Western New York Regional Clean Energy Hub

Regional Assessment and Barriers Analysis (RABA)

Final Report

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Executive Summary

RABA Purpose and objectives

The purpose of the WNY Regional Clean Energy Hub's Regional Assessment and Barriers Analysis (RABA) is to provide local communities with baseline information and data about socioeconomic conditions, workforce and labor market trends, the impact of climate change and environmental pollution, and barriers and opportunities associated with a just transition to a clean, renewable energy economy. The RABA will inform the development of the Hub's equitable engagement strategy, including how the Hub can best leverage sector-based stakeholder networks to deliver NYSERDA programs to Disadvantaged Communities (DACs). The WNY Hub has conceived of the RABA as a *living project* that will iterate and be updated over time as new data becomes available, new trends emerge, and new relationships are cultivated with stakeholders and program participants. The ongoing participation of these groups, and the local knowledge they possess, are absolutely essential for the Hub's vision of the RABA to be realized. As a result, the WNY Hub will seek to organize a permanent formation of community advisors who can be called upon to ground truth, trouble shoot, and problem solve in support of the Hub's mission.

The WNY Hub prioritized the following objectives for the RABA:

- Raise public awareness among key stakeholders and community residents of both the goals of the Climate Leadership and Community Protection Act (CLCPA or Climate Law) and how the WNY Regional Clean Energy Hub intends to operate as a tool to meet the goals of the Climate Law, in particular, within DACs;
- Identify existing or emergent networks of sector-based stakeholders that could be engaged to contribute meaningful information and insights about population-level barriers related to social determinants of health and access to clean energy and energy efficiency;
- Collect critical insights from stakeholders through in-depth interviews;
- Measure or test stakeholder insights against the direct lived experiences of marginalized (BIPOC; low-to-moderate income) community members through focus group conversations across the five counties of the region;
- Deliver a set of baseline analyses and recommendations for mitigating or overcoming barriers to access faced by low-to-moderate income households and DACs.

Key Findings

- DACs in WNY are highly racialized. BIPOC residents are disproportionately represented in DACs. While BIPOC residents constitute approximately 22% of the overall population in WNY, around 49% of residents of DACs in the region are BIPOC.

- DAC populations are concentrated in the City of Buffalo. Nearly 50% of all DAC households in the region are located in Buffalo.
- Income inequality is high across the region. The top 20% of income earners generate 42% of the region's income, while the bottom 20% of earners account for slightly less than 3% of the region's income.
- Social determinants of marginalization are disproportionately concentrated in DACs. The number of single-parent households, persons with limited English language proficiency, adults without high school equivalency or college degrees, households without vehicles, and persons with limited or no broadband internet connections are higher in DACs across the region compared to non-DACs.
- The housing stock in WNY is old. Housing in DACs, however, is considerably older and in relatively worse condition compared to housing outside of DACs.
- Housing cost burdens are high across the region, in particular for renters. Renters represent a majority of occupied households in DACs. More than 50% of renters residing in DACs pay more than 30% of their income on housing costs, a standardized measure of housing affordability.
- NYSERDA's means-tested energy efficiency programs (Assisted Home Performance, EmPower, and EmPower+) have reached only a fraction of eligible households in WNY. From 2011-2022, approximately 12% of residents eligible for Assisted Home Performance incentives received support from NYSERDA. From 2018-2023, less than 4% of residents eligible for EmPower/+ received assistance. On average, approximately 2,000 total means-tested energy efficiency projects have been completed annually in recent years. Projects in rural counties have received relatively larger per unit investments and higher associated energy and utility bill cost savings.
- From 2008-2023, NYSERDA's NY-SUN residential rooftop solar incentives reached less than 1% of eligible households in the region. Installations in the region have generally grown since 2008 with periods of fluctuating growth and decline since 2014.

Summary of Community Engagement

The WNY Hub team that carried out the RABA project, created a two-phase approach to community engagement that relied on qualitative research methods for data collection and analysis and support from Hub subcontractors that volunteered to connect the RABA team with existing partners or community members. The first phase involved stakeholder list-building followed by a series of in-depth stakeholder interviews with 17 participants from across WNY. The second phase featured focus group conversations with 54 low-to-moderate income residents and members of DACs located in the City of Buffalo (3), Niagara Falls (1), and the Southern Counties of WNY (1). Additional information about community engagement is included in the report below.

Identification of Barriers, Opportunities, and Recommendations

Significant barriers to accessing energy efficiency and clean energy opportunities, and achieving a just transition for all communities, abound in WNY. The region's old housing stock, disparate homeownership rates, uneven access to basic and reliable transportation and communication infrastructure, and high rates of racial and economic inequality together create particular challenges for residents of DACs. The substandard condition of older housing in DACs often prevents energy efficiency and clean energy projects from moving forward due to the presence of environmental hazards (e.g., lead, mold, asbestos) or roof and foundation issues. High rates of renter occupancy in DACs leaves renters at the mercy of private landlords that may not feel incentivized to participate in NYSERDA programs where they may face out of pocket expenses. Uneven access to reliable public or private transportation and highspeed internet makes it difficult for residents to learn about and engage in program opportunities, enroll in job training, or connect to gainful employment. Generational forms of racial

and economic inequality leave many residents distrustful of both government services and solutions offered by for-profit companies. Residents of DACs can at the same time feel left behind by public sector investments and targeted by e.g., energy service companies that promise household energy savings while locking residents into deceptive terms.

Opportunities to address these barriers exist at different levels. State lawmakers and regulators have opportunities to adopt policies to create new investments in pre-weatherization and pre-electrification readiness that will then enable participation in energy efficiency and clean energy programs. New state investments in affordable and reliable transportation options and broadband connectivity in both rural communities and DACs will create conditions for broader program participation and access to clean energy jobs. NYSERDA has opportunities to make changes at the program level by increasing per unit investments to ensure energy and utility bill savings are equitably distributed across counties and urban, suburban, and rural communities. NYSERDA has an opportunity to increase access to distributed solar for low-to-moderate income households through a recent federal Solar for All award. The WNY Hub is in a position to provide more targeted outreach to landlords to increase participation rates and build brand identity/loyalty that distinguishes it from both government and for-profit actors that operate in communities without the same levels or degrees of trust.

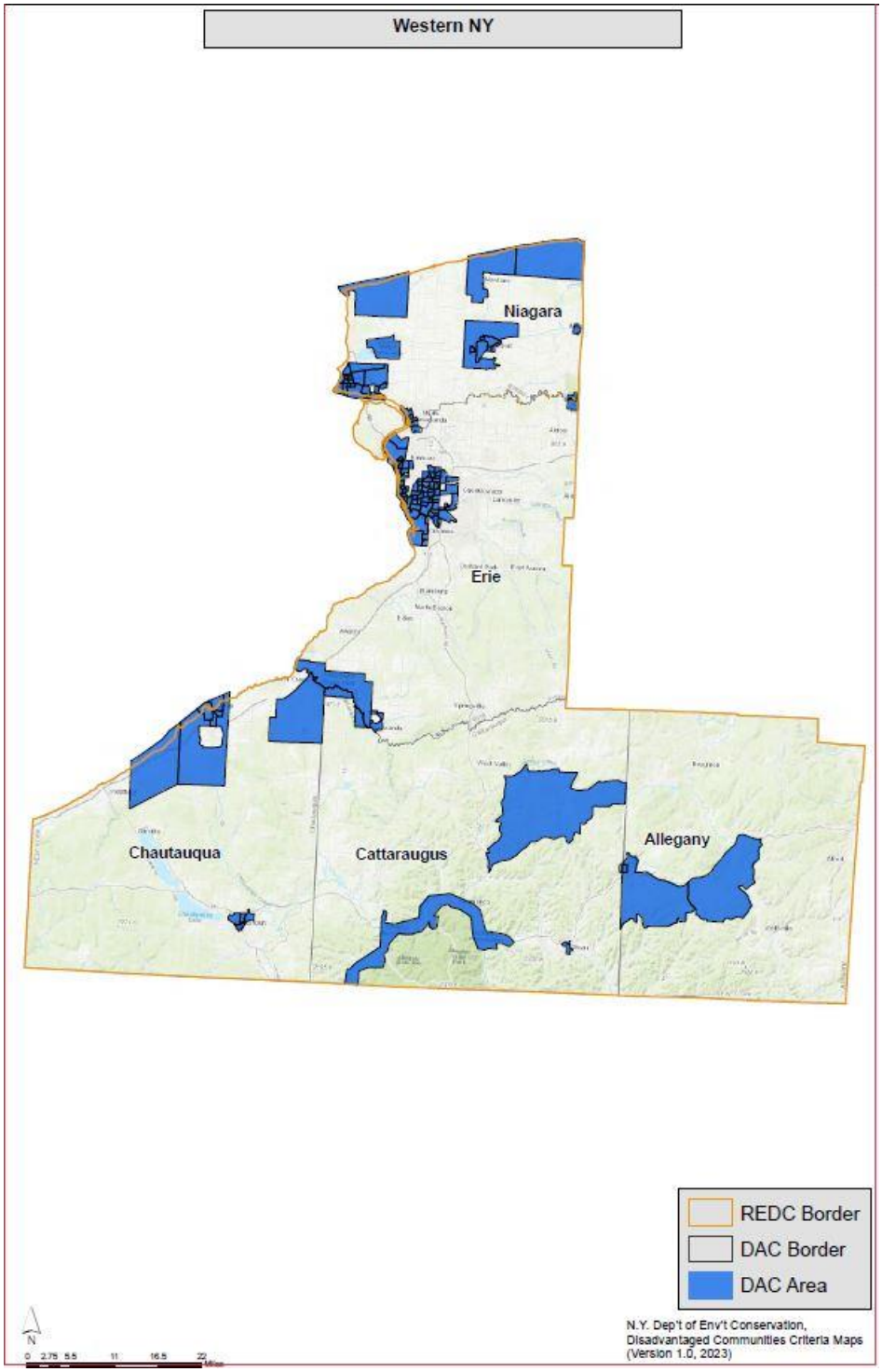
A complete breakdown of barriers, opportunities, and recommendations are included in the report.

Baseline Regional Characterization

The WNY Regional Clean Energy Hub covers the five counties of WNY, which include Niagara and Erie counties in the north and Allegany, Cattaraugus, and Chautauqua counties in the south (Southern Counties of Western New York or SCWNY). The City of Buffalo, in Erie County, represents the major urban center of the region. The region is home to 126 Disadvantaged Communities (DACs) that were formally designated by the state's Climate Justice Working Group (CJWG) on the basis of 45 indicators related to both Environmental Burdens and Climate Change Risks, and Population Characteristics and Health Vulnerabilities.[1] Erie County possesses the largest share of DACs in the region - 58% of total DAC Census tracts - followed by Niagara County with 27%, Chautauqua County with 9%, Cattaraugus County with 4%, and Allegany County with 2%. In order to ensure a more just and equitable transition to a clean energy economy that benefits all New Yorkers, the state's Climate Law, passed in 2019, mandates that DACs receive a minimum of 35% to 40% of climate and clean energy investments. The WNY Hub is focused on reducing barriers in and increasing opportunities for low-to-moderate income residents and members of DACs.

Figure 1. NYSERDA's Disadvantaged Communities (DACs) Map of WNY[2]

[1] See: https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria
[2] See, https://climate.ny.gov/Resources/Disadvantaged-Communities-Criteria



Below is a baseline characterization of the region, drawn from secondary data sources, that begins to paint a picture of what conditions are like across DAC vs. non-DAC communities. The characterization provides insights into various social determinants of marginalization and inequity that are further explored through the interview and focus group data that we present later in the report.

Baseline Regional Sociodemographic

Race and Ethnicity

White residents comprise the largest racial-ethnic group in the overall population of WNY and represent a majority of the region's DAC residents. Black, Indigenous, and People of Color (BIPOC) residents, however, make up a disproportionate share of DAC residents in the region as a whole and in the City of Buffalo, the region's largest population center. The City of Buffalo is home to just over 50% of the region's DAC residents despite accounting for just under 20% of the region's overall population. Nearly three quarters of all Census tracts in Buffalo are DACs. Historical patterns of disinvestment (e.g., redlining) and racial segregation in Buffalo have created extreme disparities of concentrated disadvantage for BIPOC communities.

Table 1. Comparative Racial-Ethnic Breakdowns of WNY and City of Buffalo

	Five-County WNY Region		City of Buffalo	
	Total Population	DACs	Total Population	DACs
White	1,099,551 (77.7%)	203,278 (51.9%)	120,650 (43.6%)	63,187 (31.9%)
Black or African American	137,267 (9.7%)	99,877 (25.5%)	89,381 (32.3%)	78,835 (39.8%)
Hispanic or Latinx	77,832 (5.5%)	42,692 (10.9%)	34,037 (12.3%)	28,523 (14.4%)
Asian	45,284 (3.2%)	21,542 (4.5%)	21,031 (7.6%)	18,619 (9.4%)
Indigenous, Native Hawaiian, or Pacific Islander	7,076 (0.5%)	4,308 (1.1%)	830 (0.3%)	396 (0.2%)
Two or More Races	45,284 (3.2%)	18,409 (4.7%)	9,962 (3.6%)	7,923 (4%)
Other Race	4,245 (0.3%)	1,567 (0.4%)	830 (0.3%)	594 (0.3%)
Total Number of Persons	1,415,124 (100%)	391,673 (100%)	276,721 (100%)	198,077 (100%)

Households and Families

DACs are characterized by much higher instances of children living in single parent households relative to regional households. Namely, 15.6% of all households in WNY's DACs are headed by single parents, compared to just 9.7% of households in the region. More consequentially, over half (52.8%) of all children in DACs live in households headed by single parents, versus just one-third (33.3%) of all WNY children. Buffalo contains roughly half (49.8%) of households living in DACs, despite accounting for only 19.8% of all households in the region. DACs in the City contain a disproportionate share of single-parent households. Roughly 85% of all single-parent households in Buffalo are situated within the City's DACs.

Educational Attainment

Compared to the overall WNY region, people living in the area's DACs are less likely to hold either a college degree (32.6% of adults 25 years or older across the region v. 19.8% in DACs) or a high school equivalency (just 8.3% of adults 25 years or older in the region lack this qualification, compared to 14.6% in DACs). Nearly half (46.5%) of all adults (25 years or older) who lack a high school diploma or equivalent live in WNY's DACs. The educational situation for the City of Buffalo is even more extreme than the regional context, with nearly nine out of every ten adults (89.3%) without a high school equivalency concentrated in the City's DACs.

Language

Across WNY, roughly 43,000 persons aged five or older speak English "less than very well," a term synonyous with limited English proficiency (LEP). Spanish is the primary language of nearly 30% of LEP persons in the region, followed by Asian or Pacific Island languages (19.6%) and all other languages (15.7%). Within DACs, however, Spanish is the most commonly spoken language at home for LEP persons (37.6%). More than half (53.1%) of all LEP persons – and 66.8% of LEP persons who are primarily Spanish speakers – live in DACs. In Buffalo, nearly all persons (92.4%) with LEP live in DACs. Spanish is the most common language spoken at home by such persons, regardless of where in the City they live.

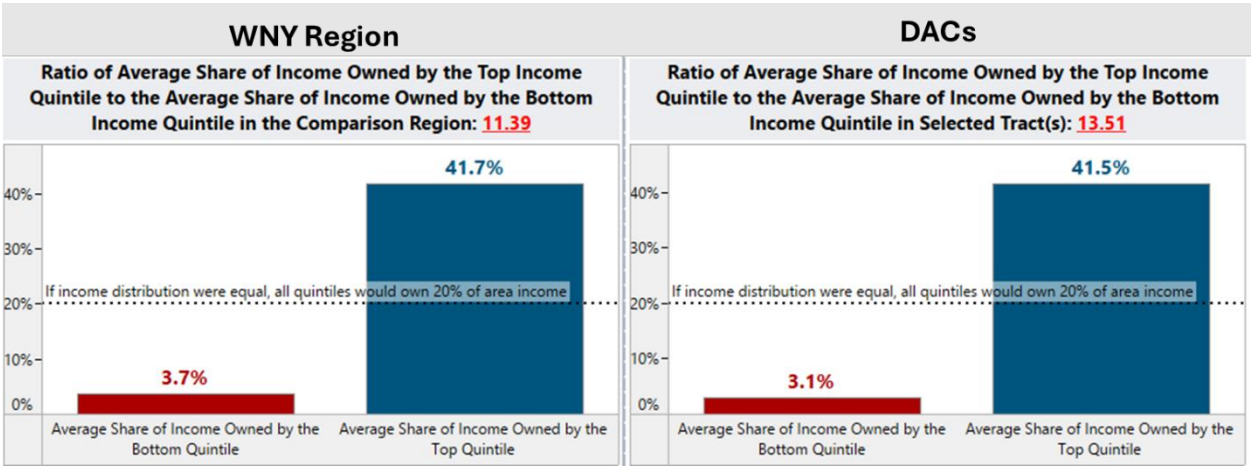
Internet Access

Slightly more than 20% of persons in WNY are un- or under-connected to broadband Internet: in addition to the 5.4% of persons who lack both a computer and an Internet connection, 4.4% of persons have a computer with no Internet subscription, and another 10.4% of persons have a computer but can only access the Internet through a dial-up connection or via their mobile phone plan. Within DACs, the percentage of un- and under-connected persons is expectedly higher, at 25.7%. The concentration of un- and under-connected persons in DACs is more extreme in Buffalo than in the region as a whole. More than eight out of ten Buffalo residents with no or limited broadband Internet connectivity at home live in the city's DACs.

Income Inequality

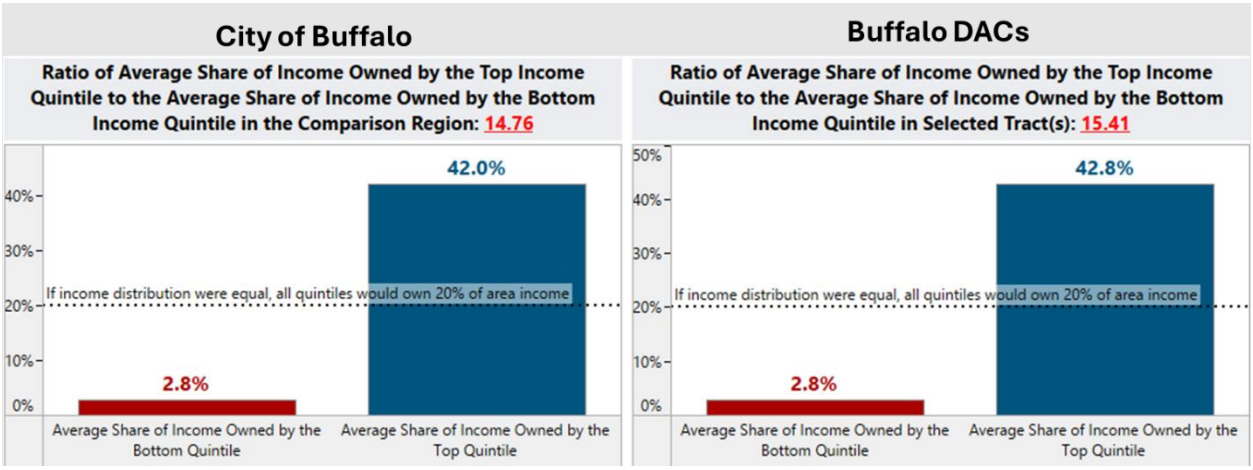
One popular way to study income inequality is to examine the ratio of income earned by the top 20% of earners (i.e., the top *quintile*) to the bottom 20% (bottom quintile). If income were distributed perfectly evenly, then any group that accounts for 20% of the population should own or earn 20% of aggregate income. To the extent that the share of a given quintile (e.g., the upper quintile) deviates from this expectation, the income distribution is unequal. The following graph shows the average (census tract-level) share of income owned by the bottom quintile of households relative to the average (tract-level) share of income owned by the top 20%. The lefthand panel of the figure makes this comparison for the WNY region as a whole, while the righthand side shows corresponding data for all DAC tracts in WNY. Notably, while the ratio of top share to bottom share is slightly larger in DACs, indicating slightly more income inequality, the distribution is not substantially different from the overall regional income distribution – which itself is highly uneven.

Figure 2. Income Inequality in the WNY Region



This same situation holds in the City of Buffalo. Importantly, the income distribution in Buffalo is meaningfully more uneven than the regional distribution, with the bottom 20% of households owning, on average (recall: these figures are tract-level averages) just 2.8% of aggregate income, compared to 42.0% for the top 20%.

Figure 3. Income Inequality in the City of Buffalo



Commuting and Vehicle Ownership

Across the region, it is very rare for owner-occupied households to lack access to a vehicle – just 4.1% of such households do not have a vehicle at home. By contrast, more than one-quarter (27.0%) of renter-occupied households lack vehicle access. Not surprisingly, lack of vehicle access is more extreme in DACs: 7.5% of owner-occupied and 38.0% of renter-occupied households in DACs do not own a vehicle. In terms of commuting patterns for labor force participants aged 16 years or older, nearly eight out of ten (76.8%) workers drive to work alone in a private automobile. Just 2.5% of WNY workers commute to work via public transit. In DACs, however, reflecting the longstanding observation that residents of low-income communities tend to have smaller ecological footprints than their more affluent counterparts, public transit riders make up 6.8% of all commuters. DAC residents are also much more likely than regional averages to carpool (10.2%, v. 7.6%) or walk (4.3% v. 2.9%) to work.

Summary

True to the name “disadvantaged” communities, DACs in WNY compared to non-DAC communities, are characterized by higher concentrations of marginalized populations, especially BIPOC residents, single-parent households, persons with limited English proficiency, adults without high school equivalency degrees, adults without college degrees, households without vehicles, and persons with limited or no broadband Internet connections. They are also communities with more pronounced levels of income inequality, and they are primarily clustered in the City of Buffalo. Notwithstanding the evident challenges that exist in disadvantaged spaces, however, DACs appear to be building blocks for more sustainable development practices, as evidenced by comparatively less environmentally harmful commuting patterns and increased propensity to walk, bike, or use public transit to get to and from work.

Buildings and Sector Assessment

Housing Stock

The housing stock in WNY’s DACs is considerably more diverse – and outwardly more supportive of higher density, mixed income settlement patterns – relative to the overall region. Across WNY, single-family structures dominate the housing

landscape, accounting for nearly two-thirds of all units (62.5% single-family detached units plus 2.8% single-family attached units). Doubles (two-family units) make up 14.3% of the regional housing stock, with a mix of three-plus-unit structures and mobile homes accounting for the remaining 20.4% of housing units. By contrast, the housing stock in DACs is split almost evenly between single-family homes (48.0% detached plus 3.2% attached) and lower-cost options. Doubles make up over a quarter of all DAC housing units (26.2%).

