Evaluation of New York City Green Roof Building Incentives

Author: Sean Chew
Supervising Faculty: Ariella Maron

I. Introduction

The Urban Heat Island Effect (UHIE), combined sewage overflow, and poor air quality pose serious threats to residents of New York City. To mitigate these threats, NYC enacted policies promoting green rooftop construction. This paper explores inequalities in their implementation, then proposes ways where they can more equitably distribute benefits to frontline communities.

The Urban Heat Island Effect (UHIE) occurs when non-reflective, heat collecting, and impervious surfaces replace areas of vegetation, causing increased surface temperatures in cities relative to surrounding areas.[1] Greener rooftops promote cool air flow, absorption of heat for photosynthesis, and shading for asphalt. Dense cities possess many impervious surfaces which exacerbate the UHIE, particularly in communities which generally enjoy fewer greenspaces compared to more affluent areas.[2]

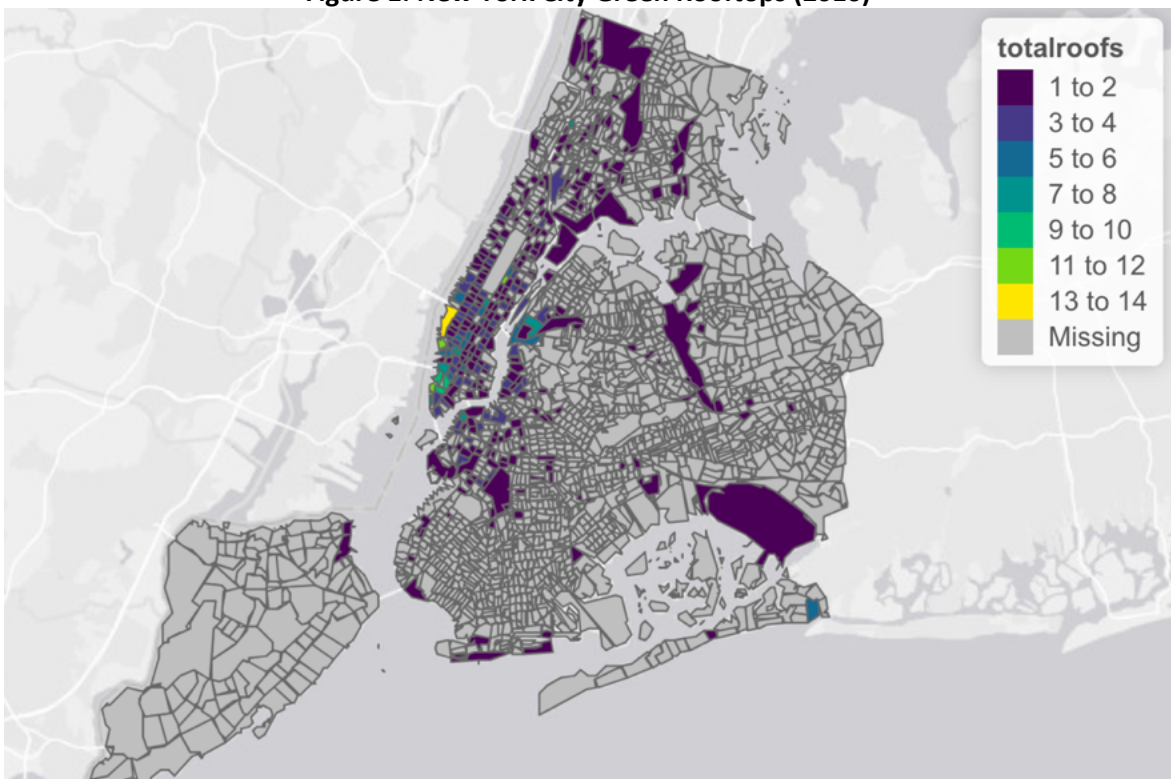
During storms, water flowing from impervious surfaces carry contaminants into sewage treatment systems. However, combined sewer systems are designed to discharge contents into NYC's waterways when overtaxed, which can lead to water pollution concerns. Since scientists predict that severe storms will increase in frequency and severity due to climate change, these facilities risk becoming further strained. Green rooftops relieve pressure on sewers by retaining 50-70% of fallen rainwater.[3]

