Housing Preservation and Development, accessed April 17, 2023, https://www.nyc.gov/site/hpd/services-and-information/do-you-qualify.page.
[3] "Defining Housing Affordability," HUD User (U.S. Department of Housing and Urban Development), accessed April 18, 2023, https://www.huduser.gov/portal/pdredge/pdr-edge-featd-article-081417.html.
[4] "Area Median Income," NYC Department of Housing Preservation and Development, accessed April 15, 2023, https://www.nyc.gov/site/hpd/services-and-information/area-median-income.page.
[5] Included in Appendix C of this report is a chart that shows the different AMI levels for the New York City Area in 2022.
[6] "Rental Burdens: Rethinking Affordability Measure," HUD User (U.S. Department of Housing and Urban Development), accessed April 18, 2023, https://www.huduser.gov/portal/pdredge/pdr_edge_featd_article_092214.html.
[7] Ibid.
[8] "Housing Equity," Office of The New York City Public Advocate, accessed April 17, 2023, https://advocate.nyc.gov/housing-equity/get-empowered/market-rate.

developments to provide affordable housing to low- and moderate-income New Yorkers, otherwise called Section 9 housing.[9] NYCHA also administers the federal Section 8 housing assistance voucher program in NYC.[10]

8. **Rent-regulated Housing** - an umbrella term that refers to privately-owned housing units where rental rates are subject to governmental regulations. Rent-regulated housing includes both rent-controlled and rent-stabilized housing in NYC, both of which are systems to limit rent increases and protect tenant rights.[11]

9. **Sustainable Housing** - housing that is environmentally conscious (during the construction process and once completed), economically sustainable, and built in locations and ways that encourage health, social, and environmental benefits for residents.[12]

10. **Zoning** - laws that regulate how certain areas of land may be used, including building density, within a municipality (residential, commercial, transit, etc.). In NYC, zoning regulations are determined, amended, and approved by the City Planning Commission and the City Council.[13]

11. **Built Environment** - the human-made structures where people live, work, and recreate.

12. **Environmental Justice** - "the principle that all people, regardless of race, color, national origin, gender, disability status, age, or socioeconomic background, have a right to live, work, and play in communities that are safe, healthy, and free of harmful environmental conditions."[14] Environmental justice is the "fair treatment and meaningful involvement of all" people in "the development, implementation, and enforcement of environmental laws, regulations, policies", and in "the distribution of environmental benefits."[15]

13. **Climate Justice** - the principle that communities most vulnerable to climate change must play an integral role in planning for climate resiliency. These are communities where climate vulnerabilities intersect with historic patterns of environmental burdens that disproportionately impact Black, Latino, and Indigenous communities.

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[9] "About NYCHA," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/site/nycha/about/about-nycha.page.
[10] "About Section 8," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/site/nycha/section-8/about-section-8.page.
[11] "Rent Stabilization and Rent Control," Division of Housing Community Renewal: New York Office of Rent Administration, accessed April 18, 2023, https://hcr.ny.gov/system/files/documents/2022/09/fact-sheet-01-09-2022.pdf.
[12] "Sustainable Housing Initiative," U.S. Department of Housing and Urban Development (HUD), accessed April 15, 2023, https://www.hud.gov/program_offices/economic_development/sustainable_housing_initiative.
[13] "About Zoning," NYC Department of City Planning, accessed April 15, 2023, https://www.nyc.gov/site/planning/zoning/about-zoning.page.
[14] "Environmental Justice," NYC Mayor's Office of Climate and Environmental Justice, accessed April 18, 2023, https://climate.cityofnewyork.us/topic/environmental-justice/.
[15] EJ 2020 Glossary, U.S. Environmental Protection Agency, accessed April 15, 2023, https://www.epa.gov/environmentaljustice/ej-2020-glossary.

Climate justice is grounded in "the recognition that it is [these same] historically-overburdened communities that are most vulnerable to a rapidly changing climate. Disparities that are persistent in our society, from social to economic and health inequities, can be exacerbated by impacts of climate change like extreme heat, flooding, and catastrophic weather events. The pursuit of climate justice also means holding those with the most responsibility for the climate crisis accountable."[16]

14. **Environmental Justice Areas/Communities** - New York City's legal classification for low-income or minority communities located in the city where, based on US Census data, more than a quarter of residents living under the poverty line or more than 51% of residents identify as part of a minority population (Hispanic, Black, Asian and Pacific Islander or American Indian).[17] "These areas have been and continue to be more vulnerable to potential environmental injustices due to factors including history of systemic racism and inequitable resource distribution."[18]

15. **Disadvantaged Communities** - New York State's legal classification for "communities that bear burdens of negative public health effects, environmental pollution, impacts of climate change, and possess certain socioeconomic criteria." These areas may have high "concentrations of people that are of low income, high unemployment, high rent burden, low levels of home ownership, low levels of educational attainment, or members of groups that have historically experienced discrimination on the basis of race or ethnicity."[19] Under the New York State 2019 Climate Leadership and Community Protection Act, disadvantaged communities must receive "at least 35% of total statewide spending on projects that reduce greenhouse gas emissions and pollution."[20]

16. **Climate Mitigation** - processes that can lessen the impacts of climate change by preventing, reducing, or removing the emission of greenhouse gasses (GHG) into the atmosphere.[21] Mitigation is achieved either by reducing the sources of these gasses — e.g. by decreasing the burning of fossil fuel/increasing the usage of renewable energies, or establishing a cleaner transit system — or by enhancing the storage of these gasses — e.g. by increasing the size of forests. In short, mitigation is a human intervention that reduces the sources of GHG emissions and/or enhances GHG storage.

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[16] "Environmental Justice," NYC Mayor's Office of Climate and Environmental Justice.
[17] "Identifying and Addressing Environmental Justice Issues: Int 0886-2015," The New York City Council, accessed April 18, 2023, https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=2460360&GUID=0C9F8C9D-5F14-4C1E-B4AD-37BB96F82BA3.
[18] "Environmental Justice," NYC Mayor's Office of Climate and Environmental Justice.
[19] "Draft Disadvantaged Communities Criteria and List Technical Documentation," New York State Climate Justice Working Group, accessed April 18, 2023, https://climate.ny.gov/-/media/project/climate/files/Technical-Documentation-on-Disadvantaged-Community-Criteria.pdf.
[20] Samantha Maldonado, "Final Map of 'Climate Disadvantaged' Communities Now Includes Blocks Previously Excluded - but Other Vulnerable Areas Left Out," The City, March 29, 2023, https://www.thecity.nyc/2023/3/29/23662480/final-map-climate-disadvantaged-communities.
[21] "U.S. Climate Resilience Toolkit," Glossary | U.S. Climate Resilience Toolkit, accessed April 15, 2023, https://toolkit.climate.gov/content/glossary.

17. **Climate Adaptation** - anticipating the adverse effects of climate change and taking appropriate action to prevent or minimize the damage they can cause, or taking advantage of opportunities that may arise.[22] Examples of adaptation measures include large-scale community changes, such as relocating coastal communities to inland areas, as well as behavioral shifts, such as individuals reducing their food waste. In essence, adaptation can be understood as the process of adjusting to the current and future effects of climate change.

18. **Climate Resiliency** - **"**the capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption."[23] Examples of climate resiliency include infrastructure investments and modifications, such as building defenses to protect against sea-level rise or designing buildings to be more flood-resilient.

19. **Climate Vulnerability** - the potential for a physical place or community to be negatively affected by climate change, in terms of short-term impacts such as exposure to/severity of extreme weather events, or long-term impacts such as sea level rise.[24]

20. **Climate Displacement** – the relocation of groups of people, "as a result of sudden and/or slow-onset of climate and weather-related disasters."[25]

21. **Housing Affordability Gap** - the difference between housing costs (whether rental rates or home prices) that households can afford to pay based on their incomes, and actual average housing costs.[26]

22. **Electrification** - the process of replacing fossil fuel-based systems with electric alternatives in residential, commercial, and industrial buildings with the goal of increasing overall building efficiency and reducing greenhouse gas emissions.

[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] "Climate Displacement In NYC: Making Space For Our Neighbors," Rebuild by Design, 2022, https://rebuildbydesign.org/wp-content/uploads/2022/12/NYC-Climate-Displacement-Report.pdf.
[26] "Myths and Facts," Coalition For The Homeless, accessed April 15, 2023, https://www.coalitionforthehomeless.org/myths-and-facts/.

Methodology

The team's methodology consisted of both qualitative and quantitative methods, combining extensive desk research, interviews, data aggregation and analysis. We aimed to generate a comprehensive snapshot of the intersection of affordable housing and climate justice for low-income New Yorkers of color - with a particular focus on low-income women of color - with Queens and the Bronx sitting at the forefront of our research. We set out to understand the perspectives of key stakeholders across the city in the government, private, nonprofit, and academic sectors, to answer our research question: "What public policies, practices, and private initiatives should be advocated for and implemented to maximize the availability of affordable housing, address the disproportionate impact of climate change, and center communities of color at the forefront of developing long-term solutions?"

Desk Research

Our team identified three main areas of research to focus the scope of our topic:

1. **The intersection of housing affordability and climate crisis:** We approached this question by discussing inequality and its effect on housing and climate vulnerability through race, income, and gender lenses. We collected data mainly from the NYU Furman Center, NYC Housing Preservation & Development, NYC Population FactFinder, and NYC Planning Population Division, to illustrate how NYC's lack of affordable rental units and the climate crisis disproportionately impacts people of color, low-income communities, and women.
2. **Case studies and specific climate change-related challenges in NYC:** In this section, we conducted thorough research on extreme climate events and how they interplay with housing. We used case studies on basement flooding in Queens and utility burden in the Bronx to discuss the intersection of extreme rainfall/extreme heat and housing affordability in NYC. We addressed the risk of flooding and heat waves and reported progress on climate adaptation and mitigation efforts for extreme and extreme heat.
3. **Landscape and stakeholder analysis:** we organized the landscape stakeholder analysis into two main categories– government (city, state, and federal) vs. non-government (private, nonprofit, and academic sectors) stakeholders– to better understand how different housing and environmental justice agencies, organizations, and coalitions work together to address issues, run campaigns and further push through policy change.

Interviews

Our team sent out close to thirty interview requests to government officials, nonprofit organizations, academics, real estate developers, and community activists and conducted fifteen structured interviews. We utilized interviews as an opportunity to gain insight directly from experts working in the field. Throughout the interviews, we set out to gain a deeper understanding of the gaps in current affordable housing policy, current issues at the intersection of housing and climate justice, and plausible proposals for addressing housing affordability and climate risks in NYC. Most interviews were conducted by at least two team members, and for selected interviews, before the interview started, we asked permission of

the interviewee to record. After completing all interviews, our team studied the interview notes, synthesized them into themes, and generated trends from our findings, which will be discussed throughout the report. General interview questions and an interviewee list are located in the Appendix of this report.

Research Challenges

Broad Scope

Looking at New York City's housing affordability crisis through the lens of climate justice offers many possible challenges to study and paths to pursue. Housing affordability in a city as big and diverse as New York is affected by numerous factors. There are broad issues such as a constrained supply of housing by public and private pressures, as well as an ever-increasing demand for affordable units. Acute challenges like gentrification, access to transit, and an inability to access homeownership affect low-income communities of color the hardest.

Similarly, climate justice can take many different forms. Is it best to think about mitigation strategies to reduce carbon emissions in order to limit the negative consequences of climate change? Or is looking into adaptation and resilience questions about the existing built environment a more effective goal of the report? Given this context, focusing the scope of this report proved to be a challenge. Ultimately, the team decided to pursue interrelated housing and climate issues, legislation, and solutions as opposed to looking at them separately.

U.S. Census Data

The 2020 U.S. census had some unique challenges that affected the reliability of the typically robust data set. The Census counts every person residing in the U.S., including citizens, non-citizen legal residents, and undocumented residents. However, former U.S. President Donald Trump proposed adding a citizenship question in the 2020 U.S. Census, which could have spread fear among undocumented immigrant communities and their family members, potentially causing many residents to be reluctant to participate in the Census and therefore be absent from the data.[27]

Additionally, the COVID-19 pandemic made data collection more difficult for the 2020 U.S. Census. During the outbreak, the Bureau temporarily suspended in-person census surveys, which could have impacted the enumeration of hard-to-reach populations (e.g. the homeless) and communities in group living situations (e.g. prisons and nursing homes).[28] While our team can only speculate on the effects of the difficulties the 2020 Census faced, it is possible that there are some questions regarding the accuracy of this Census data, which could have had downstream consequences on our research. However our team also utilized data from the annual American Communities Survey in our research, which helps to bolster the robustness of our report and compensate for any potential errors in the 2020 Census Data.

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[27] Holly Straut-Eppsteiner, "Research Shows a Citizenship Question Would Suppress Participation among Latinxs and Immigrants in the 2020 Census, Undermining Its Reliability," National Immigration Law Center, April 22, 2019, https://www.nilc.org/2019/04/22/citizenship-question-would-undermine-census-reliability/.
[28] Saher Khan, "How the Coronavirus Pandemic Has Affected the 2020 Census," PBS (Public Broadcasting Service, April 1, 2020), https://www.pbs.org/newshour/nation/how-the-coronavirus-pandemic-has-affected-the-2020-census.

Gender-Specific Data

In collecting the demographic data of people and housing, our team found that gender data was not sufficiently disaggregated with other variables in the U.S. Census data. For example, it was difficult to find data that showed demographics of overlapping identities, such as gender and disability, or gender and poverty level. Additionally, we found that while there is gender-specific data related to housing conditions, data that looked at climate risk from a gender lens was difficult to find. For example, there seems to be room for further exploration of how certain climate factors such as extreme rainfall and extreme heat affect women - especially women of color, and older women. This type of intersectional data would provide an important lens to analyzing the climate risks to women in New York City.

The Intersection of Housing & Climate

Affordable Housing through the Lens of Climate Justice

New York's housing crisis is inextricably linked to its climate challenges. This report seeks to address the interconnectedness between two congruent crises: first, the lack of affordable housing, and second, the impending climate-related issues that will impact the housing stock. The same policies, regulations, and institutions that restrict housing supply also constrain the city's climate goals. As a city synonymous with opportunity and diversity, the stark reality of soaring housing costs and the disproportionate impact of climate change on marginalized communities limit the promise of a fair and inclusive urban landscape.

The widening gap between the rich and poor in New York City has led to a stark disparity in the availability of affordable housing options. Luxury high-rises continue to dominate the city's skyline, while almost 50% of New Yorkers are struggling with housing insecurity and financial strain.[29] This affordability crisis is further compounded by a housing market that primarily caters to the wealthy, with limited viable options for low-income residents. From 2006 to 2019 the share of rental units affordable to households earning 80% area median income (AMI) declined from 52.5% to 40.7%.[30] Eviction rates also continue to increase since the COVID-19 eviction moratorium was lifted in January of 2022, and an estimated 4,400 people were removed from their homes during the 2022 calendar year.[31] The impact of this crisis is most pronounced in areas like the South Bronx and Queens, where gentrification and skyrocketing rents have led to the displacement of long-time residents.[32] [33]

Meanwhile, climate change poses significant risks to a dense city built on the sea. Superstorm Sandy and Hurricane Ida have demonstrated the devastating power of extreme weather events, which disproportionately affect lower-income communities. More frequent and extended heat waves are forecast to dramatically increase by 2050 according to an Environmental Protection Agency (EPA) study, with the average number of days with temperatures over 90℉ more than tripling, from 18 to 57 annually.[34] As sea levels rise, flooding becomes more frequent, and dangerously hot temperatures grip the city, the city's crumbling infrastructure and lack of affordable, resilient housing become apparent. The importance of climate equity becomes increasingly relevant as vulnerable communities frequently endure the greatest burden of the consequences of environmental disasters.

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[29]"State of Renters and Their Homes," NYU Furman Center, accessed April 15, 2023, https://furmancenter.org/stateofthecity/view/state-of-renters-and-their-homes.
[30] "Citywide Data," NYU Furman Center, accessed April 15, 2023, https://furmancenter.org/stateofthecity/view/citywide-data.
[31]David Brand, "NYC Eviction Rate Continues to Rise Since Ban Was Lifted, as Homelessness Surges," Gothamist, January 18, 2023, https://gothamist.com/news/nyc-eviction-rate-continues-to-rise-since-ban-was-lifted-as-homelessness-surges.
[32] Lawrence Cappello, "Gentrification and the South Bronx: Demographic and Socioeconomic Transformations in Bronx Community District #1," CUNY Academic Works, July 2020, https://academicworks.cuny.edu/clacls_pubs/87/.
[33] Sarah Ngu, "'Not What It Used to Be': In New York, Flushing's Asian Residents Brace against Gentrification," The Guardian, August 13, 2020, https://www.theguardian.com/us-news/2020/aug/13/flushing-queens-gentrification-luxury-developments.
[34] "New York City Assesses Extreme Heat Climate Risk", U.S Environmental Protection Agency, accessed April 15, 2023, https://www.epa.gov/arc-x/new-york-city-assesses-extreme-heat-climate-risk.

The housing and climate crises are also both worsening. Home prices and rents are rising much faster than incomes every year, straining household budgets.[35] Since 2000, citywide median incomes have increased by only 15%, while median rents jumped by over 38% (Figure 1).[36] Housing is the largest monthly cost for the vast majority of New Yorkers and as a greater share of their income goes towards paying for a place to live, unexpected costs can push families over the edge into homelessness.[37] [38] Across the country, higher housing costs and increasing rates of homelessness are correlated.[39] When looking at the various effects of climate change on New York City, dealing with dangerous weather events is the most pressing issue to address. The city has options to consider when envisioning a new future for its built environment. It can target climate change mitigation, resilience, or adaptation. For the best outcomes, it must do all three simultaneously.

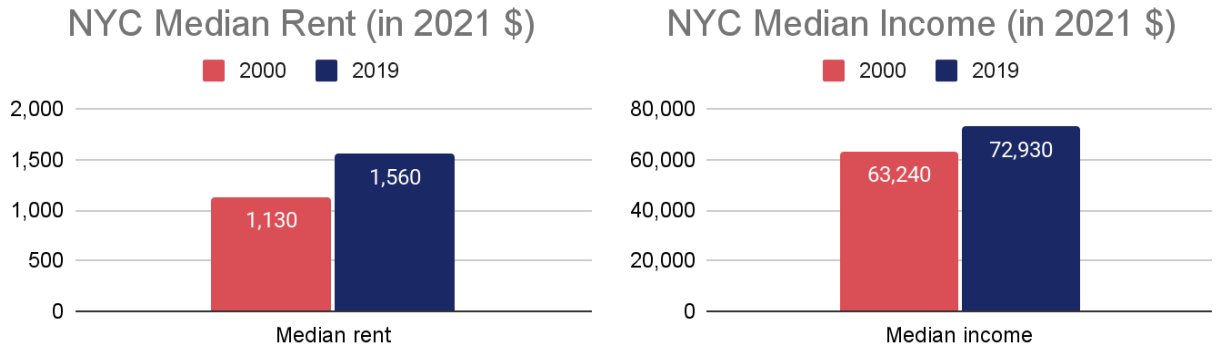

Figure 1. Citywide median incomes increased by only 15%, while median rents jumped by over 38%
Source: NYU Furman Center, 2000-2019

Race and Wealth Gap: Inequality and Its Effect on Housing and Climate

New York State is home to 20.2 million people, and 8.8 million of those residents live in New York City (NYC), making it twice as large as the next biggest U.S. city. Encompassing five boroughs, The Bronx, Queens, Brooklyn, Manhattan, and Staten Island, NYC has a unique layout and structure, spanning over

[35]Kristian Hernández, "Rising Construction Costs Stall Affordable Housing Projects," The Pew Charitable Trusts, April 25, 2022, https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/04/25/rising-construction-costs-stall-affordable-housing-projects.
[36] "Citywide Data," NYU Furman Center.
[37] "Consumer Expenditures in 2020," U.S. Bureau of Labor Statistics, December 2021, https://www.bls.gov/opub/reports/consumer-expenditures/2020/home.htm.
[38] Joy Moses, "New Research Quantifies the Link Between Housing Affordability and Homelessness," National Alliance to End Homelessness, December 13, 2018, https://endhomelessness.org/blog/new-research-quantifies-link-housing-affordability-homelessness/.
[39] Gary Warth, "Cause of Homelessness? It's Not Drugs or Mental Illness, Researchers Say," Los Angeles Times, July 11, 2022, https://www.latimes.com/california/story/2022-07-11/new-book-links-homelessness-city-prosperity.

300 miles and being surrounded by 520 miles of coastline.[40] [41] The same geographic attributes that make the city so appealing—such as its many waterfronts—make it susceptible to climate change and may require the abandonment of at-risk neighborhoods.

Following national trends, the wealth gap in NYC continues to expand; in 2022, a report was published that confirms New York State is home to the biggest wealth gap in the US.[42] If NYC is not able to serve low- and moderate-income people and families, then the city will struggle to grow and provide equitable opportunities for its residents to thrive.

NYC in particular is a global commerce, cultural, and economic hub, with many of the world's largest companies headquartered in the city. It is also one of the most diverse cities in the country. In order for the NYC economy and industries to continue to expand, New Yorkers need to be able to afford sustainable, reliable, and durable housing. While New York State's gross state product (GSP) ranks third highest in the US and contributes 7.7% to the US gross domestic product (GDP), there are many people in NYC living in poverty.[43] In 2019, 1.2 million adults (18% of the City's adult population) and 350,000 children in NYC lived in poverty, and the City poverty rate was nearly double the national average. An additional 2.1 million NYC adults (32%) were considered low-income, defined as living below 200% of the poverty line.[44] Poverty rates differed by borough; in 2019, 24% of Bronx residents, 21% of Brooklyn residents, 21% of Queens residents, 16% of Manhattan residents, and 13% of Staten Island residents lived in poverty. Poverty rates were also higher among foreign-born residents of NYC (24%) as compared to US-born residents (16%).[45] Approximately one in five women were living in poverty in 2019 (compared to one in six men), and New Yorkers with a high school degree or less were three times more likely to be in poverty than those who had graduated college.[46] These statistics set the stage for what will be discussed throughout this report regarding the ramifications of growing income inequality, as well as the gender and racial wealth gap, on New Yorkers' access to climate-resilient affordable housing.

Historically marginalized communities are the ones most impacted by the legacy of systemic policies that have affected economic, social, educational, health, and environmental outcomes today. According to the 2020 Census, the distribution of the population across NYC boroughs is largely uneven, with approximately 2.73 million people living in Brooklyn, while just shy of 500,000 people reside in Staten

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[40] "New York City," New World Encyclopedia, accessed April 16, 2023, https://www.newworldencyclopedia.org/entry/New_York_City.
[41] "Climate Displacement In NYC: Making Space For Our Neighbors," Rebuild by Design, 2022. https://rebuildbydesign.org/wp-content/uploads/2022/12/NYC-Climate-Displacement-Report.pdf.
[42] Nick Reisman, "Report Finds New York Home to Largest Income Gap in U.S.," Report finds NY home to largest income gap in U.S., November 16, 2022, https://spectrumlocalnews.com/nys/central-ny/ny-state-of-politics/2022/11/16/report-finds-ny-home-to-largest-income-gap-in-u-s-.
[43] "Economic and Demographic Trends," Office of the New York State Comptroller, accessed April 16, 2023, https://www.osc.state.ny.us/reports/finance/2022-fcr/economic-and-demographic-trends.
[44] "The State Of Poverty And Disadvantage In New York City (Vol. 4)," Robin Hood (Poverty Tracker Research Group at Columbia University, April 2022), https://www.robinhood.org/wp-content/themes/robinhood/images/poverty-tracker/pdfs/POVERTY_TRACKER_REPORT25.pdf.
[45] Ibid.
[46] Ibid.