Figure 4. Housing Stock Characteristics in the WNY Region

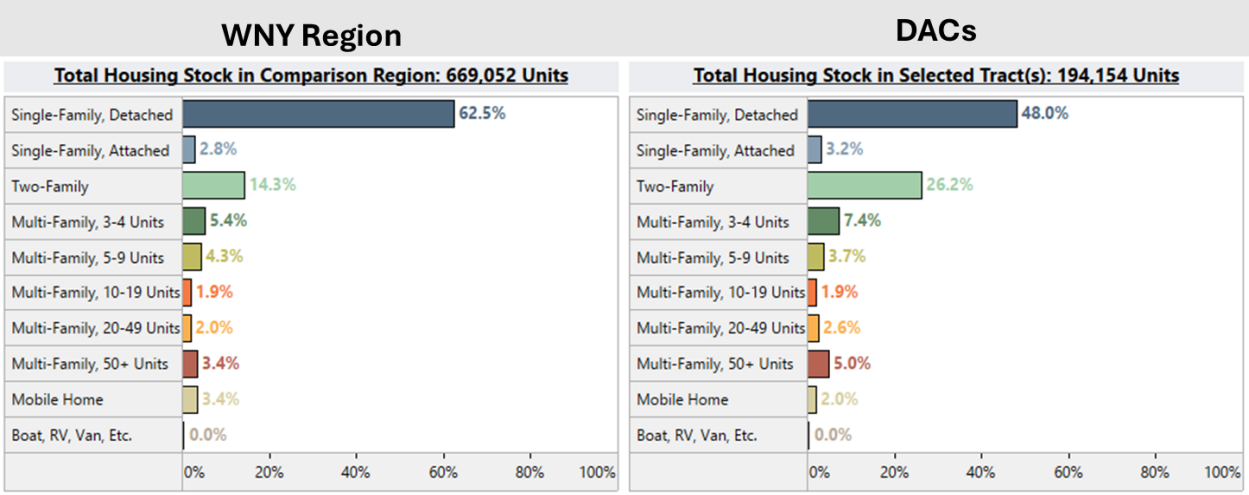
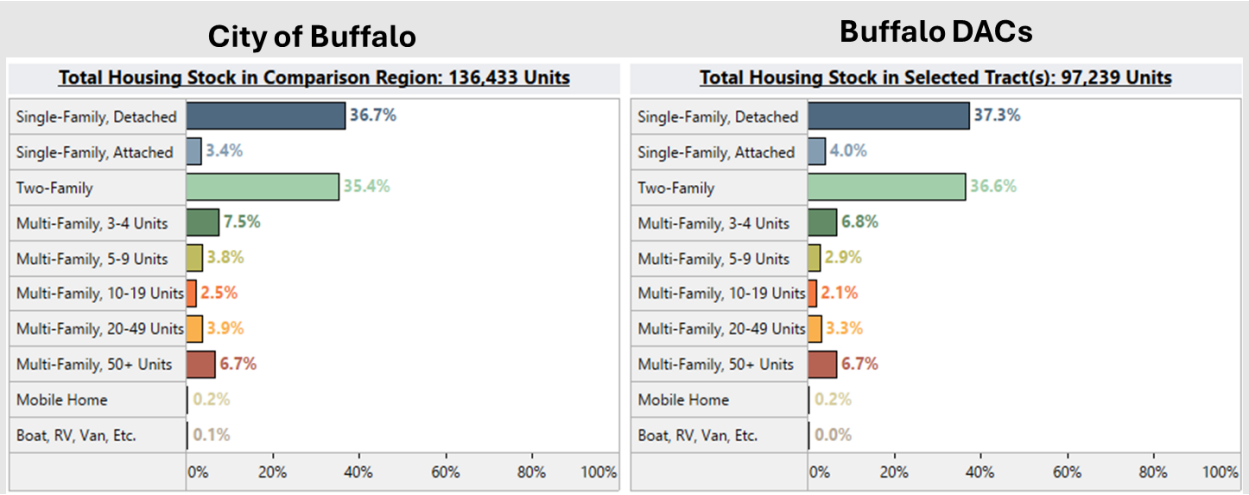


Figure 5. Housing Stock Characteristics in the City of Buffalo

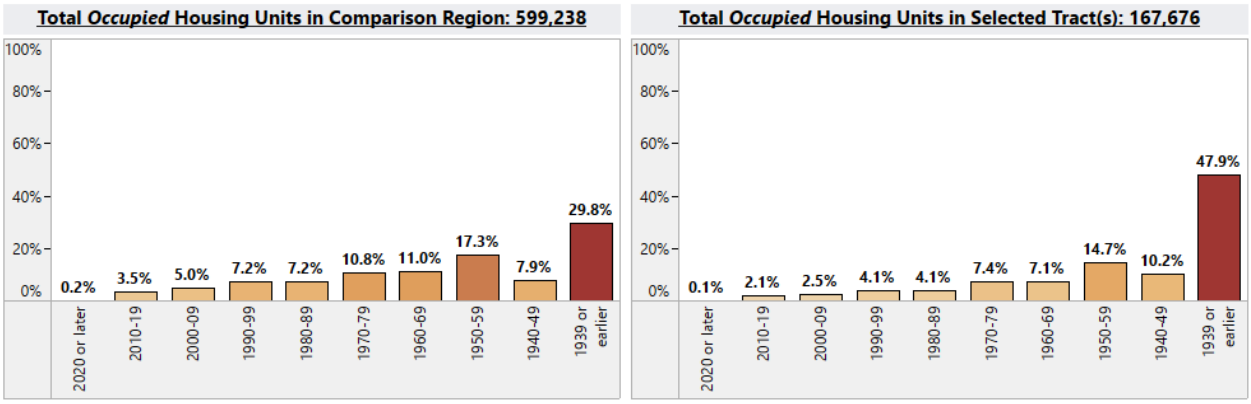


Age of Occupied Stock

In a region that is well known for having an old housing stock, it should come as no surprise that the plurality of occupied housing units in WNY were built prior to 1940. However, the stock in DACs is *considerably older* than the average regional stock. Compared to 29.8% of WNY housing units being built before 1940, around half of all DAC units (47.9%) were constructed before World War II. The implication is that DAC residents, who were already determined by NYSERDA to bear a

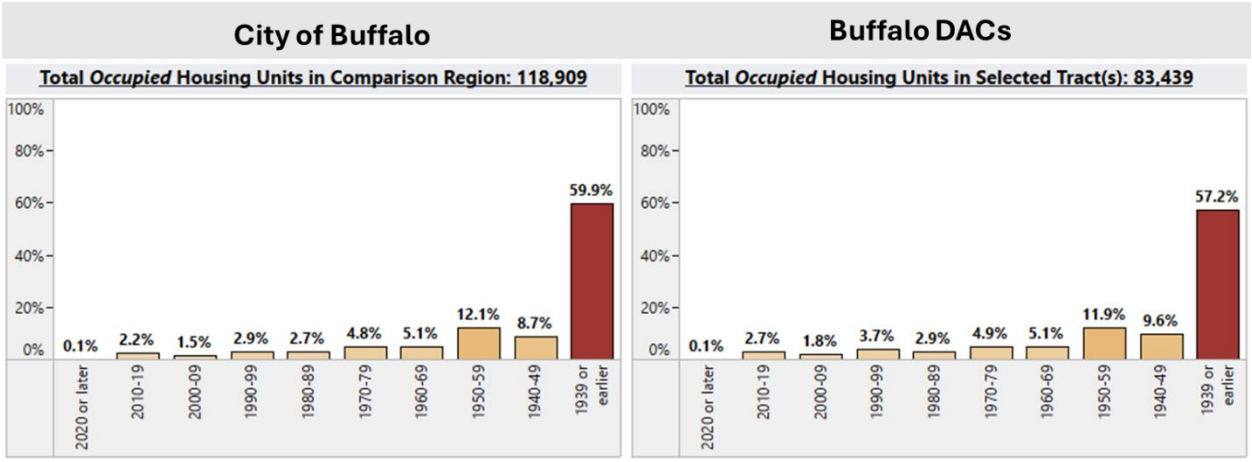
disproportionate share of the region's environmental and social burdens, are also more likely to live in older housing subject to deterioration, lack of weatherization, and costly upkeep and maintenance routines.

Figure 6. Age of Occupied Housing Units in the WNY Region



As the region's principal city and site of some of the region's earliest urban developments, Buffalo's housing stock is much older than regional averages. On this matter, there are few observable differences between Citywide conditions and DAC conditions. Regardless of where in Buffalo one lives, they are likely dwelling in housing that was built several generations ago.

Figure 7. Age of Occupied Housing Units in the City of Buffalo



Household Energy Type

The dominant source of home heating fuel in WNY and the City of Buffalo is methane gas (85.1%), with electricity coming in a distant second place (9.7%). This regionwide pattern is mirrored in WNY's and Buffalo's DACs, though DAC homes are slightly more likely to use electricity (11.0%).

Figure 8. Household Energy Type in the WNY Region

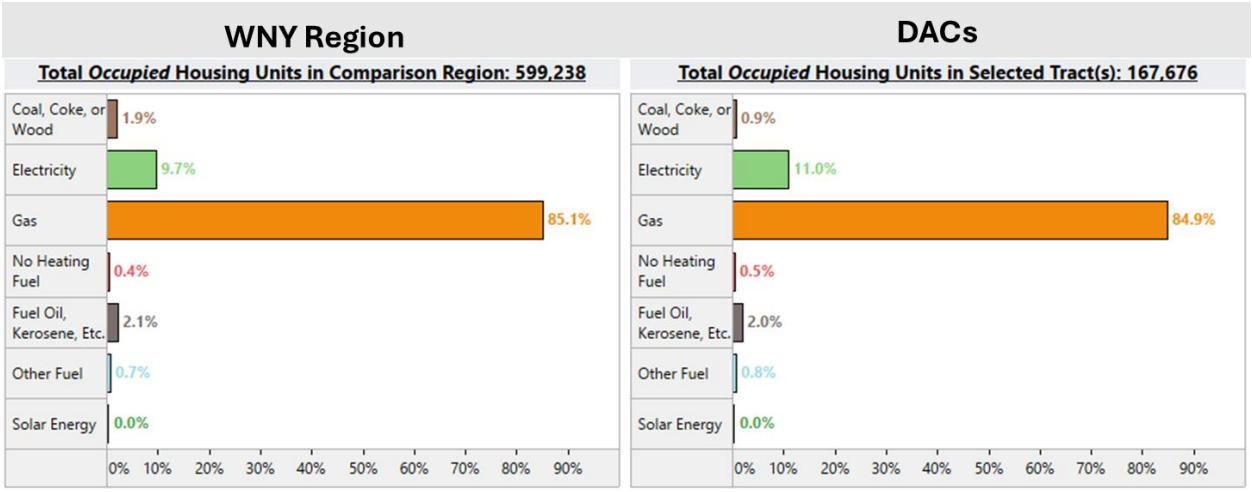
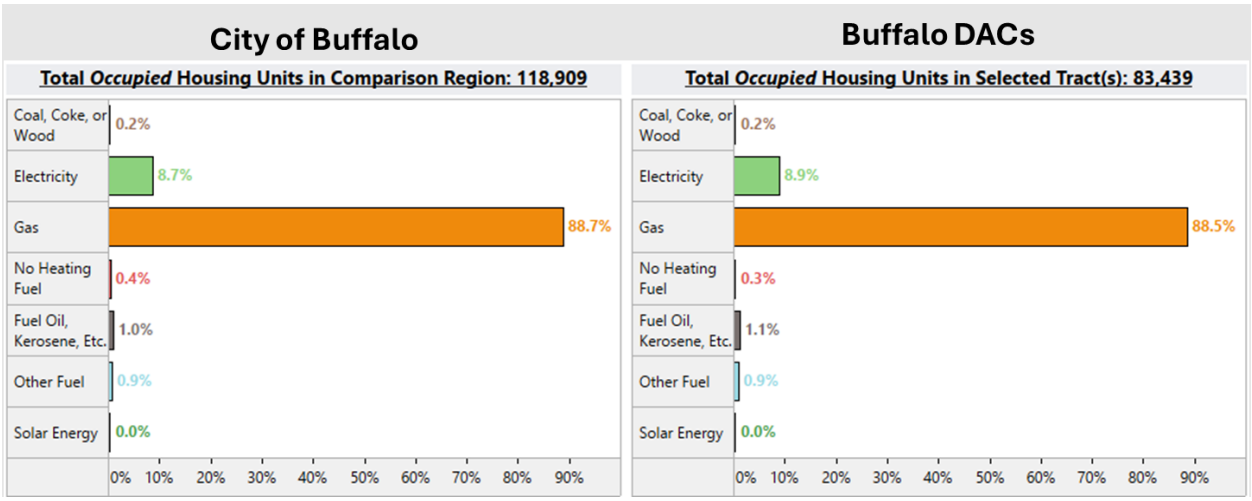


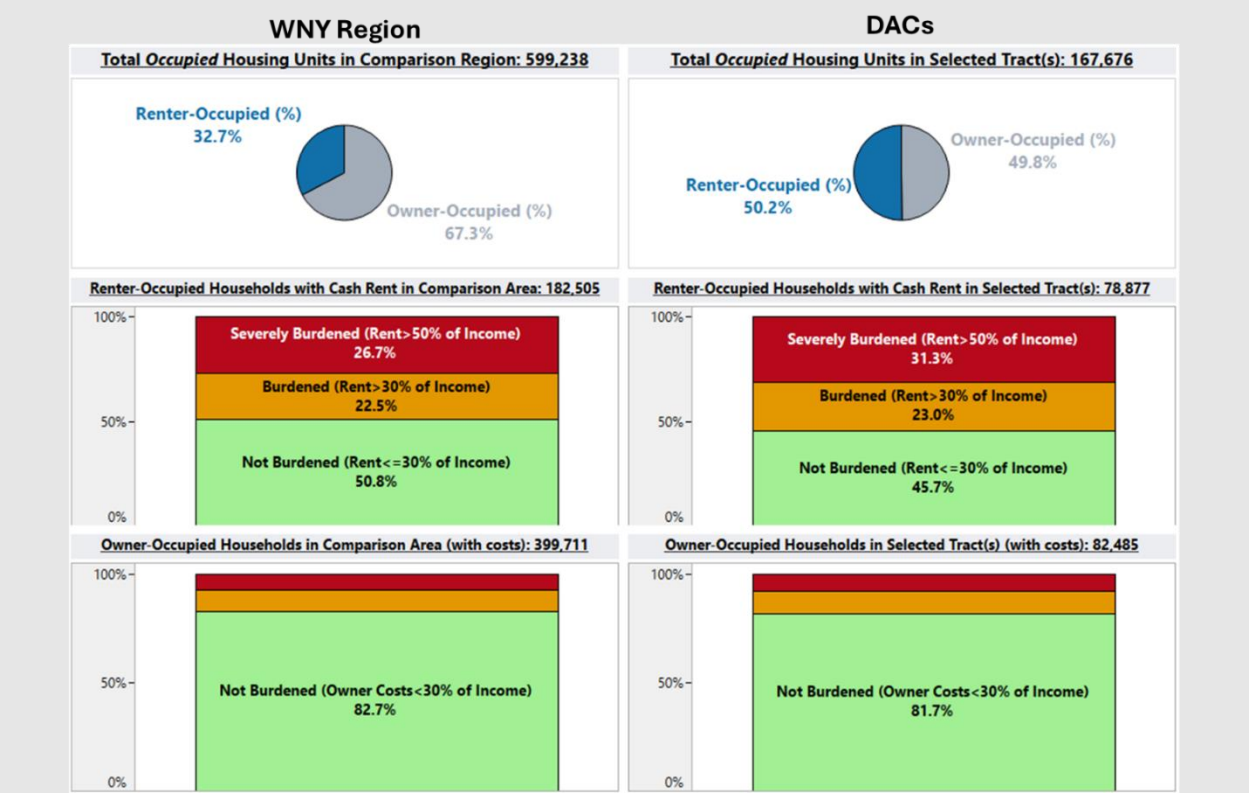
Figure 9. Household Energy Type in the City of Buffalo



Tenure and Housing Cost

The following figure compares the entire WNY region to WNY DACs on housing tenure (top-third), renter housing cost burden (middle-third), and owner housing cost burden (bottom-third). Whereas owner-occupied households enjoy a supermajority (67.3%) across the region, renters are a majority of occupied households in DACs (50.2%). While, at least at the regional scale, there are few differences in patterns of housing cost burden between the overall region and its DACs, cost burden rates are high – especially for renters. Roughly half of all renter-occupied units in WNY (49.2%) are cost-burdened (i.e., use 30% or more of their income on housing). This number grows to slightly more than half (54.3%) in DACs. For owners, cost burden rates are 17.3% overall, and 18.3% in DACs.

Figure 10. Tenure and Housing Cost in the WNY Region



In Buffalo, where renters are a majority of all households (57.4%) and DAC households (59.9%), over half of renter-occupied housing units are cost-burdened: 51% of tenant households in Buffalo spend 30% or more of their gross monthly income on housing, whereas 55% of tenant households in Buffalo's DACs live in this situation. These numbers do not deviate too markedly from region-wide figures, signaling that renters everywhere in WNY struggle with housing affordability – cost-burden is not just a problem for City residents. On the owner-occupied side, 17.8% of Buffalo's homeowner households are cost-burdened, compared to 19.4% of such households in the City's DACs. Once again, these patterns do not deviate considerably from broader regional trends.

Summary

Compared to their parent region, DACs in WNY contain more diverse housing stocks with more balance between single- and multi-family units, older housing structures, significantly greater rates of renter occupancy, and somewhat greater struggles with housing affordability. Coupled with the sociodemographic disparities identified previously, one can conclude that WNY's DACs are spaces in which marginalized population subgroups struggle to make ends meet from within an aging, seemingly distressed built environment.

Regional Clean Energy Workforce

Based on data for the period of 2016 –2022 issued by the U.S. Energy and Employment Report (USEER) for the five counties of WNY, overall, the region's clean energy workforce appears to be on an upward trajectory, particularly in the solar power generation industry sector, the high efficiency HVAC and clean heating and cooling sector, and the energy storage sector in Erie County. Jobs in the hydroelectric power generation industry in Niagara County also grew substantially during this period. And the rate of employment growth in the advanced materials and insulation sector in all but Allegany County showed a positive

upward trend. While these trends represent positive developments for the clean energy economy in the region, the rate of fossil fuel industry job growth in many cases matched or exceeded the rates of clean energy job growth. See Appendix 1 for a complete break down of employment trends.

Regional Partners and Assets

We identified a list of 45 potential regional partners and assets (see Appendix 2) during initial RABA stakeholder engagement and networking through the WNY Hub subcontractor team. The following organizations participated in in-depth stakeholder interviews and made a commitment to work with the Hub to help overcome barriers to participation faced by the region's DACs.

Community Health Center of Buffalo (CHCB)

CHCB is a federally qualified healthcare provider for low-to-moderate income families, BIPOC residents, and refugee and immigrant populations. CHCB operates in the City of Buffalo, the City of Niagara Falls, and the City of Lockport, and could emerge as an outreach and equitable engagement partner through patient referrals.

Every Person Influences Children (EPIC)

EPIC is a Niagara County-based childcare provider for refugee and immigrant families and low-to-moderate households in Niagara Falls and Lockport. EPIC could help promote Hub services and direct clients to the Hub.

ACCORD Corporation

ACCORD provides a range of direct services (housing, childcare, food, domestic violence, and business services) to residents of Allegany County and is interested in working with the Hub to connect participants with NYSERDA energy efficiency programs.

Jamestown Public Utilities Company

The Jamestown PUC is a pioneering micro-grid developer and electricity provider based in Jamestown, Chautauqua County. They're committed to work with the Hub to raise public awareness of the benefits of energy efficiency and clean energy.

Baseline Assessment of Clean Energy Program Participation

Baseline of Regional Clean Energy Programs

An analysis of publicly available NYSERDA energy efficiency and clean energy program data reveals that programs and incentives have only reached a small fraction of eligible residents in the region (see Appendix 3). From 2011-2022, approximately 12% of the 69,000 residents eligible for Assisted Home Performance incentives received support from NYSERDA totaling $18.1 million of direct investment. From 2018-2023, less than 4% of the 253,000 residents eligible for EmPower/+ received assistance totaling $53.7 million of direct investment. On average, approximately 2,000 total means-tested energy efficiency projects have been completed annually in recent years. Projects in rural counties have received relatively larger per unit investments and higher associated energy and utility bill cost savings. From 2008-2023, NYSERDA's NY-SUN residential rooftop solar incentives reached less than 1% of eligible households in the region. Installations in the region have generally grown since 2008 with periods of fluctuating growth and decline since 2014.

Existing NYSERDA Community Campaigns

NYSERDA's Clean Energy Communities program provides opportunities for municipal governments to propose and implement community campaigns in the areas of community solar, clean heating and cooling, and electric vehicles. The table below breaks out completed community campaigns by location in the WNY region.