NYC's aging building stock often use oil and gas combustion which release greenhouse gases (GHGs) and air pollutants such as NOx and SOx. As a significant emitter of air pollutants, buildings lower air quality for residents and increase incidents of respiratory illness. Green rooftops directly mitigate these effects by filtering pollutants.

According to The Nature Conservancy, there is significant potential in NYC's rooftops, since its buildings cover about 40,000 acres, while only 730 buildings possessed green rooftops in 2016.[4] Figure 1 shows green rooftops counts in NYC, which generally concentrate in wealthier areas.

[1] "A New York City Guide to Green Roofs." The Cooper Union Institute for Sustainable Design, n.d. Accessed November 28, 2021.
[2] Extance, Andy. "Green Roofs Offer Antidote to Urban Heat Island Effect, Say Researchers." *The Guardian*, September 2, 2010, sec. Environment. https://www.theguardian.com/environment/2010/sep/02/green-roof-urban-heat-island.
[3] "A New York City Guide to Green Roofs." The Cooper Union Institute for Sustainable Design.
[4] "Green Roofs Footprints for New York City, Assembled from Available Data and Remote Sensing | Zenodo." Accessed November 7, 2021. https://zenodo.org/record/1469 674.

Figure 1: New York City Green Rooftops (2016)



Source: Map created using data from "Look Up to Make Room for a Greener NYC." The Nature Conservancy; NYC Environmental Protection

Recognizing their potential, NYC passed Local Laws 92 and 94 of 2019, which mandate the addition of either solar panels or green roofs on new building construction and major roof renovations with exceptions.[5] Because building green roofs exhibit high upfront costs, NYC established economic incentive programs on construction and major rooftop retrofits through Local Law 96 of 2019 (LL96) and other green financing programs. However, incentive programs have served larger businesses while leaving resource gaps in frontline communities. These communities generally reside in neighborhoods with lower incomes, higher proportions of renters, and older building stock. Therefore, current green roof policies risk perpetuating structural inequality that holds frontline communities back from benefitting from resiliency policies while accruing monetary benefits to private businesses. Consequently, frontline communities do not obtain financial resources or receive investments in capacity building to advocate for future policy and economic benefits.