Island.[47] Queens, Manhattan, and the Bronx are home to 2.4, 1.7, and 1.47 million people, respectively.[48] Many people of color in NYC live in the outer boroughs: in 2021, the Bronx was 56.1% Hispanic, 28.5% Black, 3.7% Asian, and 9.0% White[49], while Queens' racial makeup was 27.9% Hispanic, 16.8% Black, 25.6% Asian, and 24.6% White.[50] For context, the citywide average is 28.9% Hispanic, 21.1% Black, 14.1% Asian, and 31.9% White (Figure 2).[51]

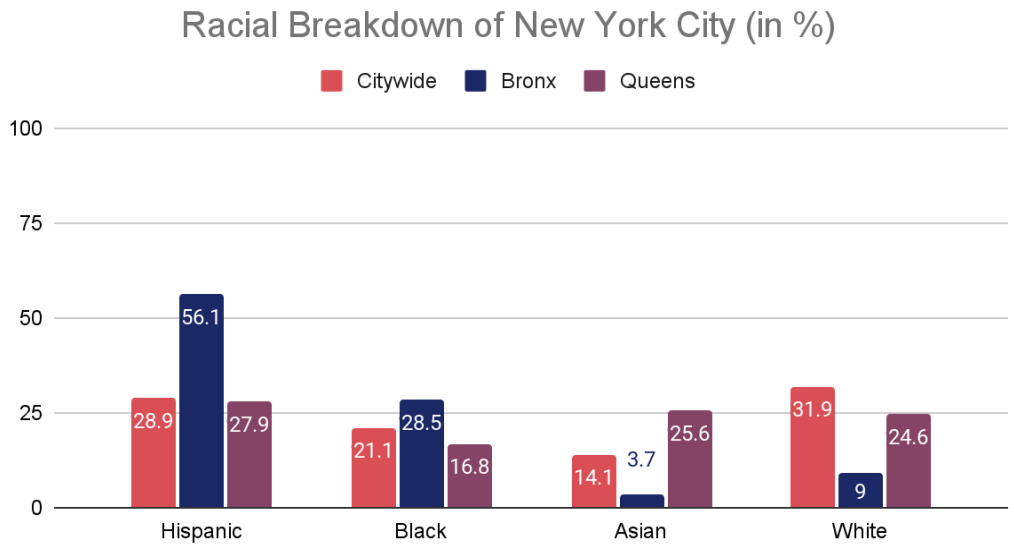

Figure 2. Breakdown of percentage of people's race and ethnicity for Citywide, Bronx, and Queens
Source: NYC Planning Population FactFinder, 2017-2021

There has been a historical decline in affordable housing since the late 1990s that continues in the present day. NYC continues to see rising numbers of high-cost rentals, while low-cost rentals continue to decrease. In just thirty years, the rental stock has dramatically changed, as is illustrated in Figure 3; from 1996-2021, there was a loss of over half a million rental units with monthly rents of less than $1,500.[52] [53] The supply of affordable housing in NYC is generally trending downward, and its impact will only be

[47] "Population Estimates For New York City and Boroughs as of July 1, 2021," City of New York, accessed April 17, 2023, https://www.nyc.gov/assets/planning/download/pdf/planning-level/nyc-population/population-estimates/current-population-estimates-2021.pdf.
[48] Ibid.
[49] "NYC Planning Population FactFinder: Bronx," NYC Population FactFinder, accessed April 18, 2023, https://popfactfinder.planning.nyc.gov/#10.47/40.7301/-73.9836.
[50] "NYC Planning Population FactFinder: Queens," NYC Population FactFinder, accessed April 18, 2023, https://popfactfinder.planning.nyc.gov/explorer/boroughs/4?source=acs-current.
[51] "NYC Planning Population FactFinder: New York City," NYC Population FactFinder, accessed April 18, 2023, https://popfactfinder.planning.nyc.gov/explorer/cities/New%20York%20City?source=acs-current.
[52] "2021 New York City Housing and Vacancy Survey Selected Initial Findings," New York City Department of Housing Preservation and Development, May 16, 2022, https://www.nyc.gov/assets/hpd/downloads/pdfs/services/2021-nychvs-selected-initial-findings.pdf.
[53] Milagros Clark, "Housing Affordability: The Dire Housing Crisis for Extremely Low-Income New Yorkers."

further exacerbated by climate change. When evaluated together, climate change and access to affordable housing has already - and will continue - to disproportionately impact NYC's most vulnerable residents and communities. The housing affordability gap continues to widen, as demonstrated by multiple factors, such as the amount of unhoused New Yorkers and those who are unable to pay their monthly rents. In March of 2022, 48,524 people slept in NYC Department of Homeless Services and Department of Housing Preservation and Development shelters, with many more people sleeping in other shelters, subway stations, and on the streets.[54]

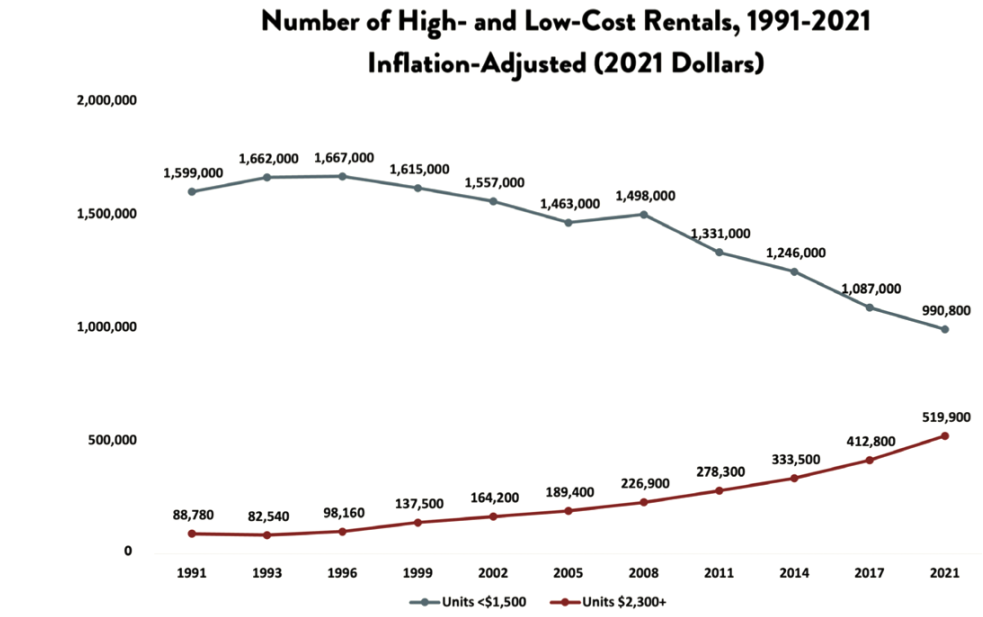

Figure 3. The supply of affordable housing in NYC is generally trending downward
Source: New York City Department of Housing Preservation and Development, 2021

Further, according to a March 2023 analysis conducted by The New York Housing Conference, there is a growing number of rent arrears—defined as missed or overdue rent payments—in NYC. In a data set of 900 buildings encompassing over 49,000 units, 31% of units have failed to pay rent for more than two months, owing in total over $145 million.[55] In addition, nearly a third of tenants face eviction because it will be difficult for these low-income tenants to pay back their overdue rent payments.[56] The reasons for the increase in rental arrears are multilayered and include economic hardships due to the COVID-19 pandemic, inflation, and severe rent burden. In the following section, the impact of housing and climate inequality and the subsequent unaffordability of rental units—will be discussed in the context of its outsized impact on women—specifically women of color, mothers, and the elderly.

[54] Ibid.
[55] "New York's Rental Arrears Crisis", New York Housing Conference, March 2023, https://thenyhc.org/wp-content/uploads/2023/03/NY-Rent-Arrears-Crisis-3.8.23-Final.pdf.
[56] Ibid.

(Un)affordable Housing: Disproportionate Impact on Women

The gender pay gap is prevalent in NYC and impacts the types of housing women can afford—especially for single, female renters and women that are supporting a family. A staggering one in four women are economically vulnerable in NYC, and when looking at women of color specifically, Black and Latino women and girls are 25% more likely to live in poverty.[57] Over 90% of families in shelters with women are from a female-headed household, and over 85% of those living in shelters identify as people of color, further demonstrating the implications of how women-headed households and people of color are most likely to experience homelessness.[58] [59]

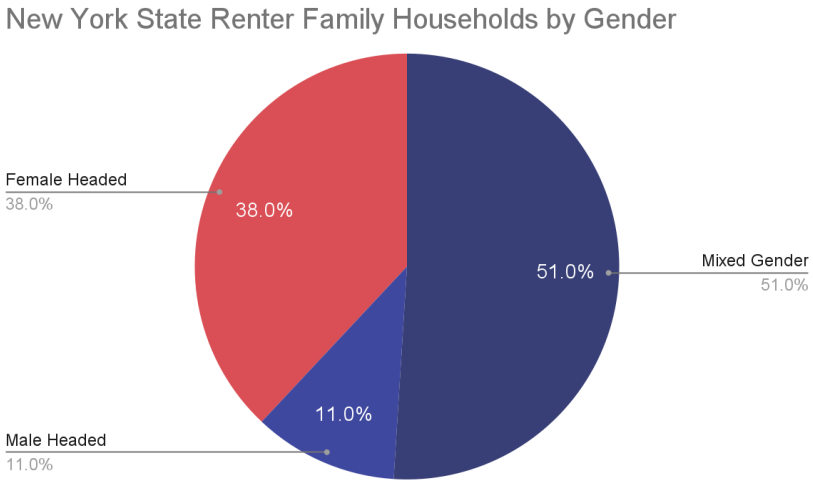

Figure 4. The majority of single-parent households are female-headed
Source: Housing Justice for All, 2019

Low-income women are disproportionately impacted by the rental affordability crisis. In New York State, 38% of renter households are female-headed, as compared to the 11% of renter households that are male-headed households (Figure 4).[60] Rental households are also more likely to be in poverty; 79% of households in poverty are renters, and nearly 60% of renters below the poverty line are women.[61] While the overall NYC population is slightly skewed with a higher female population (52.3%) than the male population (47.7%) when looking at the population over 65, this discrepancy is even more pronounced, with 58.8% female versus 41.2% male.[62] NYC's female population is more susceptible to issues that arise in aging populations, such as accessibility and affordability. In addition to the aforementioned statistics

[57] "Poverty Among Women in NYC," Art Start, accessed April 16, 2023, https://www.art-start.org/poverty-among-women-in-nyc.
[58] Ibid.
[59] "Basic Facts About Homelessness: New York City," Coalition for the Homeless, February 2023, https://www.coalitionforthehomeless.org/basic-facts-about-homelessness-new-york-city/.
[60] "How Women Are Impacted By New York State's Rental Housing Crisis," Housing Justice for All, February 5, 2019, https://housingjusticeforall.org/wp-content/uploads/2021/03/womenreportfinal.pdf.
[61] Ibid.
[62] "NYC Planning Population FactFinder: New York City," NYC Population FactFinder.

illuminating the unequal burdens on women renters and women with children, these discrepancies continue as women age.

Matthew Desmond, author of *Evicted: Poverty and Profit in the American City*, explains the correlation between the cycle of rent burden, and the "inevitability" of eviction for families struggling economically in the US.[63] His findings show a relationship between the compounding issues of eviction and job loss, pushing families into a cycle of poverty. Though he uses Milwaukee as a case study, his broader points about cycles of inequality and poverty—especially for women of color—are helpful to understand the context of NYC's housing crisis. His research found that one in five Black women renters reported being evicted at some point in their lives and that, even when controlling for how much rent is owed to the landlord, people living with children were three times more likely to be evicted.[64] This demonstrates the statistical disadvantage for women of color and mothers in low-income communities where the rent burden is particularly high.

Another important consideration, particularly for mothers, is the rising costs of childcare in NYC, which is estimated at $16,000 per year.[65] When looked at through the lens of the average income at the poverty line, childcare alone would cost over half of the average income at the poverty line.[66] These realities are also inextricably woven into women's healthcare outcomes. For example, the percentage of women or birthing parents with late or no prenatal care varied considerably throughout the city from (1% to 15%).[67] According to the 2022 "Well-Being Index" Update, The Bronx and the eastern parts of Queens are among the communities with the highest rates of late or no prenatal care.[68] The compounding economic and health outcomes for low-income women and women of color are deeply connected with their ability to access safe and affordable housing.

While there is significant information regarding women in housing, there is no comparable data when it comes to the impact of climate change on women in New York City. However, even if the climate impact is similar, many women would have to deal with the disproportionate impact of unaffordable housing in the context of an extreme weather event. While there is a gap in gender-specific climate change-related data, it is important to keep this lens in mind for future data collection and research into sustainable affordable housing in New York City.

[63] Gillian B. White, "America's Insidious Eviction Problem," The Atlantic (Atlantic Media Company, March 1, 2016), https://www.theatlantic.com/business/archive/2016/03/eviction-matthew-desmond-housing/471375/.
[64] Ibid.
[65] "Poverty Among Women in NYC." Art Start.
[66] Ibid.
[67] "Well-Being Index: 2022 Update," NYC Center for Innovation Through Data Intelligence, October 2022, https://www.nyc.gov/assets/cidi/downloads/pdfs/2022-NYC-Well-Being-Index-Final.pdf.
[68] Ibid.

Issues Affecting Sustainable Housing Today

Issues in Demand for Sustainable Affordable Housing

Affordable housing is necessary for many low- and moderate-income families to be able to live in New York City as the cost of living, particularly rent, continues to increase. In New York City, affordable housing is based on a household's percentage of area median income (AMI). According to the Department of Housing Preservation and Development (HPD), for housing to be considered affordable, a household should not pay more than one-third of its household income on rent and utilities, and the rent should be regulated so that it does not dramatically increase over time.[69] The current definition of affordable housing fails to include important factors that significantly impact a family's quality of life and ability to afford NYC's cost of living. Currently, the definition of affordable housing does not consider important factors such as a household's disposable income, neighborhood quality, and sustainability of housing.

Recent literature suggests that many NYC families cannot afford the basic essentials after paying rent, making it difficult to afford food and utilities. 68% of New Yorkers are renters and 50% of those renters are rent-burdened, meaning half of the renters in NYC are paying more than 30% of their income towards rent.[70] Rent burden is one of the most pressing current issues in the context of affordable housing, and people of color, those with a disability, and folks who were born outside of the US experience rent burden at disproportionately higher rates.

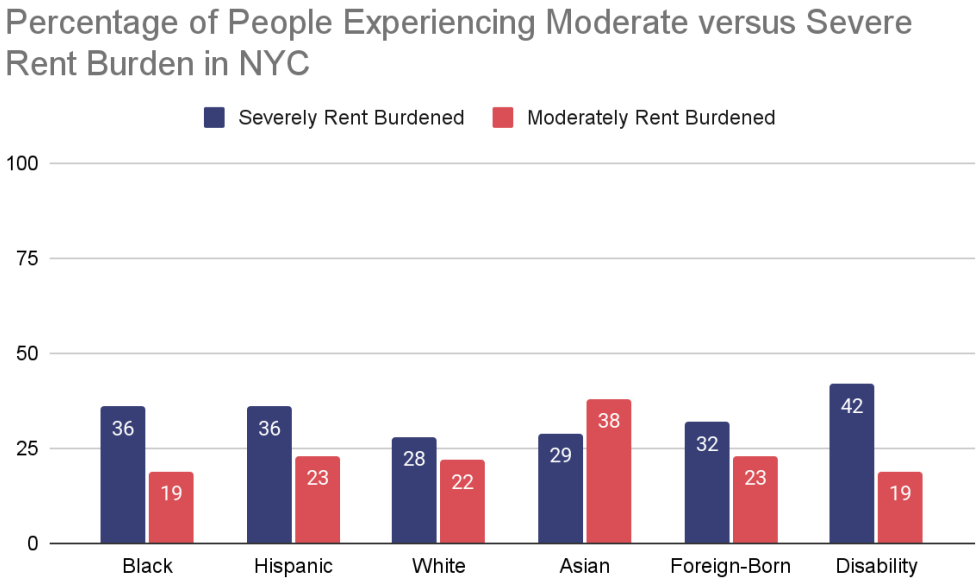

Figure 5. Percentage of People Experiencing Moderate versus Severe Rent Burden in NYC
Source: NYC Department of Housing and Preservation, 2021

[69] "Affordable Housing: Do You Qualify?," NYC Department of Housing Preservation and Development.
[70] "Fast Facts about NYC Housing," NYC Mayor's Office to Protect Tenants, accessed April 18, 2023, https://www.nyc.gov/content/tenantprotection/pages/fast-facts-about-housing-in-nyc.

Breaking down the share of severely rent-burdened and rent-burdened households - defined by HUD as spending more than 50% or 30% of their income on rent, respectively - by race, immigration status, and whether an individual lives with a disability highlights the varied experiences of New Yorkers (Figure 5): Black (36%, 19%) and Hispanic (36%, 23%) renters experienced rent burden at a higher rate than White (28%, 22%) and Asian (29%, 20%) New Yorkers.[71] Foreign-born New Yorkers experienced a severe rent burden at 32% and a moderate rent burden at 23%. For households with one or more people living with a disability, 42% were severely rent burdened, and 19% were moderately rent burdened. Of the households that made less than $25,000 that did not live in public housing or have a government assistance voucher, 85% of them were severely rent burdened.[72]

Owing to limited choices and the considerable financial burdens on families and household budgets, numerous New Yorkers find themselves unable to select environmentally conscious housing options. As new housing typically produces the least emissions, the prevalence of housing units built over 50 years ago inadvertently pushes the majority of renters into older and high-emission homes.[73]

Even when a renter or prospective homebuyer has a desire for making climate-friendly decisions, the options are often not available. For renters, investing in electric appliances such as induction ranges, heat pump water heaters, and other efficient electric technologies is expensive and oftentimes not allowed by the terms of their lease. Even if making upgrades is technically permitted by their landlord, in practice, it is not feasible. Tenants might be responsible for infrastructure upgrades in order to bring power to the location of equipment that only has a gas connection, which would drive up the cost and be an investment into a property they do not own. Additionally, tenants are much more transient, turning any purchase of new equipment into another large item they have to move from apartment to apartment.

Prospective homebuyers also face difficult climate tradeoffs when considering where to purchase. The New York City Panel on Climate Change suggests that sea levels are expected to increase between 8 to 30 inches by the 2050s, and as much as 15 to 75 inches by the end of the century, placing many areas of NYC at risk.[74] Some neighborhoods that are currently more affordable are in FEMA flood areas, forcing lower-income buyers to choose between owning a home to build wealth and putting their family, savings, and possessions in harm's way. Further, the types of sustainable investments into homes that are necessary to bring down greenhouse gas (GHG) emissions also drive up the value of homes, thus pricing out some New Yorkers from homeownership.

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[71] "2021 New York City Housing and Vacancy Survey Selected Initial Findings," New York City Department of Housing Preservation and Development.
[72] Ibid.
[73] "One City Built to Last," City of New York, accessed April 16, 2023, https://www.nyc.gov/assets/builttolast/downloads/OneCity.pdf.
[74] "Info Brief: Flood Risk in NYC," NYC Department of City Planning, November 2016, https://www.nyc.gov/assets/planning/download/pdf/plans-studies/climate-resiliency/flood-risk-nyc-info-brief.pdf.

Issues in Supply of Sustainable Affordable Housing

In 2021, there were an estimated 3,644,000 total housing units in New York City, with 15% in The Bronx, 30% in Brooklyn, 25% in Manhattan, 25% in Queens, and 5% in Staten Island (Figure 6).[75] The vast majority of housing stock in NYC tends to be concentrated in older buildings, with 56% of the housing units being built before 1947, and 27% of the housing stock in buildings built between 1947 and 1973.[76] This means that four in five houses are fifty or more years old. Making the upgrades needed for a low-carbon future becomes immensely more difficult with older housing stock. Existing building architecture, infrastructure, and layout all prove to be roadblocks to electrification, the details of which will be discussed in the report.

In addition, old housing tends to be less energy efficient.[77] Older windows and poor insulation lead to more heating and cooling loss, which forces residents to run their HVAC systems more frequently.[78] [79] This is not only a waste of energy, which drives up GHG emissions, but also a financial burden on households because their utility bills increase. Older housing is also at a greater risk of issues that impact the health and quality of life of its residents, like mold.

Of the available housing in 2021, there were 2,274,260 rental units available in NYC. 45% of rental units were market rate, 44% were rent-stabilized, 7% were public housing, 3% were other-regulated, and less than 1% were rent controlled (Figure 6).[80] The net rental vacancy rate was 4.54% citywide and varied significantly by borough. While in Manhattan, the net rental vacancy rate was just over 10%, in the Bronx, the net rental vacancy rate was 0.68%, and in Queens, it was 4.15%.[81] It is worth noting that Manhattan's rental vacancy was calculated at 10%, which was likely driven by multiple factors including the effects of COVID-19 on Manhattan's 7% population loss during 2021, vacant luxury units owned by foreign investors, and some landlords holding rent-stabilized apartments off of the market.[82] [83] [84]

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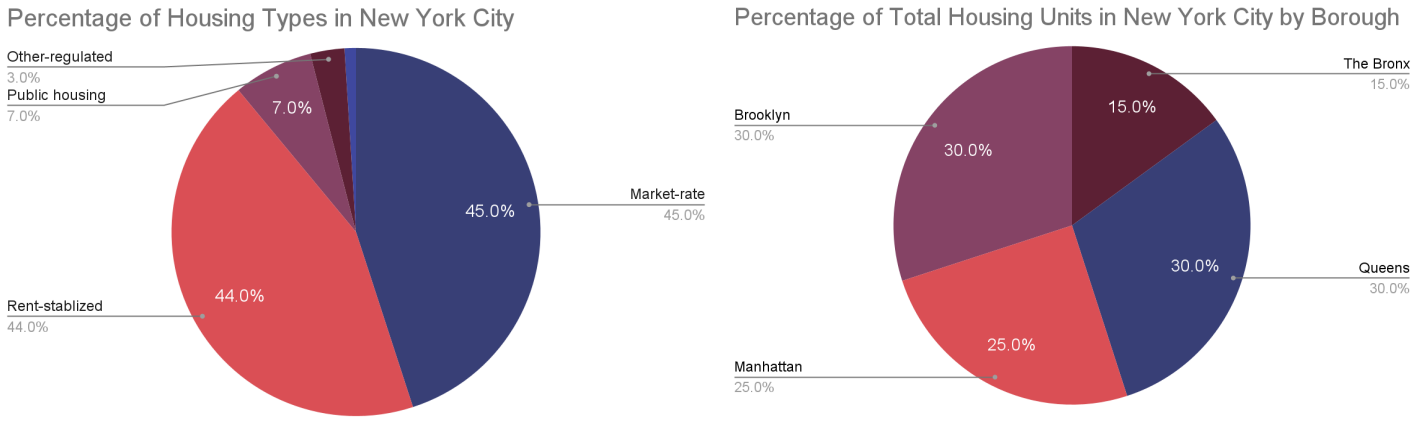
[75] "2021 New York City Housing and Vacancy Survey Selected Initial Findings," NYC Department of Housing Preservation and Development.
[76] Ibid.
[77] Anna Gasha, "It May Be Time to Reconsider Energy Efficiency Exemptions for Historic Buildings," State of the Planet (Columbia Climate School, January 18, 2022), https://news.climate.columbia.edu/2022/01/18/it-may-be-time-to-reconsider-energy-efficiency-exemptions-for-historic-buildings/.
[78] "Update or Replace Windows," U.S. Department of Energy, accessed April 16, 2023, https://www.energy.gov/energysaver/update-or-replace-windows.
[79] "Insulation," U.S. Department of Energy, accessed April 16, 2023, https://www.energy.gov/energysaver/insulation.
[80] "2021 New York City Housing and Vacancy Survey Selected Initial Findings," NYC Department of Housing Preservation and Development.
[81] Ibid.
[82] "Manhattan Lost 6.9% of Its Population in 2021, the Most of Any Major U.S. County," NBC New York (NBC New York, March 25, 2022), https://www.nbcnewyork.com/news/local/manhattan-lost-6-9-of-population-in-2021-the-most-of-any-major-u-s-county/3616010/.
[83] Michael Herzenberg, "The Loopholes That Help to Send NYC Skyscrapers into the Clouds," Spectrum News NY1, accessed April 18, 2023, https://www.ny1.com/nyc/all-boroughs/changing-skyline-of-new-york/2020/01/07/sky-s-the-limit-ny1-the-loopholes-that-sent-nyc-s-luxury-skyscrapers-into-the-clouds.
[84] Cezary Podkul and Lena Groeger, "Renter Beware: Ten Ways Unscrupulous Landlords Cheat NYC Tenants," ProPublica, January 15, 2016, https://projects.propublica.org/graphics/landlord.

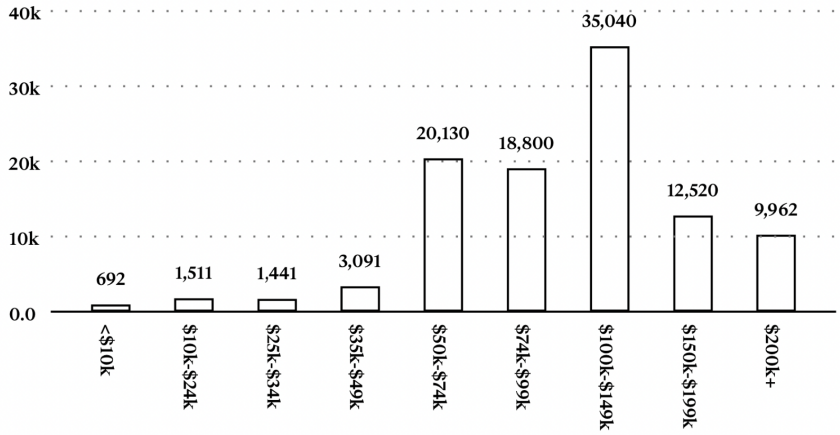
Figure 6: Percentages of Housing Type and Housing Unit Locations in New York City



Source: NYC Department of Housing and Preservation, 2021

Importantly, when net rental vacancy is understood in the context of monthly asking rent, the most expensive rental units ($2,300+) had a 12.64% vacancy rate, while the vacancy rate for least expensive options was significantly lower. The net rental vacancy rate for units with monthly rents of less than $900 and $900-$1,499 was 0.86% and 0.93%, respectively.[85] This shows that low-cost rental units are in high demand, yet in short supply, as vacancy rates for apartments below $1,500 per month are nearly zero. Households earning under $50,000 thus have very few housing options. Whereas because there are more expensive units available, higher-income households can be more selective in their housing decisions.

Figure 7. Incomes needed to afford vacant units available in rent



Source: NYC Department of Housing and Preservation, 2021

[85] "2021 New York City Housing and Vacancy Survey Selected Initial Findings," NYC Department of Housing Preservation and Development.

New York City simply does not have enough affordable housing for its low-, moderate-, and middle-income residents. The city needs to add 560,000 units of housing by 2030 in order to accommodate new residents and make up for the shortfall of the past decade.[86] This will be challenging as the Department of Buildings has been approving permit applications and issuing certificates of occupancy at a rate of about 20,000-30,000 units per year, or 200,000 units by 2030, well short of the housing deficit.[87] Major structural reforms to the city's zoning, entitlement, and review processes are needed if the city is going to deal with its housing crisis.

Applying the Climate Lens

Climate change is deeply affecting the habitability of many NYC neighborhoods. It also disproportionately impacts women, communities of color, and low-income New Yorkers. Dr. Katharine Wilkinson, a writer and climate change activist, underscores that understanding climate change as a "threat multiplier" is perhaps the best way to understand its nuanced and varied impact, explaining in a New York Times interview that "climate is a multiplier of any cracks, imbalances or injustices that are present in current society. It amplifies them."[88] These sentiments by Dr. Wilkinson set the important intersectional framework that we will use to discuss New York City's relationship with climate change and its impact on affordable housing. Histories of systematic racism and discrimination have led to inequitable resource distribution and climate injustices that continue to make people vulnerable to detrimental health and safety outcomes. Applying the principle of environmental justice to housing, all people, regardless of race, gender, disability status, age, or socioeconomic background have the right to live in communities that are safe, healthy, and free of negative environmental conditions.