Table 2. Completed Community Campaigns in WNY[3]

Community	County	Community Population	Number of DAC Tracts	List of Completed Community Campaign Actions
City of Dunkirk	Chautauqua	12,563	5	• Community Campaigns - Community Solar - Tier 1 (200 points) - 5/21/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 5/21/2024
City of Niagara Falls	Niagara	50,193	17	• Community Campaigns - Community Solar - Tier 1 (200 points) - 7/30/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 7/30/2024 • Community Campaigns - Community Solar - Tier 3 (500 points) - 8/20/2024
City of North Tonawanda	Niagara	31,568	5	• Community Campaigns - Community Solar - Tier 1 (200 points) - 7/2/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 7/9/2024 • Community Campaigns - Community Solar - Tier 3 (500 points) - 8/20/2024
Erie County	Erie	919,040	73	• Community Campaigns - Community Solar (200 points) - 7/27/2021
Town of Aurora	Erie	13,782	0	• Community Campaigns - Community Solar - Tier 1 (200 points) - 7/2/2024
Town of Evans	Erie	16,356	0	• Community Campaigns - Community Solar - Tier 1 (200 points) - 7/16/2024
Town of Porter	Niagara	6,771	0	• Community Campaigns - Community Solar - Tier 1 (200 points) - 4/10/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 4/10/2024
Village of Hamburg	Erie	9,409	0	• Community Campaigns - Community Solar - Tier 1 (200 points) - 6/26/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 7/2/2024
Village of Westfield	Chautauqua	4,896	0	• Community Campaigns - Clean Heating and Cooling - Tier 1 (500 points) - 8/20/2024 • Community Campaigns - Clean Heating and Cooling - Tier 2 (500 points) - 10/3/2024

[3] See, https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Communities/Tracking-Progress/CEC-Map

Village of Youngstown	Niagara	1,935	0	• Community Campaigns - Community Solar - Tier 1 (200 points) - 4/23/2024 • Community Campaigns - Community Solar - Tier 2 (300 points) - 8/20/2024

Stakeholder and Community Engagement

Outreach Tools and Methods

The WNY Hub team that carried out the RABA project created a two-phase approach to community engagement. The first phase involved building a list of regional stakeholders from a cross-section of relevant fields and sectors, including healthcare, local government, non-profit social movement and service providers, philanthropy, and religious faith leaders. The list initially grew out of conversations with Hub subcontractors – Cornell Cooperative Extension-South; Cornell Cooperative Extension-North, VIA WNY-211, the WNY Sustainable Business Roundtable, Monarch of Infinites Possibilities, and Erie County government, and Inclusive Prosperity Capital – and snowballed as the team made initial inroads through phone and email outreach, and completed stakeholder interviews. By the conclusion of the project, the RABA team invited 84 stakeholders to participate in (a.) an introductory 1-on-1 meeting to introduce the Hub and the purpose of the RABA project, and (b.) a 90-minute in-depth interview. Seventeen stakeholders completed interviews. The team recorded and transcribed all completed interview conversations. The interviews were designed to capture population-level or field-level insights about social determinants of health, climate and environmental vulnerability, and access to both clean energy and energy efficiency services as well as more general social and health services across the region. Participants were invited to reflect on the Hub's intended role in delivering services and programs to DACs and then offer recommendations for effective program design and community engagement.

The second phase of stakeholder and community engagement prioritized focus group conversations with low-to-moderate income residents and members of DACs. The team collaborated with Hub subcontractors to organize and facilitate several of the focus groups and relied on support from stakeholders engaged in phase one to locate, schedule, and promote additional focus groups. The team opened up the first focus group opportunity to PUSH Buffalo members. The group represented a racially and ethnically diverse cross section of Buffalo's residential population. The next three focus groups centered the participation of Black residents from Buffalo's East Side. Neighborhoods on the East Side rank as some of the most disadvantaged communities in the region. The fifth focus group occurred in the city of Niagara Falls and included participation by Black residents of the city. The team organized two final focus groups in the town of Cuba in Allegany County and in the city of Olean in Cattaraugus County. Participants in these conversations were predominantly white. Focus group participants responded to a similar set of questions to those used in the in-depth interviews. The team sought to measure or test some of the insights shared in the interviews against the various accounts of barriers and opportunities that focus group participants contributed to the conversations in order to deepen our understanding and appreciation of population-level and individual-level experiences faced by residents of the region's DACs. A total of 53 people participated in the focus group conversations. Participants were provided with gift cards to compensate them for their time and local knowledge. Again, the team recorded and transcribed each focus group conversation. Transcripts from both the in-depth interviews and focus groups were coded for key themes using a combination of inductive and deductive methods that corresponded with the barriers categories used in the statewide barriers report by NYSERDA.

Table 3. Focus Group Discussions

Focus Group Discussions			
Date	Location		Number of Participants
	DACs Represented	County	
February 14, 2024	West Side (City of Buffalo)	Erie	7
March 3, 2024	East Side (City of Buffalo)	Erie	8
March 11, 2024	East Side (City of Buffalo)	Erie	8
March 18, 2024	East Side (City of Buffalo)	Erie	10
April 9, 2024	Niagara Falls	Niagara	8
May 10, 2024	Cuba	Allegany	5
May 22, 2024	Olean	Cattaraugus	8

Stakeholder and Community Feedback - Climate Change and Local Environmental Pollution Impacts on WNY DACs

For the purposes of the RABA, the team defined extreme weather events, such as blizzards, windstorms and rising temperature, as climate change impacts; soil, air, and water contamination stand as varieties of environmental pollution. Accounts of extreme weather events provided by stakeholders and community members occurred more frequently in conversations with residents of Buffalo and Niagara Falls. The blizzard of 2022 was particularly devastating for residents in the City of Buffalo, where the official death toll reached 49 residents. Participants shared feelings of being overlooked, that they didn't feel that local and state government had adequately prepared or protected vulnerable communities ahead of the storm.

> *"It's hard to prepare for something like if you don't have a job. You can't buy stuff later. Some people got to eat what they buy. You know, they don't have the ability to put stuff away and save it. And then when the storm comes, you're unprepared, right? So, people were shaming people that just didn't have the resources. I know that that was payday. It looks like Friday I was about to get my check and go shopping. But I couldn't get my check. I could not go shopping and didn't get groceries in a storm trying to get from point A to point B."*
>
> **Focus group participant from the East Side of Buffalo**

One interview participant, who is a leading provider of community-based health care services in Western New York, noted how the blizzard had a disproportionate impact on low-income zip codes in Buffalo that suffered from prolonged power outages due to failed electrical infrastructure. Another stakeholder concluded that the disparate impact of the storm on primarily Black communities revealed the systemic racism that persists in the city of Buffalo.

Elsewhere in the region, extreme weather events have had a less pronounced and violent impact on residents living in the Southern Counties of WNY though many participants noted the disruptive impacts of windstorms and lowland flooding. Residents living in rural areas shared experiences of isolation, anxiety over late insurance payments, and hardships they've encountered when roads flood and they're unable to access basic needs like food for short periods of time.

Generally, across the region, participants shared a belief that extreme weather events are happening more frequently and are having a direct negative impact on the livelihoods of DACs in Western NY. Rising temperatures and heat waves represent a particularly acute stressor for members of DACs who have underlying health conditions. Participants residing in DACs in Buffalo and Niagara Falls noted struggles to cope with extreme heat when air conditioning is not widely available or affordable. For more vulnerable residents, the only path to managing extreme heat at home is to request a recommendation from a medical

doctor to the Department of Social Services, which creates additional bureaucratic hurdles to clear. Many residents face increased electricity bill costs to operate air conditioning units in their homes, many of which remain un-weatherized, which can serve as another deterrent. Outside of the home, neighborhoods on the East Side of Buffalo suffer from a lack of shade and tree canopy cover that can help reduce the urban heat island effect. An overriding sentiment shared by participants in Buffalo and Niagara Falls was that summers in the region are becoming more stressful and anxiety inducing due to climate change impacts.

For residents in the Southern Counties of WNY, extreme heat has created stress and social isolation, in particular for children and seniors who are already physically isolated in rural communities and must endure rising temperatures without easy access to cooling centers. Southern counties are predominantly agricultural communities. Stakeholders and focus group participants believe climate change impacts are threatening the viability of farming as invasive plant species proliferate and contribute to low yields of corn for livestock and costly agricultural crop management practices.

> *"The invasive weeds are not responsive to pesticide and mixing it with corn becomes less valuable. Weed monitoring and pest management have become ultra burdens although we live in an agricultural area, we don't raise much food in these areas. A lot of our agriculture is based on corn livestock crops. But we're trying to open the door about those climate issues because it all makes everything expensive."*
> **Agricultural sector professional from Cattaraugus County**

As noted above, most houses in Western NY DACs are old and suffer from disrepair and disinvestment. Participants acknowledged that an all-too common standard of living for residents of DACs includes exposure to toxic lead paint, asbestos inside the home, poor indoor air quality, a lack of weatherization improvements, and legacies of industrial pollution that has left behind brownfields and Superfund sites in their communities. Residents of the Southern Counties of WNY on the other hand, shared a belief that environmental conditions, in particular air quality, in their communities are better compared to their counterparts in Buffalo and Niagara Falls due in part to underdevelopment and deindustrialization.

> *"I've been allowed to live in places where all sorts of toxicity exist."*
> **Focus group participant from the East Side of Buffalo**

Focus group participants from Buffalo and Niagara Falls described the impact of environmental pollution at the neighborhood level. Soil contamination means gardens cannot be grown in those areas and participants see the rise and incidence of cancer in their neighborhoods as a direct result of exposure to toxic water, soil, and air. Air pollution from heavily-trafficked highways, like the Kensington Expressway, built as part of urban renewal strategies in the 1950s and 1960s, contribute to high rates of asthma and other respiratory illnesses. A Buffalo-based community health care leader confirmed that elevated asthma and cancer rates can be found in neighborhoods that sit adjacent to the Kensington Expressway. Other participants reported either experiencing directly themselves or witnessing others in the community experiencing additional respiratory diseases such as bronchitis, and COPD; cardiovascular disease; breast, colon and thyroid cancers; allergies; and autoimmune diseases. The consistent exposure to all kinds of environmental pollution compounds the socioeconomic challenges DACs in the region face as residents are forced to pay for healthcare to address symptoms while the underlying causes in the community continue to create harm.

Stakeholders and focus group participants from the Southern Counties of WNY talked about the higher standard of air quality they experience due to a lack of industrial pollution as a point of pride. Participants, however, did describe the potential negative environmental and public health impact of smoking tobacco and trash-burning by low-income families due to a lack of garbage collection services. As tobacco products are cheap in the Southern Counties, smoking rates are among the highest in

New York State. As a result, second-hand smoke is a leading cause of childhood asthma. Another more acute source of environmental pollution that participants identified was sewage discharge from a wastewater treatment facility in Cattaraugus County and its negative impact on water-based recreational activities in the area.

Stakeholder and Community Feedback – Access to Clean Energy

Stakeholders and community members talked extensively about the poor quality of housing found across DACs due to the age of the housing stocks, income inequality, lack of access to funding and financing, and disinvestment by large numbers of absentee landlords who too often speculate on real estate in the region. Substandard housing quality ranked as perhaps the largest barrier to accessing clean energy. What home repair programs do exist appear to advantage homeowners over renters, or in some cases particular residents or communities, and aren't funded in sustainable ways or administered to ensure streamlined access with minimal eligibility restrictions to overcome. When funding runs out or enrollment windows close, residents of DACs grow distrustful of government sponsors and community-based program implementers.

Residents of the Southern Counties of WNY discussed a deficit of qualified contractors and workers in their communities which increases labor costs and the overall cost of services, degrades the quality of the services that are provided, and contributes to long project lead times and completion times. Travel and transportation logistics serve to disincentivize participation in clean energy programs for both residents and contractors. For residents of rural DACs who work long hours at multiple part-time jobs, the lack of public transportation options and the high cost of private transportation make it difficult to participate in community outreach and engagement activities to learn about program opportunities. For contractors, lengthy travel distances between jobs eat into the money they'd otherwise earn for completing projects.

In recent years, large numbers of immigrants and refugees have moved to or been resettled in urban DACs. As a result, language access has emerged as a big challenge for service providers to manage and for new arrivals to overcome. Information about clean energy programs and the benefits of clean energy has failed to flow freely to these communities. Stakeholders and focus group participants from urban DACs noted that flows of reliable and factual information about clean energy are interrupted by deceptive direct-to-consumer and door-to-door marketing activities of energy service companies (ESCOs) that are ubiquitous in those communities. For many rural communities, misinformation about the threats of climate change and the benefits of a transition to clean, renewable energy shapes negative perceptions and works to politicize solutions and divide communities.

> *"You know climate change may or may not be real. They're not sure about that. So, you know, I think it goes along with the political climate of the times."*
>
> **Stakeholder interview participant from Allegany County**

Barriers and Opportunities

Outlined below is a comprehensive list of barriers and opportunities that accurately summarizes the insights shared by stakeholders and community members.

Table 4. Barriers and Opportunities - Physical and Economic Conditions and Structures

Barrier Subcategory	Barrier Identified	Recommendations and Opportunities to Address Barrier

Housing Quality	Housing stocks within DACs are among the oldest in the country and suffer from deferred maintenance, disinvestment, the presence of health and safety hazards like lead, mold, asbestos, and knob and tube wiring. As a result, housing stocks in DACs require substantial investments in weatherization and electrification readiness measures.	**NYS:** Enact the Green Affordable Pre-Electrification (GAP) Fund (S8535/A9170). The GAP Fund would direct new investments toward energy efficiency and building electrification readiness while codifying tenant protections. *[HPHC]* **NYSERDA:** Capture and publish data on program deferrals due to pre-existing conditions in order to establish the scope and scale of the problem. *[HPLC]* **WNY Hub:** Leverage federal IRA funding and state and local housing improvement funds to target comprehensive investments in DACs within the City of Buffalo using funds that have been secured by the WNY Hub lead, PUSH Buffalo. *[HPLC]*
	Absentee landlords engage in speculative real estate activities that contribute to the persistence of substandard housing conditions for renters.	**NYS:** Require real estate LLCs to disclose the identity of members through a statewide rental registry program in order to increase transparency and accountability around housing quality. *[HPHC]* **WNY Hub:** Provide know your rights resources and legal services referrals, along with NYSERDA program information, to tenants living in substandard rental housing as a means of building trust with vulnerable households. *[HPLC]*
Housing and Energy Affordability	Housing maintenance/operating costs and rents across the region are increasingly unaffordable for residents of DACs, including for small mom-and-pop landlords.	**NYS:** Enact the NY HEAT Act (S2016B/A4592B) to codify a 6% energy affordability standard for low-to-moderate income households in NYS. *[HPHC]* **NYS:** Adopt new utility rate designs for low-to-moderate income households installing heat pump equipment to ensure all electric equipment is affordable to operate. *[HPHC]* **NYSERDA:** Develop and/or enforce program rules that prohibit landlords from raising rents on tenants in properties that receive state or federal clean energy incentives. *[HPHC]* **NYSERDA:** Capture, track, and publish information about actual post-retrofit

		energy cost savings and operating costs. *[LPLC]* **WNY Hub:** Develop targeted marketing materials for mom-and-pop landlords that raise awareness around energy and operating cost savings associated with energy efficiency improvements. *[HPLC]*
	Residents in the Southern Counties of WNY pay a premium for delivered fuels (wood, propane).	**WNY Hub:** Promote clean heating and cooling alternatives that leverage federal IRA incentives and clean heat program rebates. *[HPLC]*
Transportation	Public transportation options are insufficient and unreliable across the region, leaving residents of DACs physically and socially isolated from service providers and employment opportunities, including clean energy services and jobs.	**WNY Hub:** Explore online training options for job seekers (e.g., https://cahillresources.com/) and virtual workshop formats for residents. *[LPLC]* **WNY Hub:** Use Local Pilot and Project funding for transportation stipends, ride share fare, or carpooling fuel reimbursements for residents to attend job training or community workshops. *[HPLC]*
	A lack of public transportation options in rural DACs in the Southern Counties of WNY is compounded by a lack of affordable private transportation options and long travel distances.	
High-speed Internet Access and Computer Ownership	In urban DACs, high-speed internet access and computer ownership remains unaffordable for many residents, leaving them disconnected from clean energy service providers and digital program enrollment opportunities.	**WNY Hub:** Maximize time in diverse community settings tabling, conducting door-to-door outreach, and facilitating workshops. *[HPLC]* **WNY Hub:** Utilize ad-buys in community newspapers to promote program opportunities. *[HPLC]* **WNY Hub:** Mail paper applications and instructions to residents. *[HPLC]* **WNY Hub:** Host program information and enrollment sessions at public computer lab facilities (e.g., libraries, K-12 schools, community centers, or community colleges and universities). *[HPLC]*
	In rural DACs, high-speed internet service is either unavailable or network connectivity is unreliable, and computer ownership is unattainable, leaving residents disconnected from clean energy service providers and digital program enrollment opportunities.	
Language Access	Large and growing immigrant and refugee populations in urban DACs with limited English proficiency increases costs for service providers of language translation and interpretation services.	**NYSERDA:** Provide capacity building and financial support to immigrant- and refugee-owned contractors in WNY that enables their participation in NYSERDA programs. *[HPHC]*

		WNY Hub: Seek to partner with immigrant community leaders and refugee resettlement agencies that serve urban DACs to communicate information about program opportunities. *[HPHC]* **WNY Hub:** Translate materials in other languages. *[HPLC]* WNY Hub: Use Local Pilot and Project funds to recruit and provide stipends to immigrant and refugee community ambassadors to break down language and cultural barriers. *[HPHC]*
Low Wage Jobs and Underemployment	Lack of family sustaining full-time employment opportunities forces low-income residents and residents of DACs to cobble together low wage part-time jobs and work longer hours to make ends meet and leaves less time for residents to pursue clean energy program opportunities.	**WNY Hub:** Maintain flexible work schedules (evenings, weekends, holidays) to meet with households when they have windows of availability. *[LPLC]*

Table 5. Barriers and Opportunities - Financial and Knowledge Resources and Capacity

Barrier Subcategory	Barrier Identified	Recommendations and Opportunities to Address Barrier
Confidence and Trust in Financial Benefits	Lack of confidence in the ability of clean energy programs to deliver truly no cost or affordable services that provide meaningful financial benefits.	**WNY Hub:** Capture and broadcast testimonials from early adopters in DACs to validate program benefits. *[HPLC]*
Direct-to-Consumer Marketing	Predatory and misleading direct-to-consumer mail and telemarketing in rural DACs, and door-to-door marketing by ESCOs in urban DACs creates confusion and erodes trust in the financial benefits of clean energy services; renews faith in name brand entities like investor-owned utilities.	**NYS:** Prohibit deceptive direct-to-consumer marketing practices including door-to-door outreach in DACs. *[HPHC]* **NYSERDA:** Build NYSERDA's statewide brand in DACs as a trusted and reputable source for factual and transparent information about the benefits of clean energy through direct mail, advertising in community newspapers, neighborhood billboards, and by highlighting the unique role played by the WNY Hub. *[HPLC]*

Table 6. Barriers and Opportunities - Perspectives and Information

Barrier Subcategory	Barrier Identified	Recommendations and Opportunities to Address Barrier
Distrust of Government Programs	Due to persistence of structural racism and economic inequality in urban DACs, claims that government support will reach marginalized communities and make a direct, positive impact on people's lives and livelihoods is doubted or held in contempt as a form of top-down white saviorism.	**WNY Hub:** Ensure frontline Hub staff and subcontractors are representative of the communities they work in. **WNY Hub:** Forge additional partnerships with local community-based partners and compensate partners for time and effort spent directly supporting community engagement efforts. **WNY Hub:** Leverage relationships with local elected officials (e.g., city councilmembers) to directly engage constituents. *[HPLC]* **WNY Hub:** co-design and implement Community Campaigns and/or Local Pilots and Projects with local elected officials, faith leaders, etc. *[HPHC]*
	In rural DACs, perceptions that community-based program implementers operate with ulterior motives and agendas than what's publicly promoted.	**WNY Hub:** Build and leverage relationships with local elected officials, small businesses, faith leaders, school officials, etc., to reset perceptions. *[HPHC]* **WNY Hub:** Co-design and implement Community Campaigns and Local Pilots and Projects with local leaders out front. *[HPHC]*
Zero Sum Thinking	Rural communities hold a belief that a transition to a clean, renewable energy economy will destabilize agricultural economic activity, displace family farms, and industrialize the land.	**WNY Hub:** Develop targeted marketing materials for family farms that raise awareness around energy and operating cost savings associated with energy efficiency improvements. *[LPLC]*
	Belief held by landlords that programs will only deliver benefits to tenants.	**NYSERDA:** Provide enhanced financial incentives to landlords who agree to sign regulatory agreements tied to the useful life of the improvements that are designed to preserve rental unit affordability. *[HPHC]* **WNY Hub:** Develop a value proposition for landlords in the context of a Community Campaign that frames energy efficiency and clean energy upgrades as worthwhile

		investments to preserve the integrity and extend the useful life of their property while reducing tenant turnover by stabilizing energy costs. *[HPHC]*
Ideological and Political Worldview	In some rural communities, climate denialism blends with libertarianism and conspiratorial thinking to politicize the clean energy transition and keep residents polarized.	**WNY Hub:** Rely on trusted local messengers (teachers, faith leaders, business owners, nurses and doctors), and include testimonials from program participants, to promote Hub services with a focus on health and affordability benefits. *[LPHC]*
Energy Reliability	For urban DACs, particularly in the city of Buffalo, the December blizzard in 2022 confirmed beliefs that aging electrical infrastructure is unreliable, and the existing electrical grid cannot safely support a transition away from fossil fuels.	**WNY Hub:** Educate residents of urban DACs on the resiliency benefits ("passive survivability") of whole house energy efficiency improvements. *[HPLC]*
	For rural DACs, delivered fuel sources like wood and propane are believed to be inherently more reliable than electricity and in the case of wood, provide residents with a form of energy independence.	**WNY Hub:** Focus messaging on the health benefits and cost savings of switching to high efficiency electric heat pumps. *[HPLC]*

Table 7. Barriers and Opportunities - Program Design and Implementation

Barrier Subcategory	Barrier Identified	Recommendations and Opportunities to Address Barrier
Program eligibility	Clean energy programs are designed to prioritize the needs of homeowners and often leave tenants without meaningful access to clean energy benefits.	**WNY Hub:** Raise awareness of NYSERDA's EmPower+ program among renters through direct mail, outreach to housing providers, Buffalo Housing Court, municipal building inspectors, etc. *[HPLC]*
	Program eligibility thresholds are too restrictive and funding levels are too low to meet the needs of renters, including small businesses.	**NYSERDA:** Expand income eligibility thresholds to make grant-based assistance available to more households in DACs; increase total amount of funding available for clean energy projects in DACs; create programs that target small business owners in DACs. *[HPLC]*
Funding for Non-Energy Improvements	Funding for programs designed to address weatherization and electrification readiness, and substandard health and safety conditions, like Buffalo's Green and Healthy Homes Initiative, is	**NYSERDA:** Collaborate with other state agencies, like NYS Homes and Community Renewal, and local governments to create more comprehensive programs that are easy for program implementers and residents to administer and access. *[HPHC]*

	unsustainable and difficult to braid together; when programs ramp down, trust is broken with residents of DACs.	
Contractor Availability and Performance	Contractors avoid taking jobs in DACs, perform substandard work, or lack the cultural competence to engage respectfully with residents.	**NYSERDA:** Improve contractor oversight and quality assurance; create publicly available contractor scorecards. *[HPLC]* **NYSERDA:** Report on contractor participation rates in DACs vs. non-DACs to determine if contractors are failing to serve particular communities. *[HPLC]* **WNY Hub:** Offer community health worker training for contractors to build their cultural competency. *[HPLC]* **WNY Hub:** Design a Community Campaign that incorporates enhanced performance and participant satisfaction standards. *[LPLC]* **WNY Hub:** Leverage Community Campaign and Local Pilot and Project funding to build and demonstrate Hub-led energy assessment and project management capacity. *[HPHC]*
	In rural communities, there's a lack of trained and qualified clean energy contractors and workers which causes long delays for projects to be approved and scheduled for installation; in urban DACs there are a lack of Minority and Women-owned contractors serving those communities.	**NYS:** Provide funding, potentially through the Office of Just Energy Transition, to develop a network of small, neighborhood-based Sustainability Workforce Training Centers in DACs and encourage collaboration with community colleges, state universities, and building trades unions in those communities. *[HPHC]* **NYSERDA:** Promote and incentivize training and credentialing opportunities to new or existing MWBEs that will enable participation in NYSERDA programs. *[HPLC]* **WNY Hub:** Use budgeted MWBE capacity building support funds to buy down cost of training and credentialing for new contractors. *[HPLC]*