II. Landscape Analysis

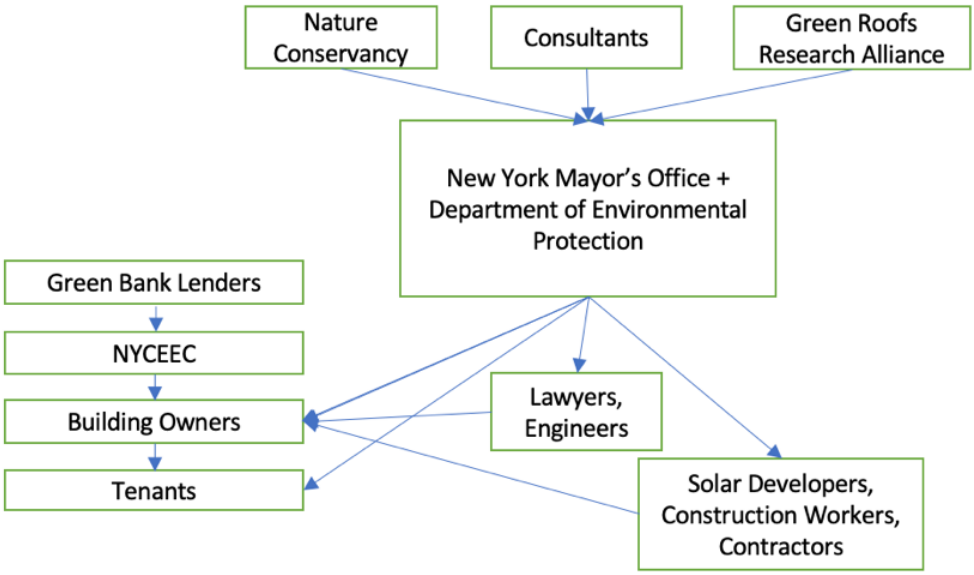
a. The Players

Currently, stakeholders impacted by decisions on NYC's green roof policies include private, nonprofit, and public actors. Nonprofits, such as The Nature Conservancy and the Green Roofs Research Alliance (GRRA), publish reports and conduct research on sustainability initiatives and green roof implementation, which inform local policy decisions. The NYC Energy Efficiency Corporation (NYCEEC) is a nonprofit that administers loans and acts as a green bank for sustainable infrastructure projects.

[5] "NYC's Sustainable Roof Laws." Policy Brief. The Nature Conservancy, December 2019.

Private actors possess outsized policy influence. The government hires consultants to analyze urban policy and inform decisions, and private financial institutions provide capital for lending projects that fund rooftop economic incentives. Building owners receive loans and incentives from NYCEEC and the government while implementing building retrofits and construction, which are then enjoyed by tenants. Lawyers, engineers, solar developers, construction workers, and contractors are other players that implement the infrastructure upgrades necessary for green rooftop construction. Figure 2 presents a stakeholder map of these various interests.

Figure 2. Stakeholder Map



b. Current Initiatives

LL96 of 2019 established a Property Assessed Clean Energy (PACE) financing program to fund sustainability projects for buildings complying with the Climate Mobilization Act of 2019. Recipients repay private loans through voluntary charges on a building's property tax bill issued by the Department of Finance.[6] Although people consider PACE a promising new policy, PACE is designed to increase green roof coverage quickly by targeting larger buildings. [7] NYCEEC states that the minimum loan amount required by lenders is $500,000.[8] From the private sector's perspective, administering smaller loans to non-businesses offer less profit and present greater risks.

NYC further provides a two-tiered property tax abatement for buildings with green roofs, granting $5.23/ft^2 and $15/ft^2 to standard and highly vulnerable districts respectfully.[9] NYC revised its tax abatement with feedback from constituents, first from $4.50/ft^2 in 2008, $5.23/ft^2 in 2013, and finally to

[6] "Local Law 96: PACE Financing - Frequently Asked Questions." New York City Mayor's Office of Sustainability; NYCEEC, n.d. Accessed November 7, 2021.
[7] "Green Roofs Failing to Sprout on City's Co-Ops and Condos." Accessed November 7, 2021. https://www.habitatmag.com/Publication-Content/Green-Ideas/2021/2021-June/Green-Roofs-Failing-to-Sprout-on-City-s-Co-ops-and-Condos.
[8] "Property Assessed Clean Energy - NYC Accelerator." Accessed November 28, 2021. https://www1.nyc.gov/site/nycaccelerator/resources/pace.page.
[9] An act to amend the real property tax law, in relation to the green roof tax abatement, S5554B § (2019).

$15/ft^2$ today.[10] [11] Although these revisions provide marginally better access to frontline communities, gaps still exist. NYC received only 11 applications since the 2019 revision. Critics note that the costs of retrofitting a typical brownstone or townhouse range from $65 to $90/ft^2.[12]

Lastly, the NYC Department of Environmental Protection (DEP) offers funding for green roof retrofits under their Green Infrastructure Grant Program.[13] The program funded green roofs at larger developments such as Wegman's in Brooklyn and Two Bridges Tower in Manhattan.[14] However, grant application processes can be difficult for property owners without resources available to commercial entities, including structural analysis and legal services.[15]