Given this context, it is important to look at affordable housing through an intersectional lens and consider the ways in which climate change reduces housing supply and increases costs for all New Yorkers. The following sections will dive into the disproportionate consequences of both flood risk and extreme heat on low-income communities and highlight the severity of the issue. It will also look at the need for building electrification in order to address climate issues affecting NYC's housing stock.

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[86] "The Real Estate Board of New York to The Joint Legislative Public Hearing on Fiscal Year 2022-2023 Executive Budget Proposal Topic: Housing," New York State Assembly, February 1, 2022, https://nyassembly.gov/write/upload/publichearing/001270/003547.pdf.
[87] "State of the City's Housing Stock." NYU Furman Center, accessed April 18, 2023. https://furmancenter.org/stateofthecity/view/state-of-the-citys-housing-stock.
[88] Lauren Jackson, "The Climate Crisis Is Worse for Women. Here's Why.," The New York Times, August 24, 2021, https://www.nytimes.com/2021/08/24/us/climate-crisis-women-katharine-wilkinson.html.

Responding to Extreme Rainfall in New York City

Introduction to Extreme Rainfall

In New York City, many neighborhoods are affected by flooding, which occurs with extreme rainfall events—characterized as a large amount of rainfall in a short period of time. Given that it is difficult to retrofit old buildings to be flood-proof and expensive to obtain flood insurance, extreme rainfall poses a huge risk to New Yorkers, especially in low-income households. As extreme rainfall causes flooding and damages people's homes and personal belongings, homeowners and renters are burdened by financial stains and some are even displaced from homes they cannot afford to repair.

In addition to property damage, extreme rainfall also has led to serious injuries and death, with a greater risk of drowning posed to those who live in affordable basement apartments. It is important to consider the safety and financial burden experienced, especially in immigrant communities of color in outer boroughs like Queens. This section will explore the climate risks of extreme rainfall and its impact on affordable housing, specifically looking at basement apartments in Queens as a case study of what is being done to adapt and mitigate flooding in communities most affected.

The Intersection of Extreme Rainfall and Housing Affordability in NYC

For many New Yorkers, Superstorm Sandy was seen as a wake-up call to the risks of extreme rainfall, especially in vulnerable communities, with its storm surge covering 16.6% of land across the five boroughs.[89] In 2012, Superstorm Sandy's flooding took 43 lives and damaged properties across New York City.[90] Approximately 69,000 housing units were damaged or destroyed - with an estimated $19 billion in damages.[91] Thousands of New Yorkers were temporarily displaced due to power outages and damages, while others could not afford the costs to rebuild their homes.[92] The damage caused by Superstorm Sandy to the city's housing stock meant that some affordable units were permanently lost, thus, making housing more expensive and difficult to obtain.[93] Housing inequality came to the forefront as low-income people, people of color, and elderly New Yorkers were the most vulnerable to life-threatening hazards and displacement from the effects of the extreme rainfall.

More recently, Hurricane Ida was a sudden and deadly storm, leaving behind a shocking wave of destruction and death across the boroughs. Thirteen people were killed, eleven of whom lived in basement apartments in Queens, and the federal government provided $936 million to fix damaged properties across

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[89] "Sandy's Effects on Housing in New York City," NYU Furman Center, accessed April 17, 2023, https://furmancenter.org/files/publications/SandysEffectsOnHousingInNYC.pdf.
[90] Ibid.
[91] "Impact of Hurricane Sandy," NYC Community Development Block Grant Disaster Recovery, accessed April 16, 2023, https://www.nyc.gov/site/cdbgdr/about/About%20Hurricane%20Sandy.page.
[92] "Sandy Funding Tracker", NYC Recovery, accessed April 16, 2023, https://www.nyc.gov/content/sandytracker/pages/housing.
[93] Deborah Helaine Morris, Thaddeus Pawlowski, and Hugo Sarmiento, "Opinion: New York's Climate Crisis Is a Housing Crisis," City Limits, October 28, 2022, https://citylimits.org/2022/10/28/opinion-new-yorks-climate-crisis-is-a-housing-crisis/.

New York State and New Jersey.[94] While many basement apartments are considered illegal due to the safety concerns of not meeting building codes, many people have no other option because they cannot afford safe housing in New York City. These extreme weather events highlight that the most vulnerable people are disproportionately affected as it is more difficult for them to find safe, affordable housing.

Climate Risk of Displacement Due to More Intense Storms

Climate change has already begun to deeply impact housing availability in NYC and will only continue to further exacerbate New York City's affordable housing problem. Many of the city's most vulnerable populations will be the ones most impacted by climate change. Property damage to homes by flooding can often be extensive and expensive to repair. FEMA estimates that even one inch of rain causes up to $25,000 of damages to homes.[95] The aftermath of flooding puts people in a difficult position to have to choose to fix their homes or move.

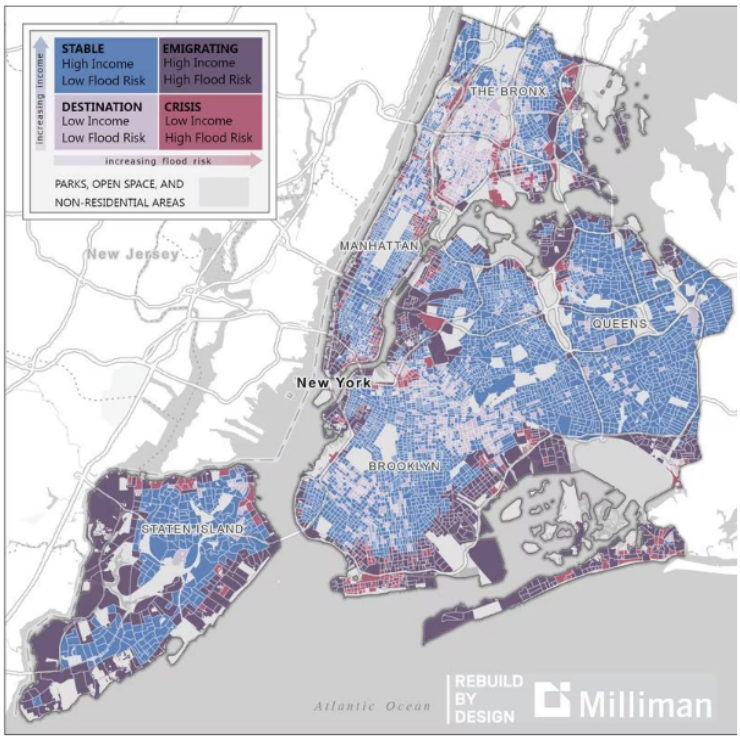

Figure 8. Flood Risk Map of New York City
Source: Rebuild by Design, 2022

According to a study conducted by Rebuild By Design and Milliman, using data from the NYC Panel on Climate Change, 40% of New Yorkers are at risk of displacement due to climate change. An estimated 1.7 million people, 20% of the city's population, currently live within or adjacent to the estimated 2050

[94] Jaclyn Jeffrey-Wilensky, "NYC Flood Map Shows Where Ida Hit Hardest - and Where Urgent Action Is Still Needed," Gothamist, September 3, 2022, https://gothamist.com/news/nyc-flood-map-shows-where-ida-hit-hardest-and-where-urgent-action-is-still-needed.
[95] "Flyer: Just One Inch of Water," FEMA, accessed April 17, 2023, https://www.fema.gov/sites/default/files/2020-05/8.5x11_1_inch_flyer.pdf.

coastal floodplain, and nearly 400,000 of these people live in low-income neighborhoods where the median household income is about $31,000.[96] These statistics indicate that NYC residents will be forced to grapple with the fact that their homes may no longer be habitable as climate change progresses. These realities will leave people in lower socioeconomic status households with the difficult decision of having to move either to another neighborhood in NYC or out of the city. Climate-related changes in neighborhood demographics caused by people moving inland away from floodplains could result in negative consequences for existing residents who live in those inland neighborhoods, due to the fact that there will be a higher demand for housing. It is estimated that these movements would affect the nearly 1.8 million people in lower-income neighborhoods as people search for affordable housing.[97]

Many homebuyers are not aware of their neighborhoods' flood risks. In 2021, over 7,500 new home purchases in NYC had previously been flooded, despite the fact that even a perceived risk of flooding is reported to drive down property values. The economic consequences associated with climate change are astronomical: the NYC Comptroller's Office estimated that property values in the City's 100-year floodplain total over $176 billion in 2022.[98] The consequences of climate change have disproportionate impacts on neighborhoods of color and of lower socioeconomic status. Those living in crisis quadrants—defined as low-income with high flood risk—had vastly different racial makeup than those living in emigrating—high-income neighborhoods with high flood risk—quadrants. In crisis quadrants, which are home to 443,826 people (or 5% of the NYC population), the racial breakdowns are as follows: 35% White, 32% Black, 11% Asian, 22% Other Race, 37% Hispanic or Latino.[99] 40% of households were living below the poverty line, the median household income was $30,975, and 90% of housing units were rented housing units. In contrast, for emigrating quadrants, which are home to 1,259,709 people (15% of the NYC population), the racial breakdowns are as follows: 57% White, 20% Black, 12% Asian, 11% Other Race, and 19% Hispanic or Latino. 10% of households were living below the poverty line, the median household income was $92,814, and 57% were rented housing units.[100]

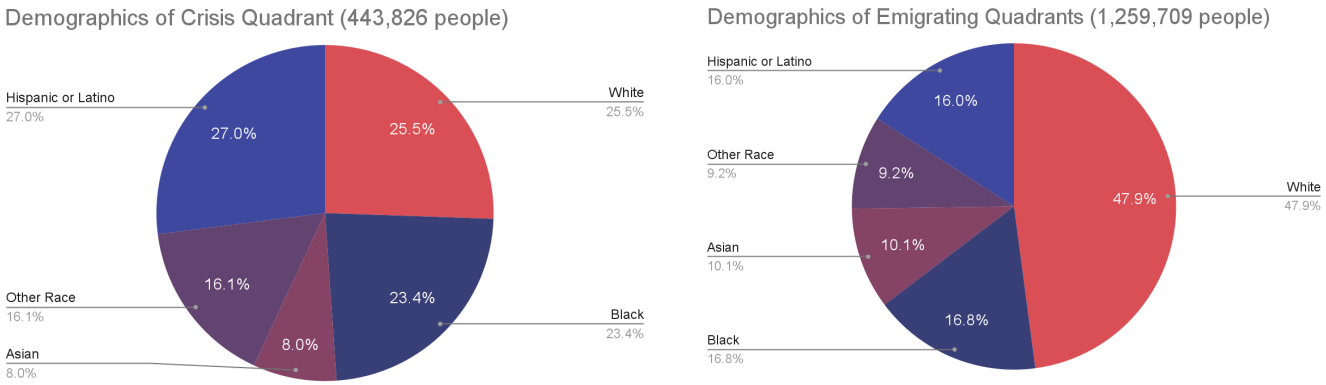

Figure 9. Demographics of Crisis and Emigrating Quadrants
Source: Rebuild by Design, 2022

[96] "Climate Displacement In NYC: Making Space For Our Neighbors." Rebuild by Design.
[97] Ibid.
[98] Ibid.
[99] Ibid.
[100] Ibid.

Based on the data, it is clear that low-income income people of color are predominantly represented in the crisis quadrants and particularly vulnerable to negative outcomes associated with climate risk, like displacement. The lack of awareness of flood risk especially affects the hundreds of thousands of low-income people living in basement dwellings at the highest risk of flooding, especially as rainfall is projected to continue to increase.

Case Study on Flooding in Queens

Extreme Rainfall in Queens

Over the last couple of years, extreme rain has become more common, threatening people's ability to live in safe, affordable, resilient homes. Southeast and Central Queens, North Staten Island, and Southeast Bronx are expected to experience the greatest increases in extreme rainfall risk.[101] Queens is most at risk of future flooding from extreme rainfall due to its older housing stock, low-lying marshland topography, historic stormwater flow paths, and overburdened combined sewer system. Projected flood maps illustrate 43,679 properties (19% of all stock) that have a greater than 26% chance of being severely affected by flooding over the next 30 years in Queens.[102]

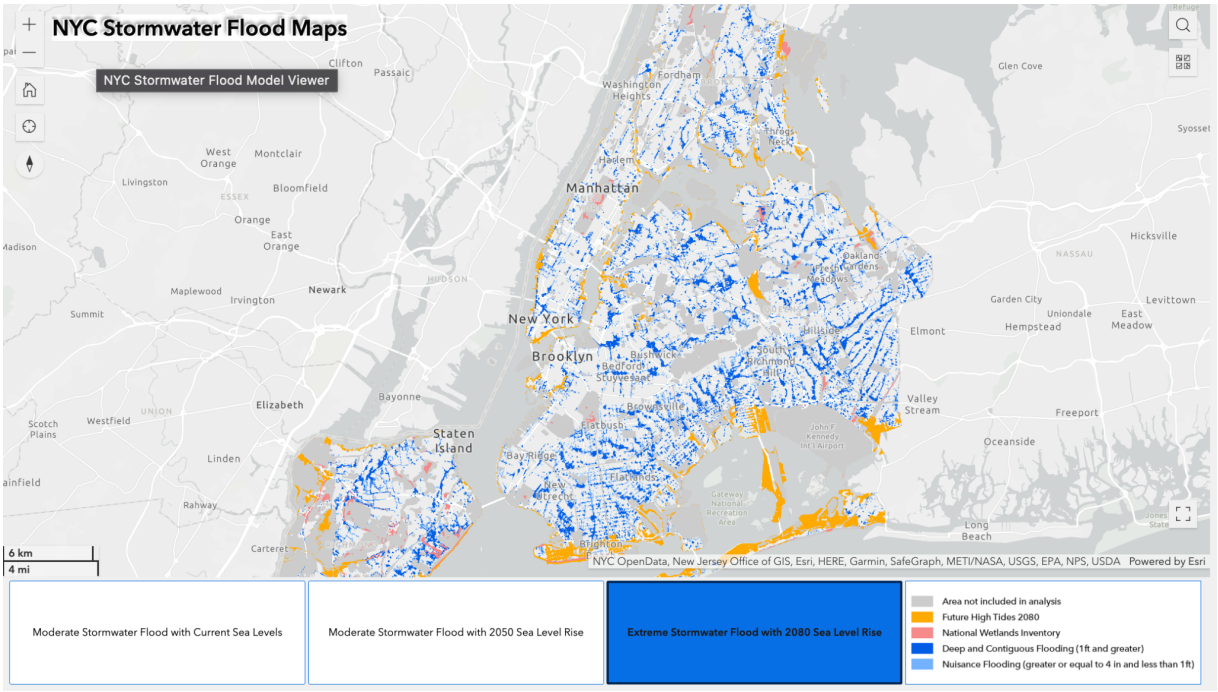

Figure 10. NYC Stormwater Flood Map
Source: ArcGIS, developed by the City of New York

[101] "Extreme Rainfall," NYC Mayor's Office of Climate and Environmental Justice, accessed April 18, 2023, https://climate.cityofnewyork.us/challenges/extreme-rainfall/.
[102] "Queens County, New York Flood Factor Report," Risk Factor, accessed April 16, 2023, https://riskfactor.com/county/queens-county-newyork/36081_fsid/flood.

Flooding from extreme rainfall in Queens affects health outcomes, economic stability, transportation access, and the overall safety of its residents. As evident in the statistics, those who have been excluded or marginalized based on their race, income, or ability are more vulnerable to the impacts of climate-related issues, like flooding. Elderly New Yorkers and those with limited mobility are the most susceptible to storm-related injuries and fatalities. Residents of older, less resilient housing stock in flood-prone areas are also at direct risk, especially those living in basement apartments.

In New York City, there are approximately 100,000 illegal basement and cellar apartments.[103] However because these units are illegal and often difficult to identify, housing experts estimate that the number of people living in these units could be much higher.[104] Queens, being the most diverse borough, has the highest population of immigrants, as well as the largest concentration of basement and cellar dwellings.[105] Of Queens' 2.3 million residents, 1.1 million of them are immigrants.[106] Additionally, there is an estimated undocumented population of 560,000 citywide.[107]

In a city with soaring rent prices and housing shortages, many of the City's low-income and immigrant residents are left with no option but to move into these illegal dwellings. While basement apartments are typically one of the most affordable housing options for people, in their current condition they are unsafe to live in. City government and nonprofit partners have been working together to address the complicated issue of basement apartments, in an effort to protect vulnerable people from harm's way while also preserving affordable housing in New York City.

Issues of Basement Apartments in Queens

While New York City estimates that it has approximately 100,000 basement apartments, the Pratt Center for Community Development estimates that in actuality, there are about 376,000 possible units for basement housing: basements in one-, two- or three-family homes.[108] Through mapping, the Pratt Center found that basement apartments are found in severely rent-burdened neighborhoods where the majority of residents are Black, Latino, or Asian.[109] Using U.S. Census records and city building records, East New York, Canarsie, and Brownsville, in Brooklyn, and Jackson Heights, Elmhurst, and Fresh Meadows, in

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[103] Amy Yee, "In New York City's Basement Apartments, Flood Dangers Remain a Year after Ida," Bloomberg, September 1, 2022, https://www.bloomberg.com/news/articles/2022-09-01/in-new-york-city-s-basement-apartments-flood-dangers-remain-a-year-after-ida.

[104] Ari Ephraim Feldman, "Fate of Basement Unit 'Census' Effort Unclear, Five Months after Ida," Spectrum News NY1, February 15, 2022, https://www.ny1.com/nyc/all-boroughs/news/2022/02/14/fate-of-basement-unit--census--effort-unclear--five-months-after-ida.

[105] "Queens Neighborhood Profile," NYU Furman Center, accessed April 16, 2023, https://furmancenter.org/neighborhoods/view/queens.

[106] Naeisha Rose, "Queens Is Home to Most Naturalized Immigrant Population: Moia Report," QNS, April 2, 2018, https://qns.com/2018/04/queens-is-home-to-most-naturalized-immigrant-population-moia-report/.

[107] "State of Our Immigrant City," NYC Mayor's Office of Immigrant Affairs, March 2018, https://www.nyc.gov/assets/immigrants/downloads/pdf/moia_annual_report_2018_final.pdf.

[108] Ephraim Feldman, "Fate of Basement Unit 'Census' Effort Unclear, Five Months after Ida."

[109] "Basements Data Dashboard," Tableau Public (Pratt Center for Community Development, January 16, 2022), https://public.tableau.com/app/profile/pratt.center/viz/NYCBasementsandCellars/CouncilDistricts.

Queens, were identified as having large populations living in basement units.[110] The question of what to do with basement apartments is still in discussion, as they are recognized as a source of affordable housing in New York City but they are unsafe as long as flooding caused by future extreme rain events continues to be a growing concern for the city.

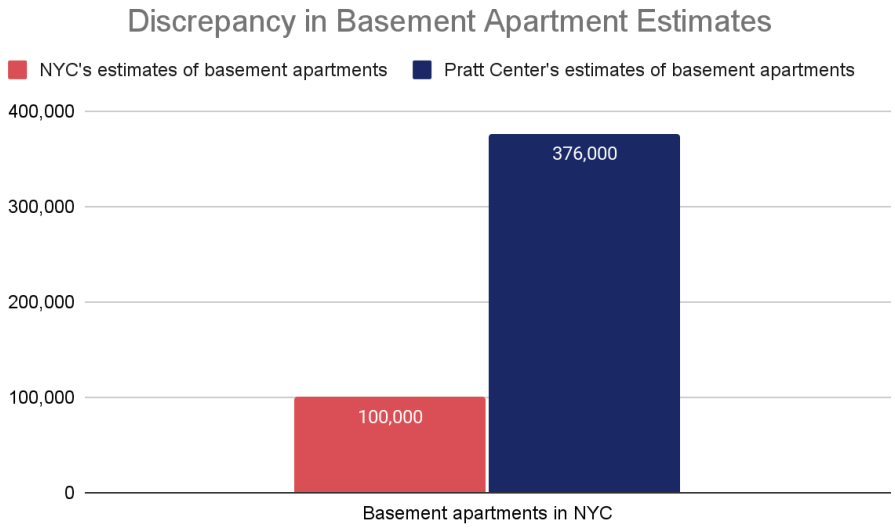

Figure 11. Discrepancies in basement apartment estimates suggest there are more than 100,000
Source: Rebuild by Design, 2022

Basement apartments are of immediate concern in the ways in which these units are actively dangerous in an emergency situation. The dwellings often have only one means of egress, so if it is blocked or non-functioning during a flood, fire, or another emergency, the residents are trapped. According to discussions with experts in the construction industry, proper egress from a building should include multiple exit points, as well as appropriately sized doors and hardware, to ensure residents have multiple functioning exits to escape.

Landlords that illegally convert their basements often do not obtain permits or hire high-quality, licensed contractors to complete the renovation.[111] This leads to poor workmanship in some dangerous trades, most notably by electricians. Poor-quality electrical installations increase the likelihood of an electrical fire due to overloaded circuits from space heaters and other high-energy-consuming appliances.[112] Unoccupied basement construction requires fewer electrical outlets, so when they are converted to illegally occupied units, residents are forced to overuse extension cords, further straining the unit's electrical infrastructure.[113] These basements often have inadequate heating because they were not meant to be habitable, forcing tenants to use inefficient and dangerous space heaters.

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[110] Ephraim Feldman, "Fate of Basement Unit 'Census' Effort Unclear, Five Months after Ida."
[111] "Bringing Basement Apartments Into the Light," Office of the New York City Comptroller, August 30, 2022, https://comptroller.nyc.gov/reports/bringing-basement-apartments-into-the-light/.
[112] "Residential Building Electrical Fires," U.S. Fire Administration - FEMA, March, 2008, https://nfa.usfa.fema.gov/downloads/pdf/statistics/v8i2.pdf.
[113] "2020 Residential Code of New York State," International Code Council, accessed April 16, 2023, https://codes.iccsafe.org/content/NYSRC2020P1/chapter-39-power-and-lighting-distribution.

In addition to extreme weather and life-safety risks, the poor conditions in basement apartments affect residents' health and quality of life. Below-grade homes are not conducive to human flourishing due in large part to poor air quality, as these units have insufficient ventilation because of a lack of windows and low-quality HVAC systems. Being underground means high levels of moisture in the air and concrete which increases the likelihood of mold and mildew developing, which are particularly harmful to children and the elderly, as they increase rates of asthma and other respiratory issues.[114] Gas stoves are also often installed in the units and they produce dangerous pollutants and off-gasses that cause heart, pulmonary, and brain function issues.[115] Other health implications include persistent pest infestations which worsen air quality and increase the spread of disease. Finally, lacking access to natural light negatively impacts mental health and can contribute to feelings of depression and anxiety. The prevalence of safety hazards and health issues caused by living in unregulated basement apartments further contributes to the increased climate vulnerability of immigrants and low-income communities of color.

While tenants deal with the brunt of the difficulties and hazards in unregulated basement apartment arrangements, landlords also face challenges. They are faced with steep barriers to legally converting their property due to exorbitant renovation costs and the various constraints of remodeling an existing building. For example, designing, procuring, and installing a second egress to a building is incredibly expensive, if it is even physically possible. In addition, meeting fire and life safety codes might require adding sprinklers, upgrading the existing electrical service, and constructing fire-rated barriers. Each of these updates could cost tens of thousands of dollars, even without considering the rest of the renovation costs to make the unit habitable. Ultimately, many well-meaning landlords do not have the hundreds of thousands of dollars required to legally convert their basement apartments into safe, healthy homes. As such, the units remain in an unregulated gray area; too numerous and important to the affordable housing supply to shut down; too unsafe for people to live in; and yet too expensive to legally convert.

The inability to regulate basement apartments further exacerbates the extent of the safety hazards present. Public officials are often unaware of the locations of these units and, even when notified, they rarely have the ability to assess the conditions and hazards at each property. Between January 2011 and September 2021, the city received more than 157,000 complaints involving illegal conversions, but more than half of the cases were closed after an inspector was unable to gain access to the dwelling.[116] Because occupants are predominantly from marginalized communities when issues arise with their basement apartments or their landlords, they tend to have little recourse due to the lack of a formal legal arrangement. As a consequence, tenants of these units struggle to get leaky pipes, broken appliances, and moldy drywall fixed because the landlords know that tenants cannot go to authorities for fear of losing their homes. While these apartments are affordable, they often come at the expense of safety, which will only increasingly affect people as extreme rainfall increases year-over-year. New York City faces a complex set

[114] Evin J. Howard et al., "Asthma Prevalence and Mold Levels in US Northeastern Schools," *The Journal of Allergy and Clinical Immunology: In Practice* 9, no. 3 (March 2021): pp. 1312-1318, https://doi.org/10.1016/j.jaip.2020.10.012.
[115] Wynne Armand, "Have a Gas Stove? How to Reduce Pollution That May Harm Health," Harvard Health Publishing, (Harvard Medical School, September 7, 2022), https://www.health.harvard.edu/blog/have-a-gas-stove-how-to-reduce-pollution-that-may-harm-health-202209072811.
[116] Mihir Zaveri et al., "How the Storm Turned Basement Apartments into Death Traps," The New York Times, September 2, 2021, https://www.nytimes.com/2021/09/02/nyregion/basement-apartment-floods-deaths.html.

of challenges as they simultaneously look to maintain the affordable basement units while also appropriately regulating them for safety.