	Projects that require coordination with multiple contractors create scheduling and project completion challenges that have negative impacts for residents.	**NYSERDA:** Develop case studies and how-to toolkits documenting successful attempts across the Regional Hubs network to braid NYSERDA and non-NYSERDA programs. *[LPLC]* **NYSERDA:** Provide cross-training opportunities in building performance to non-NYSERDA contractors to better align general home repair and clean energy program objectives. *[LPHC]* **NYSERDA:** Provide project management training and support for Hubs implementing braided program models. *[LPLC]* **NYSERDA:** Pilot new HCR/NYSERDA braided program models. *[HPHC]*
	Contractors struggle with cash flow to initiate projects and programs are often late in reimbursing contractors for completed work.	**NYSERDA:** Change program rules to provide additional upfront financial support to contractors, with a focus on MWBEs, that commit to partnering with Regional Hubs and providing a high standard of service to DACs. *[HPHC]*
Outreach and Education	Travel costs and logistics for residents in rural communities deter participation in outreach events and workshops.	**NYSERDA:** Provide transportation funding to Hubs engaged in rural outreach to offer to residents to offset travel costs to workshops and incentivize participation. *[HPLC]*
	More extensive networks of community-based organizations are standing by to support outreach and education in DACs if resources are available.	**NYSERDA:** Increase overall funding levels for the Hubs initiative statewide to maximize opportunities for stakeholder and community engagement and participation. *[HPHC]* **WNY Hub:** Utilize resources available for Community Campaigns or Local Pilots and Projects to demonstrate the efficacy of an all-hands-on-deck approach. Direct funds to support time and effort or deliverables-based contributions from additional partners. *[HPLC]*

Next Steps

Develop and Assessment of Recommendations

The recommendations and opportunities outlined above were coded as follows:

Table 8. Assessment of Recommendations

High Priority, Low Complexity [HPLC] Recommendations with the greatest potential impact and ease of implementation. These recommendations will provide meaningful benefits to DACs and can be implemented by mobilizing existing Hub resources and partnerships or through modest programmatic changes.
High Priority, High Complexity [HPHC] Recommendations with the greatest potential impact and difficulty of implementation/outside the Hub scope of work. These recommendations will provide meaningful benefits to DACs and can be implemented through legislative reform, regulatory rulemaking, or significant programmatic changes.
Low Priority, Low Complexity [LPLC] Recommendations with the least potential impact and greatest ease of implementation. These recommendations will provide fewer benefits to DACs and can be implemented by mobilizing existing Hub resources and partnerships or through modest programmatic changes.
Low Priority, High Complexity [LPHC] Recommendations with the least potential impact and greatest difficulty of implementation/outside the Hub scope of work. These recommendations will provide fewer benefits to DACs and can be implemented through legislative reform, regulatory rulemaking, or significant programmatic changes.

Implementing Recommendations

Recommendations labeled HPLC will take precedence over implementation of the remaining recommendations because they stand a greater chance of delivering benefits to DACs at a timescale that aligns with the remaining term of the WNY Hub contract. Many of the HPLC recommendations can feature in Community Campaigns and/or Local Pilots and Projects. The WNY Hub has yet to draw down those supplemental funds and will work to closeout 2024 by developing a set of preliminary proposals for the design or co-design of various HPLC recommendations using the supplemental funding.

Appendix 1

Energy Generation Jobs, 2016-2022

County	2016	2022	Change	% Change
Allegany				
Solar	57	<10	-52	-91.2%
Wind	<10	<10	0	0.0%
Hydroelectric	67	40	-27	-40.3%
Natural Gas	<10	<10	0	0.0%
Coal	<10	76	71	1420.0%
Oil & Fossil Fuel	<10	<10	0	0.0%
Other	<10	<10	0	0.0%
Cattaraugus				
Solar	17	12	-5	-29.4%
Wind	<10	12	7	140.0%
Hydroelectric	<10	<10	0	0.0%
Natural Gas	<10	<10	0	0.0%
Coal	<10	12	7	140.0%
Oil & Fossil Fuel	<10	<10	0	0.0%
Other	24	<10	-19	-79.2%
Chautauqua				
Solar	<10	25	20	400.0%
Wind	<10	<10	0	0.0%
Hydroelectric	12	<10	-7	-58.3%
Natural Gas	32	<10	-27	-84.4%
Coal	94	<10	-89	-94.7%
Oil & Fossil Fuel	<10	17	12	240.0%
Other	74	<10	-69	-93.2%
Erie				
Solar	450	1,180	730	162.2%
Wind	113	134	21	18.6%
Hydroelectric	182	96	-86	-47.3%
Natural Gas	62	16	-46	-74.2%
Coal	152	113	-39	-25.7%
Oil & Fossil Fuel	<10	57	52	1040.0%
Other	674	<10	-669	-99.3%
Niagara				
Solar	68	47	-21	-30.9%
Wind	15	17	2	13.3%
Hydroelectric	36	404	368	1022.2%

Natural Gas	38	28	-10	-26.3%
Coal	113	90	-23	-20.4%
Oil & Fossil Fuel	<10	13	8	160.0%
Other	86	<10	-81	-94.2%

Transmission, Distribution, and Storage Jobs, 2016-2022

County	2016	2022	Change	% Change
Allegany				
Traditional	181	231	50	27.6%
Storage	<10	<10	0	0.0%
Smart Grid	<10	<10	0	0.0%
Micro Grid	<10	<10	0	0.0%
Other Grid Mod	n/a	<10	n/a	n/a
Cattaraugus				
Traditional	121	93	-28	-23.1%
Storage	<10	<10	0	0.0%
Smart Grid	<10	<10	0	0.0%
Micro Grid	<10	<10	0	0.0%
Other Grid Mod	n/a	<10	n/a	n/a
Chautauqua				
Traditional	305	296	-9	-3.0%
Storage	<10	<10	0	0.0%
Smart Grid	<10	<10	0	0.0%
Micro Grid	14	<10	-9	-64.3%
Other Grid Mod	n/a	<10	n/a	n/a
Erie				
Traditional	1,916	1,632	-284	-14.8%
Storage	45	987	942	2093.3%
Smart Grid	<10	<10	0	0.0%
Micro Grid	150	38	-112	-74.7%
Other Grid Mod	n/a	26	n/a	n/a
Niagara				
Traditional	291	251	-40	-13.7%
Storage	15	13	-2	-13.3%
Smart Grid	<10	<10	0	0.0%
Micro Grid	56	11	-45	-80.4%
Other Grid Mod	n/a	<10	n/a	n/a

Fuels Jobs, 2016-2022

County	2016	2022	Change	% Change

Allegany				
Coal	<10	<10	0	0.0%
Petroleum	<10	27	22	440.0%
Natural Gas	<10	<10	0	0.0%
Woody Biomass	34	31	-3	-8.8%
Corn Ethanol	12	<10	-7	-58.3%
Other Clean Fuel	19	12	-7	-36.8%
Other	n/a	<10	n/a	n/a
Cattaraugus				
Coal	<10	<10	0	0.0%
Petroleum	26	110	84	323.1%
Natural Gas	22	45	23	104.5%
Woody Biomass	41	38	-3	-7.3%
Corn Ethanol	<10	<10	0	0.0%
Other Clean Fuel	40	<10	-35	-87.5%
Other	n/a	10	n/a	n/a
Chautauqua				
Coal	<10	<10	0	0.0%
Petroleum	22	84	62	281.8%
Natural Gas	15	87	72	480.0%
Woody Biomass	25	23	-2	-8.0%
Corn Ethanol	16	<10	-11	-68.8%
Other Clean Fuel	90	17	-73	-81.1%
Other	n/a	<10	n/a	n/a
Erie				
Coal	<10	21	16	320.0%
Petroleum	708	1,045	337	47.6%
Natural Gas	600	1,120	520	86.7%
Woody Biomass	11	10	-1	-9.1%
Corn Ethanol	52	13	-39	-75.0%
Other Clean Fuel	337	53	-284	-84.3%
Other	n/a	119	n/a	n/a
Niagara				
Coal	<10	<10	0	0.0%
Petroleum	<10	25	20	400.0%
Natural Gas	<10	<10	0	0.0%
Woody Biomass	0	<10	5	
Corn Ethanol	24	<10	-19	-79.2%
Other Clean Fuel	29	26	-3	-10.3%
Other	n/a	<10	n/a	n/a

Energy Efficiency Jobs, 2016-2022

County	2016	2022	Change	% Change
Allegany	26	27	1	3.8%
Energy Star/Lighting	14	15	1	7.1%
Traditional HVAC	80	86	6	7.5%
High Efficiency HVAC & Renewable H&C	<10	<10	0	0.0%
Advanced Materials & Insulation	<10	<10	0	0.0%
Other	26	27	1	3.8%
Cattaraugus				
Energy Star/Lighting	44	44	0	0.0%
Traditional HVAC	34	39	5	14.7%
High Efficiency HVAC & Renewable H&C	53	56	3	5.7%
Advanced Materials & Insulation	<10	11	6	120.0%
Other	23	26	3	13.0%
Chautauqua				
Energy Star/Lighting	136	135	-1	-0.7%
Traditional HVAC	114	132	18	15.8%
High Efficiency HVAC & Renewable H&C	159	173	14	8.8%
Advanced Materials & Insulation	32	52	20	62.5%
Other	56	65	9	16.1%
Erie				
Energy Star/Lighting	1,372	1,406	34	2.5%
Traditional HVAC	1,174	1,446	272	23.2%
High Efficiency HVAC & Renewable H&C	1,509	1,730	221	14.6%
Advanced Materials & Insulation	308	374	66	21.4%
Other	360	445	85	23.6%
Niagara				
Energy Star/Lighting	224	226	2	0.9%
Traditional HVAC	194	221	27	13.9%
High Efficiency HVAC & Renewable H&C	250	266	16	6.4%
Advanced Materials & Insulation	50	60	10	20.0%
Other	58	65	7	12.1%

Appendix 2

Potential Regional Partners and Assets

Organization	County	Sector	Services
Buffalo Federation of Neighborhood Centers	Erie	Social Services	Care Management; Residential Services; Senior Services; BFNC Hope Center; Youth Services
Buffalo Urban League	Erie	Social Services	Housing and Community Development; Workforce Development; Youth Empowerment
SUNY Buffalo State University	Erie	Higher Education	Education and Training
Community Foundation for Great Buffalo	Erie	Philanthropy	Grant Making
Division of Citizens Services, Buffalo	Erie	Government	311 Call and Resolution Center
Lincoln Memorial United Methodist Church	Erie	Church	Community Development
Erie County Department of Health	Erie	Government	Public Health
Native American Community Services, Inc.	Erie and Niagara	Social Services	Community and Cultural Services, Information and Referral, Economic Development
Hispanics United of Buffalo	Erie	Social Services	Housing, Social Services, Health Services, Nutrition
Neighbor Works Community Partners	Erie and Niagara	Housing	Home Buyer Orientation and Education, Home Energy Audit
Partnership for the Public Good	Erie	Research	Policy and Social Issues Research for Buffalo
Habitat for Humanity - Buffalo	Erie	Housing	Homeownership
WNY Veteran Housing Coalition	Erie	Housing	Housing for homeless veterans
Westminster Economic Development Initiative (WEDI)	Erie	Business	Economic Development
Community Health Center of Buffalo	Erie & Niagara	Health	Community Healthcare services
SNAPCAP (Safety Net Healthcare)	WNY	Health	Community Healthcare services
Hearts and Hands	Niagara	Social Services	Transportation and In-Home Care Services
Niagara Falls Memorial Primary Care Center	Niagara	Health	Family Health

Horizon Health Services	Niagara	Health	Family Health
Parent Network WNY	Niagara	Health	Family Health
Lockport CareNet	Niagara	Health	Family Health
Pinnacle Services	Niagara	Social Services	Domestic Violence Prevention, Parenting and Youth Services
United Way of Greater Niagara	Niagara	Non-profit	Grant Making
YWCA of the Niagara Frontier	Niagara	Social Services	Housing, Youth and Community Services
Lockport Housing Authority	Niagara, Lockport	Housing	Housing Assistance
Emmanuel United Methodist Church	Niagara, Lockport	Church	Religious and Community Services
Grace Chapel	Niagara, Lockport	Church	Religion
New Directions Youth and Family Services	Eire & Niagara	Social Services	Youth and Family Care Services
University at Buffalo	Erie	University	Academic Services
Niagara County Government	Niagara	Government	County Government
Allegany County Government	Allegany	Government	County Government
Chautauquan County Government	Chautauqua	Government	County Government
Cattaraugus County Government	Cattaraugus	Government	County Government
Southern Tier West Regional Planning and Development Board	Allegany, Cattaraugus, and Chautauqua	Government	Regional Planning, Community Development, Economic Development
Salvation Army	Chautauqua	Social Services	Homelessness Prevention
United Way of Cattaraugus County	Cattaraugus	Non-profit	Grant Making
Connecting Communities in Action	Cattaraugus	Social Services	Utility Shutoff and Eviction Prevention, Weatherization Assistance, Housing Services
Jericho Road Community Health Center	Erie	Health	Immigrant and Refugee Services, Primary Healthcare
YMCA Lockport	Niagara	Social Services	Youth and Adult Services
First Presbyterian Church of Lockport	Niagara	Religious	Youth and Family Services
Veterans One-Stop Center	WNY	Social Services	Supportive Services for Veterans

Appendix 3

NYSERDA spending in Western New York

Prepared by: Switchbox

Alison Spencer

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Minh Nghiem

Juan-Pablo Velez

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Findings

Assisted

Assisted Home Performance is a ratepayer-funded, residential energy efficiency program run by NYSERDA. It targerts moderate income households, defined as households with annual incomes between 60% and 80% of their area's median income.

There are approximately 69,000 of these households across the five counties of Western New York.

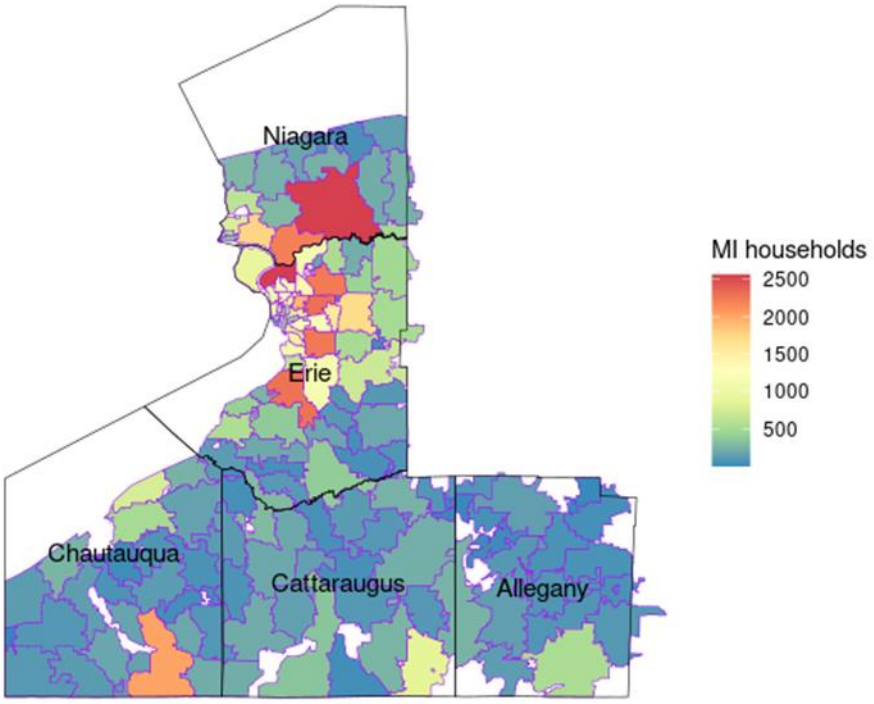

Figure 1: Number of moderate income households, by zip code

They are highly concentrated in Erie and Niagara counties.

Big picture

- Between 2010 and 2022, NYSERDA disbursed $18,081,182 on 8,401 energy efficiency projects across Western New York.
- These incentives catalyzed a further $41,853,095 in out-of-pocket spending by program beneficiaries.
- We estimate that 12.1% of eligible households across Western New York benefited from the program between 2010 and 2022. [1]
- These projects produced an estimated $3.1M in bill savings and 2.9M kWh in energy savings in their first year.

Projects over time

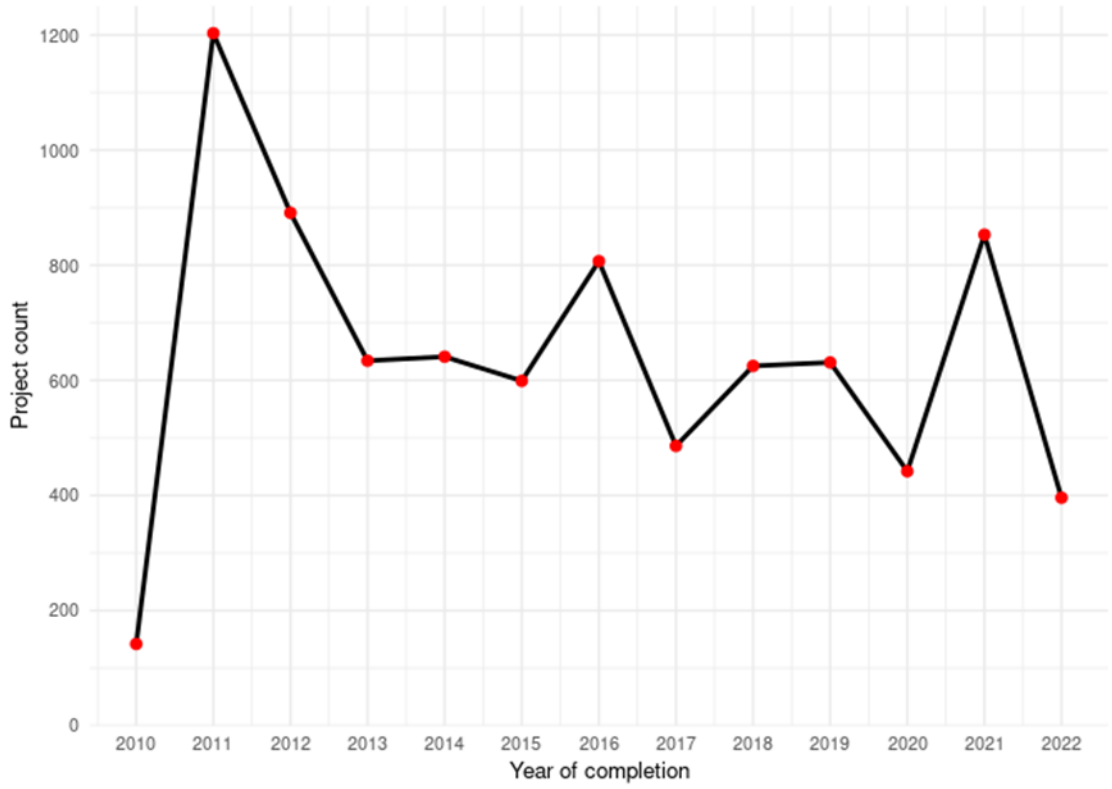

Figure 2: Number of completed Assisted projects by year

In 2011, contractors completed 1,203 projects across Western New York, the highest in any single year during our study period.

Projects appear to be on a downward trajectory since 2021, averaging around 700 projects a year and reaching a low of 396 in 2022. It's not clear why program activity declined, at from examining the data.

Spending by county

How did NYSERDA distribute this $18M across the 5 counties?

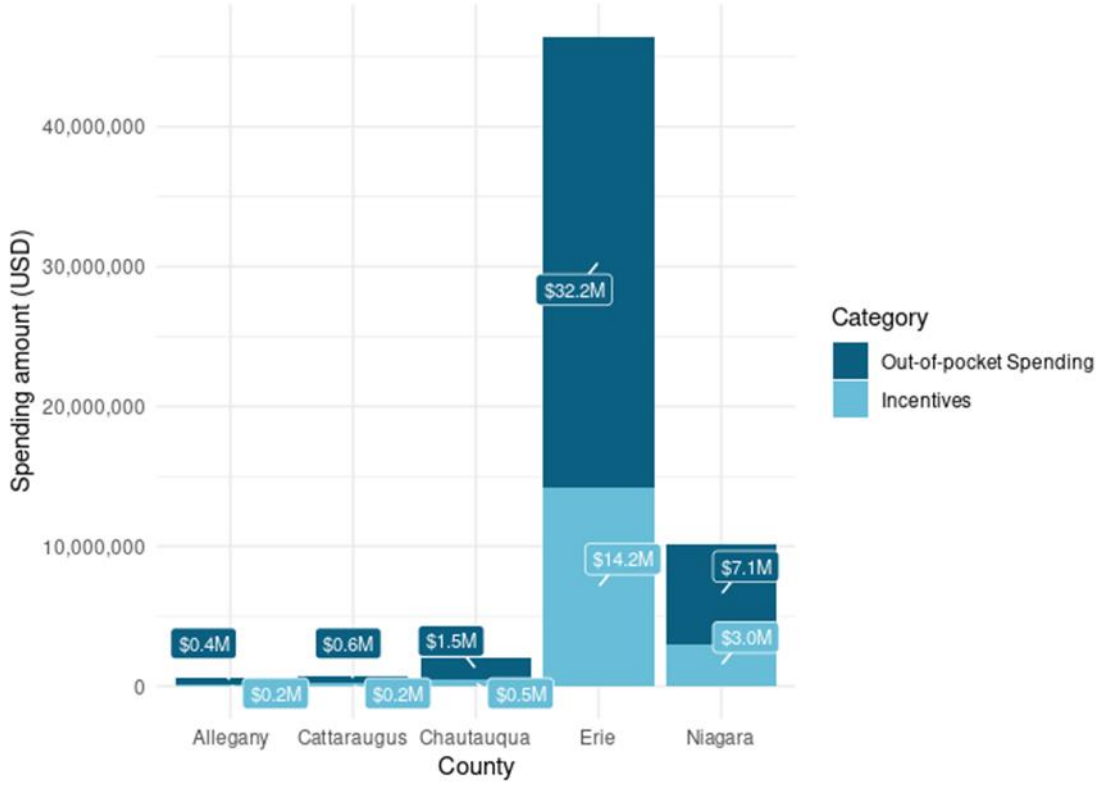

Figure 3: Assisted Incentives and Out-of-pocket Spending by County

95% of the incentive spending went to Erie and Niagara counties, with 4 out of 5 of those dollars going to Erie county.