D. Outcomes

Currently, few building owners invested in new green rooftops or retrofitted existing rooftops. As of November 2021, the DEP's online database quantifies only seven "Final Design" phase green roof projects corresponding to three locations: the NYC 40th Precinct in The Bronx, Aurum Condominium in Harlem, and London Terrace Towers in Chelsea.[16] All projects belong to larger buildings.[17]

In the 2020 DEP report, the department counted one green roof asset in GreenHUB, its database of green infrastructure projects, reflecting slow progress promoting green roof construction. Ultimately, policies did not translate to increased construction, and their implementation has not led to equitable outcomes. Currently, NYC attempts to utilize targeted universalism for its tax abatement programs to serve more vulnerable regions, but it remains insufficient to meet building owner needs on a city scale and largely neglects frontline communities. Therefore, green roof policies neglect to fully incorporate the Just Transition Framework, an environmental justice framework based on the principle that a healthy economy and a clean environment can co-exist. Green rooftop policies generally align with the framework, since it promotes a healthy economy and cleaner environment by investing in rooftops for wealthier communities, and the processes do not actively cost workers or community members their health, environment, jobs, or economic assets. However, in practice, the policies do not assist communities most affected by the environmental hazards, and members of the frontline communities do not sit on leadership when crafting policy decisions.

The policies further perpetuate distributional and structural inequality. Most incentives result in green rooftop construction in wealthier areas which result in accrued benefits for wealthier neighborhoods. The incentives reinforce relationships and networks with bigger corporations capitalizing on the existing incentives, rather than establishing new connections or investing in capacity

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[10] Living Architecture Monitor. "Fine Tuning New York City's Green Roof Tax Abatement Program." Accessed November 7, 2021. https://livingarchitecturemonitor.com/articles/fine-tuning-new-york-citys-green-roof-tax-abatement-program-f21.

[11] "Legislation - Rules." Accessed November 7, 2021. https://www1.nyc.gov/site/sustainability/legislation/legislation-rules.page?utm_source=Consolidated+Master+List&utm_campaign=a7d36a78f0-EMAIL_CAMPAIGN_2018_01_29_COPY_01&utm_medium=email&utm_term=0_ec395e0b20-a7d36a78f0-56992361.

[12] "Green Roofs Failing to Sprout on City's Co-Ops and Condos."

[13] "Green Infrastructure Grant Program - DEP." Accessed November 7, 2021. https://www1.nyc.gov/site/dep/water/green-infrastructure-grant-program.page.

[14] "NYC Green Infrastructure 2020 Annual Report." NYC Environmental Protection, n.d. Accessed November 7, 2021.

[15] "Green Infrastructure Grant Program Workshop." n.d. Accessed November 11, 2021.

[16] FIELD CONDITION. "Construction Update: NYPD 40th Precinct." Accessed November 7, 2021. http://fieldcondition.com/blog/2021/7/29/construction-update-nypd-40th-precinct; Warerkar, Tanay. "Eco-Friendly Harlem Condo Launches Sales From $505K." Curbed NY, April 29, 2016. https://ny.curbed.com/2016/4/29/11537784/harlem-condo-aurum-sales-launch-550k; "London Terrace Towers in Chelsea: Review and Ratings | CityRealty." Accessed November 7, 2021. https://www.cityrealty.com/nyc/chelsea/london-terrace-towers-410-west-24th-street/282.

[17] "ArcGIS - DEP Green Infrastructure Program Map." Accessed November 7, 2021. https://www.arcgis.com/home/webmap/viewer.html?webmap=a3763a30d4ae459199dd01d4521d9939&extent=-74.3899,40.497,-73.3757,40.9523.

building and job creation within frontline communities. Although the green roof tax abatement considered procedural equity by engaging with focus groups, it falls short of distributing benefits equitably. Lastly, the policies promote an economy that is extractive rather than one that is regenerative; the policies prioritize approaches targeting the profitability of green roof projects instead of recognizing them for their community benefits.