Climate Adaptation and Mitigation Efforts for Extreme Rainfall

New York City has been faced with the challenge of both adapting to increased storms and mitigating their potential effects, while simultaneously protecting those that are most vulnerable to climate change. Both Hurricanes Sandy and Ida changed New York in many ways: flood maps were redrawn, building codes revised, and engineers worked to adapt the city's shoreline. Policy initiatives and strategies were oriented towards adapting to flooding caused by extreme rainfall, especially in neighborhoods in Southeast and Central Queens that are disproportionately affected by these storms. This section will look at policies, tools, and pilots that have been used to promote basement apartment safety, provide education on flood prevention and sewer retrofitting, and outline flood mitigation via green infrastructure projects. These strategies aim to help Queens adapt to extreme rainfall by planning for future projected storms.

Retrofitting Basement Apartments

The dangers of illegal basement apartments in NYC have been evident for years. However, this issue gained increased attention following the death of 11 people during Hurricane Ida. Through a pilot program started in 2019, called the Basement Apartment Conversion Pilot Program (BACPP), NYC provides eligible low- and middle-income homeowners with up to $150,000 of low-interest or forgivable loans as well as technical assistance to convert their basement or cellar into safe, legal, and rentable apartments. The BACPP is open to owners of one-, two-, and three-family homes in East New York and Cypress Hills, Brooklyn.[117] The goal of this program is to help create safe housing for tenants by providing homeowners the opportunity to retrofit these apartments and create legal, regulated, affordable rentals. The focus of the program is on lower-income homeowners with eligibility extending only to those earning less than 165% AMI. However, the BACPP excludes homes in the highest flood-risk areas of the eligible neighborhoods, tempering the benefits of the program and leaving many residents at risk. As of January 2023, there were only five active participants in the BACPP, in part due to the narrow set of eligible households and the restrictive zoning, regulatory, and financial burdens that make conversions so difficult.[118] The pilot program's progress was also slowed by the COVID-19 pandemic, and it did not receive new funding in last year's budget. The program needs to reassess its requirements and outreach approach in order for the pilot program to be successful.

Legalizing Basement Apartments

Robust advocacy and legislative efforts are currently underway to make the legalization of basement apartments more accessible by changing components of the New York State Multiple Dwellings Law. The Multiple Dwellings Law is often cited as a main obstacle to legalization efforts of basement units, such as the 2019 Basement Apartment Conversion Pilot Program in Brooklyn.[119] Community-based advocacy

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[117] "Basement Apartment Conversion Pilot Program," NYC Department of Housing Preservation and Development, accessed April 16, 2023, https://www.nyc.gov/site/hpd/services-and-information/basement-apartment-conversion-pilot-program.page.
[118] Annie McDonough, "NYC's Basement Apartment Pilot Draws Only 5 Participants," City & State New York, January 24, 2023, https://www.cityandstateny.com/policy/2023/01/nycs-basement-apartment-pilot-draws-only-5-participants/382166/.
[119] Ibid.

groups, such as the Basement Apartments Safe for Everyone (BASE) Coalition - which includes Queens-based nonprofits such as Chhaya Community Development Corporation[120] - have led advocacy campaigns for years to convince the government to appropriately respond to the crisis of unsafe living conditions for residents of basement apartments. The concerns in the Multiple Dwellings Law center on the high costs associated with construction changes necessary to meet the current city and state regulations, which do not necessarily ensure safety.[121] NYC Comptroller Brad Lander's 2022 report on basement apartments outlines specific zoning and building codes that would ease the creation of legal accessory dwelling units, such as easing size and parking requirements that do not directly affect safety of basement units.[122]

Grassroots advocacy efforts led by the BASE Coalition have created political pressure and momentum such that legislation to expand access to legalization and city regulation of basement units is currently being considered for the fiscal year 2023-2024 New York State budget.[123] This proposal is supported by Mayor Adams and the Chief Housing Officer of NYC, Jessica Katz.[124] Both view basement apartments as a way to add these units to aid the affordable housing crisis. This effort must continue by outlining specific recommendations for changes in the Multiple Dwellings Law in order to increase the safety of basement apartments.

Spotlight on Chhaya Community Development Corporation (CDC):

Chhaya CDC is a key member of the BASE (Basement Apartments Safe for Everyone) coalition advocacy campaign, which aims to expand the number of legal, safe, affordable basement apartments throughout NYC.[125] This coalition brings together community organizations, advocates, tenants, homeowners, and community members who are organizing working-class neighborhoods and communities of color to increase the number of legally-recognized, affordable, and safe basement apartments, as well as other accessory dwelling units ("ADUs") in New York City. After years of advocacy, the BASE campaign helped to spur the creation of the 2019 Basement Apartment Conversion Pilot Program in Brooklyn.[126]

[120] "Basement Apartments Safe for Everyone," Chhaya Community Development Corporation, accessed April 18, 2023, https://chhayacdc.org/campaigns/base-campaign/.
[121] Emma Whitford, "Queens Is the Battleground in State Budget Fight over Basement Apartments," City Limits, March 30, 2023, https://citylimits.org/2023/03/30/queens-is-the-battleground-in-state-budget-fight-over-basement-apartments/.
[122] "Bringing Basement Apartments Into the Light," Office of the New York City Comptroller.
[123] Whitford, "Queens Is the Battleground in State Budget Fight over Basement Apartments."
[124] Ibid.
[125] "Basement Apartments Safe for Everyone," Chhaya Community Development Corporation
[126] "Bringing Basement Apartments Into the Light," Office of the New York City Comptroller.

Planning for Flooding Through Education

Given the higher risks of extreme rain and flooding, there has also been a concerted effort to educate people about the flood risks and attempts at better storm planning, preparation, monitoring, and recovery. The Rainfall Ready Action Plan published by the city outlines the shared responsibilities of New Yorkers and the City government to combat intense storms.[127] It aims to inform particularly vulnerable New Yorkers about their specific flood risks. Within this report, several resources are highlighted such as New York City Stormwater Flood Maps—an interactive map published by the NYC Department of Environmental Protection (DEP) to help property owners understand their risk during storms.[128] [129] The City is also working to expand FloodHelpNY in partnership with The Center for NYC Neighborhoods. FloodHelpNY provides tenants and landlords across NYC with address-specific information and resources on flood risk, flood insurance, and flood retrofits in multiple languages.[130] Additionally, NYC FloodNet is an interactive online map that shows real-time flood data "in neighborhoods that are vulnerable to high tides, storm surge, and stormwater runoff" to inform residents of flood risks.[131]

In addition to maps, other agencies have worked to create alerts and provide resources to prepare for extreme rainfall and flooding risk. If enrolled, residents are able to receive updates on Notify NYC from NYC Emergency Management (NYCEM), issuing emergency alerts and resources.[132] The Department of Transportation (DOT) and the Department of Parks and Recreation (DPR) have also installed warning signs in 75 chronically flooded locations with the intention to warn people of potential intense rainfall.[133] Those that are in flood paths are also receiving sandbags and deployable flood barriers to help mitigate risks but they are encouraged to purchase flood insurance to receive technical assistance for damage caused by more frequent storms. It is the job of both the City and its residents to ensure neighborhoods and communities are educated and prepared for their community's respective flood risks.

Making a Safer and More Affordable Neighborhood

NYC's 7,000-mile sewer system was not developed to handle the extreme rainfall brought about by intense storms like Hurricane Ida and Sandy. If the sewer system cannot efficiently discharge the stormwater, then neighborhoods flood, turning basement apartments into serious safety concerns and damaging properties across the affected area. Families in these homes can be displaced as the units are repaired which puts pressure on the rest of the city's housing stock. There have been strides to improve neighborhoods through both sewage retrofits and eco-housing projects. In a major planning effort, the City is also looking at upgrades to sewage systems to plan for more intense storms. The goal is to upgrade 70 miles of sewer infrastructure per year utilizing new design standards that are required to meet today's climate needs.

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[127] "Rainfall Ready NYC Action Plan," NYC Department of Environmental Protection, accessed April 17, 2023, https://www.nyc.gov/site/dep/whats-new/rainfall-ready-nyc.page.
[128] New York City Stormwater Flood Maps, accessed April 17, 2023, https://experience.arcgis.com/experience/6f4cc60710dc433585790cd2b4b5dd0e.
[129] "Plan for Intense Storms," NYC Department of Environmental Protection, accessed April 17, 2023, https://www.nyc.gov/site/dep/whats-new/plan-for-intense-storms.page.
[130] FloodHelpNY.org, accessed April 17, 2023, https://www.floodhelpny.org/.
[131] "About," FloodNet, August 31, 2022, https://www.floodnet.nyc/.
[132] "Notify NYC", accessed April 17, 2023, https://a858-nycnotify.nyc.gov/.
[133] "Plan for Intense Storms," NYC Department of Environmental Protection.

Alongside these investments in infrastructure, there have been efforts to also invest in affordable housing for communities as well. Last year in 2022, a $50M Rochdale, Southeast Queens sewage project was completed, with six miles of new sewer and water mains in order to alleviate flooding in the area.[134] The project was also paired with a joint housing initiative with the Department of Housing Preservation, New York City Housing Authority, and Habitat for Humanity to rehabilitate 13 vacant city-owned buildings to convert them into 16 eco-friendly houses equipped with solar panels and heat efficiency technology to promote homeownership for low- and moderate-income families.[135] The affordable homes will be transferred to the Interboro Community Land Trust to ensure long-term affordability. These holistic projects address climate solutions from multiple angles, including improvement to climate adaptation and sustainable housing. Partnership projects that address a variety of local issues should be encouraged by advocates and city government alike.

Spotlight on Habitat Net Zero and Interboro Community Land Trust:

Habitat Net Zero, located on the Interboro Community Land Trust[136] site, is the rehabilitation of 13 vacant, dilapidated properties into 16 sustainable, affordable homes.[137] The project will be certified through Enterprise Green Communities and implement Passive House principles, two green certification systems that are projected to significantly reduce the project's energy demand as well as its heating and cooling demand. As the project is a CLT, it will ensure that future generations of first-time home buyers will benefit from sustainable, affordable housing.

Expanding Green Infrastructure

Upgrading all of the sewers in NYC would take approximately 100 years at the current replacement rate. As the pace of infrastructure reconstruction is not quick enough to handle flooding from any storms occurring in the near future, NYC DEP has developed innovative solutions to create multi-purpose infrastructure that can help mitigate the extreme rainfall affecting the city. Technology and nature-based infrastructure like rain gardens, flood sensors, cloudbursts, and porous pavement offer mitigation benefits while the city's sewer system is being upgraded. Rain gardens are planted areas designed to collect and manage stormwater that runs off the streets and sidewalks when it rains. In addition to managing stormwater, these assets beautify neighborhoods, purify the air, and reduce temperatures during hot

[134] Gwynne Hogan, "$50M Southeast Queens Sewage Project Completed, Mayor Says," Gothamist, March 9, 2022, https://gothamist.com/news/50m-southeast-queens-sewage-project-completed-mayor-says.
[135] "Mayor Adams Announces Significant Quality-of-Life Improvements," Office of the Mayor, March 9, 2022, https://www.nyc.gov/office-of-the-mayor/news/116-22/mayor-adams-significant-quality-of-life-improvements-new-affordable-homeownership#/0.
[136] Interboro Community Land Trust, accessed April 18, 2023, https://www.interboroclt.org/.
[137] "Habitat Net Zero offers 16 families opportunities to build equity in Southeast Queens," Habitat NYC and Westchester, accessed April 18, 2023, https://habitatnycwc.org/net-zero-announcement/.

weather.[138] In 2019, 200 curbside rain gardens were built in southeast Queens to capture 20 million gallons of stormwater runoff annually.[139] Since then, there has been a total of 11,000 rain gardens installed city-wide, with the city constructing 2,300 rain gardens in South Ozone Park in Queens, an area strongly affected by Ida.[140] Porous pavement has also been deployed as a more recent strategy. Currently, more than 25% of New York City is covered by sidewalks; these are impervious areas that repel stormwater and run it to the sewer system.[141] Porous pavement offers more benefits, as it can absorb water instead of simply directing it to the already over-taxed sewer system. They can also be utilized where rain gardens cannot be, due to land use constraints or other sidewalk infrastructure. Green infrastructure is important because it slows down rapid flooding, which as discussed, causes property damage and deaths in unsafe housing.

NYCHA, in collaboration with the NYC DEP, has begun the implementation of cloudburst management systems on some of its public housing buildings. Cloudbursts are defined as a "sudden, heavy downpour" where a lot of rain occurs in a short amount of time.[142] Cloudbursts have the potential to damage property and critical infrastructure, as well as cause pollution to important bodies of water. Cloudburst infrastructure prevents neighborhood flooding during intense storms or everyday rain events by acting like a sponge to absorb water and slow the water release into sewer pipes through underground storage tanks.[143] The water is soaked up like a sponge and retained to slow the release of rain into sewers and prevent overburdened sewers. For example, South Jamaica Houses has rehabilitated a basketball court into cloudburst infrastructure, serving as a dual-purpose daily amenity for residents.[144] The basketball court on rainy days will hold large amounts of water, preventing extreme rainfall from flooding the neighborhood and the public housing development. NYCHA's goal is to create a comprehensive cloudburst management system that will serve all of Southeast Queens. In January 2023, Mayor Adams announced $400 million in capital funds that will support the creation of cloudburst infrastructure in four new sites (Corona and Kissena Park, Queens, Parkchester, Bronx, and East New York, Brooklyn).[145] These nature-based strategies can help reduce carbon emissions and increase green space in neighborhoods, all the while effectively managing stormwater.

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[138] "Increasing Stormwater Resilience in the Face of Climate Change: Our Long Term Vision," NYC Department of Environmental Protection, accessed April 17, 2023, https://www1.nyc.gov/assets/dep/downloads/pdf/environment/education/18-building-resiliency-nyc.pdf.
[139] Victoria Merlino, "City Hopes Innovative 'Rain Gardens' Will Curb Flooding in Se Queens," Queens Daily Eagle, November 25, 2019, https://queenseagle.com/all/2019/11/25/city-hopes-innovative-rain-gardens-will-curb-flooding-in-se-queens.
[140] "Green Infrastructure Program Map," NYC Department of Environmental Protection, accessed April 18, 2023, https://nycdep.maps.arcgis.com/apps/webappviewer/index.html?id=108b0be0cbf246ad85fbb4e2c4fdbcb1.
[141] "Increasing Stormwater Resilience in the Face of Climate Change: Our Long Term Vision," NYC Department of Environmental Protection.
[142]"Cloudburst Management," NYC Department of Environmental Protection, accessed April 17, 2023, https://www.nyc.gov/site/dep/environment/cloudburst.page.
[143] "NYCHA 2022 Fact Sheet." NYC Housing Authority, April 2022. https://www.nyc.gov/assets/nycha/downloads/pdf/NYCHA_Fact_Sheet_2022.pdf.
[144] "NYCHA: South Jamaica Houses Cloudburst Master Plan 2018," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/assets/nycha/downloads/pdf/NYCHA-South-Jamaica-Clouburst-Plan-Report-2019.pdf
[145] "Mayor Adams Announces Construction of new Cloudburst Resiliency Projects to Better Manage Intense Rainfall Events in Flood-Prone Neighborhoods," Office of the Mayor, January 9, 2023, https://www.nyc.gov/office-of-the-mayor/news/023-23/mayor-adams-construction-new-cloudburst-resiliency-projects-better-manage-intense.

Responding to Extreme Heat in New York City

Introduction to Extreme Heat

Temperatures in New York City have risen more quickly than in other parts of the country due, in part, to the Urban Heat Island (UHI) effect, which is caused by a high quantity of dark and impervious surfaces, little vegetation, and dense human activity.[146] These factors lead to an overall higher heat index, and consequently, a higher summertime peak energy demand. This elevated energy demand leads to more power being generated from fossil-fuel plants which drive up GHG emissions, air pollution, and utility costs. Urban heat has proven to be the most dangerous weather-related event, especially for low-income households, the elderly, and Black and Latino communities.

As indicated in the 2022 New York City Heat-Related Mortality Report, an average of 370 New Yorkers die over the summer from heat-related causes.[147] In 2021, there were approximately 644 hospitalizations due to extreme heat exposure. Current climate models project that up to 75 days of the year could reach 90 degrees Fahrenheit by 2080.[148] In a Columbia University Study on climate heat mortality, if heat mitigation and adaptation efforts are not enacted, an estimated 3,300 heat-related deaths will occur annually by 2080—a nearly nine-fold increase compared to current averages.[149] This section will explore climate risks related to extreme heat and its effect on affordable housing, specifically looking at the energy burden in the Bronx as a case study of current efforts to mitigate extreme heat-related complications in the most affected communities.

The Intersection of Extreme Heat and Housing Affordability in NYC

As evident in the Heat Vulnerability Index (HVI), it is clear that heat vulnerability disproportionately affects low-income people across neighborhoods in New York City.[150] Neighborhoods like East Harlem, Central Harlem, and the South Bronx have the highest heat vulnerability scores due to structural and historical racism.[151] Poor air quality, minimal tree coverage, and inadequate access to cooling and air conditioning contribute to variance among heat-related vulnerabilities.[152] Many low-income and people of color in heat-vulnerable neighborhoods live in older, poorly maintained apartment buildings and crowded

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[146] "Cool Neighborhoods - New York City," The City of New York, accessed April 17, 2023, https://www.nyc.gov/assets/orr/pdf/Cool_Neighborhoods_NYC_Report.pdf.
[147] "Health Department Releases Report on Heat-Related Mortality in New York City," NYC Department of Health, June 16, 2022, https://www.nyc.gov/site/doh/about/press/pr2022/heat-related-mortality-report.page.
[148] "Extreme Heat Policy Agenda 2022," WE ACT for Environmental Justice, June 2022, https://www.weact.org/wp-content/uploads/2022/06/WE-ACT-2022-Extreme-Heat-Policy-Agenda.pdf.
[149] "Scientists Identify Ways to Prevent Heat-Related Deaths from Climate Change," Columbia University Mailman School of Public Health, June 23, 2016, https://www.publichealth.columbia.edu/news/scientists-identify-ways-prevent-heat-related-deaths-climate-change.
[150] "Interactive Heat Vulnerability Index," Environment & Health Data Portal, accessed April 17, 2023, https://a816-dohbesp.nyc.gov/IndicatorPublic/beta/key-topics/climatehealth/hvi/.
[151] John Leland, "Why an East Harlem Street Is 31 Degrees Hotter than Central Park West," The New York Times, August 20, 2021, https://www.nytimes.com/2021/08/20/nyregion/climate-inequality-nyc.html.
[152] Nicole Chavez, "Black People Are More Likely to Die from Heat Stress than White People in New York City, Report Says," CNN (Cable News Network, June 17, 2022), https://www.cnn.com/2022/06/17/us/new-york-heat-related-deaths-report/index.html.

apartments with intergenerational living.[153] These families are more likely to be burdened both by rent and energy costs, ultimately impacting people's access to safe housing.

While most research defines energy burden as a household paying more than 6% of its income toward utility bills, many low-income households in New York City pay as much as up to 20% of their income toward energy bills.[154] According to the American Council for an Energy-Efficient Economy, at least 25 percent of low-income households in New York City have a high energy burden.[155] Utility bills can increase by up to 20 to 30 percent due to air conditioning use in the summer and many low-income households are forced to forego home cooling due to costs.[156]

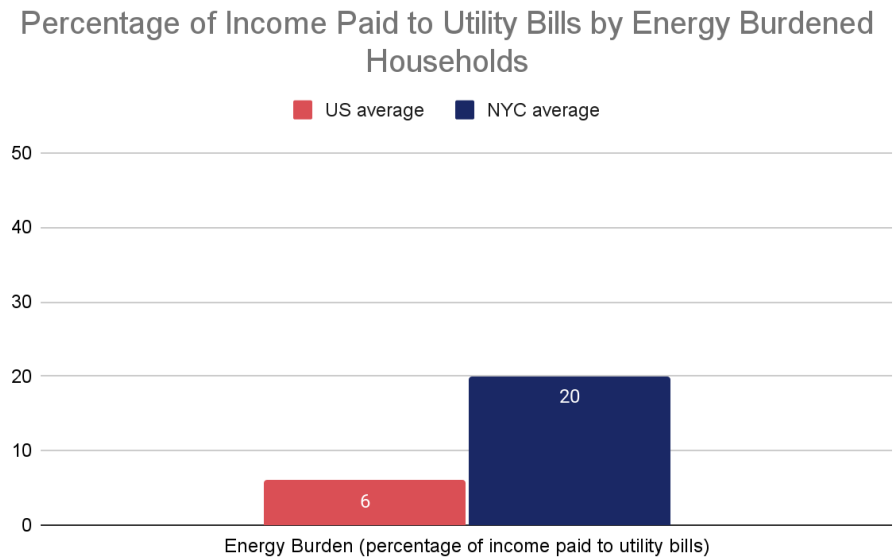

Figure 12: Percentage of Income Paid to Utility Bills by Energy Burdened Households
Source: NYC Mayor's Office of Sustainability and the Mayor's Office for Economic Opportunity, 2019

[153] Sonal Jessel, Samantha Sawyer, and Diana Hernández, "Energy, Poverty, and Health in Climate Change: A Comprehensive Review of an Emerging Literature," *Frontiers in Public Health* 7 (December 12, 2019), https://doi.org/10.3389/fpubh.2019.00357.
[154] "Understanding and Alleviating Energy Cost Burden in New York City ," NYC Mayor's Office of Sustainability and the Mayor's Office for Economic Opportunity, August 2019, https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/EnergyCost.pdf.
[155] Quratulain Tejani, "New York Is Facing a Pandemic-Fueled Home Energy Crisis, with No End in Sight," Inside Climate News, May 20, 2022, https://insideclimatenews.org/news/20052022/new-york-utility-bills/.
[156] "Extreme Heat Policy Agenda 2022," WE ACT for Environmental Justice.

Climate Risk of Heat-Deaths Due to More Frequent Heat Waves

In general, the Urban Heat Island effect suggests that cities can be as much as 22 degrees Fahrenheit hotter than their surrounding areas.[157] Furthermore, those living in historically disinvested neighborhoods that have endured racist policies, like redlining and unfair zoning practices are the most impacted.[158] A key component to consider is the variance among NYC neighborhoods and the ways in which various communities are equipped to handle climate change-related issues.

In New York City, heat-related deaths account for about 2% of all deaths over the warm season months of May to September.[159] The 2022 Heat-Related Mortality Report published by the City of New York found that Black New Yorkers are twice as likely to die due to heat-related causes than white New Yorkers, in large part due to the structural racism present in inequitable access to resources such as housing, wealth, and education.[160] Importantly, lack of access to air conditioning in residences, neighborhood poverty rates, and age are all positively linked to heat-related deaths. In addition, heat-related deaths are more prevalent in men than women and in people who had pre-existing health issues. Of the subset of people whose medical examiner records were evaluated after death, over 90% had at least one chronic health condition, over 70% were reported to have cardiovascular disease, and over 40% of adults aged 18-64 were clinically obese.[161] Nearly 70% of people who died due to heat stress were exposed to dangerous heat in their own homes, and of the people who died in their own homes, over 80% either had no air conditioning, or their air conditioning was broken or not in use.[162]

Case Study on Utility Burden in the Bronx

Extreme Heat in the Bronx

In New York City, the South Bronx is recorded to be 8 degrees Fahrenheit hotter than places like the Upper West Side and Upper East Side - some of the richest neighborhoods in New York City.[163] The Bronx has the highest poverty rate across the boroughs with 24% of Bronx residents living in poverty, as compared to the 18% citywide average.[164] The Heat Vulnerability Index (HVI), developed by Columbia University and the NYC Department of Health and Mental Hygiene (DOHMH), takes into consideration metrics like surface temperature, green space, access to home air conditioning, and the demographics of the area (Figure 13).[165] Bronx residents are also burdened with high CO2 emissions from the Cross-Bronx Expressway and the two peaker plants - highly polluting power plants that are turned on in the summer to

[157] Jenny Bock and Sonal Jessel, "8 Ways NYC Can Help Vulnerable Communities Survive Summer Heat," State of the Planet, (Columbia Climate School, September 27, 2021), https://news.climate.columbia.edu/2021/09/27/nyc-vulnerable-communities-summer-extreme-heat/.
[158] Ibid.
[159] "2022 New York City Heat-Related Mortality Report," NYC Environmental Health, accessed April 18, 2023, https://nyccas.cityofnewyork.us/nyccas2022/report/1.
[160] Ibid.
[161] Ibid.
[162] Ibid.
[163] Aliya Uteuova, "The Wealth Divide Linked to 370 Heat Deaths in New York Each Year," The Guardian, September 7, 2022, https://www.theguardian.com/us-news/2022/sep/07/new-york-heat-deaths-map-inequality.
[164] "The State Of Poverty And Disadvantage In New York City (Vol. 4)," Robin Hood.
[165] "Interactive Heat Vulnerability Index," Environment & Health Data Portal.

address peak energy demand.[166] Six out of the 12 most heat-vulnerability community districts are located in the Bronx, showing the unequal distribution of heat issues in the Bronx, which affects health and quality of life.