What accounts for concentration of spending in the north of the region? Does it simply reflect where moderate income households live?

Let's take a look:

- Erie county, which has 67.2% of the eligible population, received 78.6% of the incentive spending.
- Niagara county, with 15.6% of the eligible population, received 16.8% of the incentive spending.
- Chautauqua, Allegany, and Cattaraugus, with 17.2% of the eligible population, received 4.6% of the spending.

County	Projects count	Total project spending	Total incentives	Total out-of-pocket spending	Total bill savings	Total energy savings (kW)
Erie	6,534	$46,435,577	$14,212,326	$32,223,251	$2,304,157	2,036,992
Niagara	1,487	$10,124,268	$3,035,614	$7,088,654	$625,764	561,205
Cattaraugus	82	$751,134	$181,951	$569,183	$67,431	60,817

Chautauqua	236	$2,024,400	$485,055	$1,539,345	$122,442	244,897
Allegany	62	$598,898	$166,236	$432,662	$29,062	50,503

Table 1: Assisted program statistics by county

While the majority of moderate income residents of Western New York do in fact live in Erie and Niagara counties—82% of households, to be precise—this does not fully explain the spending concentration.

It appears that the three rural counties in southern portion of New York State received a less-than-proportional share of the incentive spending between 2010 and 2022.

To understand why, let's look at program penetration, the percent of eligible households that benefited from the program:

County	MIHHs count	Beneficiary household percentage
Erie	46,535	14%
Niagara	10,819	14%
Cattaraugus	3,626	2%
Chautauqua	6,160	4%
Allegany	2,154	3%

Table 2: Assisted program subsidy recipients

While we estimate that 14% of eligible moderate income households in Erie and Niagara counties participated in the Assisted program during the study period, program penetration was much lower in Cattaraugus, Chautauqua, and Allegany.

In other words, the program is reaching a smaller percentage of moderate income households in the southern counties, despite the fact that the households make up a greater share of the population of many zip codes:

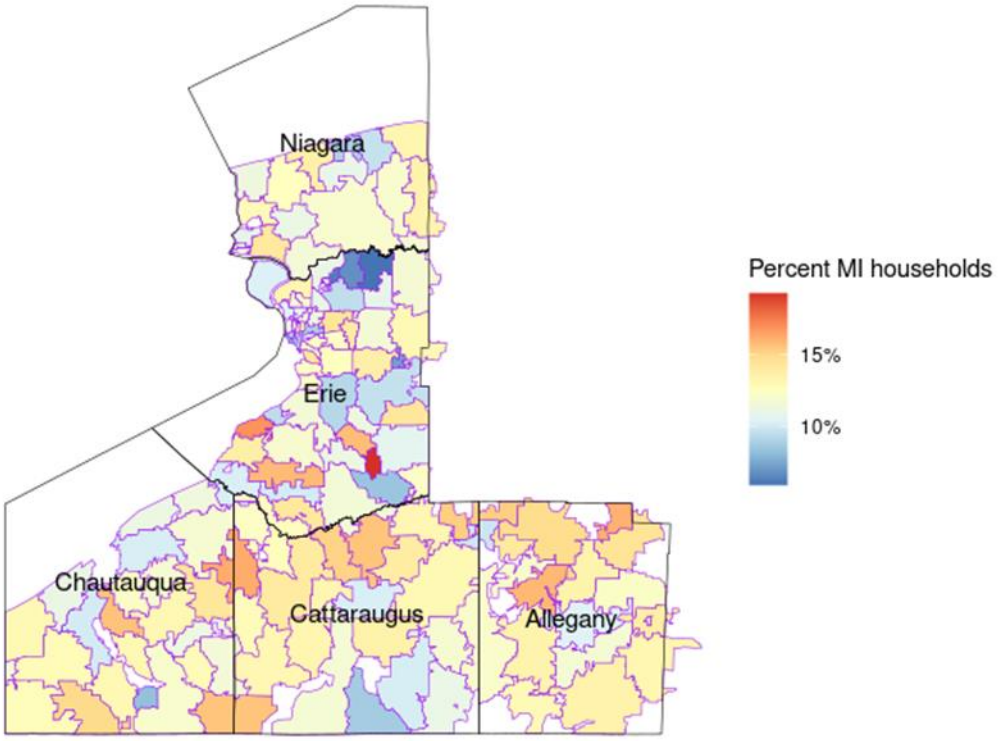

Figure 4: Percent of eligible households for Assisted program

Benefits by county

Despite the lower program penetration, the households that Assisted did reach in the southern counties enjoyed more than double the energy savings in the first year after the energy efficiency work was performed, on average:

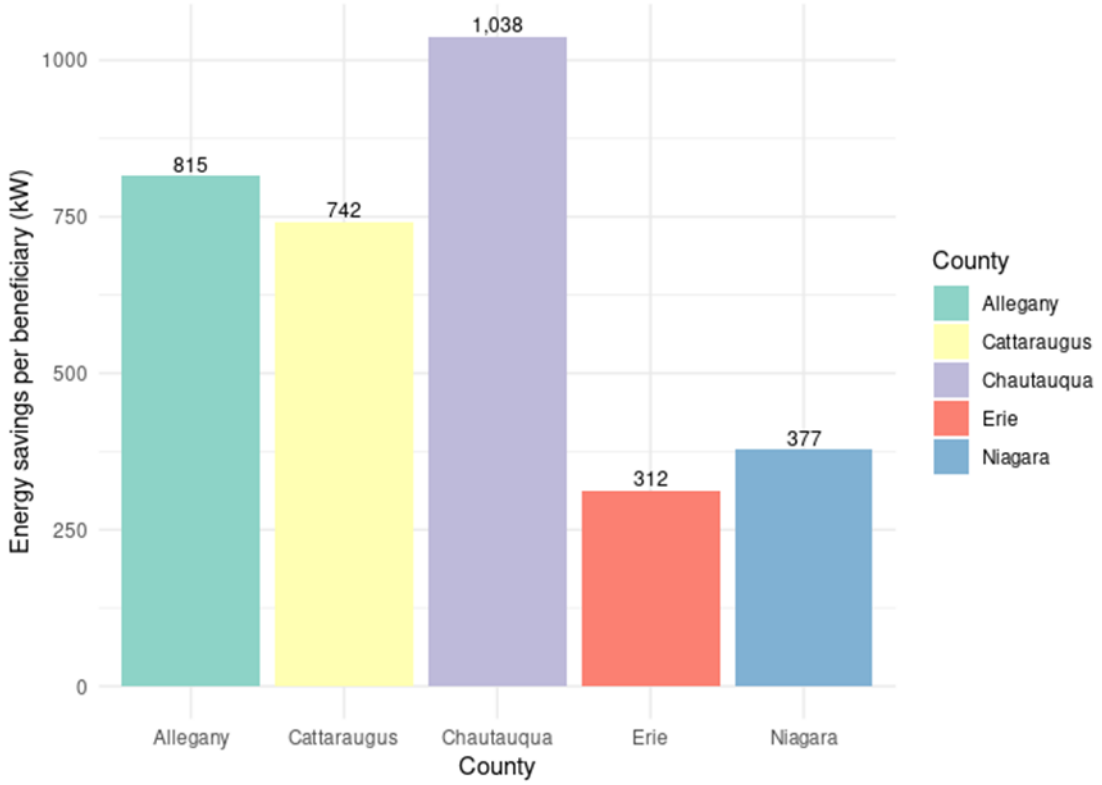

Figure 5: Energy savings per beneficiary by county for Assisted program

Why did that happen? Rural homes often consume more energy than urban ones, and so may be benefit more from energy efficiency measures. But another part of the story may be that households in these areas spent more on their projects:

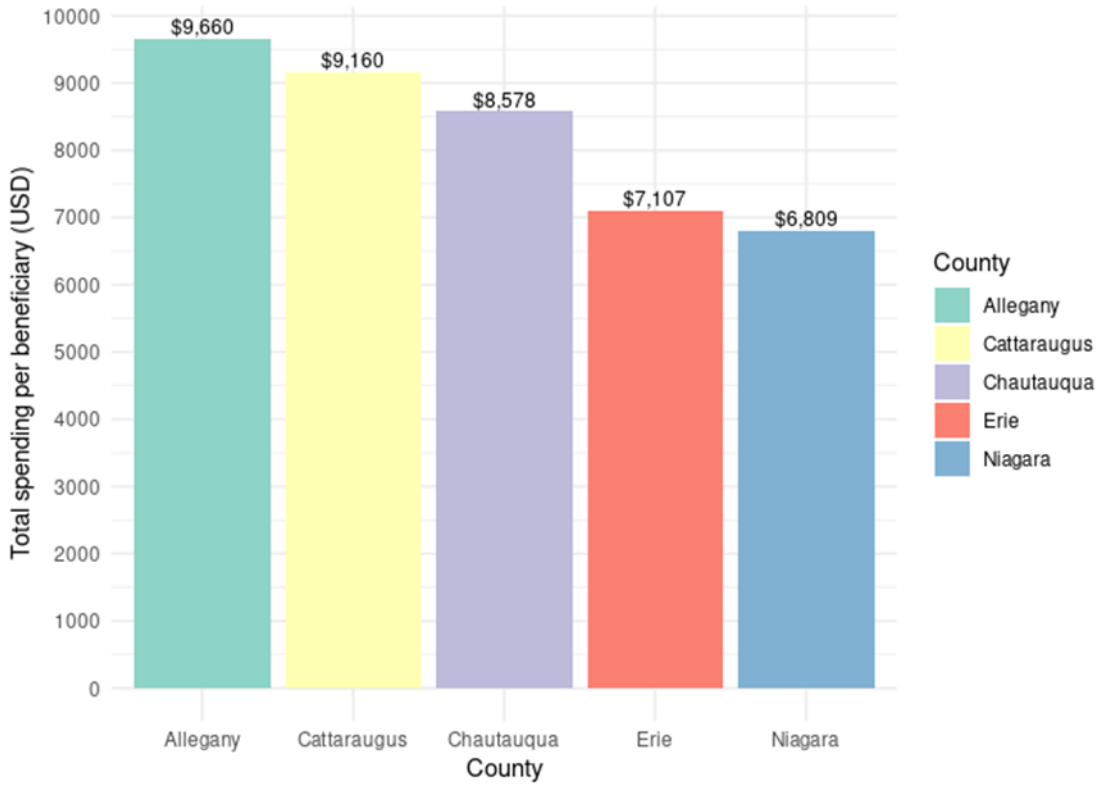

Figure 6: Total project spending per beneficiary by county for Assisted program

The average total project cost in Erie and Niagara—including both NYSERDA's incentives and household out-of-pocket costs—stands at $7K. In the southern counties, the average total project cost ranged between $8.5K and $9.5K.

County	Total spending	Incentives	Out-of-pocket spending
Erie	$7,107	$2,175	$4,932
Niagara	$6,809	$2,041	$4,767
Cattaraugus	$9,160	$2,219	$6,941
Chautauqua	$8,578	$2,055	$6,523
Allegany	$9,660	$2,681	$6,978

Table 3: Assisted program measures per beneficiary household by county

This is not primarily due to higher average incentive payments, however, but to high out-of-pocket costs. Projects in the southern counties spent 3 dollars out-of-pocket for every 1 dollar NYSERDA chipped in incentives. In Erie and Niagara, the ratio is close to 2-to-1.

Interestingly, however, the 2x better energy savings didn't translate into 2x more bill savings:

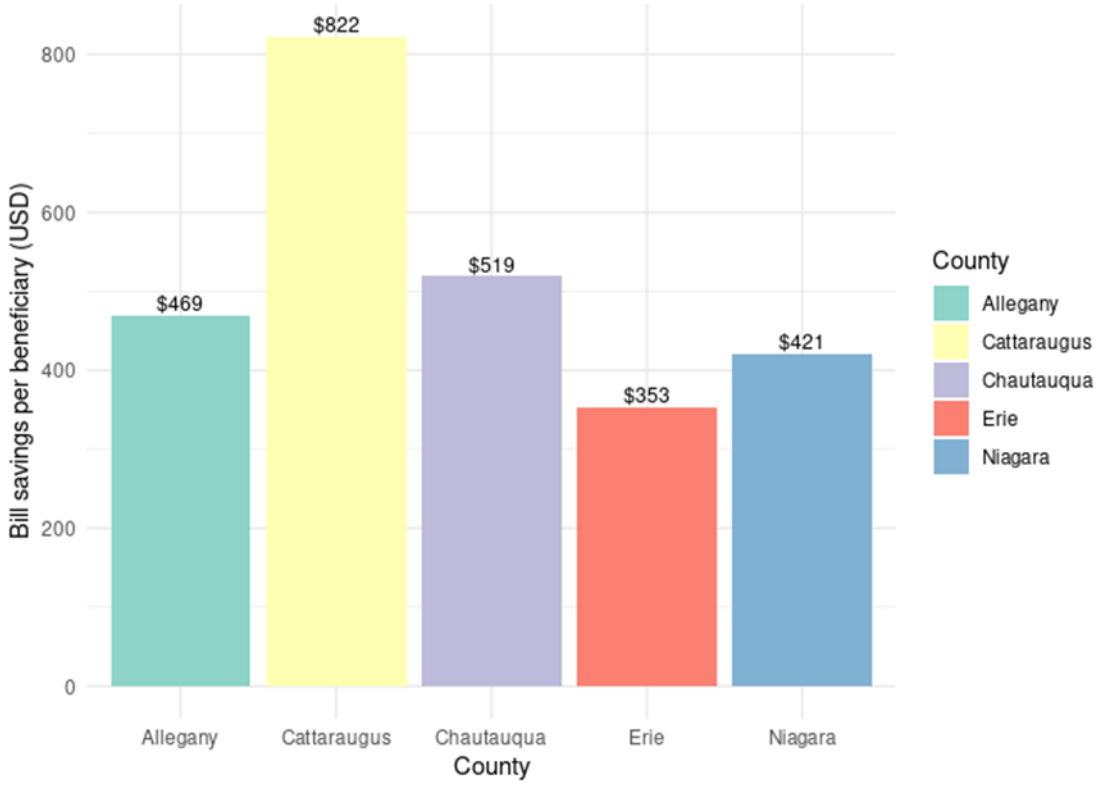

Figure 7: Bill savings per beneficiary by county for Assisted program

It's not immediately clear why this is the case.

Spending by race

How did NYSERDA distribute this $18M in demographic terms?

Let's start by examining the racial makeup of moderate income households across Western New York:

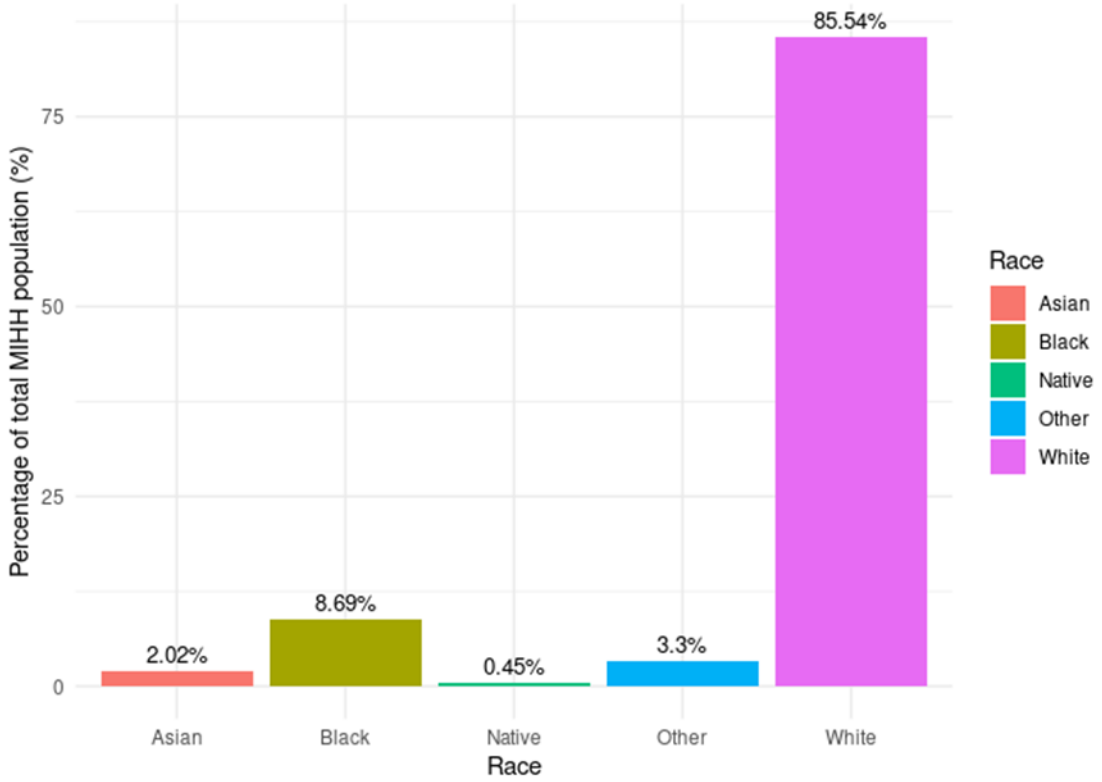

Figure 8: Racial makeup of middle income households in WNY

If the racial makeup of *program beneficiaries* looks similar, we can conclude that the money was spent equitably—if we assume that the energy efficiency need is roughly equal across racial groups.

This is a big assumption, and unfortunately we lack the data to verify if it is true. (If that assumption doesn't hold, in other words, then the chart doesn't provide a basis for judging the equity of how the money was spent.)

And we need to make a second assumption before we can crunch the numbers: NYSERDA doesn't tell us the race of the household behind each Assisted project, only the zip code that household lived in. This allow us to calculated how many spending went to each zip code. We assume that households in a given zip code are all equally likely to receive funds from Assisted, regardless of race. In other words, we must assume that within a given zip code, a moderate income white household is just as likely to have done an Assisted project as a moderate income black household.

With those two caveats in mind, let's look at the estimated racial makeup of program beneficiaries in Western New York:

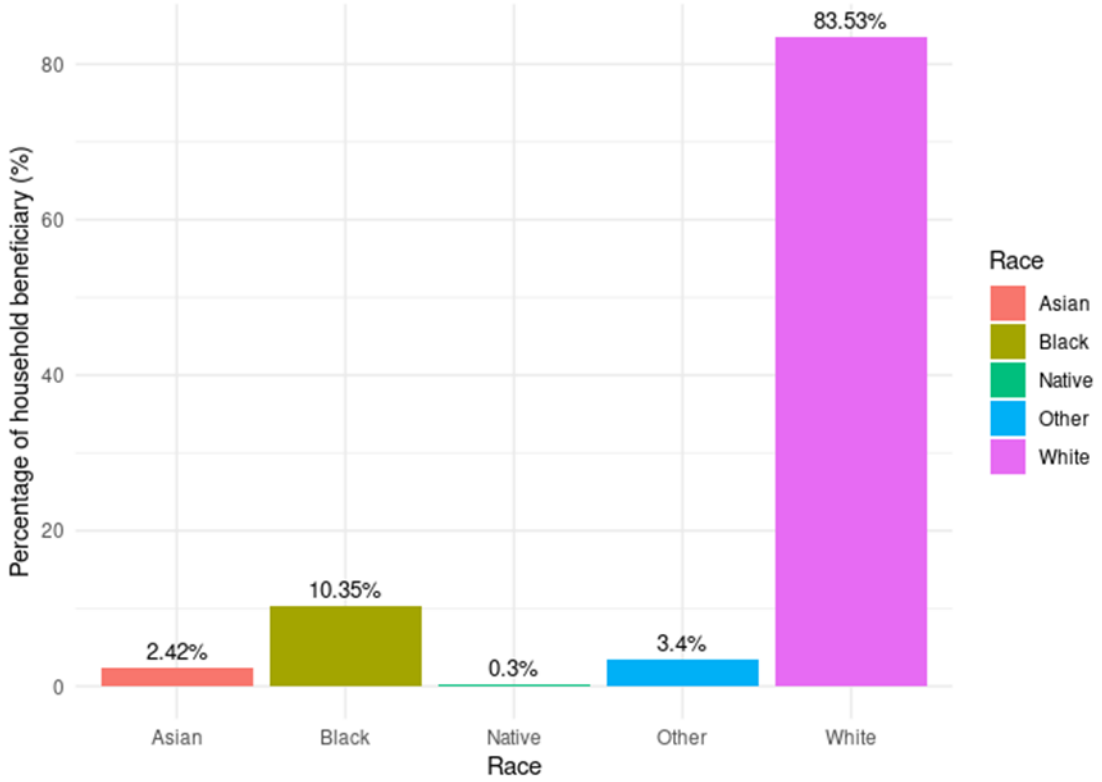

Figure 9: Racial makeup of moderate income households in WNY

White households made up 85.5% of the moderate income population, and we estimate they made up 84% of households that did Assisted programs. The percentages are similar across racial groups: Black households made up 8.7% of the eligible population and 10% of program beneficiaries, asian households made up 2% and 2%, and so on.

While not definitive, this finding suggests that Assisted incentives were spent in a broadly equitable way in Western New York.

Empower

NYSERDA's Empower program subsidizes energy efficiency interventions for low-income New Yorkers, defined as households whose annual income is under 60% AMI.

There are approximately 253,000 of these households across Western New York.