III. Policy Alternatives

Because rooftop construction is expensive, financial assistance from the government is unlikely to directly push green roof construction across large swaths of NYC aside from limited large new developments. However, changes in standard process for green roofs can result in more structural equity and longer-term positive change.

Because current policies are designed to promote large scale green roof construction for large buildings owned by corporations, equitable policy alternatives can be more effective if they incorporate targeted universalism resembling successful policies in Toronto. Toronto implemented an Eco-Roof incentive program which led to approximately 620 mandated green rooftops, with 70 obtaining green roof grants and 336 receiving cool roof grants since 2010.[18] Like Toronto, NYC can adopt a universal goal around the UHIE and tackle it through varied approaches. Targeted approaches to the UHIE allow frontline communities more access to the benefits of green rooftops, even if green rooftops are not constructed on households sheltering frontline communities themselves.

NYC's policies can be re-evaluated based on the Just Transition Framework. While considering which communities to aid, stronger relationships can be forged with building owners, tenants, and administrators of grant and tax rebate programs. Doing so would shift green rooftop incentives to focus on their health benefits to communities. The DEP and NYCEEC can consult more closely with communities in buildings needing rooftop retrofits so that their input can be incorporated into the policymaking process. Ultimately, these procedures would plant advocates in frontline communities, so their voices are continually present while crafting policies. Incorporating them would rectify procedural inequalities while crafting previous iterations of policies. Investing in long term community advocates would begin to ameliorate transgenerational inequality. An emphasis on creating stable and well-paying jobs in frontline communities and ownership of property with green rooftops would reflect progress.

IV. Policy Recommendations

Green rooftop policies can be crafted to address more systemic issues. Doing so will lead to greater procedural, structural, distributional, and transgenerational equity of benefits of green rooftops across NYC.

Job training programs can be created to employ frontline community workers in green roof construction, engineering, politics, and law so that benefits of employment flow directly to them. NYC can start by engaging them through focus groups to incorporate their training needs directly, then create a process focused on long term capacity building. Establishing longer term networks will result in increased capacity to advocate for their community with the government.

Leading by example, NYC can facilitate eco-rooftop building goals on public buildings, prioritizing retrofits in regions at higher heat vulnerability risk, and directly employ workers that complete those

[18] ULI Developing Urban Resilience. "Toronto Green Roof Bylaw & Eco-Roof Incentive Program." Accessed November 22, 2021. https://developingresilience.uli.org/case/toronto-green-roof-bylaw-and-eco-roof-incentive-program/.

training programs. When building owners wish to comply with green rooftop laws through solar, community solar programs can be incorporated to increase access and decrease ownership costs. Community solar promotes ownership, democratic participation, and equity through community driven decision making.

In addition to increasing incentives from their current levels, their scope can be broadened to other solutions such as cool roofs and stormwater management solutions. Grant, loan, and tax abatement policies can be refined to address support gaps to noncommercial interests, including more affordable solutions to the UHIE. Administering smaller loans accessible to more citizens would be a vital first step. These funding streams can come from NYCEEC itself, federal and state governments, or philanthropic donations and green banks. Regulations can be set so energy cost savings flow to tenants while shielding them from price increases.

Ultimately, these policy recommendations will result in an increase in stable jobs, advocacy capacity, health outcomes, and environmental resiliency. By engaging frontline communities in the decisions, policy making would set a more inclusive precedent for future processes while building up future advocacy capacity. Long underinvested, frontline communities will experience both the direct benefits of green rooftops: lowering the UHIE, averting stormwater sewage overflow, and increasing air quality. Simultaneously, they will experience the indirect benefits: accumulation of wealth and job security, community ownership of solar resources and community assets, and a stronger voice shaping policy. All together, they result in the pillars of the Just Transition towards a regenerative economy: ecological restoration, community resilience, and social equity.

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