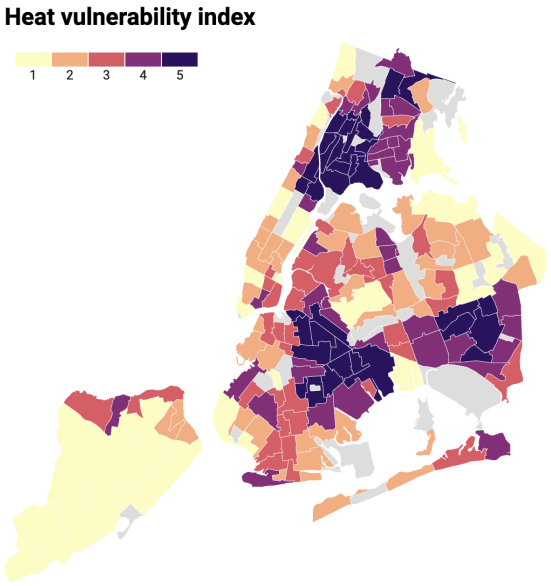

Figure 13. New York City Heat Vulnerability Index, 2018
Source: New York City Heat-Related Mortality Report, 2022

In areas like the Bronx that have a higher HVI, there are higher rates of heat-related illness. Heat-related illness disproportionately affects Black people as their mortality rates are higher than in other communities.[167] Many of these disparities are the result of structural racism, like neighborhood disinvestment, racist housing policies, low-wage job opportunities, and lower access to high-quality education and healthcare. Black New Yorkers experience higher poverty rates, and lower access to air conditioning, cooling resources, and green space. Additionally, children, elderly people, and those with health issues or disabilities are at a higher risk due to mobility issues and pre-existing conditions. In the Bronx, 17% of households with older adult residents live without a functioning AC.[168] According to NYC Planning's Population FactFinder, Those living with a disability in the Bronx were an estimated 15.7% of the population which is nearly 5% more than the citywide average, and those 65 and over living with a disability in the Bronx (43.2%) were nearly 10% more than the citywide average (34.6%).[169] These health and safety concerns are also further exacerbated by high levels of asthma, diabetes, and other chronic and mental health factors seen in The Bronx. It is important to address the intersection of housing, health, and climate action to right the wrongs of discriminatory practices that continue to affect marginalized communities today.

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[166] Hazar Kilani, "'Asthma Alley': Why Minorities Bear Burden of Pollution Inequity Caused by White People," The Guardian, April 4, 2019, https://www.theguardian.com/us-news/2019/apr/04/new-york-south-bronx-minorities-pollution-inequity.
[167] "Interactive Heat Vulnerability Index," Environment & Health Data Portal.
[168] "Health of Older Adults in New York City," NYC Department of Health, accessed April 18, 2023, https://www.nyc.gov/assets/doh/downloads/pdf/episrv/2019-older-adult-health.pdf.
[169] "NYC Planning Population FactFinder: Bronx," NYC Population FactFinder.

Issues of Utility Burden in the Bronx

Bronx residents' access to safe affordable housing is threatened in various ways by extreme heat. According to the 2017 study, 56% of people in the Bronx are considered rent burdened and 36% of households bring home less than $25,000 annually.[170] Utility burden is also a serious problem when assessing heat vulnerability in the Bronx. As those who are rent-burdened are already paying 30% of their income on housing, utility costs add an additional expense. These expenses are further exacerbated during summer and winter months with more extreme temperatures. Older buildings in the Bronx tend to trap heat, which makes internal temperatures in homes higher than they should be, leading to health and safety risks.[171] A study on urban heat and mortality rates found that overall heat-related death rates correlated with a prevalence of poor housing conditions, poverty, impervious land cover, high land surface temperatures, and lower air conditioning access.[172] As 80% of housing units are renter-occupied, renters bear the brunt of energy inefficiency with high utility bills.[173]

Compared to the other boroughs, The Bronx experiences the highest levels of energy burden in the city (Figure 14). On average, Bronx residents spend about $228 per month on electricity and a total of $2,736 on electricity per year - which is 27% higher than the national average electric bill.[174] Close to 60% of New Yorkers living in the Bronx missed utility payments persistently throughout a 5-year period, while 32% have experienced a complete utility shutoff.[175] Data also shows that New Yorkers have different experiences with energy insecurity when further disaggregating energy burden by racial composition. Similar to the highest heat mortality rates, Black, Latino, and multiracial New Yorkers have the highest rates of energy insecurity in the city (Figure 15).

[170] Rachel Sugar, "Over 70 Percent of Bronx Residents Are at Risk of Displacement: Study," Curbed NY, March 7, 2017, https://ny.curbed.com/2017/3/7/14844904/bronx-nyc-affordable-housing-report.
[171] Aliya Uteuova, "The Wealth Divide Linked to 370 Heat Deaths in New York Each Year."
[172] Joyce Klein Rosenthal, Patrick L Kinney, and Kristina B Metzger, "Intra-Urban Vulnerability to Heat-Related Mortality in New York City, 1997-2006," Health & place (U.S. National Library of Medicine, November 2014), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4348023/.
[173] Ibid.
[174] "Electricity Cost in Bronx County, NY: 2023 Electric Rates," EnergySage, accessed April 17, 2023, https://www.energysage.com/local-data/electricity-cost/ny/bronx-county/.
[175] "The Poverty Tracker," Columbia University Center on Poverty and Social Policy, accessed April 18, 2023, https://www.povertycenter.columbia.edu/poverty-tracker-data.

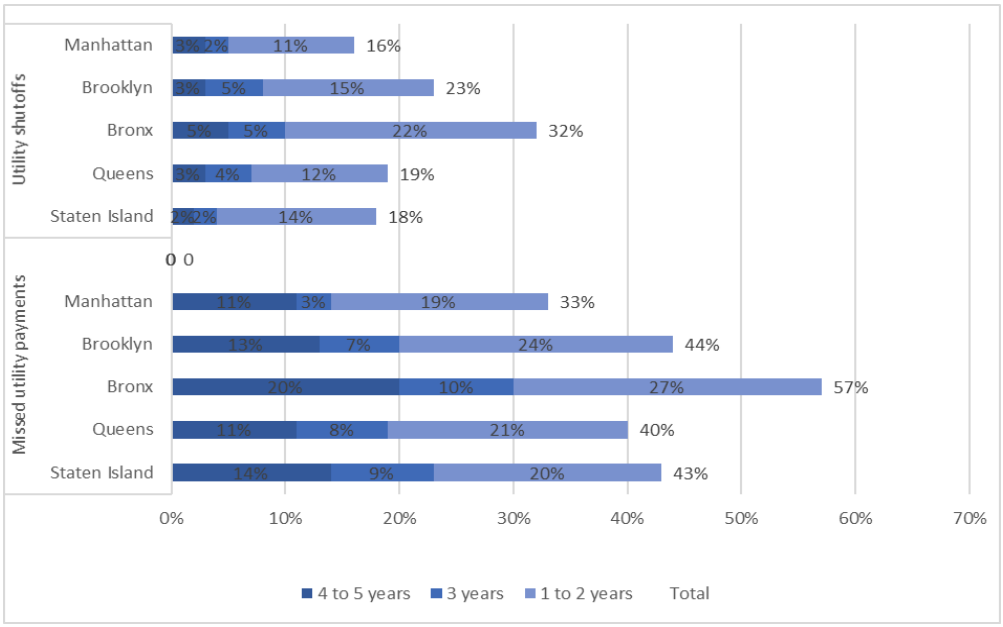

Figure 14. Energy Insecurity in New York City by Borough
Source: Center on Poverty and Social Policy, 2015-2019

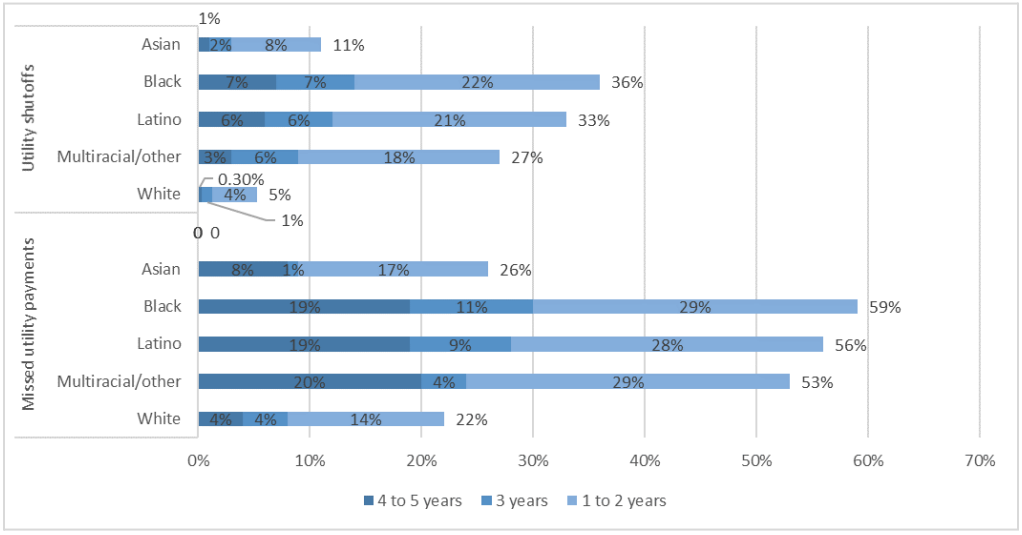

Figure 15. Energy Insecurity in New York City by Race
Source: Center on Poverty and Social Policy, 2015-2019

Most heat-related deaths occur when people are inside homes without air conditioning and an AC unit is the most effective way to prevent heat illness. However, utility bills can increase up to 30% during the summer due to the use of AC units, which may prevent already utility-burdened people from getting an AC unit or using it. Studies have shown that there is a racial disparity in AC access among Latino and

Black respondents.[176] Even those who did have AC access were hesitant to turn it on due to high utility costs.[177] In low-income households with ACs, 15% of people reported never or rarely using their AC, and 24% of people said they chose not to use their unit because of the cost.[178] In addition to unequal access to AC, low-income households tend to be at higher risk of heat illness, in large part due to the prohibitive costs of running AC. Policy action should be directed toward the boroughs most in need of affordable energy options to assist New Yorkers who disproportionately suffer from energy burdens that affect their ability to live in safe and affordable housing.

Climate Adaptation and Mitigation Efforts for Extreme Heat

There have been various climate adaptation efforts in the South Bronx to address the risks of extreme heat and utility burden that is contributing to the lack of affordable housing in the Bronx. This section will evaluate policies, tools, and pilots that promote utility technical assistance, energy efficiency projects, cooling programs, and green space expansion in order to help The Bronx adapt to more extreme heat.[179]

Increasing Technical Assistance

One way to ameliorate the impact of extreme heat on vulnerable communities is to provide indoor cooling mechanisms via AC units, which is especially impactful during hotter times of the year. In the summer of 2020, the Get Cool NYC program under the de Blasio administration provided 75,000 ACs to older low-income residents in private and public buildings across the 5 boroughs, including in NYCHA housing.[180] The New York State Public Service Commission also approved providing up to $70 million in financial assistance to approximately 440,000 low-income families with their summer utility bills.[181] While this relief program was not continued, it is an example of the benefits that direct assistance can provide when the city allocates appropriate funding and sufficiently reaches out to vulnerable communities. New York City also runs ElectifyNYC, a program to help homeowners make climate-friendly upgrades such as heat pump installations, building weatherization, and shifting away from fossil-fuel-intensive equipment.[182] Its goal is to reduce carbon emissions from existing buildings while creating significant savings on homeowners' utility bills.

More permanently, the state government created programs like the Home Energy Assistance Program (HEAP), a program designed to help low-income New Yorkers with heating and cooling by installing air conditioners and providing financial assistance on energy bills for residents with high utility burdens. In addition to utility bill payment assistance, they also offer energy equipment repair and replacement

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[176] Jennifer Bock et al., "Compounding Risks Caused by Heat Exposure and Covid-19 in New York City: A Review of Policies, Tools, and Pilot Survey Results," Journal of Extreme Events (U.S. National Library of Medicine, June 2021), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9036680/.
[177] Ibid.
[178] Ibid.
[179] Ibid.
[180] "Get Cool NYC: Mayor De Blasio Updates New Yorkers on Covid-19 Summer Heat Plan," Office of the Mayor June 12, 2020, https://www.nyc.gov/office-of-the-mayor/news/433-20/get-cool-nyc-mayor-de-blasio-new-yorkers-covid-19-summer-heat-plan.
[181] Ibid.
[182] "ElectrifyNYC," City of New York, accessed April 18, 2023, https://www.nyc.gov/site/electrifynyc/index.page.

benefits.[183]As HEAP focuses more on heating, the City has advocated for increased federal funding to help lower physical and utility-cost barriers for in-home and more efficient cooling technology. However, there have been serious concerns about the program being underfunded and facing challenges in its access and uptake. The pandemic has only made matters worse.[184] Just this January, the Hochul administration announced utility bill forgiveness worth $672 million for struggling New York households, indicating the extent of the problem.[185] Technical assistance has been directed more at landlords to make energy-efficient upgrades to their homes. When it comes to technical assistance, it is important to advocate for renter-specific utility assistance and ensure that The Bronx is getting its fair share of assistance through these programs.

Providing Cooling Education and Programming

There is also a lack of awareness of local heat emergencies among heat-vulnerable populations. In a survey conducted during the summer of 2011, 30% of seniors surveyed were not aware of any heat warnings issued by the City and did not perceive themselves to be at risk; additionally, many did not identify air conditioning as an important health protection strategy.[186] As discussed in the Cool Neighborhoods Report published by the Mayor's Office of Climate and Environmental Justice, the Be a Buddy Program was created to encourage New Yorkers to check on at-risk neighborhoods like the elderly or people with disabilities who are at a higher risk of danger from extreme heat.[187] Over the first two-year pilot, the Be a Buddy network has served over 1,300 residents with 66 local volunteers and 500 engagement events. People have been engaged in this program to support their community and increase local relationships. The city has also sought to increase well-shaded streets, public pools, parks with sprinklers and water fountains, and fire hydrants with spray caps. They have also expanded their network of Cooling Centers - which are primarily libraries, community centers, and senior centers that offer free access to cooling during heat waves.

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[183] "Home Energy Assistance Program (HEAP)," New York State Office of Temporary and Disability Assistance, accessed April 17, 2023, https://otda.ny.gov/programs/heap/#cooling-assistance.
[184] "Helping New Yorkers Keep the Heat On," New York State, accessed April 18, 2023, https://www.ny.gov/helping-new-yorkers-keep-heat.
[185] "Governor Hochul Announces $672 Million Electric and Gas Utility Bill Relief for New Yorkers," Office of the Governor of New York, January, 19, 2023, https://www.governor.ny.gov/news/governor-hochul-announces-672-million-electric-and-gas-utility-bill-relief-new-yorkers.
[186] Jennifer Bock et al., "Compounding Risks Caused by Heat Exposure and Covid-19 in New York City."
[187] "Cool Neighborhoods - New York City," The City of New York.

Spotlight on Be a Buddy Outreach by THE POINT Community Development Corporation:

CUNY created a Multimedia Project to profile the Be a Buddy Outreach by THE POINT Community Development Corporation (CDC) as they engaged with residents of the South Bronx, particularly Hunts Point and Longwood. THE POINT aims to prepare the community for future climate events through a series of climate health education and community preparedness workshops. THE POINT embraces the idea that climate includes emotional and mental well-being.[188] "Volunteers identify community needs to address ongoing community needs and to prepare for future needs in holistic ways. This is a community which endures multiple forms of oppression, poverty, gentrification, displacement and the threat of police violence."[189]

Expanding Cooling Infrastructure

One of the biggest successes in the South Bronx has been the strategic implementation of NYC CoolRoofs. As described in the Cool Neighborhoods report, 11 million square feet of rooftops have been painted white to reduce the roof temperature.[190] By painting the roof white, sunlight is reflected instead of absorbed and the internal building temperatures are reduced by up to 30%.[191] This initiative further decreases the power demand of energy in the summer months, leading to a reduction in carbon emissions and improved air quality, as well as reducing the impact of the Urban Heat Island Effect. These cool roof installations are offered at low to no cost for buildings considered nonprofits, affordable or low-income housing, community or recreational centers, schools/colleges, hospitals or clinics, museums or other cultural centers, as well as select cooperatively owned housing. In addition to the environmental benefits, the CoolRoofs program also brings green jobs to New Yorkers, which are jobs that produce goods or deliver services that increase energy efficiency or generate renewable energy.[192] Cool Roofs pays for training to teach people how to install energy-saving reflective rooftops. Since 2018, 73% of new cool roofs have been in high HVI areas like the Bronx, indicating the borough is prioritized by the City for this program.[193]

Similar to CoolRoofs, other City agencies are also considering ways to prevent heat absorption to make neighborhoods cooler. The Department of Transportation is developing new heat mitigation strategies for streetscapes like the use of cool pavement, light-colored pavement, and coating materials designed to reduce temperatures in streets and public sidewalks.[194] In 2022, the NYC Department of Transportation

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[188] "Be A Buddy Multimedia Project: Stories of Strength from the South Bronx," The Center for the Humanities, accessed April 18, 2023, https://www.centerforthehumanities.org/programming/be-a-buddy-multimedia-project.
[189] Ibid.
[190] "Cool Neighborhoods - New York City," The City of New York.
[191] "NYC CoolRoofs," NYC Mayor's Office of Climate and Environmental Justice, accessed April 18, 2023, https://climate.cityofnewyork.us/initiatives/nyc-cool-roofs/.
[192] "New York State Green Jobs Study: Key Findings for New York City," CUNY Graduate Center, November 2011, https://www.gc.cuny.edu/sites/default/files/2022-01/CUR-Green-Jobs-Study-Summary-NYC.pdf.
[193] "Local Heat Equity Examples," U.S. Environmental Protection Agency, accessed April 18, 2023, https://www.epa.gov/heatislands/local-heat-equity-examples.
[194] "AdaptNYC," NYC Mayor's Office of Climate and Environmental Justice, accessed April 18, 2023, https://climate.cityofnewyork.us/initiatives/adaptnyc/.

was awarded a $320,500 FEMA Building Resilient Infrastructure and Communities (BRIC) grant to develop new heat mitigation strategies for streetscapes.[195] Through the DOT Vision Zero projects, the City has been working to ensure 360,000 square feet of new planted space is installed throughout Brooklyn, Queens, and The Bronx. Intentional choices in design help minimize the Urban Heat Effect and make neighborhoods cooler, especially those with a high HVI such as The Bronx.

Spotlight on CoolRoofs with Sustainable South Bronx, a division of The Hope Program:
Sustainable South Bronx, a division of The HOPE Program, prepares young adults for careers in green construction and maintenance. Their mission is to empower New Yorkers to build sustainable futures through comprehensive training, jobs, advancement, and lifelong career support.[196] NYC CoolRoofs is a ten-week transitional employment program that pays participants to get hands-on experience in painting rooftops with reflective material to make buildings more sustainable. As they are committed to holistic services, workers are provided with a $15 hourly wage as well as professional clothing, meals, and mental health case management.[197] In addition, the HOPE program invests in skill-building through its HOPEworks curriculum, which includes digital literacy, resume writing, interviewing skills, and more. Partnering with the city, the nonprofit was responsible for over 1.5 million square feet of energy-saving reflective rooftop installations in 2018.[198] So far, they have improved the energy efficiency of 28 New York City buildings.[199]

Increasing Tree Canopy and Green Space

In a dense concrete city, green spaces with trees, shrubs, and grass cover create a refuge from the sun and absorb carbon emissions, acting as a natural coolant in many communities. In the fiscal year 2022, the Adams administration planted 13,000 trees.[200] As the City has continued to plant more trees, they are prioritizing communities in HVI-4 neighborhoods to plant an estimated 36,000 additional trees per year. Within The Bronx, NYC Parks is prioritizing tree planting in Williamsbridge, Woodlawn, Eastchester, Edenwald, Soundview, and Morris Park. Since 2017, 11,634 street and park trees will have been planted in the most heat-vulnerable (HVI-5) neighborhoods, and approximately 14,530 are planned through Spring 2024.[201] Higher tree canopy means lower average temperature, which helps to cool down the neighborhood through nature-based solutions like planting trees.

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[195] Ibid.
[196] "What we do," The Hope Program, accessed April 18, 2023, https://www.thehopeprogram.org/what-we-do/.
[197] "NYC CoolRoofs," The Hope Program, accessed April 18, 2023, https://www.thehopeprogram.org/nyc-coolroofs/.
[198] "Hope's NYC Coolroofs Program Responsible For Over 1.5 Million Square Feet Of Energy-saving Reflective Rooftop Installations This Year," The Hope Program, August 22, 2018, https://www.thehopeprogram.org/2018/09/05/hopes-nyc-coolroofs-program-responsible-for-over-1-5-million-square-feet-of-energy-saving-reflective-rooftop-installations-this-year/.
[199] "Our Impact," The Hope Program, accessed April 18, 2023, https://www.thehopeprogram.org/our-impact/.
[200] "AdaptNYC," NYC Mayor's Office of Climate and Environmental Justice.
[201] Ibid.

Similarly, large areas of green spaces contribute to cooling not only directly, but also indirectly in surrounding areas as the urban green space cooling effect deflects the radiation from the sun and absorbs emissions.[202] Green space also encourages movement, connectivity, and community space that provides mental and physical health benefits, which was especially necessary during the COVID-19 pandemic.[203] A lack of trees and green infrastructure has been linked to other chronic health effects like asthma. Mott Haven in the South Bronx is considered "Asthma Alley" due to the poor air quality in the community due to the heavy truck traffic and proximity to the Cross-Bronx Expressway.[204] In the Bronx, there has been an activist movement pushing for the "capping" of the Cross-Bronx Expressway (CBE), which suggests building a deck on top of the CBE and building a park. The reimagining of the CBE is currently being studied by the city through funding from the federal US Department of Transportation's Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grant.[205] While making these significant public space improvements, it is necessary to be mindful of green gentrification—where the creation of green space may lead to wealthier families looking to move in, driving up property values and rent.[206]As high heat vulnerability areas continue to be prioritized as areas for investment in green space areas, it is important to consider strategies to combat green gentrification and displacement by protecting affordable housing in the surrounding community.

Investing in Sustainable Community Initiatives and Capacity Building

Lastly, to focus on community action in the climate crisis, Bronx residents are taking matters into their own hands and investing in clean, renewable community energy with the intention of transferring the benefits of renewable energy to residents.[207] Bronx Community Solar project is a community-led initiative where the community can subscribe to a shared solar panel that is installed nearby and subscribers receive the financial benefits of low-cost renewable energy credits to their energy bill.[208] Investing in sustainable energy is much more cost-effective in the long run, reducing utility costs for residents and leaving more disposable income for other basic necessities. As this project is in its early stages, it is important to inform residents of the long-term financial, health, and wellness benefits that come from building out local renewable energy capacity. To get the word out, there are successful partnerships with trusted community organizations doing outreach about the project to encourage this shift.

Community-based organizations are trusted partners on the ground; there has been more effort to provide support in capacity building and outreach on education, technical assistance, and other resources. The New York State Energy Research and Development Authority (NYSERDA) has even looked to fund

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[202] Farshid Aram et al., "Urban Green Space Cooling Effect in Cities," *Heliyon* 5, no. 4 (April 2019), https://doi.org/10.1016/j.heliyon.2019.e01339.
[203] Bianca Lopez et al., "Who Benefits from Urban Green Spaces during Times of Crisis? Perception and Use of Urban Green Spaces in New York City during the COVID-19 Pandemic," *Urban Forestry and Urban Greening* 65 (September 22, 2021), https://doi.org/10.1016/j.ufug.2021.127354.
[204] Kilani, "'Asthma Alley': Why Minorities Bear Burden of Pollution Inequity Caused by White People."
[205] David Westenhaver, "Plan to Cap Cross Bronx Expressway Moves to Next Steps," Hunts Point Express, December 26, 2021, https://huntspointexpress.com/2021/12/26/plan-to-cap-cross-bronx-expressway-moves-to-next-steps/.
[206] Ben Handy, "Green Gentrification in New York City," Journal of Civil Rights & Economic Development, (St. John's University School of Law, October 13, 2020), https://www.jcred.org/shortreads/green-gentrification-in-new-york-city.
[207] "About Us," Bronx Community Solar, accessed April 18, 2023, https://bronxcommunitysolar.org/the-project.
[208] Ibid.

these efforts through Clean Energy Hubs, identifying local nonprofits as informational hubs providing support in accessing clean energy financial incentives, home-energy assessments, community solar, and other state resources.[209] The Clean Energy Hubs for Manhattan, The Bronx, and Brooklyn are currently run by WE ACT and Center for NYC Neighborhoods respectively.[210] Capacity building for community-based organizations is essential to be able to spread education, resources, and assistance, especially to those who need it most.

[209] "Regional Clean Energy Hubs Program," NYSERDA, accessed April 17, 2023, https://www.nyserda.ny.gov/All-Programs/Regional-Clean-Energy-Hubs.
[210] Ibid.