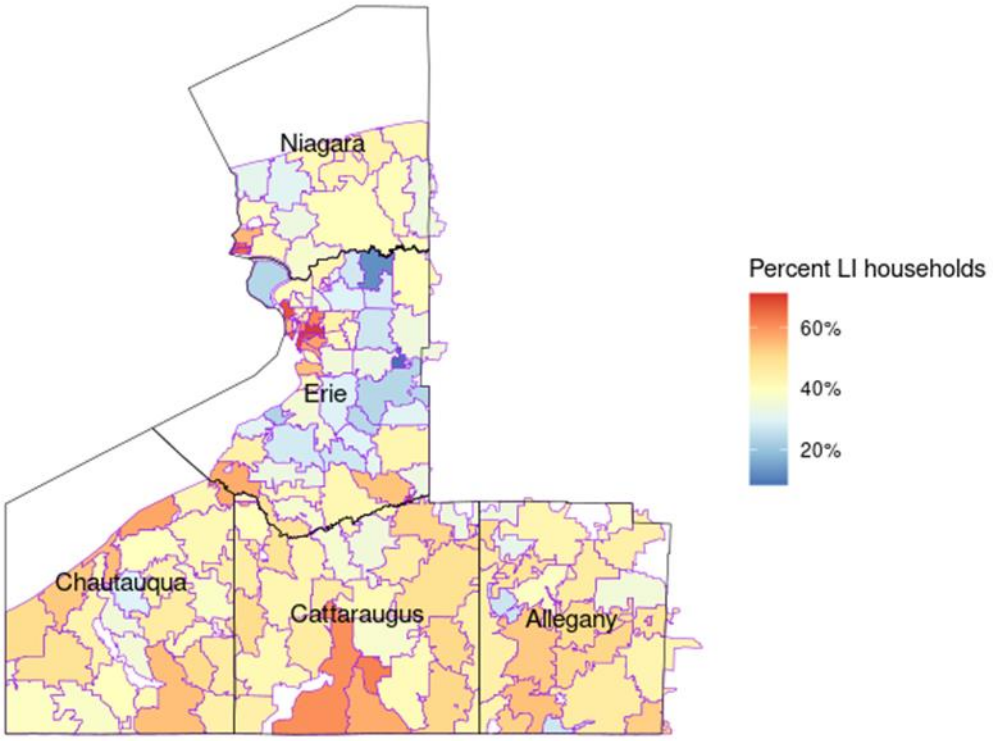

Figure 10: Percent Empower eligible households (WNY)

They are most concentrated in Buffalo, where low income households often make up 60% of a zip code, and the southern counties, where they make up 40-50% of the population, on average.

Unlike Assisted, Empower covers a project's total cost,[2] providing free energy retrofits to eligible households. In other words, incentives equal the total project cost, and there is no out-of-pocket spending.

Big picture

- Between 2018[3] and 2023, NYSERDA disbursed $53,653,748 for the completion of 8,793 residential energy efficiency projects in Western New York.
- We estimate that 3.47% of eligible households in the region benefited from the program between 2018 and 2023. [4]
- These projects produced an estimated $3.3M in first-year bill savings, and 3,8M kW in first-year energy savings across Western New York.

Projects over time

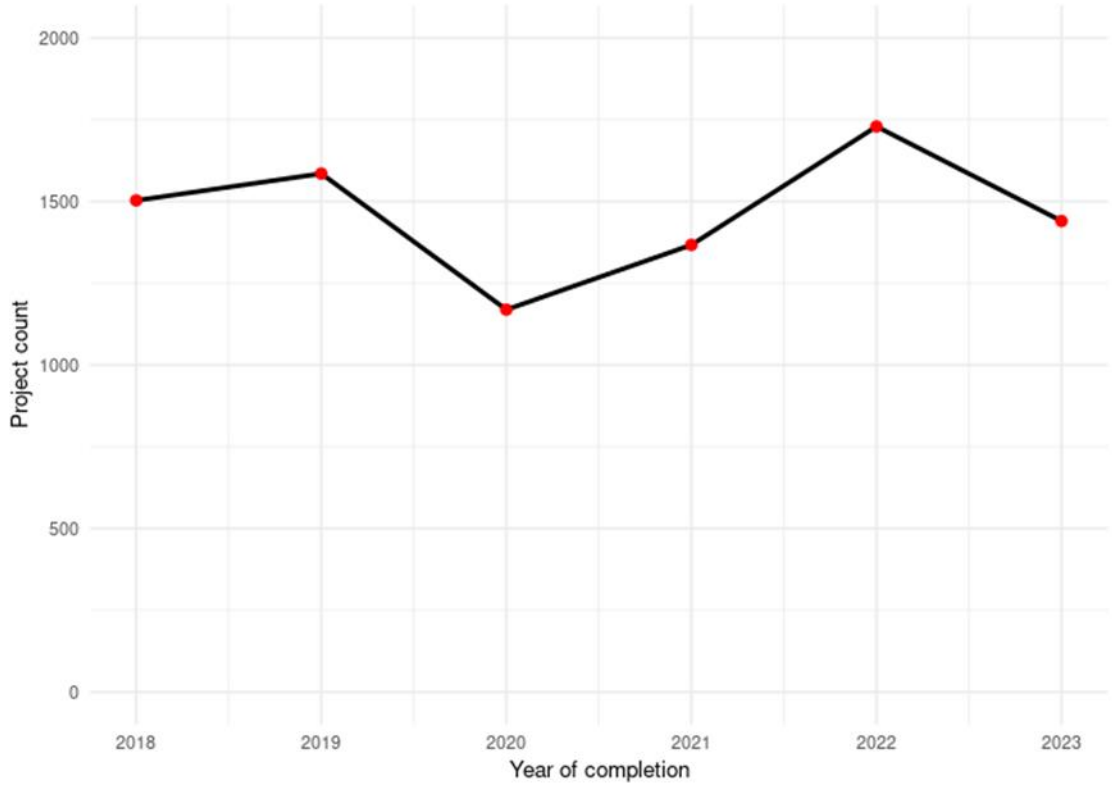

Figure 11: Number of completed Empower projects by year

The annual number of completed projects per year was fairly consistent in our study period, averaging around 1,500 projects a year. The dip to a low of 1,169 projects completed in 2020 was likely caused by the Covid pandemic.

It's also worth noting the difference in scale between Empower, with an average of 1,465 projects a year, and Assisted, with an average of 642 projects.

This difference could be due to Empower's more generous subsidies, which may encourage household participation and reduce the resistance of landlords to out-of-pocket expenses.

Spending by county

How did NYSERDA distribute Empower funds across the 5 counties?

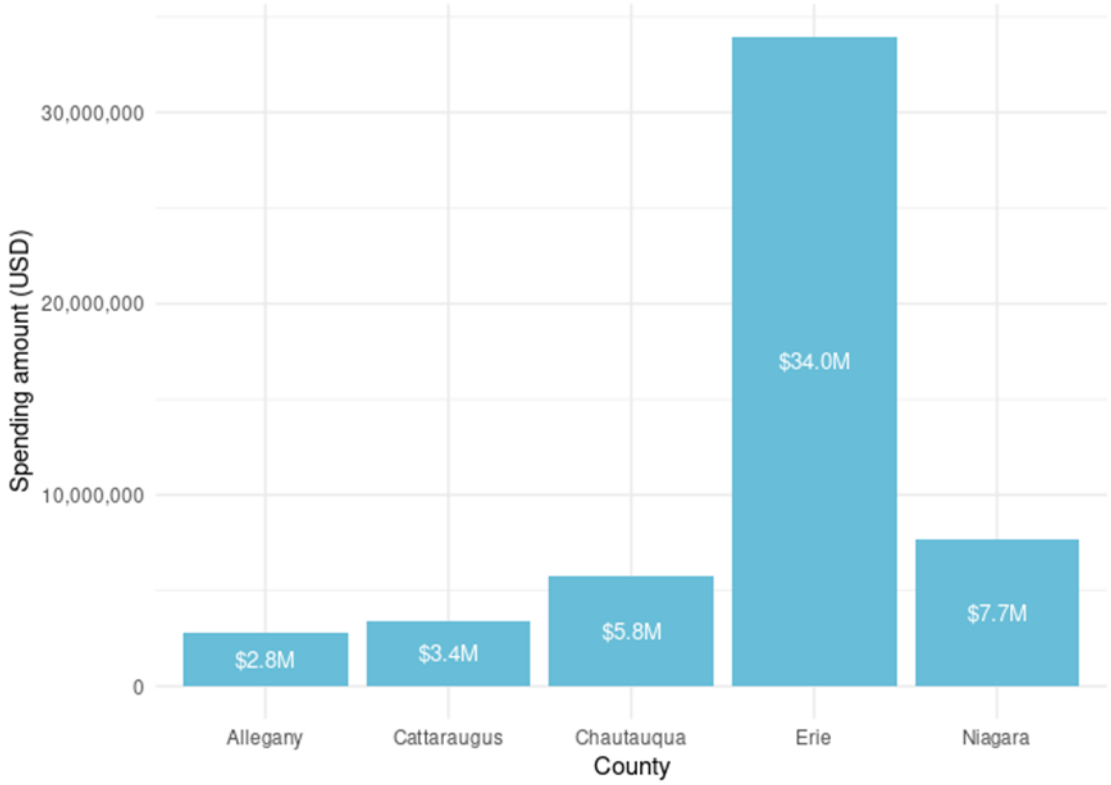

Figure 12: Incentives Spending by County

- Erie county, which has 66.5% of the eligible population, received 63.3% of the incentive spending.
- Niagara county, with 15.1% of the eligible population, received 14.3% of the incentive spending.
- Chautauqua, Allegany, and Cattaraugus, with 18.4% of the eligible population, received 22.4% of the spending.

The pattern here is the opposite of Assisted: the southern counties received a slightly larger-than-proportional share of the incentive spending, while Erie and Niagara, where the majority of low-income households live, received a slightly less-than-proportional share.

Program penetration sheds a light on this finding:

County	Potential beneficiaries count	Subsidy recipients percentage
Erie	168,561	3.43%
Niagara	38,170	3.15%
Cattaraugus	14,072	3.75%
Chautauqua	25,249	3.51%
Allegany	7,436	5.43%

Table 4: Empower program beneficiary percentage

Compared to Assisted, which had much higher program penetration in Erie and Niagara counties, Empower's rates are much more similar across counties. The one exception is Allegany county, where an estimated 5.43% of eligible households have participated.

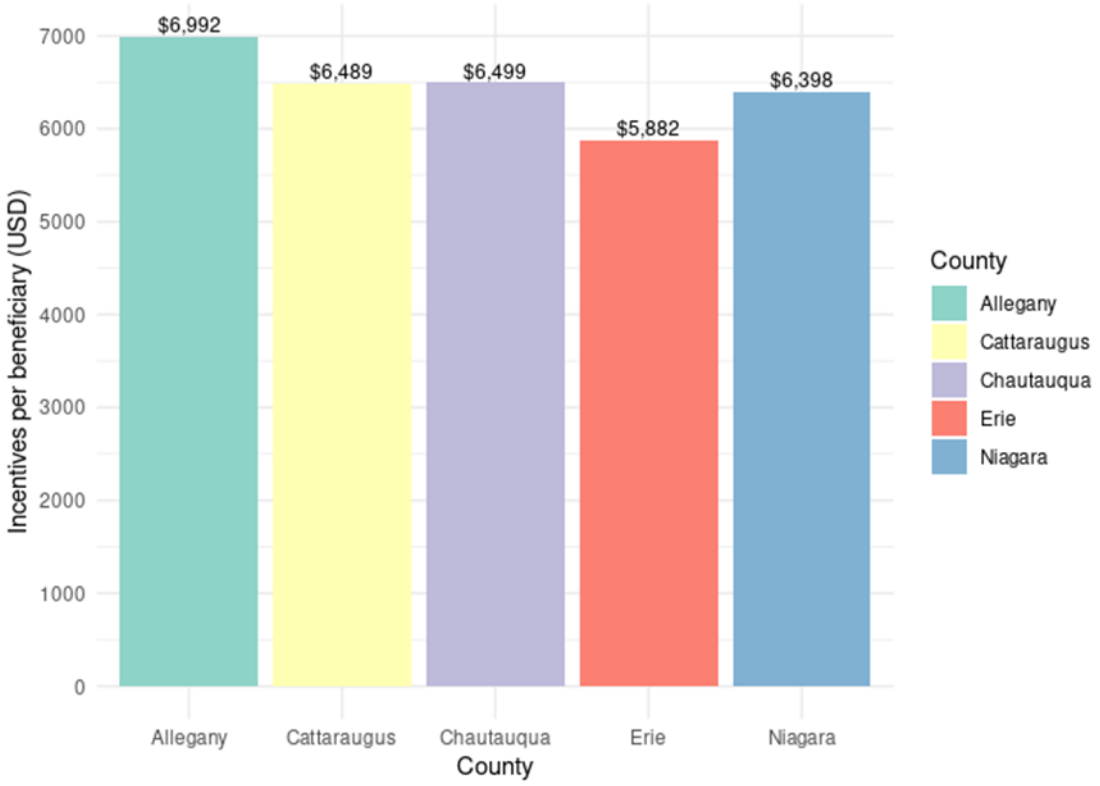

Figure 13: Total incentives per beneficiary by county for Empower program

On top of that, program participants in southern counties received $600-1,100 more than in Erie county, on average, which helps explain why these these counties received a slightly larger-than-proportional share of the funding. Given that Empower covers 100% of eligible energy efficiency measures, this per capita funding difference may reflect the higher expensive in energy efficiency retrofits in rural areas.

Benefits by county

As in the case of Assisted, participating households in Southern counties received greater first-year energy savings than those in Niagara and Erie, though the difference is not as stark.

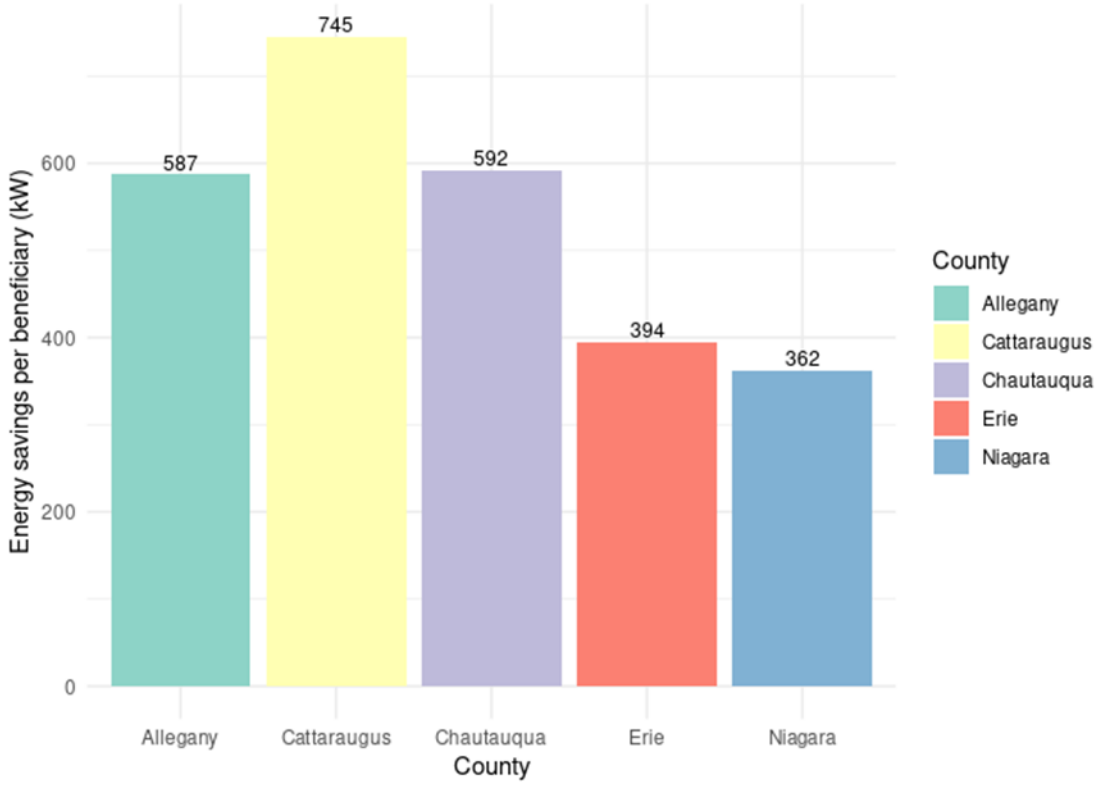

Figure 14: Energy savings per beneficiary by county for Empower program

This different in energy savings, could be partly due to the higher per-capital project costs in these counties, though the savings gap was larger than the cost gap.

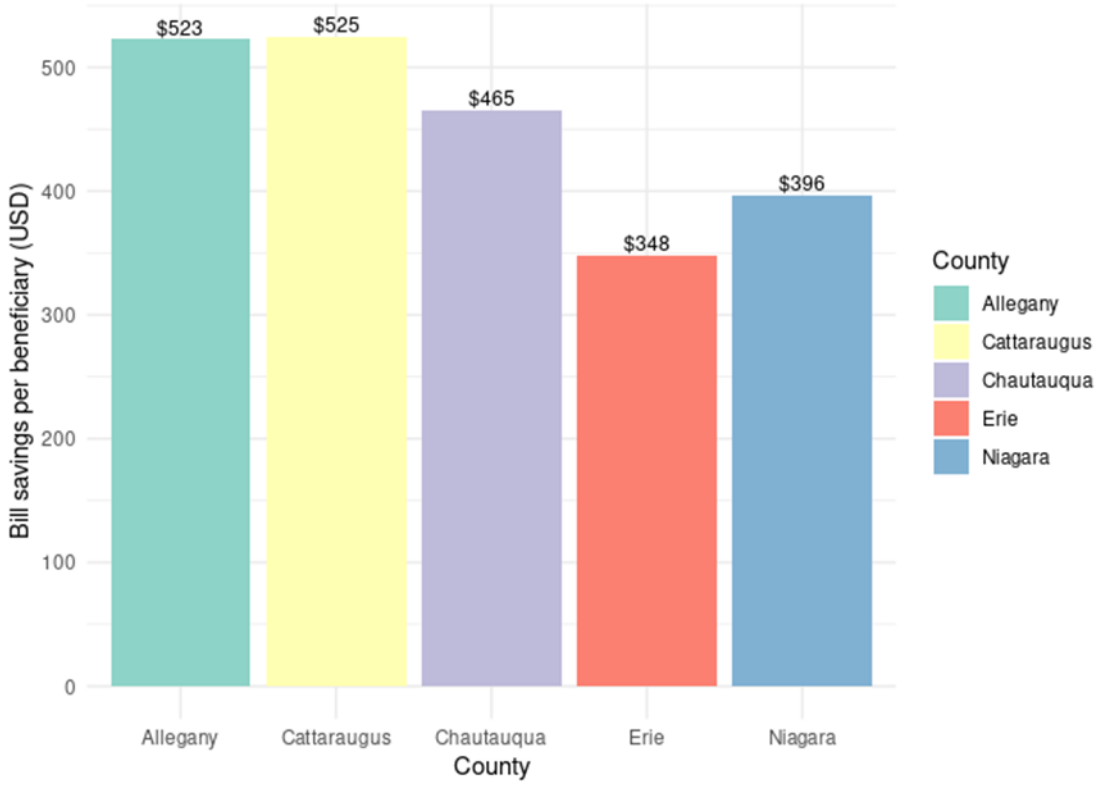

Figure 15: Bill savings per beneficiary by county for Empower program

The disparity in energy savings also translated to a disparity in bill savings, with Southern counties saving more than Northern ones. However, as with Assisted, the bill savings gap was smaller than the energy savings gap.

Interestingly, bill savings didn't line up perfectly with energy savings. Allegany had virtually the same first-year bill savings as Cattaraugus, but lower energy savings. In the other direction, Erie had slightly higher first-year energy savings than Niagara, but lower bill savings.[5]

Spending by race

Next, we examine how NYSERDA distributed Empower's $53.6M in demographic terms, first by looking at the racial composition of low income households in Western New York:

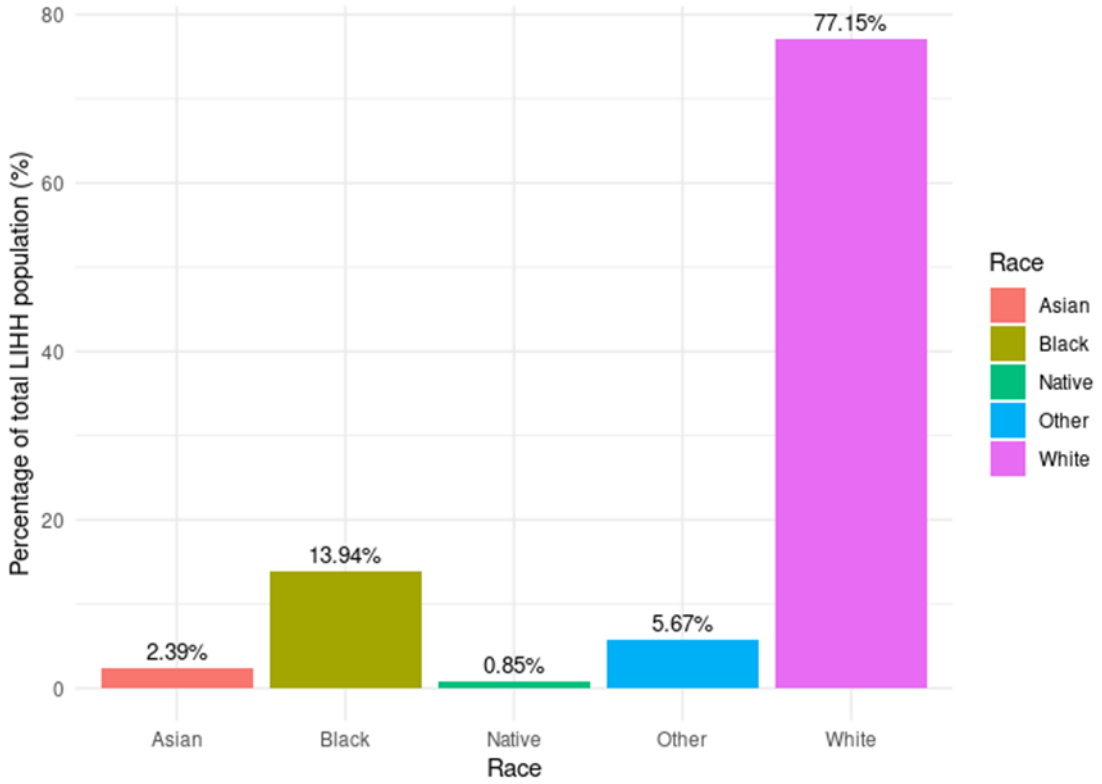

Figure 16: Racial makeup of low income households in WNY

Once again, if the racial makeup of *program beneficiaries* looks similar, we can conclude that the money was spent equitably—if we assume that the energy efficiency need is roughly equal across racial groups.