Preserving and Creating Sustainable Affordable Housing in New York City

Mitigating Building Carbon Emissions

Adapting to climate change cannot be the only priority for New York. The city must also do its part to keep global temperatures below the international target of 2℃ above pre-industrial levels. To effectively combat the long-term impacts of carbon emissions on the environment, we must collectively focus on mitigation strategies that reduce carbon emissions. Buildings make up over two-thirds of New York's greenhouse gas emissions and are driven primarily by natural gas and electricity consumption in homes and commercial buildings.[211] The city emitted over 52 million tons of CO2 in 2021, and 31 million tons came from residential and commercial buildings. Achieving its 80% CO2 emissions reduction target by 2050 requires a concerted effort to decarbonize the building sector.[212]

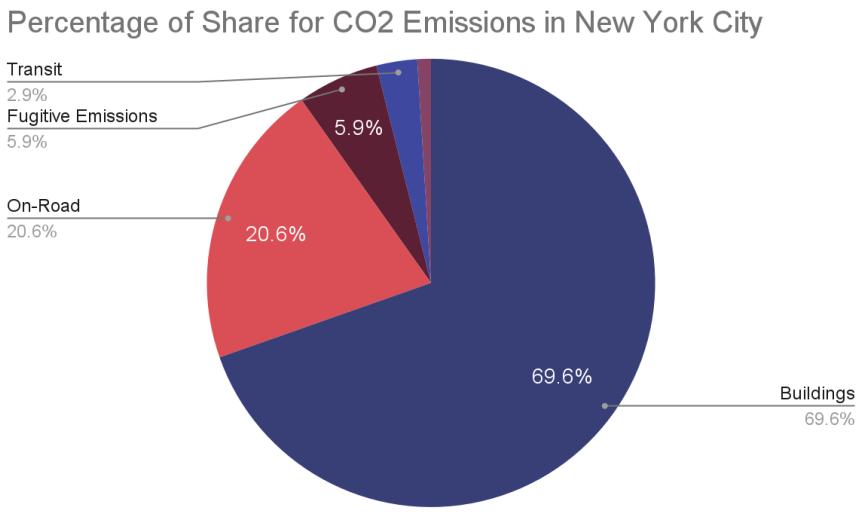

Figure 16. Buildings make up to two-thirds of CO2 emissions in New York City
Source: NYC Mayor's Office of Climate and Environmental Justice, 2021

Electrifying Existing and New Buildings

In 2019, the New York City Council passed Local Law 97 (LL97) as part of the Climate Mobilization Act to sharpen the city's fight against climate change and target the building sector.[213] While it is the responsibility of the Department of Buildings and the Mayor's Office of Climate and Environmental Justice (MOCEJ) to ensure emissions reductions and that buildings submit compliance reports, other

[211] "NYC Greenhouse Gas Inventories," NYC Mayor's Office of Climate and Environmental Justice, accessed April 18, 2023, https://climate.cityofnewyork.us/initiatives/nyc-greenhouse-gas-inventories/.
[212] "Securing Our Future: Strategies for NYC in the Fight Against Climate Change," New York City Council, accessed April 18, 2023, https://council.nyc.gov/data/securing-our-future/.
[213] "Local Law 97," Urban Green Council, accessed April 18, 2023, https://www.urbangreencouncil.org/what-we-do/driving-innovative-policy/ll97/.

agencies also play a major role in the implementation of LL97. The legislation sets carbon emissions caps for buildings' energy use with the intent to meet the citywide emissions reduction goals.

Central Elements of Local Law 97[214]

- LL97 targets buildings greater than 25,000 square feet and covers nearly 60% of the city's building area (~50,000 buildings).
- Carbon emission limits are calculated per square foot from a 2005 baseline and are based on 10 building categories.
- Many buildings will require significant retrofits because they are far over target emissions limits.
- Compliance flexibility is provided through Renewable Energy Credits (RECs), which allow landlords to purchase a currently unlimited quantity of credits to offset their building's carbon emissions.
- New York government buildings are expected to meet an earlier compliance timeline to achieve 40% emissions reductions by 2025 and 50% by 2050.
- For NYCHA, LL97 targets are portfolio-wide, not building-specific; however, while NYCHA is subject to DOB enforcement, it is exempt from any financial penalties to which private buildings are subject; and
- Annual penalties are calculated on emissions over the target limit multiplied by $268. Compliance reports will be due every May 1st starting in 2025.

The high GHG emissions of buildings explain, in part, why so many New Yorkers are energy burdened: most buildings are currently extremely energy inefficient, lacking adequate sustainability principles. As New York City continues to implement its sustainability plan throughout all levels of the city, not just the built environment, utility costs for residents will decrease and air quality will improve.

Retrofitting Existing Buildings

New York City has over one million buildings and 90% of them are expected to still be in use by 2050.[215] As such, electrification and decarbonization of existing buildings are the linchpins to reaching the city's climate goals. Given this context, the inherent costs and regulatory obstacles involved in renovating such a large quantity of buildings take on greater importance.[216]

The many challenges arising from the age, design, and existing infrastructure of these structures were highlighted during our research interviews. One of the primary obstacles in this process is the presence of outdated electrical systems. Many of these buildings were constructed with electrical systems designed to accommodate lower power demand than those required by contemporary appliances and technologies. Consequently, these systems often lack the capacity to support the increased electrical load that comes with electrification, necessitating costly and time-consuming upgrades.

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[214] Ibid.
[215] "One City Built to Last: 2nd Edition," The City of New York - Mayor's Office of Sustainability, accessed April 18, 2023, https://www.nyc.gov/html/gbee/downloads/pdf/TWGreport_2ndEdition_sm.pdf
[216] Steve Cohen, "Reducing Greenhouse Gas Emissions from NYC's Buildings," State of the Planet (Columbia Climate School, August 22, 2022), https://news.climate.columbia.edu/2022/08/22/reducing-greenhouse-gas-emissions-from-nycs-buildings/.

Our interviewees also stressed that another significant challenge is the physical constraints imposed by the existing architecture and design of older buildings. Retrofitting these structures with modern electrical equipment, such as wiring, outlets, and electric heating systems can be complicated due to limited space for installation and the need to maintain the structural integrity of the building. In some cases, this may require extensive modifications to walls, ceilings, and floors, which can be both disruptive to tenants and expensive for building owners.

The energy efficiency of older buildings is often suboptimal because of their insufficient insulation, poor window quality, and outdated HVAC systems. Improving energy efficiency is a critical aspect of electrification, as it helps to reduce overall energy consumption and associated costs. However, addressing these issues in older buildings can be a complex and expensive process, involving extensive renovations and retrofitting.[217]

The cost of electrifying older buildings is a persistent barrier. Upgrading electrical systems, improving energy efficiency, and integrating renewable energy sources can be a significant financial burden for building owners and occupants.[218] While there are incentive programs and financing options available to help offset these costs, they may not always be sufficient to make such projects feasible for all stakeholders.[219] Moreover, navigating the various regulations, permitting processes, and compliance requirements associated with these upgrades can be a daunting and time-consuming task, potentially hindering progress and adding to overall project costs.

Ultimately these costs are either borne by homeowners or landlords pass them along to renters, increasing housing costs for all New Yorkers along the way. Finding effective policy tools, financing mechanisms, and ownership structures to make these greenhouse gas reductions a reality will be key moving forward.

Investing in Upgrades for Public Housing

New York City Housing Authority (NYCHA) is the largest public housing authority in North America. Since 1935, it has provided affordable housing units to low- and moderate-income New Yorkers. As of 2022, NYCHA provides affordable housing to close to 340,000 authorized residents, representing 7.4% of the city's rental apartments and comprising almost 4% of the city's population.[220] The true number of people living in NYCHA housing is likely much higher as many residents that are staying with family,

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[217] "Report Examines the Challenges and Costs of Building Resilience Against Climate Threats in New York," NYU Furman Center, 2014, https://furmancenter.org/news/press-release/report-examines-the-challenges-and-costs-of-building-resilience-against-cli.

[218] Kenneth T. Rosen et al., "New York Building Electrification and Decarbonization Costs," Rosen Consulting Group, June 2022, https://www.nyserda.ny.gov/-/media/Project/Climate/Files/2022-Comments/NY-Building-Electrification-Cost-Full-Report-June2022.

[219] Claire Kramer Mills and Jacob Scott, "Sustainable Affordable Housing: Strategies For Financing An Inclusive Energy Transition," Federal Reserve Bank of New York, October 2022, https://www.newyorkfed.org/medialibrary/media/outreach-and-education/community-development/fed-affordable-housing-and-energy-transition-final-10-4-22.

[220] "NYCHA 2022 Fact Sheet." NYC Housing Authority, April 2022. https://www.nyc.gov/assets/nycha/downloads/pdf/NYCHA_Fact_Sheet_2022.pdf.

friends, and acquaintances are not listed on the lease.[221] Any undercount increases the importance of NYCHA housing to the overall affordable housing picture in New York City.

The city's public housing system is distributed throughout the five boroughs. Manhattan has the most developments (82), followed by Brooklyn (79) and then the Bronx (75). Although Queens (21) does not have as many developments as the three aforementioned boroughs, it does have the largest public housing developments: Queensbridge North and Queensbridge South Houses (3,147 apartment units). Staten Island has the least number of developments and apartment units, with 10 and 4,510 respectively. Close to 65% of these public housing developments are 50 years or older, with the oldest development, First Houses in Manhattan, dating back to 1935. A large number of these developments are between 50-59 years old (79 developments) and 60-69 years old (52 developments).[222]

While the quantity of affordable public housing in New York City is impressive and crucial for providing housing to the city's low-income communities, there are many issues that have arisen since its creation 88 years ago. Residents living in NYCHA housing report mold, rodents and pests, malfunctioning elevators, and unreliable heating. While many of these issues are due to the age of the buildings, a large share of the problem stems from the sheer size of NYC's public housing system and the capital needed to adequately maintain it.

Since 1998, NYCHA cites a continuous decline in funding from the state and federal government for capital and operations expenses. The pandemic also negatively impacted one of NYCHA's main sources of revenue: rents. COVID-19 hit NYC's most marginalized and at-risk communities the hardest, causing many low- and moderate-income New Yorkers to lose their jobs and struggle to pay rent. These are the very same communities that makeup NYC's public housing population. "More than 73,000 NYCHA households owed approximately $454 million in rent arrears at the end of 2022, with public housing unlikely to receive help from the state's pandemic rent relief program, which prioritized private market tenants for the limited funding."[223] This led to a decrease in NYCHA's rent collection which would normally be allocated toward capital and operations expenses.

With more than $45 billion dollars needed for capital repairs and upkeep - and a significant loss in government funding and tenant revenue - the majority of the city's public housing developments have fallen into disarray.[224] As a result, NYCHA has had to implement innovative ways to secure the capital needed for its public housing developments. NYCHA is utilizing three main paths for getting both public and private money invested into its properties.

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[221] "What Will Happen to NYCHA's Hidden Population under Rad?," Red Hook Star-Revue, December 9, 2019, https://www.star-revue.com/what-will-happen-to-nychas-hidden-population-under-rad/.
[222] Ibid.
[223] Iziah Thompson and Marquis Jenkins, "Opinion: Thousands of NYCHA Tenants Forgotten Under Emergency Rental Assistance Program," City & State New York, January 19, 2023, https://www.cityandstateny.com/opinion/2023/01/opinion-thousands-nycha-tenants-forgotten-under-emergency-rental-assistance-program/381976/.
[224]"RPA-Time to Act," RPA, October 2019, https://rpa.org/work/reports/time-to-act.

Private Investment with RAD-PACT

The majority of NYCHA housing was created under Section 9 of the U.S. Housing Act of 1937.[225] Per our discussion with field experts, under federal law, NYCHA is not allowed to issue bonds in order to make capital improvements to its properties. This has left NYCHA with relatively few financial tools to fix its backlog of necessary repairs. Congress attempted to address this issue with the RAD-PACT program under the Department of Housing & Urban Development, which created a pathway for Section 9 public housing to be converted to Section 8 housing using private investment.[226] The landlord would then enter into a contract with the federal government to provide the affordable units in perpetuity in exchange for federally guaranteed rent above the resident's maximum payment of 30% of their income.[227] The Section 8 federal subsidy is about twice as much as the Section 9 subsidy making the conversions financially viable for private management companies.[228] Crucial to its mission, the properties continue to be owned by NYCHA and remain as part of the public housing stock while under private management.

However, the RAD-PACT conversions in NYCHA have had some complaints from tenants. According to a report from Human Rights Watch, two developments housing about 6,500 residents saw a dramatic increase in evictions following the management takeover by private firms.[229] Further, residents cited a lack of government oversight and limited options for calling out violations of their rights to regulators.[230] Finally, some residents in the RAD-PACT conversions have noted the problems of poor maintenance of buildings and pest infestations have continued even under private management, putting into question a primary argument for the conversions. However, it is still early on in the life of the RAD-PACT program, and solving NYCHA's inadequate building maintenance will take time to produce results.

Public Funding with Public Housing Preservation Trust

In June of 2022, Governor Kathy Hochul signed legislation creating another avenue for public housing authorities to raise capital for needed repairs and improvements: the Public Housing Preservation Trust.[231] The trust is an entirely new public entity and affords NYCHA the ability to remain the permanent owner of the property while signing a long-term ground lease with the trust. In turn, the trust issues bonds to raise funding to complete comprehensive building improvements. The trust also gives NYCHA the higher value federal subsidies, Tenant Protection Vouchers, that it receives for converting to the federal Section 8 program.[232]

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[225] "A Blueprint for Change," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/assets/nycha/downloads/pdf/Blueprint_for_Change_Brief_8.5x11_English.pdf.
[226] "What Is Rad?," U.S. Department of Housing and Urban Development (HUD), accessed April 18, 2023, https://www.hud.gov/RAD/residents/WhatIsRAD.
[227] "Fact Check: Top 5 Myths about Rad (Rental Assistance Demonstration)," accessed April 18, 2023, https://www.nyc.gov/assets/nycha/downloads/pdf/rad-top-5-myths-fact-check.pdf.
[228] "A Blueprint for Change," NYC Housing Authority.
[229] Jackson Gandour, "'The Tenant Never Wins,'" Human Rights Watch, January 27, 2022, https://www.hrw.org/report/2022/01/27/tenant-never-wins/private-takeover-public-housing-puts-rights-risk-new-york-city.
[230] Ibid.
[231] "Public Housing Preservation Trust," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/site/nycha/about/public-housing-preservation-trust.page.
[232] Ibid.

According to our interviews and discussions with subject-matter experts, the trust is intended to assuage political concerns from tenant rights advocates about the privatization of public housing. Any properties that utilize the trust must also keep homes permanently affordable as well as maintain NYCHA residents' existing tenant protections.[233] Additionally, it created a mechanism for residents to vote on which path their building would like to take. They can remain managed by NYCHA, convert to RAD-PACT, or go with the trust model.

Prioritize Climate Upgrades or Backlog of Repairs?

NYCHA faces a uniquely difficult challenge with building electrification. The carbon emissions of public housing's large portfolio of primarily older buildings are significant. Investing in clean electrical infrastructure like solar panels, heat pump HVAC systems, and improved weatherization of windows and walls would have a dramatic impact on the city's building emissions. At the same time, the massive backlog of repairs is a pressing crisis for its residents. NYCHA leadership will struggle to explain why adding rooftop solar was a better use of money for a resident with a child that is developing asthma due to a recurring mold issue. However, that does not mean NYCHA is ignoring the need for shouldering some of the burdens of the city's climate goals.

NYCHA has developed an initiative called the Clean Heat for All Challenge, which supports the goals of New York State's Climate Leadership and Community Protection Act to call for a 40% reduction of greenhouse gas emissions in buildings by the end of 2030. Clean Heat for All is a challenge for NYCHA to replace campus-scale steam heating systems with electric heat pumps, which is projected to significantly reduce both energy consumption and GHG emissions.[234] Moving to no-carbon sources would eliminate 70-75% of GHG emissions and see significant reductions in energy consumption with the proposed heat pump system.[235] With a $70 million investment from the state, this program is working to install 30,000 heat pumps over the next 5 to 10 years.[236] Investments like this are steps in the right direction for NYCHA to electrify its public housing stock, but must continuously be weighed against the day-to-day needs of its residents.

Creating New Sustainable Buildings

While existing buildings pose a bigger obstacle to reducing long-term emissions, new buildings are still an important component of the climate fight. New housing has the advantage of being able to dictate the design process from the beginning of the building's life cycle. This allows climate-friendly equipment, appliances, and infrastructure to be included at the point when it is least expensive to incorporate them.

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[233] Ibid.
[234] "NYCHA, NYPA and NYSERDA Announce Global Innovation Challenge to Decarbonize NYCHA Buildings Using New Heat Pump Electrification Technologies," New York Power Authority, December 20, 2021, https://www.nypa.gov/news/press-releases/2021/20211220-decarbonize.
[235] "NYCHA Climate Mitigation Roadmap," NYC Housing Authority, accessed April 18, 2023, https://www.nyc.gov/assets/nycha/downloads/pdf/NYCHA-LL97-Whitepaper.pdf.
[236] "$70M Initial Investment Will Decarbonize NYCHA Buildings with New Electric Heat Pumps," NYCHA Now, August 2022, https://nychanow.nyc/70-million-initial-investment-will-decarbonize-nycha-buildings-with-new-heat-pump-electrification-technologies/.

Building the kind of climate-friendly units near transit in New York is difficult, making the city much less affordable for residents.

One of the persistent limiting factors of new affordable housing construction is the impact of antiquated zoning and land use regulations. New York's strict requirements on building type, density, and size make it more difficult to achieve the city's housing production goals, especially given the limited supply of land that is not vulnerable to climate change. Projects that don't conform to the zoning code require discretionary approvals from the City Planning Commission, which can take years to obtain. The delays in the entitlement process drive up costs and uncertainty, making badly needed energy-efficient housing construction less likely to be built. As of 2019, 20% of new housing units receive their approvals through the discretionary review process.[237] While this figure appears relatively low, it is likely a severe undercount of the true impact of the challenging zoning code because it does not capture the unquantifiable amount of projects that are never pursued due to the excessive requirements.

The initial costs associated with building new climate-friendly housing can be significantly higher than those for traditional housing. Sustainable design features, such as energy-efficient technologies and resilient materials, can contribute to these higher costs.[238] These costs can be a barrier to entry for developers, who may struggle to secure financing for climate-friendly projects. Additionally, affordable and climate-friendly housing can be particularly challenging to develop in New York City due to the high up-front costs associated with sustainable design needing to be balanced with the city's dearth of affordable units for lower-income residents. This tension can lead to forgoing climate-friendly aspects of a project in order to lower housing costs in the short term.

One interviewee highlighted another related impediment to producing housing that has low carbon emissions: the way projects are financed. The full life-cycle costs of housing have historically not been considered when financing decisions are made. Energy-efficient homes that install equipment with significantly lower operating costs are not able to realize those savings when going to banks for funding. This perversely incentivizes more carbon-intensive construction. A mortgage and lending strategy called "underwriting efficiency" was noted during the interview process which has more recently become used to facilitate larger loans for projects that have low operating costs.[239] In the following sections of the report we will highlight particular governmental agencies, laws, regulations, and programs that are pushing toward an electrified future.

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[237] "Info Brief: How much housing is built as-of-right?" NYC Department of City Planning, March 2019, https://www.nyc.gov/assets/planning/download/pdf/planning-level/housing-economy/how-much-housing-is-built%20as-of-right.pdf.

[238] Audrey Henderson, "Upfront Costs Prevent Many from Upgrading Appliances," Energy News Network, June 21, 2022, https://energynews.us/2022/06/21/new-appliances-can-help-keep-people-in-their-homes-but-upfront-costs-are-a-big-obstacle/.

[239] "Underwriting Efficiency Handbook," Community Preservation Corporation, accessed April 18, 2023, https://communitycp.com/thought-leadership/tool/underwriting-efficiency-handbook/.

Setting Design Standards for New Sustainable Affordable Housing

In the regulated affordable housing landscape, the Department of Housing Preservation and Development (HPD) has the authority to push the properties it funds and oversees towards electrification. HPD is charged with the maintenance and provision of quality and affordable housing, in addition to promoting resident health. In an effort to increase the sustainability of NYC's building stock and meet NYC's GHG emissions reduction goals, HPD has set forth sustainability requirements for its funding practices.[240] In order to receive funding from HPD, developers must align their buildings with certain green certification systems. HPD offers developers a choice between Enterprise Green Communities (EGC) with the NYC 2020 overlay or LEED version 4.1, gold or platinum.[241]

While there are many green certification systems with varied requirements, they broadly promote sustainability by setting strict standards for energy efficiency, water use, embodied carbon, climate resiliency, environment, sustainability of sites, health/wellness, and proximity to transportation and community services. Studies have shown that these green certification systems are effective in emission reduction. For example, results from a study showed that LEED-certified buildings consume 25% to 30% less energy compared to conventional buildings.[242] Additionally, another study on the impact of LEED-certified affordable housing on asthma in the South Bronx found decreases in daily respiratory systems, asthma symptoms, and urgent visits to healthcare professionals.[243]

One of the newer tools that HPD has at its disposal to push for building electrification is its Preservation Design Guidelines. As of March of this year, all preservation projects have to comply with HPD's design guidelines. These guidelines comprise a major part of HPD's Sustainability Framework and are intended to ensure that all HPD projects successfully meet NYC's varying climate goals in the coming years. The preservation design guidelines have both mandatory requirements and stretch goals that control for Heat, Ventilation, and Air Conditioning (HVAC), resiliency, envelope and energy efficiency, and health and wellness depending on if the project is a moderate, substantial, or gut rehabilitation. If the project does not abide by these guidelines, HPD will not fund it.[244]

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[240] "New York City's Roadmap to 80 x 50," The New York City Mayor's Office of Sustainability, accessed April 18, 2023, https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City's%20Roadmap%20to%2080%20x%2050_Final.pdf.

[241] "Sustainability," NYC Department of Housing Preservation and Development, accessed April 18, 2023, https://www.nyc.gov/site/hpd/services-and-information/sustainability.page.

[242] Ali Amiri, Juudit Ottelin, and Jaana Sorvari. "Are LEED-Certified Buildings Energy-Efficient in Practice?" *Sustainability* 11, no. 6: 1672. (March 2019), https://doi.org/10.3390/su11061672.

[243] Elizabeth Garland et al., "Impact of LEED-Certified Affordable Housing on Asthma in the South Bronx," *Progress in Community Health Partnerships: Research, Education, and Action* 7, no. 1 (2013): pp. 25-26, https://doi.org/10.1353/cpr.2013.0008.

[244] "Preservation Design," NYC Department of Housing Preservation and Development, accessed April 17, 2023, https://www.nyc.gov/site/hpd/services-and-information/preservation-design.page.

Ensuring Affordability During Residential Rezoning

The City Planning Commission under the Department of City Planning (DCP) has a significant amount of authority to determine what gets built and where it will be located. As discussed in more detail in the 'New Buildings & Zoning' section of this report, NYC's zoning laws and land use regulations limit the ability to construct a sufficient amount of new affordable housing. The city has a limited supply of land that needs to be efficiently utilized to keep housing costs down. Projects that do not conform to the strict zoning requirements require approval from the City Planning Commission, which leads to long delays in the entitlement process.[245] Zoning laws that are more flexible and align with broader citywide goals of affordability and addressing climate change will boost affordable housing production.

Some of the major rezonings for affordable housing projects are currently underway in Queens, Brooklyn, and The Bronx. Just last year, Mayor Adams proposed rezonings in the East Bronx as well as Crown Heights and Bedford-Stuyvesant in Brooklyn. These rezonings are intended to assist Mayor Adams in achieving his moonshot goal of 500,000 new affordable housing units by the turn of the decade.[246] The rezonings in the Bronx are projected to add 6,000 new homes, a quarter of which will be income restricted. The Bronx rezoning will also add roughly 10,000 jobs to the area.[247]

While rezoning provides many positive benefits such as the creation of more affordable housing units, many residents object to these rezoning attempts. Residents in these communities express a variety of concerns about the rezoning plans including environmental issues and gentrification, but the continued lack of affordability appears to be their foremost concern.[248] A study from the Association for Housing and Neighborhood Development found that units in an affordable housing project in East New York were still unaffordable for many local residents.[249]

One project in Brooklyn, Gowanus Green, will set aside a portion of its units to be affordable. Half of the apartments will be reserved for New Yorkers who earn 50% of AMI or below, while 40% will be reserved for households earning between 80 percent and 120 percent of AMI.[250] [251] The higher incomes may seem beyond what affordable housing income thresholds should be restricted to, however providing housing for

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[245] Sean Campion, "Improving New York City's Land Use Decision-Making Process," Citizens Budget Commission of New York, September 6, 2022, https://cbcny.org/research/improving-new-york-citys-land-use-decision-making-process.

[246] "Mayor Adams Unveils 'Get Stuff Built,' Bold Three-Pronged Strategy to Tackle Affordable Housing Crisis, Sets 'Moonshot' Goal of 500,000 New Homes," Office of the Mayor, December 8, 2022. https://www.nyc.gov/office-of-the-mayor/news/893-22/mayor-adams-get-stuff-built-bold-three-pronged-strategy-tackle-affordable-housing#/0.

[247] David Brand, "Adams' First Two Neighborhood Rezonings Take Shape as Mayor Looks to Supercharge Development," City Limits, December 9, 2022, https://citylimits.org/2022/12/09/adams-first-two-neighborhood-rezonings-take-shape-as-mayor-looks-to-supercharge-development/.

[248] Chris Walters, "East Harlem Residents Push Back on City Rezoning Plan at Packed Community Board Hearing," Association for Neighborhood and Housing Development, May 17, 2017, https://anhd.org/blog/east-harlem-residents-push-back-city-rezoning-plan-packed-community-board-hearing.

[249] David Brand, "NYC Council Approves De Blasio's Massive Gowanus Rezoning," City Limits, November 23, 2021, https://citylimits.org/2021/11/23/nyc-council-approves-de-blasios-massive-gowanus-rezoning/.

[250] Ibid.

[251] A chart indicating the 2022 AMI levels for the New York City Area can be found in Appendix C of this report.

critical workers contributes to the economy and vibrancy of the city.[252] Nurses, firefighters, and other middle-class earners also need housing stability in a housing market that increasingly works only for the highest earners.

Considering a New Way for Sustainable Affordable Homeownership

Investing in Community Land Trusts

The Community Land Trust (CLT) model is a supply-side strategy for preserving affordable housing that does not rely on market incentives for real estate developers to build new housing. Instead, establishing a CLT is a community-based approach that allows tenants access to homeownership at affordable rates.[253] Successful and sustainable CLTs can therefore help prevent displacement and be a longer-term solution to prevent increasing rents. CLTs can also provide opportunities for homeownership and wealth-building to lower-income communities and communities of color, who have often been historically excluded from these types of critical opportunities to establish financial and housing security.[254] CLTs are viewed by some as a way to increase racial equity, while also preserving affordable housing and preventing displacement and gentrification.[255]

CLTs are discussed as a potential solution to the affordable housing crisis both in NYC and throughout the United States. Throughout our interviews and desk research, the endorsement of CLTs as a large-scale strategy in New York City was mixed. CLTs appear to work well in certain communities and contexts, while in others they can be a less attractive solution to preserving affordable and sustainable housing. While CLTs can be difficult to scale, this model of community-controlled housing can provide communities with significant benefits in both the preservation of existing affordable housing and the construction of new affordable units.