As with Assisted, NYSERDA doesn't provide us with the race of program participants, only the financial details of each project, and the zip code where the project took place.

If we make the same assumption that we did for Assisted—namely, that within a given zip code, a low-income white household is as likely to participate in Empower as a low-income household of any other race—we can estimate the racial makeup of the program's beneficiaries in Western New York:

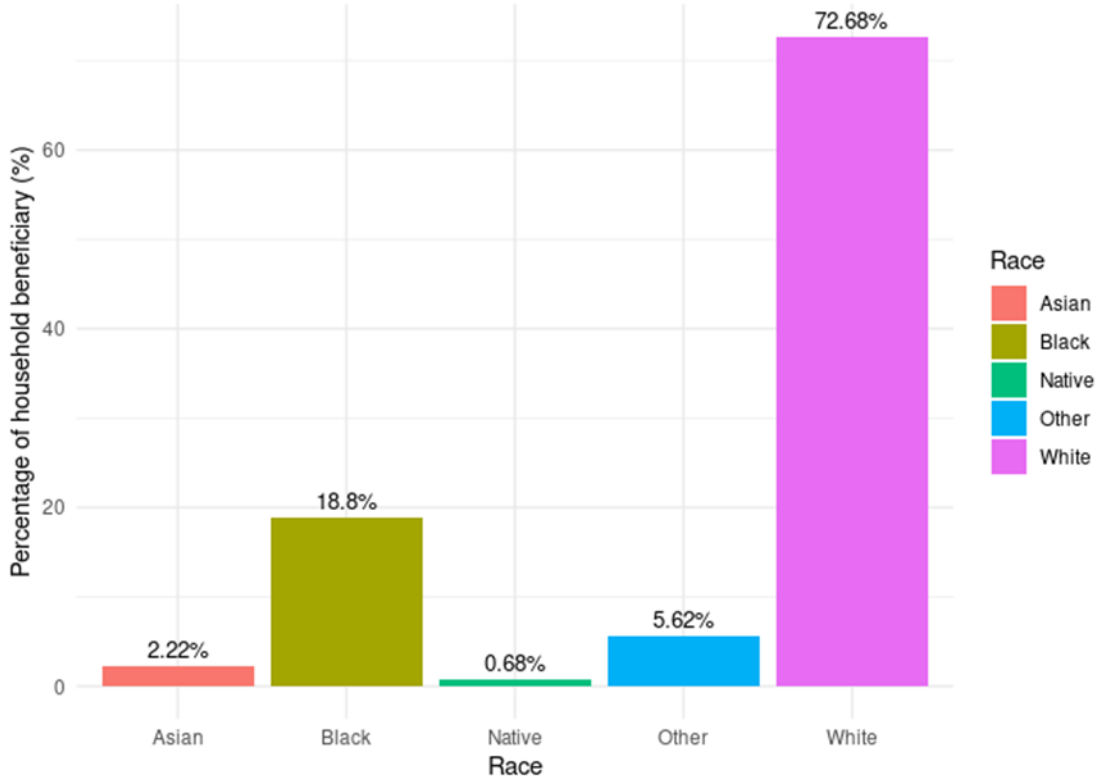

Figure 17: Racial makeup of Empower program's beneficiary households in WNY

- White households make up 77.2% of low-income population, and 72.7% of Empower households.
- Black households make up 13.9% of low income population, and 18.8% of Empower households.
- The percentages of other races were nearly identical.

Despite our assumptions, the positive 4 point difference between Black household eligibily and participation provides strong evidence that program funds were disbursed equitably.

NY-Sun: Residential

NY-Sun is NYSERDA's up-front incentive for distributed solar, including rooftop and community installations. [6]

This part of the analysis focuses on residential rooftop solar in Western New York. Any household that installs rooftop solar with a qualified contractor is eligible.

Big picture

- Between 2008 and 2023, NYSERDA disbursed $20,360,432 on 4,491 solar panel installation projects across Western New York.
- These incentives catalyzed a further $110,362,193 in out-of-pocket spending by program beneficiaries.
- We estimate that 0.79% of all eligible households across Western New York benefited from the program between 2008 and 2023.

- Taken together, these panels added 36 MW of solar capacity to the region.

Projects over time

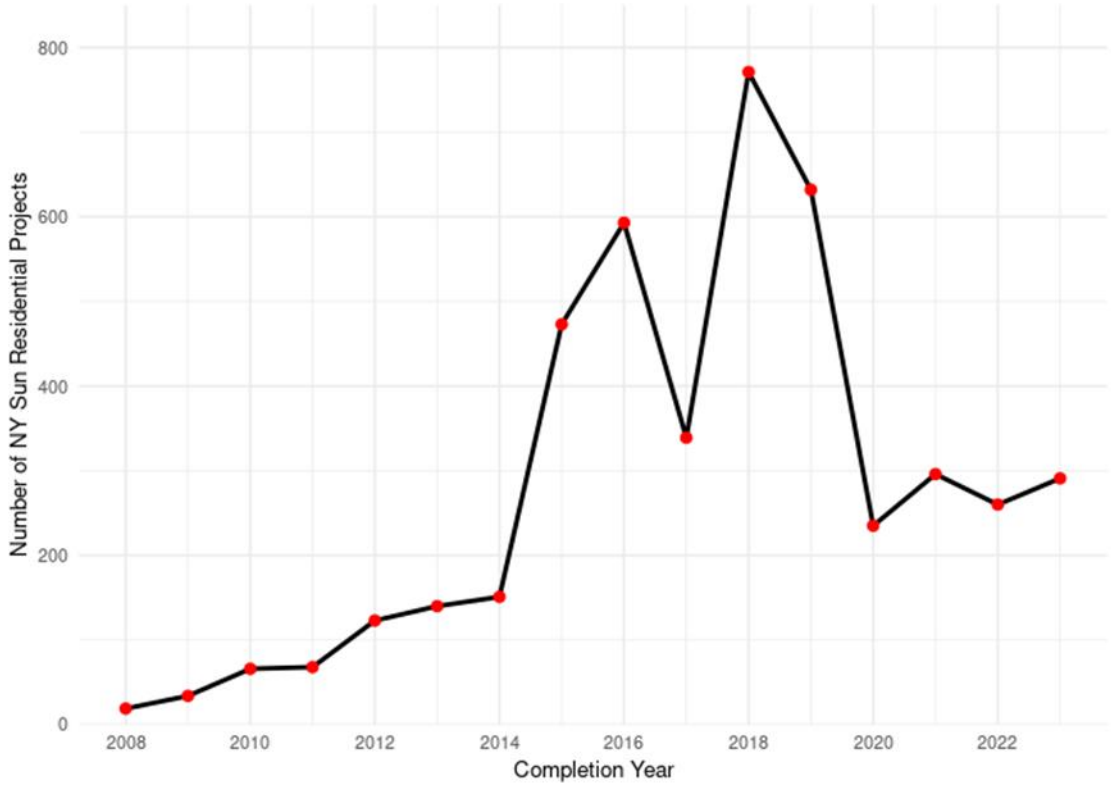

Figure 18: Number of completed NY Sun Residential projects by year

In contrast with Assisted and Empower, NY-Sun residential installations have increased over time.

Since 2020, just under 300 projects have been completed per year. This follows an explosion of projects during a 5-year period between 2015 and 2019, which saw roughly double as many installations. Before this period, installations climbed from a dozen region-wide in 2008 to approximately 150 in 2014.

It's not clear what caused this spike, though it may have to do with the drying up for NY-Sun funds post-2020.

For comparison, Assisted has average 600 projects a year in recent years, while Empower has averaged 1400.

Spending by county

How did NYSERDA distribute this $20M across Western New York?

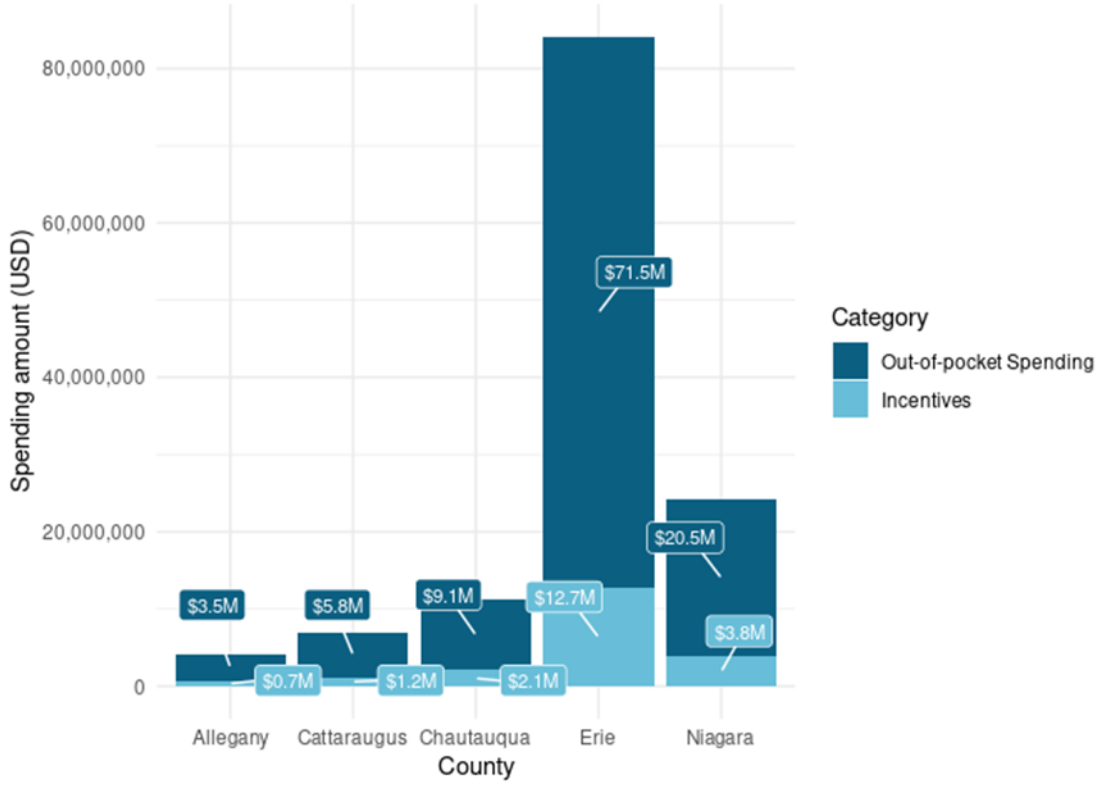

Figure 19: NY-Sun Residential Incentives and Out-of-pocket Spending by County

As we might expect, projects and funds are allocated in rough proportion to population: 62% of incentive spending went to Erie county, 19% to Niagara, and 19% went to the Southern counties.

County	Recipients percentage	Incentives per beneficiary
Allegany	0.76%	$5,546
Erie	0.75%	$4,165
Niagara	0.84%	$5,007
Cattaraugus	0.71%	$5,614
Chautauqua	0.70%	$5,671

Table 5: NY-Sun Residential by beneficiary by county

Program coverage is decently consistent across Western New York, ranging from 0.72% to 0.87% of total households in each county.

Benefits by county

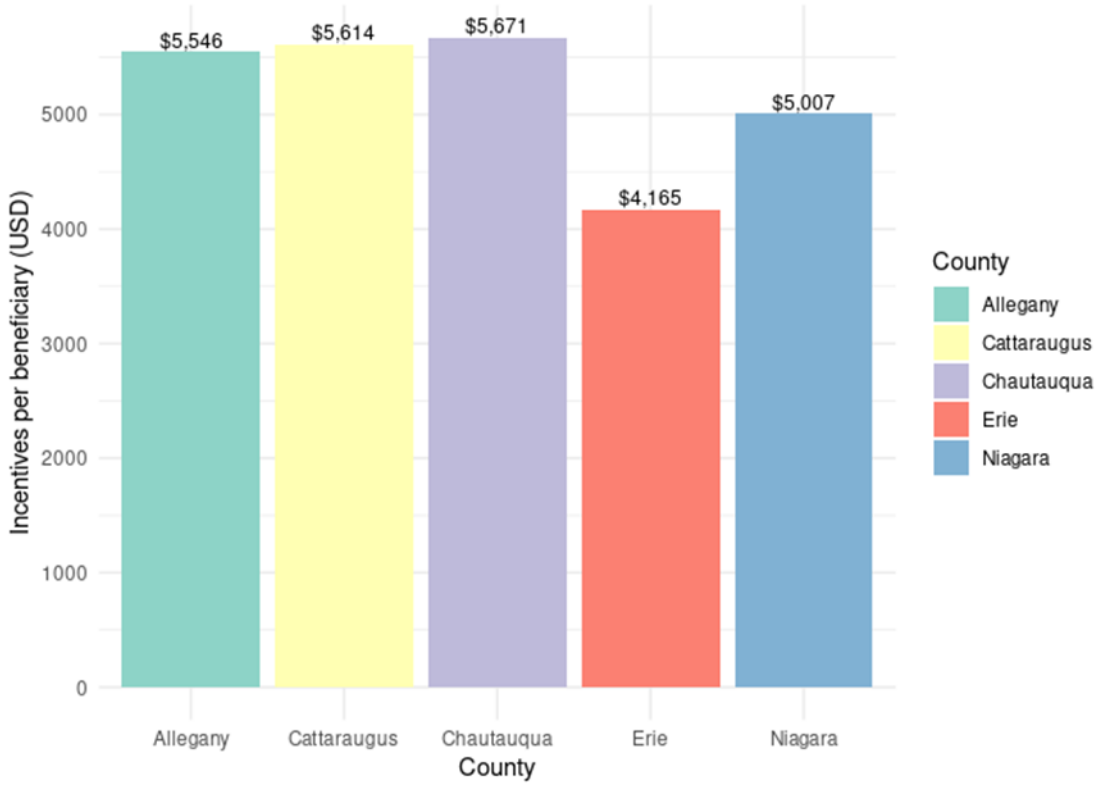

Figure 20: Total incentives per beneficiary by county for NY-Sun Residential program

Average incentives per project are considerably higher in the southern counties, averaging $5,500, 33% higher than the average in Erie, and 12% higher than Niagara.

While Erie County received the greatest aggregate subsidies due to its population size, the county's beneficiaries tend to get the least grant amount per household.

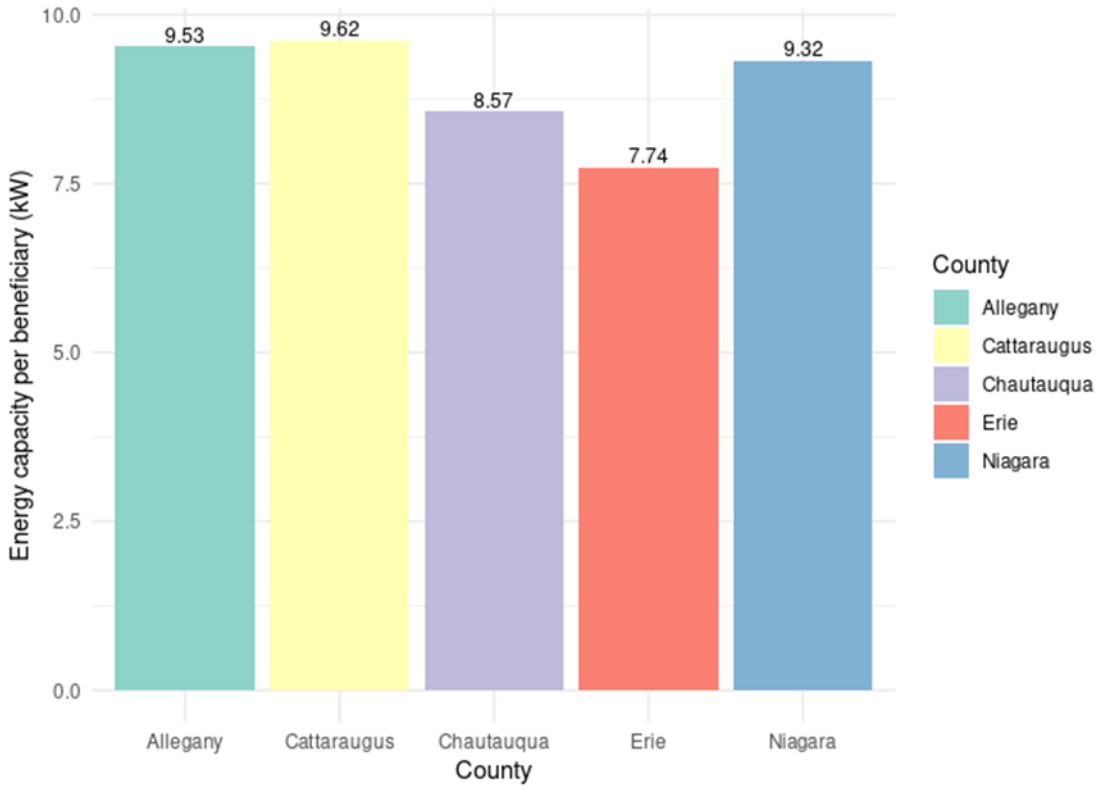

Figure 21: Energy capacity per installed system by county for NY-Sun Residential program

This is at least partly due to the larger size of residential solar installation in the, which in turn likely correlates with more available roof space in rural areas.

Spending by race

To assess the racial equity of NY-Sun spending in Western New York, let's start by examining the racial makeup of all households—not just LMI households—in the region:

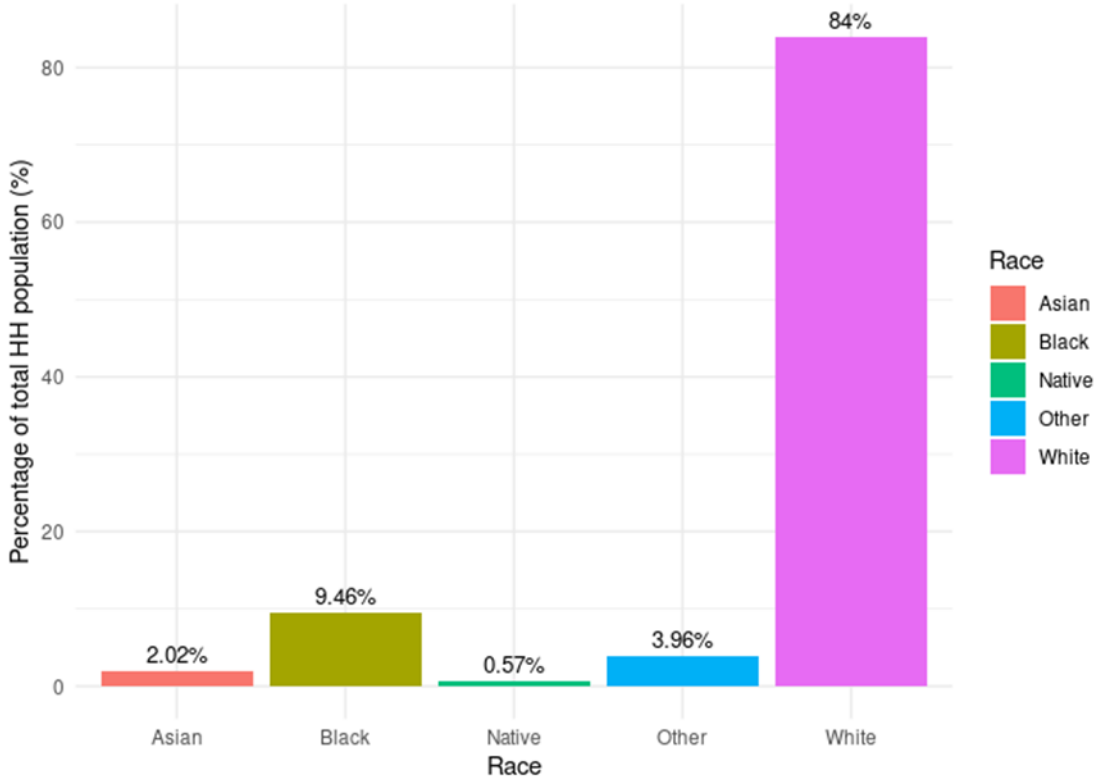

Figure 22: Racial makeup of all households in WNY

Once again, NYSERDA doesn't disclose the race of program beneficiaries, only the the technical and economic details of each installations, along with its zipc code.

Let's make our usual assumption—that a White household is equally likely to receive a NY-Sun incentive as a household of any other race—noting that the assumption is less likely to hold in this case, given that the likelihood of installing solar correlates with income, and income correlates with the race.[7]

Nevertheless, our imperfect estimate of the racial makeup of the NY-Sun residential program beneficiaries reveals a clear racial disparity in outcomes:

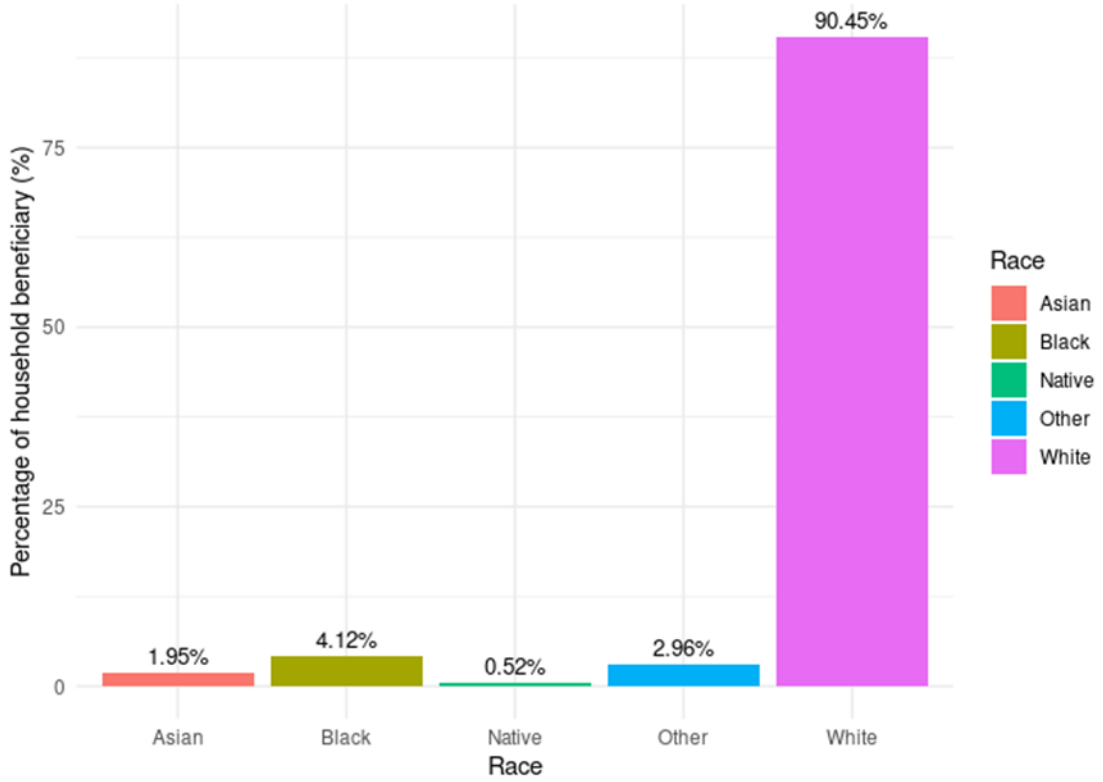

Figure 23: Racial makeup of NY-Sun Residential program's beneficiary households in WNY

While Black households represent 9.5% of the regional population, we estimate that only 4% of residential solar projects have install by Black households. While white households represent 82% of the population, we estimate they have received 90.5% of projects. Our estimates show less disparity for the other racial groups, although these figures are less likely to be accurate do the small size of these populations.