Along these lines, establishing CLTs has the potential to expand homeownership access to women. While the gender gap in homeownership has narrowed in recent years, female-headed households still fall behind male-headed households in homeownership rates. As of 2021, nationwide the homeownership rate for female-headed households was 63%, while the rate for male-headed households was 68%.[256] However, as many problems are, this is an intersectional issue, with women who face additional burdens due to economic and racial disparities facing more pronounced challenges. Single mothers (female-headed households that have children) continue to struggle more than married households in attaining

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[252] Alan Berube, "The Middle Class Is Missing (New York)," Brookings, July 8, 2006, https://www.brookings.edu/opinions/the-middle-class-is-missing-new-york/.
[253] Roshan Abraham, "NYC Is Fighting for More Community Land Trust Funding," Next City, April 21, 2022, https://nextcity.org/urbanist-news/nyc-is-fighting-for-more-community-land-trust-funding.
[254] Gabi Velasco, "How Community Land Trusts Can Advance Racial and Economic Justice," Housing Matters, February 26, 2020, https://housingmatters.urban.org/articles/how-community-land-trusts-can-advance-racial-and-economic-justice.
[255] Ibid.
[256] Jung Hyun Choi, "Unmasking the Real Gender Homeownership Gap," Urban Institute, March 28, 2023, https://www.urban.org/urban-wire/unmasking-real-gender-homeownership-gap.

homeownership.[257] From 1990-2019, Black women's homeownership rates also increased by a smaller percentage than white women's homeownership rates.[258] CLTs, therefore, offer a community-based approach to address the continued gender and economic disparity in homeownership among women, while also promoting affordable, sustainable housing for communities as a whole.

CLTs can create spaces used for affordable housing, as well as broader economic development initiatives, such as small business locations. Further, CLTs offer opportunities for low-income communities to exercise increased decision-making power over land use in their neighborhoods as they promote the creation of community-driven, sustainable housing, increased green space, and public open space. Two examples of these iterations of CLTs are the **Northwest Bronx Community & Clergy Coalition**[259] and **South Bronx Unite**'s[260] CLT structures in their Bronx communities.

However, our research illustrated that CLTs do not always meet the needs of communities struggling with preserving affordable housing. Not all tenants have the time, desire, institutional knowledge, or resources to be actively involved in incorporating as a CLT and making land use decisions. The process of establishing a CLT involves navigating complex legal and housing financial regulations. Nonprofits like **Urban Homesteading Assistance Board (UHAB)** offer technical and organizing assistance to low- to moderate-income residents interested in forming co-ops and CLTs. UHAB aims to help communities "build racial, social, economic, and environmental justice through cooperation."[261] The coalition group **NYC Community Land Initiative** also provides capacity-building support for communities interested in forming CLTs.[262] However, even with nonprofit assistance, establishing CLTs can be expensive. Before a CLT can be incorporated, nonprofits need sufficient capital to acquire the land. This often requires significant government funding to supplement the nonprofit funds to purchase the land. Our interviews indicate that while there has been increased government funding for CLTs over the past several years, there is still limited land and funding available for the wide-scale adoption of this development model.[263] [264] [265]

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[257] Ibid.
[258] Laurie Goodman, Jung Hyun Choi, and Jun Zhu, "More Women Have Become Homeowners and Heads of Household. Could the Pandemic Undo That Progress?," Urban Institute, March 16, 2021, https://www.urban.org/urban-wire/more-women-have-become-homeowners-and-heads-household-could-pandemic-undo-progress.
[259] "Northwest Bronx Community and Clergy Coalition," Northwest Bronx Community and Clergy Coalition, accessed April 16, 2023, https://www.northwestbronx.org/.
[260] "Community Land Trust," South Bronx Unite, accessed April 16, 2023, https://www.southbronxunite.org/community-land-trust.
[261] "Mission," UHAB, accessed April 16, 2023, https://www.uhab.org/about-us/mission/.
[262] "Mission, Core Values and Strategies," New York City Community Land Initiative, accessed April 17, 2023, https://nyccli.org/about/mission-and-strategies/.
[263] "Attorney General James Announces $8 Million In Grants To Fund Affordable Housing," Office of the New York State Attorney General, February 26, 2019, https://ag.ny.gov/press-release/2019/attorney-general-james-announces-8-million-grants-fund-affordable-housing.
[264] "HPD CLT Initiatives," New York City Department of Housing Preservation and Development, April 28, 2022, https://www.nyc.gov/site/hpd/services-and-information/section-8-forms.page.
[265] Emma Whitford, "NYC Just Made Its Biggest Commitment Ever to a Radical Affordable Housing Model," Gothamist, August 4, 2017, https://gothamist.com/news/nyc-just-made-its-biggest-commitment-ever-to-a-radical-affordable-housing-model.

Promoting COPA and TOPA

There are currently two legislative proposals being considered by the City and State governments that would affect the environment for CLTs in NYC. In the City, the NYC Council is considering the Community Land Act (which includes a COPA, or Community Opportunity to Purchase Act, provision).[266] In the New York state legislature, the Tenant Opportunity to Purchase Act (TOPA) is currently being debated.[267] [268] If passed, these policies would create a more welcoming regulatory environment for CLTs and tenant-owned buildings.

The Community Opportunity to Purchase Act (COPA) is a law that has been enacted in various cities and states in the United States, including Washington, D.C., San Francisco, and Los Angeles.[269] The purpose of COPA is to provide community-based organizations and nonprofits with the right of first refusal to purchase certain types of properties that are being sold. This law is intended to give these organizations an opportunity to acquire properties that may be used for affordable housing, community centers, or other community purposes.[270]

The Tenant Opportunity to Purchase Act (TOPA) is a law that exists in some US cities and provides certain tenants with the right to purchase the property they are renting before it is sold to someone else. TOPA is designed to protect tenants from being displaced from their homes due to a change in ownership.[271] In some cases, TOPA may also provide tenants with certain rights related to lease renewals, rent increases, and other issues.[272]

While COPA and TOPA are intended to promote affordable housing, they have also been subject to criticism. One issue with TOPA is that it can make it more difficult for property owners to sell their properties as they must first entertain offers and counteroffers from nonprofits, and subsequently, could miss out on lucrative, all-cash deals from private buyers.[273] This can deter investment in affordable housing. In some cases, property owners may be less likely to invest in their properties or make

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[266] "Take Action to Support the Community Land Act!," New York City Community Land Initiative, accessed April 17, 2023, https://nyccli.org/cla/.

[267] Wilfred Chan, "What If We Made It Easier for Renters to Buy Their Buildings?," Curbed, March 8, 2023, https://www.curbed.com/2023/03/tenants-opportunity-purchase-act-buy-buildings-albany.html.

[268] "Tenant Opportunity to Purchase Act (TOPA)," New York City Community Land Initiative, accessed April 17, 2023, https://nyccli.org/topa/.

[269] David Brand, "Community Land Trusts Would Get First Dibs at Buying Properties Under Revised Council Bill," City Limits, April 19, 2022, https://citylimits.org/2022/04/19/community-land-trusts-would-get-first-dibs-at-buying-properties-under-revised-council-bill/.

[270] Roshan Abraham, "Why Brooklyn Residents Want Public Land In Public Hands," Next City, February 9, 2023, https://nextcity.org/urbanist-news/why-brooklyn-residents-want-public-land-in-public-hands.

[271] "Leveraging the Housing Element to Advance Tenant & Community Opportunity to Purchase Policies," Public Advocates, accessed April 17, 2023, https://www.publicadvocates.org/wp-content/uploads/2022/04/key-considerations-for-designing-topa-copa-policies.pdf.

[272] "Advancing Equity in Housing: Tenant Opportunity to Purchase Act," Local Initiatives Support Corporation, accessed April 16, 2023, https://www.lisc.org/our-resources/resource/advancing-equity-housing-tenant-opportunity-purchase-act/.

[273] Scott Beyer and Rebecca Lau, "Expert Opinion on SJ's COPA Proposal: 'Not Sound Policy,'" Opportunity Now, January 30, 2023, https://www.opportunitynowsv.org/blog/-expert-opinion-on-sjs-copa-proposal-not-sound-policy.

improvements if they know that they will face restrictions on their ability to sell or transfer ownership in the future.

COPA has also faced criticism for its potential to limit investment and development in affordable housing. Some argue that COPA, similar to TOPA, can create uncertainty and delays in the sale of properties, which can discourage property owners from investing in or maintaining their housing.[274] Additionally, some property owners may be hesitant to sell to community-based organizations or nonprofits if they believe that the sale may be subject to legal challenges or disputes. While COPA and TOPA are intended to promote affordable housing, they may also create challenges and limitations that need to be carefully considered and balanced with other policy goals.

[274] Ibid.

Government Stakeholders and Landscape

The section below is a landscape of government players and their approach to the intersection of affordable housing, climate risks, and environmental justice. The landscape will start with providing information on the housing plans for the city and state. We will also highlight relevant policies, legislation, and initiatives from city and state agencies impacting the housing and climate space. To conclude, we will highlight select initiatives from the federal government that incentivize climate action and affordable housing development in New York City.

New York City Government

There are many policies and initiatives that Mayor Eric Adams and various New York City agencies are working on to adapt and mitigate climate change, while also addressing the affordable housing crisis.

Mayor Adams' Housing Plans for New York City

In December 2022, Mayor Adams revealed his updated housing plan, **'Get Stuff Built,'** to tackle the affordable housing crisis and housing shortage in New York City. This housing plan entails a moonshot goal to build 500,000 new homes over the next 10 years by reducing "bureaucratic obstacles" that slow down the construction of housing. Subsequently, this will lower the cost of projects and speed up development by 50%.[275]

'Get Stuff Built' involves specific actions to improve the efficiency of government processes, such as[276]:

- Speeding up the pre-certification process
- Exempting small housing projects from the Environmental Assessment Statement
- Streamlining construction inspections of fire protection systems
- Expanding DOB NOW to include a centralized "one-stop shop" construction portal. The intended benefits of Mayor Adams' 'Get Stuff Built' housing plan are more affordable units for low-income New Yorkers.

However, unintended consequences that should be considered by the city are discussed under the City Planning Commission section. Additionally, 'Get Stuff Built' will remove bureaucratic obstacles around environmental reviews and building permitting to incorporate a climate lens into affordable housing. "From digitizing and streamlining sewer applications and inspections, to updating air and noise environmental analyses based on advances in data and technology, to expediting the purchase of land to create nature-based ways to mitigate flooding, these new initiatives will help us be more efficient environmental stewards."[277]

[275] "Mayor Adams Unveils 'Get Stuff Built,' Bold Three-Pronged Strategy to Tackle Affordable Housing Crisis, Sets 'Moonshot' Goal of 500,000 New Homes," Office of the Mayor.
[276] Ibid.
[277] Ibid.

In June 2022, Mayor Adams released **The Housing Blueprint**, his administration's first housing proposal and guiding strategy.[278] The Housing Blueprint is "Mayor Adams' comprehensive plan for tackling New York City's affordable housing crisis and getting New Yorkers into the safe, high-quality, affordable homes they deserve."[279] The Housing Blueprint addresses how climate change affects New Yorkers' access to high-quality housing, especially those low-income New Yorkers. Climate hazards ranging from flooding to high heat detrimentally affect options for high-quality affordable housing. To combat this, the Adams administration has implemented a wide range of tools such as investment in training and technology to increase code enforcement in collaboration with government inspectors like HPD.[280]

City Agencies working on climate and/or affordable housing issues:

- NYC Department of Building (DOB)
- NYC Department of Housing and Preservation (HPD)
- NYC Housing Authority (NYCHA)
- NYC Emergency Management (NYCEM)
- NYC Department of Environmental Protection (DEP)
- NYC Department of Transportation (DOT)
- NYC Department of Health and Mental Hygiene (DOHMHM)
- NYC Department of Parks and Recreation (DPR)
- NYC Department of Design and Construction (DDC)
- Mayor's Office of Climate and Environmental Justice (MOCEJ)

Summary of Agency Policies and Initiatives

Below are some of the city agencies' key initiatives and policies impacting the housing and climate space discussed throughout this report:

Plans and Studies:

- Bringing Basement Apartments Into the Light - a report from Comptroller Brad Lander that outlines legislation that would provide a more comprehensive approach to legalizing and expanding accessory dwelling units like basement apartments.
- Rainfall Ready NYC Action Plan - DEP outlines the shared responsibilities of New Yorkers and the City government to combat intense storms. It aims to inform New Yorkers about flood risk and get the word out to vulnerable people.
- Cool Neighborhoods NYC - a comprehensive approach to keep communities safe in extreme heat through identified heat mitigation strategies and adaptations
- Climate Adaptation Plan for Public Housing - Lays out how climate hazards will affect NYCHA in the coming decades; where there are specific vulnerabilities to climate hazards; and an approach to preparing NYCHA for a changing climate.

[278] "Mayor Adams Outlines Blueprint for 'Housing our Neighbors' Plan to get New Yorkers Into Safe, High-Quality, Affordable Homes," Office of the Mayor, June 14, 2022, https://www.nyc.gov/office-of-the-mayor/news/393-22/mayor-adams-outlines-blueprint-housing-our-neighbors-plan-get-new-yorkers-safe-#/0.
[279] "The Housing Blueprint," NYC Department of Housing Preservation and Development, accessed April 18, 2023, https://www.nyc.gov/site/hpd/about/housing-blueprint.page.
[280] "Housing Our Neighbors: A Blueprint for Housing and Homelessness," The City of New York, accessed April 18, 2023, https://www.nyc.gov/assets/home/downloads/pdf/office-of-the-mayor/2022/Housing-Blueprint.pdf.

- AdaptNYC - a comprehensive plan to adapt to climate change hazards like extreme heat, coastal flooding, extreme rainfall, and improve social resiliency in the most at-risk communities
- PowerUpNYC Study - collaborative, year-long planning city study to clean up our air, make energy bills more affordable, create good-paying jobs, and create opportunities for local, community-owned clean energy. The study is not yet completed.
- NYC Panel of Climate Change - an independent advisory body that synthesizes scientific information on climate change and advises City policymakers on local resilience and adaptation strategies to protect against rising temperatures, increased flooding, and other hazards. The most recent report is on "Advancing Tools and Methods for Flexible Adaptation Pathways and Science Policy Integration"

Education & Awareness:

- New York City Stormwater Flood Maps - an interactive map published by DEP to help property owners understand their risk during storms. The maps show moderate stormwater flooding scenarios under current and future sea level rise conditions, as well as an extreme stormwater flooding scenario under future conditions.
- FloodHelpNY – an initiative run by city, state, and federal agencies, and the nonprofit Center for NYC Neighborhoods that shows flood risks for specific building addresses, as well as provides resources for flood insurance, building retrofits, and measures to protect homes from flood and stormwater damage.
- NYC FloodNet – an interactive online map that shows real-time flood data from flood sensors "in neighborhoods that are vulnerable to high tides, storm surge, and stormwater runoff" to inform residents of flood risks to better understand the frequency, severity, and impacts of flooding in New York City to aid advocacy and policy work.
- New York City Heat Vulnerability Index - an interactive map that seeks to summarize environmental and social factors related to health effects during extreme heat to help identify neighborhoods that are most at risk from a scale of 1 (lowest risk) to 5 (highest risk). Environmental factors include daytime summer surface temperature and green space and social factors include poverty and race.
- Cooling Centers Finder - an interactive map that shows facilities managed by agency partners of places people can go within their community to enjoy air conditioning during a heat emergency. It shows the hours of operations, level of accessibility, and logistics for New Yorkers to see.

Programming:

- Cool It! NYC - a citywide guide with an interactive map showing locations for water features, water fountains, and shady areas available to the public during heat emergencies.
- Be a Buddy Program - a community-led social resiliency program aimed at addressing extreme heat risks for vulnerable New Yorkers by connecting residents most susceptible to the health impacts of climate change-related hazards with volunteers who provide wellness checks and connections to services.
- NYC Accelerator - provides resources, training, and one-on-one expert guidance to help building owners and industry professionals improve energy efficiency and reduce carbon emissions from buildings in NYC.

Technical Assistance and Financing Programs:

- Basement Apartment Conversion Pilot Program (BACPP) - provide eligible low- and middle-income homeowners with up to $150,000 in low to no-interest, or possibly forgivable, loans and technical assistance to convert their basement or cellar into safe, legal, and rentable apartments in East New York and Cypress Hills, Brooklyn (HPD)
- ElectrifyNYC - program to help homeowners make climate-friendly upgrades such as heat pump installations, building weatherization, and shifting away from fossil-fuel intensive equipment to reduce carbon emissions from existing buildings while creating significant savings on homeowners utility bills
- Green Infrastructure Grant Program - grant that offers green roof retrofit funding for private property owners in New York City to incentivize private property owners to retrofit their roofs with green roofs to manage stormwater runoff.

Construction and Design Guidelines:

- HPD Design Guidelines for Preservation - guidelines to help New York City achieve these goals and create healthier and more sustainable homes. In addition to reducing emissions, sustainable building design can reduce energy costs for residents, improve indoor air quality, and increase residents' health, safety, and comfort.
- MOCEJ Climate Resiliency Design Guidelines - guidelines to translate future-looking climate change projections into technical guidance that engineers and architects will use as they design roads, buildings, sewer systems, hospitals, public housing, and other pieces of critical public infrastructure. This ensures that projects constructed today will be prepared for worsening extreme weather decades into the future and can continue to provide critical services to New Yorkers.

Stormwater and Cooling Infrastructure:

- Green Infrastructure - rain gardens, green and blue roofs, permeable pavement, meant to absorb stormwater from streets, sidewalks, and other hard surfaces before it can enter the sewer system or cause local flooding.
- Bluebelts - ecologically rich and cost-effective drainage systems that naturally handle the runoff precipitation that falls on our streets and sidewalks.
- Cloudburst Infrastructure - implements a combination of methods that absorb, store, and transfer stormwater to minimize flooding from cloudburst events.
- NYC CoolRoofs - a workforce development program providing free training and work experience installing energy-saving reflective rooftops in high HVI neighborhoods.

New Initiatives

- Clean Heat for All Challenge - an industry competition directed at heating and cooling equipment manufacturers to develop new electrification products that can better serve the needs of existing multifamily buildings and hasten the transition to fossil-free heating sources. NYCHA, New York Power Authority, and NYSERDA were involved.
- Resilient NYC Partners - program supports private property owners to build rain gardens, fix drainage issues, replace paved areas, and other stormwater resiliency efforts.

Legislation

- Local Law 97 - one of the most ambitious plans for reducing emissions in the nation, where most buildings over 25,000 square feet will be required to meet new energy efficiency and greenhouse gas emissions limits by 2024, with stricter limits coming into effect in 2030. The goal is to reduce the emissions produced by the city's largest buildings by 40% by 2030 and 80% by 2050. LL97 is currently in the rulemaking process to determine the citywide guidance. There have also been several lawsuits brought against the LL97 that are making their way through the legal system.
- Unified Stormwater Rule - requires developers of large parcels to retain as much stormwater on site as possible and detain the rest onsite.

New York State Government

In addition to policies at the city government level to address climate change and affordable housing, there are also a number of legislative initiatives at the state level to encourage action.

Governor Hochul's Housing Plans for New York State

To address the affordable housing crisis, Governor Hochul in April 2022 announced a $25 billion **5-Year Housing Plan**.[281] Over the next five years, the housing plan intends to create or preserve 100,000 affordable homes in New York. Governor Hochul has highlighted the housing insecurity facing many low- and moderate-income renters and homeowners; therefore, 10,000 of those affordable homes will be directed toward vulnerable populations. In addition to increasing the housing stock, the Governor's plan committed to the electrification of an additional 50,000 homes.[282]

While implementation of the entirety of the Housing Plan is essential to the creation and preservation of affordable housing, a few items are highlighted below[283]:

- "$1.5 billion for the creation and preservation of supportive housing that provides individuals and families that need supportive services and are experiencing homelessness or housing insecurity with the on-site resources they need to thrive and live independently;
- $1 billion for new construction of multifamily affordable housing to help individuals and families find new opportunities to live affordably;
- $450 million to preserve existing multi-family rental housing that will serve to strengthen existing affordable housing across the state and allow individuals and families to remain stably housed;
- $400 million to advance homeownership opportunities across the state, especially in historically underserved markets, and to give low-income families the opportunity to have the dream of first time homeownership;
- $300 million for senior housing to help older New Yorkers age in place safely in homes that meet

[281] "Governor Hochul Announces Launch of Comprehensive $25 Billion Housing Plan in Historic FY 2023 Budget," Office of the Governor of New York, April 9, 2022, https://www.governor.ny.gov/news/governor-hochul-announces-launch-comprehensive-25-billion-housing-plan-historic-fy-2023-budget.
[282] Ibid.
[283] Ibid.

their health needs in the communities they love;
- $250 million for a nation-leading electrification fund to improve energy efficiency in low-income housing units; and
- $220 million for Mitchell-Lama developments across the state to preserve affordability and make important long-term capital improvements as well as the creation of permanently affordable homeownership"

Summary of Agency Policies and Initiatives

Below are some of the state agencies' key initiatives and policies impacting the housing and climate space:

Legislation

- Climate Leadership and Community Protection Act (CLCPA) - legislation to address and mitigate the impacts of climate change in New York and put New York on a path to reaching net zero emissions
- Multiple Dwellings Law - New York City state lawmakers and advocates have advocated for the change of the Multiple Dwellings Law to formally legalize basement apartments to improve the regulation of these units

Grants and Technical Assistance

- Green Innovation Grant Program (GIGP) - projects across New York that "utilize unique EPA-designated green stormwater infrastructure design and create cutting-edge green technologies" that aim to mitigate the effects of climate change through projects like green stormwater infrastructure, energy efficiency, water efficiency, and environmental innovation will be eligible to receive competitive grants.
- Home Energy Assistance Program (HEAP) - To ease the energy burden many low- and moderate-income New Yorkers face, HEAP provides low-income households emergency utility bill payment assistance as well as energy equipment repair and replacement benefits. However, there have been serious concerns about the program being underfunded and facing challenges in its access and uptake. The pandemic has only made matters worse. Just this January, the Hochul administration announced utility bill forgiveness worth $672 million for struggling New York households, indicating the extent of the problem.
- Electric and Gas Utility Bill Relief - $672 million for struggling New York households by making utility bills more affordable for all households and small businesses through a one-time credit. Governor Hocul announces $200 million in relief for high electric bills by providing a discount to more than 800,000 New Yorkers making under $75,000 who have not been eligible for the State's current utility discount program

Initiatives

- New York State Energy Research and Development Authority (NYSERDA) Clean Energy Hubs - Local nonprofits are designated to serve as informational hubs for residents, to provide support in accessing clean energy financial incentives, home-energy assessments, community solar, and other state resources. The Clean Energy Hubs for Manhattan and the Bronx and Brooklyn are currently run by WE ACT and Center for NYC Neighborhoods respectively.

Federal Government

At the federal level, the government has worked to incentivize investment in climate change and affordable housing by funding programs and tax credits.

Inflation Reduction Act (IRA) - The IRA, passed by the Biden-Harris Administration, contained monumental provisions for clean energy and environmental innovation practices. Many of the programs within the IRA provide funding solely to nonprofit organizations that are working to advance clean energy and climate goals.

- The Greenhouse Gas Reduction Fund- offers $19.97 billion dollars in competitive grants directly to nonprofits, states, tribes, and municipalities, who will then redirect that funding to the appropriate projects. The Greenhouse Gas Reduction Fund aims to "mobilize financing and leverage private capital for clean energy and climate projects that reduce greenhouse gas emissions with an emphasis on projects that benefit low-income and disadvantaged communities."
- The Climate Pollution Reduction Program- a climate-focused provision that provides $5 billion in funds to similar entities in the Greenhouse Gas Reduction Fund. The Climate Pollution Reduction Program, however, focuses its efforts on the reduction of local greenhouse gas reduction strategies.

Low-Income Housing Tax Credits (LIHTC) - Though focused on clean energy and climate change, the IRA contains provisions that address housing affordability and sustainability in the real estate market. The low-income housing tax credit (LIHTC) program is the federal government's primary policy tool for encouraging the development and rehabilitation of affordable rental housing. The program awards developers federal tax credits to offset construction costs in exchange for agreeing to reserve a portion of units to be rent-restricted for lower-income households. The credits are claimed over a 10-year period. Developers need upfront financing to complete construction, so they will usually sell their tax credits to outside investors (mostly financial institutions) in exchange for equity financing. The equity reduces the financing developers would otherwise have to secure and allows tax credit properties to offer more affordable rents. The most recent legislative change to the LIHTC occurred in the IRA, which allowed developers who combine both the energy investment tax credit and the new energy efficient homes credit to claim the full benefits of both the aforementioned credits without losing the full LIHTC amounts.[284]

[284] "An Introduction to the Low-Income Housing Tax Credit," Congressional Research Service, January 6, 2023, https://sgp.fas.org/crs/misc/RS22389.pdf.

Non-Governmental Stakeholders and Landscape

Nonprofit Sector

Organizations

Northwest Bronx Community and Clergy Coalition (NBCCC) unites diverse communities and institutions to fight for racial justice and economic democracy in the Bronx. NBCCC is committed to making the Bronx a community where all of its residents thrive. To reach this end, the NBCCC incorporated the Bronx Community Land Trust, created Bronx People's Platform, and advocated for energy democracy, health justice, housing justice, and community development. In 1999, the NBCCC created Sistas & Brothas United (SBU), their youth organization, to develop youth leadership through academic support services and community campaigns to transform lives, schools, and communities. SBU trains young leaders in essential skills to organize communities, confront root causes of injustice and create solutions together.

Churches United for Fair Housing (CUFFH) is a grassroots advocacy organization that works towards preserving vibrant communities and advancing social, and economic justice. CUFFH organizes working-class BIPOC communities around issues such as affordable housing, tenant rights, immigrant rights, land use, racial equality, and more. CUFFH's research & policy department helps to recognize problems, understand causes, raise awareness, and inform local politicians. They use data to spark change.

Regional Plan Association (RPA), operating in the interconnected 31-county New York-New Jersey-Connecticut metropolitan region, aims to improve the economic health and environmental resilience, and quality of life in NYC. To reach these goals, RPA conducts independent research on energy & environment, housing & neighborhood planning, transportation, governance, and more. Some of the region's public works, economic development initiatives, and open space projects are derived from the RPA's research.

WE ACT for Environment Justice (WE ACT) aims to secure people of color and low-income residents with fair environmental health and protection policies and practices. Their areas of work include climate justice, clean air, good jobs, healthy homes, and sustainable and equitable land use. WE ACT was founded in 1988 when environmental racism has gone rampant—the most polluted environments in the US were where people of color live. As a result, WE ACT focuses on the "Northern Manhattan" area, the area of Manhattan that is north of 96th Street on the East side, the traditional border between "Spanish Harlem" and the Upper East Side, and the 110th on the West side, the traditional border between "West" and "Central Harlem" and the Upper West side.

Chhaya Community Development Corporation (Chhaya CDC) intends to ensure housing stability and economic well-being of South Asian and Indo-Caribbean communities in New York City. As a United States Department of Housing and Urban Development (HUD) certified counseling agency, Chhaya promotes affordable housing through direct services such as providing pre-purchase and post-purchase counseling services. Chhaya aims to ensure economically thriving communities by providing tools and

opportunities including financial counseling, lending circles, free tax preparation, etc. In 2020, they completed over 750 tax returns, providing nearly $400,000 in financial relief.

South Bronx Unite brings together residents, community organizations, academic institutions, and allies to promote the social, environmental, and economic future of Mott Haven and Port Morris. The issues they focus on are environmental justice, public health equity, community-focused development, public space equity, and arts & cultural equity. Currently, they do not have any campaigns about housing.

Center of New York City Neighborhoods was created by Mayor Michael Bloomberg and Council Speaker Christine C. Quinn in 2007 in response to the subprime mortgage crisis. The center became the largest independent nonprofit organization in the country devoted to helping homeowners at risk of foreclosure in 2008. The organization promotes affordable housing homeownership in New York by providing mortgage help, foreclosure assistance, scam prevention, and rehabs & retrofits.

Coalitions

New York City Environmental Justice Alliance (NYC-EJA), a nonprofit citywide membership network linking grassroots organizations from low-income neighborhoods and communities of color, aims to advocate for improved environmental conditions and against inequitable environmental burdens. The NYC-EJA's campaigns include climate justice & community resiliency, waterfront justice project, waste equity, transportation justice, extreme heat & air quality, and so on. Major funders include the National Institutes of Health, the Energy Foundation, the Rockefeller Brothers Fund, the Scherman Foundation, and the New York Community Trust.

New York Neighbors, a statewide, pro-housing coalition of advocates, community and civic organizations, nonprofits, and other cross-sector stakeholders, believes that New Yorkers should have affordable, safe, and stable communities. New York Neighbors value member groups' network and help convey a pro-homes message across New York State and advance Governor Hochul's housing priorities for 2023 through advocacy and education. Members include Open New York, Tri-State Transportation Campaign, Fair Housing Justice Center, Inc., Habitat for Humanity of New York State, and New York State Association for Affordable Housing.

The Waterfront Alliance, begun as a project of The Municipal Art Society of New York, was officially founded in 2017 with the goal of making the New York and New Jersey harbor a shared, resilient, and accessible resource for all. Currently, the Waterfront Alliance has grown into a coalition of more than 1,100 partner organizations, including BYD Motors, Inc., Manhattan Solid Waste Advisory Board, Novità Communications, Boston Harbor Now, etc., among which 66% are nonprofit and 32% belong to the private sector. One of the victories in addressing flood hazards is that in March 2023, a flood risk "right to know " bill was passed by the New Jersey legislature, requiring home sellers to inform regarding flood risks to all home buyers and renters. The Waterfront Alliance was the major advocate for this legislation.

Rise to Resilience (R2R), launched in 2019 and spearheaded by the Waterfront Alliance, R2R was a campaign and coalition of more than 100 organizations. Its goal is to reduce climate risks, prepare for extreme weather and build regional resilience. Since 2019, R2R has continued to call for inclusive, community-based actions from policymakers at every level of government. Member organizations include

Environmental Defense Fund, New York Building Congress, WE ACT for Environmental Justice, Rockaway Initiative for Sustainability and Equity, and more.

Basement Apartments Safe for Everyone (BASE) is a campaign and coalition of community organizations, advocates, homeowners, and tenants advocating for a legal pathway for converting New York City basements into safe, healthy, and affordable apartments. Steering committee members include CHAYYA CDC, Cypress Hills Local Development Corporation, Pratt Center for Community Development, Center for New York City Neighborhoods, and Queens Legal Services. They believe basement units are a vital part of NYC's affordable housing stock and the best solutions are ones that come from this holistic community and especially those who are most impacted by the city's archaic housing laws.

Association for Neighborhood & Housing Development (ANHD), founded in 1974, uses research, advocacy, and grassroots organizing to support member groups to build equity and neighborhoods in New York City. ANHD's member organizations include Northwest Bronx Community and Clergy Coalition, Neighbors Helping Neighbors, Southwest Brooklyn Industrial Development Corp., etc. Together, they have built over 123,000 units of affordable housing in NYC's most distressed and marginalized neighborhoods. ANHD's areas of work include ending displacement, mission-driven development, building the capacity of the movement, fighting for affordable housing, equity economic development, land use justice, and responsible banking.

Academic Sector

NYU Furman Center, a joint center of the New York University School of Law and Robert F. Wagner Graduate School of Public Service aims to conduct academic and empirical research on legal and public policy issues, promote discussions among officials, leaders, and scholars, as well as present data and analysis about real estate development, land use, housing, and community economic development. NYU Furman Center's research areas include affordable & subsidized housing, climate resilience, housing finance, land use, neighborhood conditions, and Covid-19. It created CoreData.nyc to present NYC's housing and neighborhoods data hub, and Directory of NYC Housing Programs to catalog information about many of these programs, including homeownership, housing stability and quality, land and financing, planning and zoning, and rental subsidies and assistance.

Pratt Center for Community Development, founded in 1963, Pratt Center for Community Development is a community planning organization based out of the Pratt Institute. Leveraging professional skills in urban planning, design, architecture, and public policy, Pratt Center works on the ground with community-based organizations to promote an equitable, just, and sustainable New York City. Pratt Center built the Basement Data Dashboard to provide counts of basements and cellars by each NYC Council District and as a founding member of the BASE campaign, helps advocates and policymakers understand the potential opportunity for new basement and cellar apartments in

neighborhoods across NYC.[285] Pratt Center created the Retrofit NYC Guide to Detoxing Your Home as an education & training service to provide steps for a greener and healthier living environment.

Private Sector

L+M Development Partners (L+M), founded in 1984, is a real estate development firm that develops, invests, constructs, and manages properties. L+M believes in the "double bottom line" which means that they pursue both financial returns and positive impacts on communities. To help transform neighborhoods into more economically secure communities, L+M provides monetary support through grants to nonprofit groups. Their primary focus is on the South Bronx, East New York, Brownsville, and Newark neighborhoods. Their grantmaking is focused on educational and youth programs, workforce development, health and well-being, and social justice.

[285] "Basement Apartments Safe for Everyone," Pratt Center for Community Development, accessed April 18, 2023, https://prattcenter.net/our_work/basement_apartments_safe_for_everyone_base_campaign.

Recommendations

With its diverse and intersectional network of community-based grantee partners, the New York Women's Foundation can support important efforts to maximize New York City's affordable housing stock for historically marginalized communities of color and connect these communities with resources to promote sustainable, climate-resilient housing. The following recommendations include policy and community investment approaches that NYWF can use to fund grantee partners, inform and drive coalition building and advocacy work, and for which the Foundation can build internal capacity to provide further support.

1. Support public education and outreach partnership initiatives between community-based organizations and government programs for housing and climate adaptation assistance

Throughout our interviews and research, our team identified many government-sponsored programs intended to help New Yorkers – especially low-income households and communities of color – with various challenges posed by the dual affordable housing and climate crises. However, it became clear that while these assistance programs are offered by the city and state, the communities that can most benefit from them are often unaware of their existence and/or how to take advantage of these resources. Government officials and nonprofit leaders emphasized to us that community-based organizations tend to be the most trusted messengers in communities. These nonprofits can play an important role in connecting communities with government programs. NYWF can support efforts to increase communities' access to and knowledge of the city, state, and federal resources by investing in public education and outreach programs run by community-based organizations. In a space where a lack of funding is often pointed to as a barrier to programming, NYWF can connect New Yorkers with programs that are already funded and poised to assist with housing and climate adaptation issues.

A non-exhaustive list of some examples of programs that were raised in our interviews - and which have been described earlier in this report - that could benefit from such public education and outreach campaigns include:

- Flood insurance education and assistance programs
    - FloodHelpNY
    - NYC FloodNet
- NYC Mayor's Office of Climate and Environmental Justice (MOCEJ) initiatives
    - Be A Buddy Climate Resiliency Model
    - ElectrifyNYC
- New York State Energy Research and Development Authority (NYSERDA) Clean Energy Hubs
- New York State Cooling Assistance Home Energy Assistance Program (HEAP)

Nonprofit-led public education campaigns also have the potential to minimize the bureaucratic and procedural barriers for communities to take advantage of government assistance. Negotiating government

processes can be time-consuming and inaccessible for individuals and small community-based organizations. NYWF can invest in community organizations' efforts to provide support to community members to help them navigate and receive benefits from government programs.

2. Fund capacity-building and technical assistance programs at community-based organizations

Our research underscored that many community-based organizations need increased investment in their internal capacity-building in order to effectively carry out their work in their communities. Contracting with the city government to deliver programs and receive funding entails navigating complicated, bureaucratic systems. In many cases, this high barrier of entry can prevent community-based organizations from accessing city resources that could bolster and sustain their grassroots work. NYWF can increase its funding and partnerships services for grantee partners to develop their capacity-building in areas such as, but not limited to, legal and compliance assistance, organizational management, and leadership development. This funding should be flexible to meet the unique needs of organizations, following NYWF's existing method of trust-based philanthropy and participatory grantmaking.

3. Advocate for changes to the New York State Multiple Dwellings Law and allocate funding for expanding access to the legalization of basement apartments

As described earlier in this report, illegal basement apartments pose serious threats to the safety of the over 100,000 New Yorkers living in these homes, many of whom reside in Queens and are low-income and/or immigrant workers and families.[286] One community-driven solution that NYWF can offer its support to is increasing access to safely legalizing basement apartments. The current maze of city and state regulations for basement apartment legalization discourages and prevents owners in many cases from converting their units to legal dwellings. This harms both owners and residents. Owners, many of whom are also immigrants and/or working-class, face steep financial costs to either make necessary renovations for legalization or pay fines to the city.[287] Residents are left to live in unsafe conditions, without options for formal recourse if owners refuse to make safety repairs, because of residents' fear of retaliation from owners and lack of legal protection.[288]

Our research and interviews highlighted the necessity of legalizing and equitably regulating basement apartments to ensure that the mostly low-income communities of color that reside in these units are both protected physically and legally in their homes. Expanding basement apartment legalizations will also increase opportunities for tenants to fight for their rights in housing court. NYWF can play a role in this

[286] Yee, "In New York City's Basement Apartments, Flood Dangers Remain a Year after Ida."
[287] Mihir Zaveri, "How a Bronx Basement Highlights One of New York City's Biggest Problems," The New York Times, October 13, 2021, https://www.nytimes.com/2021/10/13/nyregion/basement-apartment-bronx-illegal.html.
[288] Whitford, "Queens Is the Battleground in State Budget Fight over Basement Apartments."

fight by funding advocacy and capacity-building programs, such as legal assistance and technical support for navigating bureaucratic processes, for community-based organizations in this space. NYWF can also dedicate funding to organizations offering financial assistance for legal basement apartment conversions to homeowners who could not otherwise afford to make the necessary construction repairs to these units, in order to comply with city and state regulations. In doing so, NYWF can support the continued community-based efforts to increase housing, economic, environmental, and racial justice for those living in basement apartments in the city.

4. Target investment in neighborhoods with high heat vulnerability indexes

The areas of NYC that experience the highest levels of extreme heat tend to be communities of color with high rates of poverty and poor housing conditions. Addressing extreme heat and the reverberating negative health, economic, and housing impacts is a critical environmental justice issue for which NYWF can provide targeted resources.

The New York City government has expressed its strategy of prioritizing neighborhoods with high heat vulnerability index (HVI) scores for long-lasting "heat mitigation and structural interventions, such as home cooling assistance, green infrastructure like tree planting and greening, cool roofs, and electric grid resilience."[289] The city has also indicated its intention to involve communities in priority-setting and decision-making processes for these community investments, by working with local community-based organizations. A critical pillar of environmental justice investments, as the city has noted in its 2022 Heat-Related Mortality Report, is ensuring that residents are not displaced by resiliency investments in their communities.[290] It is encouraging that the city has incorporated these pillars of participatory community investment and environmental justice work into its heat mitigation policy approach.

NYWF can bolster these efforts by targeting its investment for environmental justice programs to community-based organizations working in and informed by the priorities of high HVI communities, such as (but not limited to) the Bronx, central Brooklyn, and northern and eastern Queens. Investing in heat mitigation initiatives described earlier in this report, such as increased treescaping and green spaces, as well as supporting efforts to increase vulnerable communities' access to sustainable cooling during extreme heat, are some possible outlets for NYWF to channel its investment.

[289] "2022 New York City Heat-Related Mortality Report," NYC Environmental Health.
[290] Ibid.

5. Evaluate the needs of inland communities and prioritize funding for these areas of climate relocation

As discussed throughout this report, the impacts of increased climate-related flooding and the resulting displacement of coastal populations are already having dramatic effects on inland communities in NYC. Lower-income inland communities will continue to be most heavily affected since the cost of relocation is lower in these areas than in higher-income inland communities.[291] It is therefore important that low-income inland communities, such as much of the Bronx, central Brooklyn, and parts of central and northern Queens, are prioritized in discussions of climate and housing resiliency resource allocation.

The intersectionality of these issues is evident in the recognition that many of these areas - the Bronx, Queens, and central Brooklyn - are the same communities that also have the highest HVI in the city and/or have experienced increasing flooding (illustrated by the basement apartment risks) despite being further inland. As indicated throughout this report, many of these areas are also lower-income and communities of color.[292] NYWF can address these overlapping inequities within low-income communities of color in inland areas by supporting community-led organizations in these neighborhoods in their efforts to sustain their communities as the climate and affordable housing crisis further strain existing infrastructure. A potential community-based effort that NYWF could support for inland communities is expanded upzoning opportunities. Increasing the opportunities for inland communities to accommodate more affordable, sustainable housing could alleviate some of the stressors that climate displacement will cause on low-income communities in inland areas.

6. Monitor the successes and evolving landscape of Community Land Trusts and invest in organizations that support the formation of CLTs in communities that have expressed interest

Based on the context of CLTs in NYC that is discussed earlier in this report, NYWF can continue to track the successes of this housing model and the possibilities for their sustainable expansion. Depending on the legislative outcomes of NYC's COPA and NY State's TOPA proposals, there could be increased opportunities and momentum for CLTs to become a robust affordable housing approach in NYC. As mentioned earlier, CLTs can be a strategy for closing the gender and racial homeownership gap. CLTs offer opportunities for women to build homeownership wealth, particularly for Black women, single mothers, and lower-income women who face additional hurdles to homeownership and the opportunities for long-term wealth creation that it provides. Establishing a CLT also provides communities the option to invest in sustainable housing on a hyperlocal level. This could create the space for communities to be empowered in their own land use decisions, and develop sustainable housing that meets their specific needs. NYWF can therefore consider CLTs as a potential tool for increasing gender, environmental, racial, and economic equity.

[291] "Climate Displacement In NYC: Making Space For Our Neighbors," Rebuild by Design.
[292] Ibid.

To address the potential challenges that low-income communities and historically marginalized communities of color face in establishing CLTs, NYWF can direct funding towards legal assistance and technical capacity-building organizations, such as the **Urban Homesteading Assistance Board (UHAB)** and the **NYC Community Land Initiative**. By investing in resources to help communities navigate the bureaucratic, regulatory, and financial obstacles associated with forming CLTs, NYWF can increase access to communities that stand to benefit most from CLT's racial and economic equity benefits. NYWF can also facilitate partnerships between sustainable housing organizations and community-based nonprofits that may be interested in CLTs, or have already established one themselves, in order to promote sustainable housing development within CLT communities.

NYWF should be sure to monitor the origins of solutions that propose establishing CLTs in communities. Where CLTs are advocated for by community-based organizations in low-income and/or communities of color as a solution to the affordable housing crisis in their own neighborhoods, NYWF can follow the community's lead in understanding the priorities of their unique populations. In utilizing its grassroots-driven and trust-based approach to grantmaking, NYWF should ensure that the affected communities are those leading decision-making when it comes to investments in interventions such as CLTs.

Conclusion

New York City's affordable housing crisis and the impacts of climate change present significant challenges to New Yorkers' social, economic, and environmental well-being. The findings from our desk research and interviews demonstrate that a comprehensive and intersectional approach is required to address the complex interplay between housing affordability, climate change, and environmental justice. By examining the historical and demographic factors that have contributed to the city's current housing landscape, as well as analyzing the implications of extreme rainfall and heat on the housing crisis, this report has shed light on the urgent need for equitable and effective solutions.

The case studies of Queens and the Bronx have underscored the disproportionate impact of climate change on low-income communities of color and women of color and highlighted the need for targeted policies and interventions. Persistent flooding is expected to worsen throughout the 21st century, leaving many of New York's residents in harm's way; the increasing frequency and duration of heat waves and humid conditions in the Bronx will lead to disastrous health outcomes for communities. By emphasizing the importance of environmental justice in housing, this report advocates for the rights of all people, regardless of their race, gender, disability status, age, or socioeconomic background, to live in communities that are safe, healthy, and free from poor environmental conditions.

To create a more equitable, sustainable, and affordable housing future for all New Yorkers, it is crucial for public, private, and nonprofit sectors to collaborate and adopt innovative strategies that address the intersection of climate change and housing affordability. This includes preserving and electrifying existing affordable housing, increasing the housing stock with sustainable units, improving community climate resilience, and ensuring access to essential governmental and nonprofit resources and services. NYWF can pursue these goals by finding, uplifting, and funding organizations that effectively utilize community land trusts (CLTs) so local communities can protect tenants in place, as well as develop properties to suit the needs of their residents. Furthermore, policy and decision-makers must actively engage with and prioritize the voices of environmental justice communities in shaping the city's broad housing and climate agendas.

This report shows that numerous programs and policies have been developed by all levels of government to build new sustainable housing, electrify existing units, and create more resilient communities. However, there is a gap in the public's understanding of the availability of these resources and services. NYWF can play an important role in unlocking the potential of existing programs by finding ways to fund and provide technical assistance to trusted community-based organizations that operate on the ground in environmental justice communities every day.

In conclusion, addressing New York City's dual challenges of affordable housing and climate change requires a holistic, inclusive, and justice-centered approach. This report serves as a call to action for NYWF to respond to the needs of the city's most vulnerable residents by increasing access to safe, resilient, and affordable housing in a thriving, sustainable urban environment.

Appendix

Appendix A: Interviewees

Our team reached out to the following organizations for interview requests. In some cases, we reached out to multiple people at the same organization who had different specialties; where relevant, this is noted. We conducted interviews with representatives from the organizations that are highlighted in orange.

Organization	Sector	Focus
Columbia University GSAPP	Academic	Housing
NYU Furman Center	Academic	Housing
NYC Department of Housing Preservation and Development	Government	Environmental Justice and Housing
NYC Department of Housing Preservation and Development	Government	Planning
NYC Mayor's Office of Climate and Environmental Justice	Government	Environmental Justice
NYC Housing Authority	Government	Environmental Justice and Housing
Office of The Bronx Borough President	Government	Planning
Office of the NYC Chief Housing Officer	Government	Housing
Office of the Queens Borough President	Government	Housing
Bronx-based community activist and consultant	Nonprofit	Environmental Justice
Center for NYC Neighborhoods	Nonprofit	Housing
Chhaya Community Development Corporation	Nonprofit	Environmental Justice and Housing
Churches United for Fair Housing (CUFFH)	Nonprofit	Housing
Cypress Hills Local Development Corporation	Nonprofit	Environmental Justice and Housing
Northwest Bronx Community & Clergy Coalition	Nonprofit	Housing
NYC Environmental Justice Alliance	Nonprofit	Environmental Justice
Regional Plan Association	Nonprofit	Housing
WE ACT for Environmental Justice	Nonprofit	Environmental Justice
South Bronx Unite	Nonprofit	Environmental Justice and Housing
L&M Development Partners	Private (Real Estate)	Environmental

Appendix B: Interview Questions

We utilized the following master list of questions to conduct our interviews. We did not cover all questions in every interview. For all interviews, we modified certain questions to be more specific to the interviewee's expertise.

Questions for all interviewees:

- Where do you see the gaps in current affordable housing policy development/priorities/approaches in NYC? In the Bronx and/or Queens specifically?
    - For increasing the supply of and access to affordable housing generally
    - Specifically in the context of addressing climate-related risks on marginalized communities
- What are the biggest issues of today at the intersection of housing and climate justice?
- What types of initiatives do you think should be funded that are not currently being funded/not being funded sufficiently?
- How do you define affordable housing in NYC, within the context of the current definition using 30% of AMI?
- What do you think is the main driver of the high cost of housing in NYC?
- What do you view as the challenges/impediments to making housing in the city more affordable for New Yorkers? What are ways you are addressing these challenges?
- What is your organization doing now and where do you want to see the organization go from here to be the most impactful?
- What new ideas/policies/proposals do you think are the most promising in addressing housing affordability/climate risks in NYC?
- As a potential solution to general affordability, we are looking into community land trusts. If you have experience with CLTs, could you speak to your experience working with these initiatives and their pros/cons?

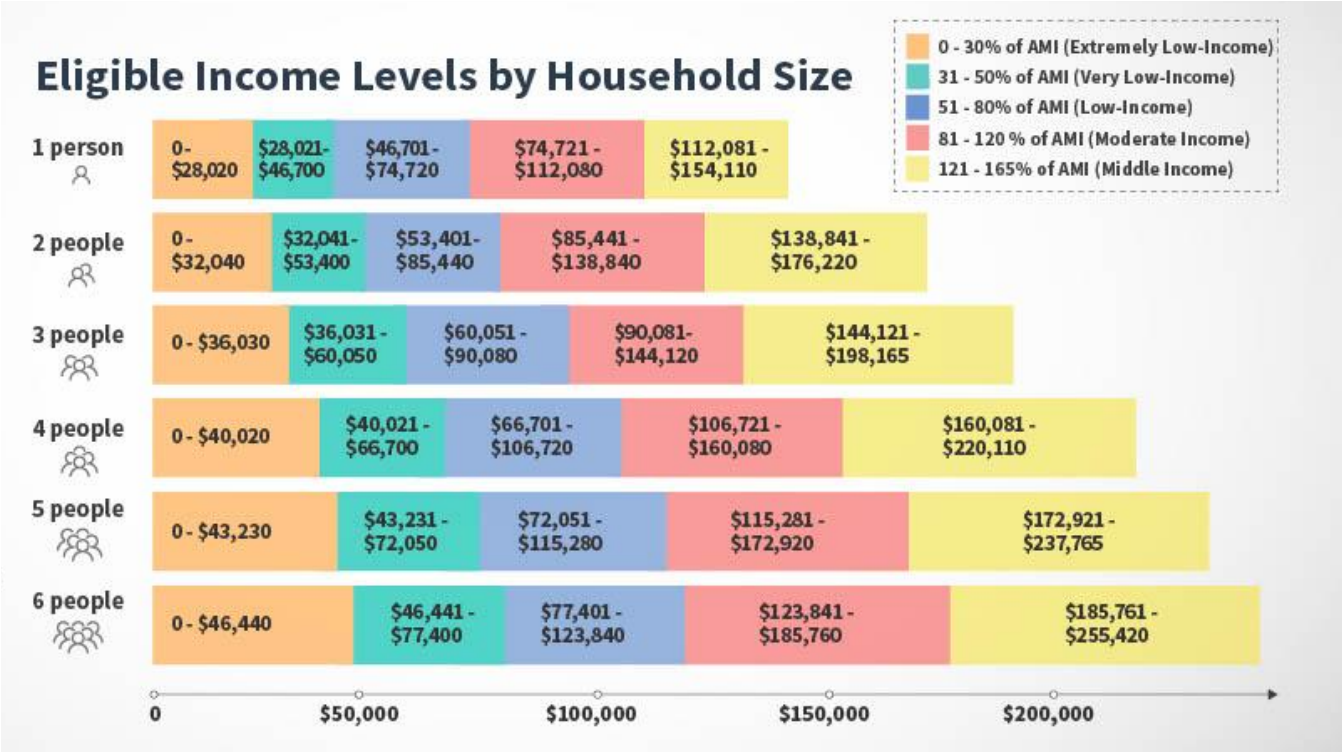
Nonprofit Questions

- Do you see any gaps in the nonprofit space working on these issues?
- Is there any organization that is doing work in this space that has been particularly impactful?
- What constrains your organization (or other community-based organizations) in your work in the affordable housing and/or environmental justice space?

Government Questions

- What are this office's priorities when it comes to sustainable housing development?
- How is this office considering sustainability in affordable housing initiatives?

Appendix C: 2022 New York City Area Median Income



Source: New York City Department of Housing Preservation and Development, 2022

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