NY-Sun: Small Commercial

NY-Sun also contains a program focused on small commercial buildings.

Big picture

- Between 2008 and 2023, NYSERDA disbursed $37,923,056 on small commercial solar installations, almost double the amount spent on residential projects.
- As a result, 559 were completed, about a tenth as many as the 4,491 residential projects that were completed in the same timeframe.
- These projects added 38 MW of capacity to Western New York, compared with the 36 MW from the residential program.
- Each project received an average of $67K, compared with $4.5K for residential solar.
- This makes sense to an extent, as these were much larger projects, with an average capacity of 68.6 kW, compared with 8.2 kW for residential solar.

- However, small commercial projects received an average of $1000 per kW, whereas residential projects received an average of $550 per kW.
- And while these incentives catalyzed a further $81M in out-of-pocket spending by program beneficiaries, every $1 NYSERDA put into small commercial solar yielded $2.2 in private investment, compared to $5.5 for residential projects.
- The discrepancy is due to the higher $/kW subsidy rate that small commercial received. It's worth noting that the residential program achieved nearly the small solar deployment across the region—36 MW vs 38 MW—for nearly half the cost.

Projects over time

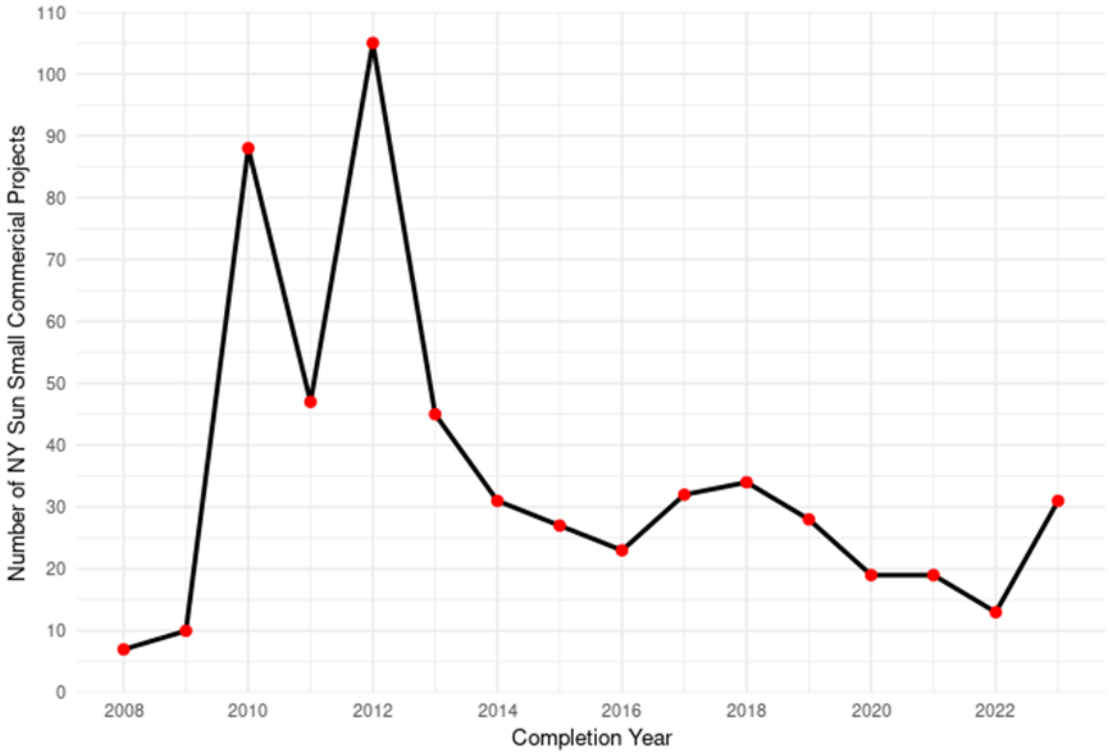

Figure 24: Completed NY Sun small commercial projects by year

In recent years, 20-35 small commercial installations have been completed annually, approximately 10x fewer than residential projects. In terms of capacity, each of these projects is approximately 10x bigger than the average residential project.

Installations spiked between 2010 and 2013. The number of project completed annually during this period was roughly 3x higher than the 2014-2023 period.

Interestingly, this spike occurred right before a similar explosion in residential projects, which occurred between 2014 and 2020.

Spending by county

How did NYSERDA distribute this $37M across Western New York?

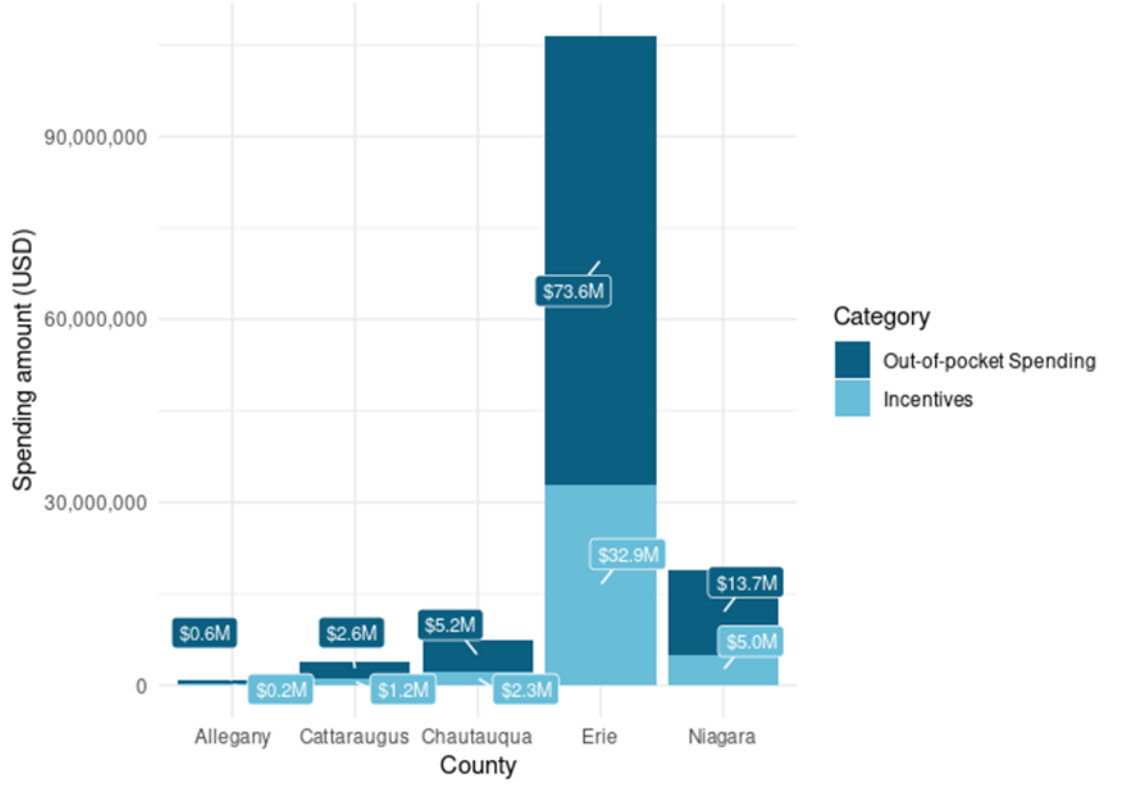

Figure 25: NY-Sun Small Commercial Incentives and Out-of-pocket Spending by County

Compared to NY-Sun residential, spending was more concentrated in Erie County, which received 78.9% of incentive spending (versus 62% in the residential program). Niagara received 12% (versus 19% in residential), and the Southern counties received 8.9% (vs 19%).

Benefits by county

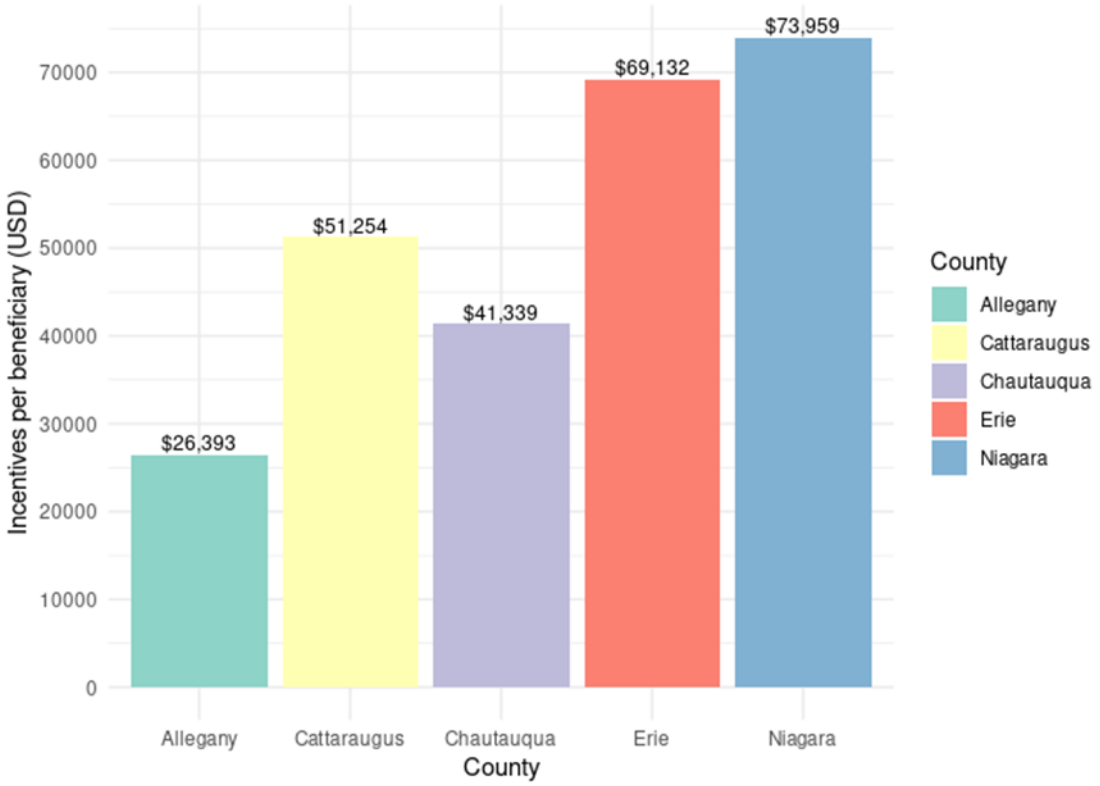

Figure 26: Total incentives per beneficiary by county for NY-Sun Small Commercial program

In the residential program, the Southern counties received $1-1.5K more incentives per project.

For small commercial, Erie and Chautauqua have much larger average incentives sizes. This is perhaps due to the presence of larger commercial rooftop spaces in these counties.

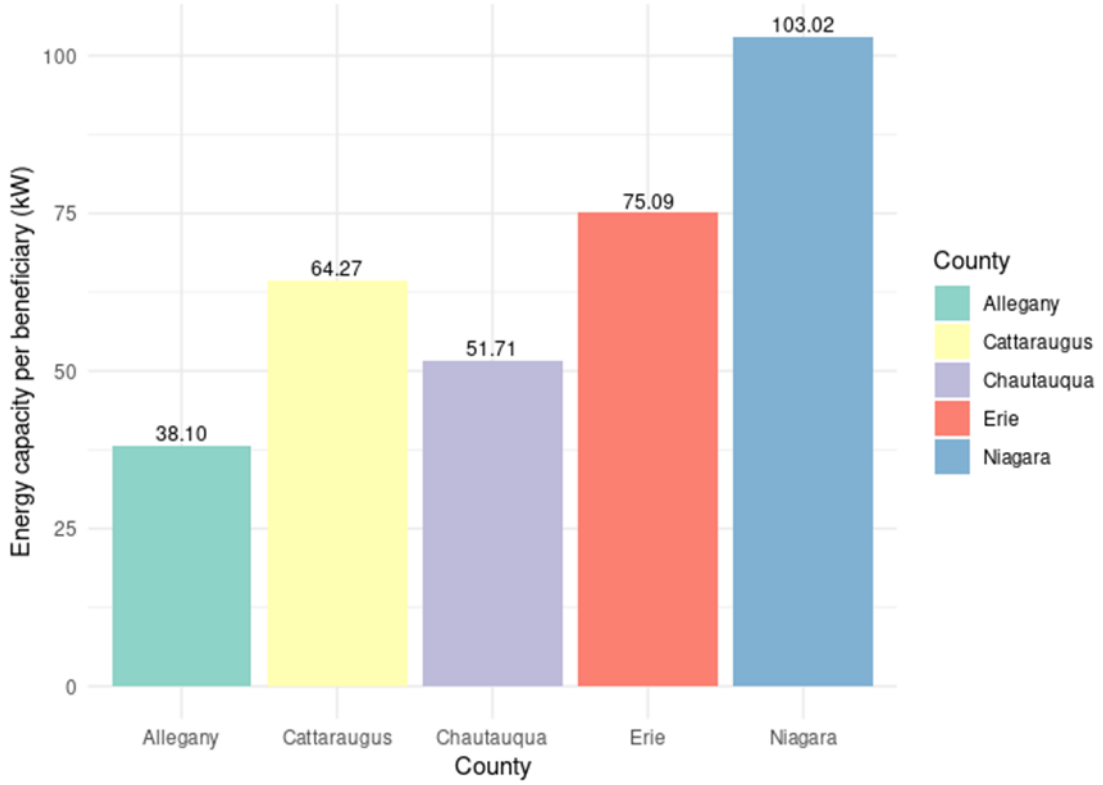

Figure 27: Energy capacity per installed system by county for NY-Sun Small Commercial program

The average capacity per project mirrors the average project incentive chart closely, with one exception: while Erie's average incentive is close to Niagara's, at around $70K, the average project capacity is 27% smaller.

NY-Sun: Large Commercial

NY-Sun also contains a program focused on large commercial projects, many of are community solar projects built in fields.

Big picture

- Between 2008 and 2023, NYSERDA disbursed $65,802,249 on large commercial solar installations, almost 2x the amount spent on small commercial projects, and 4x residential.
- As a result, 64 projects were completed, about a tenth of the 559 small commercial projects completed during this same timeframe, and a hundredth of the 4,491 residential projects.
- These projects added 240 MW of capacity to Western New York, 8.5x more than the small commercial or residential programs, respectively.
- Each project received an average of $1.028M, compared with $67K per small commercial and $4.5K per residential solar project.
- The larger subsidy makes sense, as these were much larger projects, with an average capacity of 3760 kW (3.7 MW) each, compared with 68.6 kW per small commercial and 8.2 kW per residential project.

- However, large commercial projects received an average of $273 per kW, half as much as residential solar ($550 per kW) and a quarter as much as small commercial ($1000 kW). Large commercial projects were by far the most cost effective.
- These incentives catalyzed a further $283M in out-of-pocket spending by program beneficiaries.
- Every $1 NYSERDA put into large commercial yielded $4.3 in private investment, compared to $2.2 for small commercial and $5.5 for residential.

Projects over time

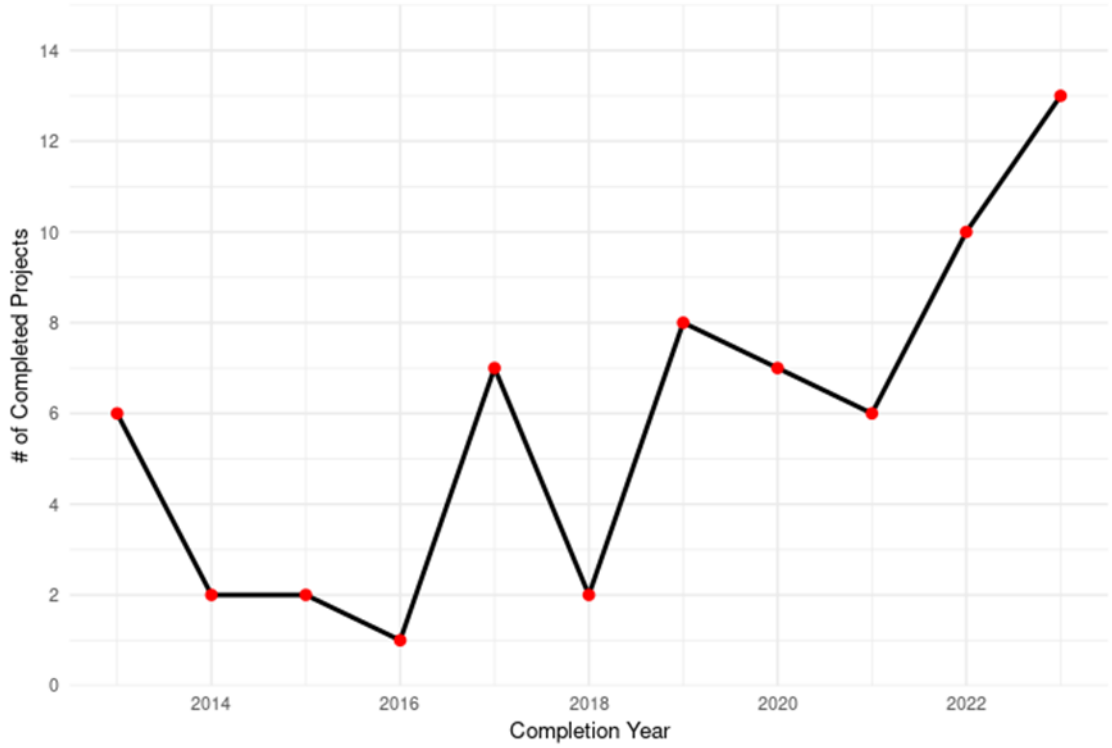

Figure 28: Completed NY Sun small commercial projects by year

Due to the size of the projects, less than 10 are typically completed annually. However, the pace has been steadily picking up since 2016.

Spending by county

How did NYSERDA distribute this $65M across Western New York?

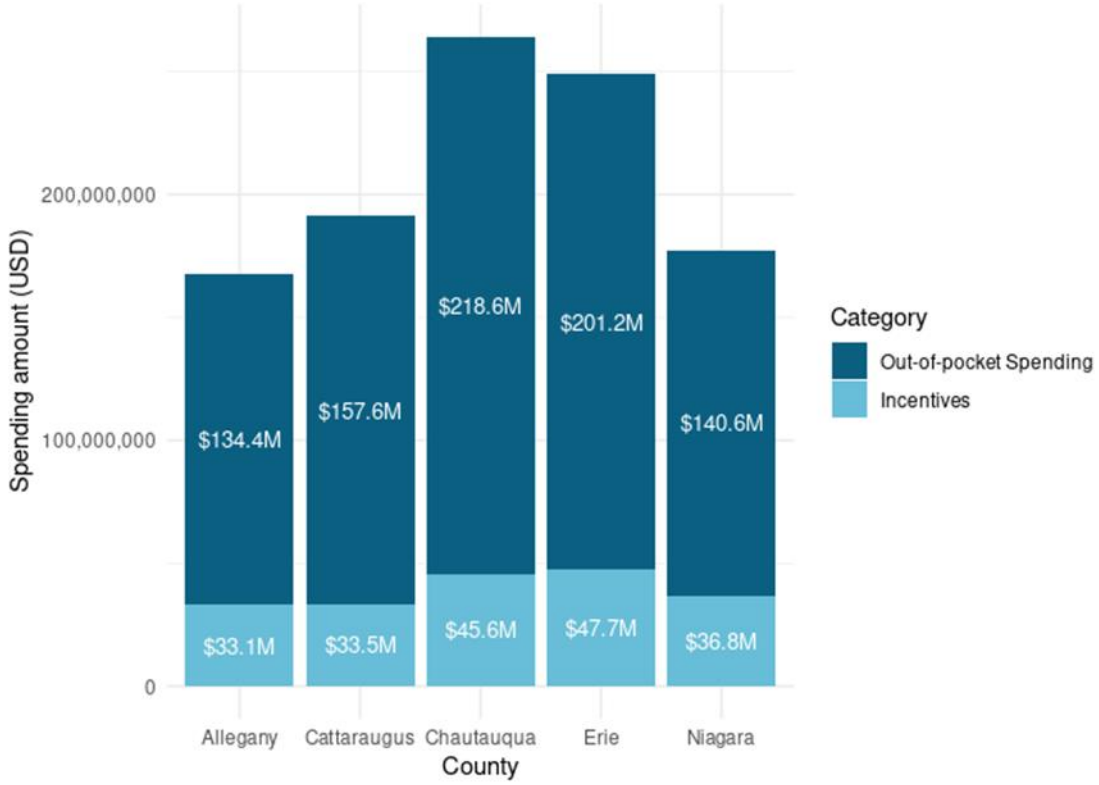

Figure 29: NY-Sun Large Commercial Incentives and Out-of-pocket Spending by County

Spending is much more equal across counties, compared to the small commercial and residential programs.

This is largely due to the fact that the other two programs focus on rooftop solar, and are thus concentrated in urban counties, where most of buildings are located. Large commercial projects are mostly sited in fields, and there's plenty of empty space in more rural counties.

In fact, for the first time, a county other than Erie got the most spending.

Benefits by county

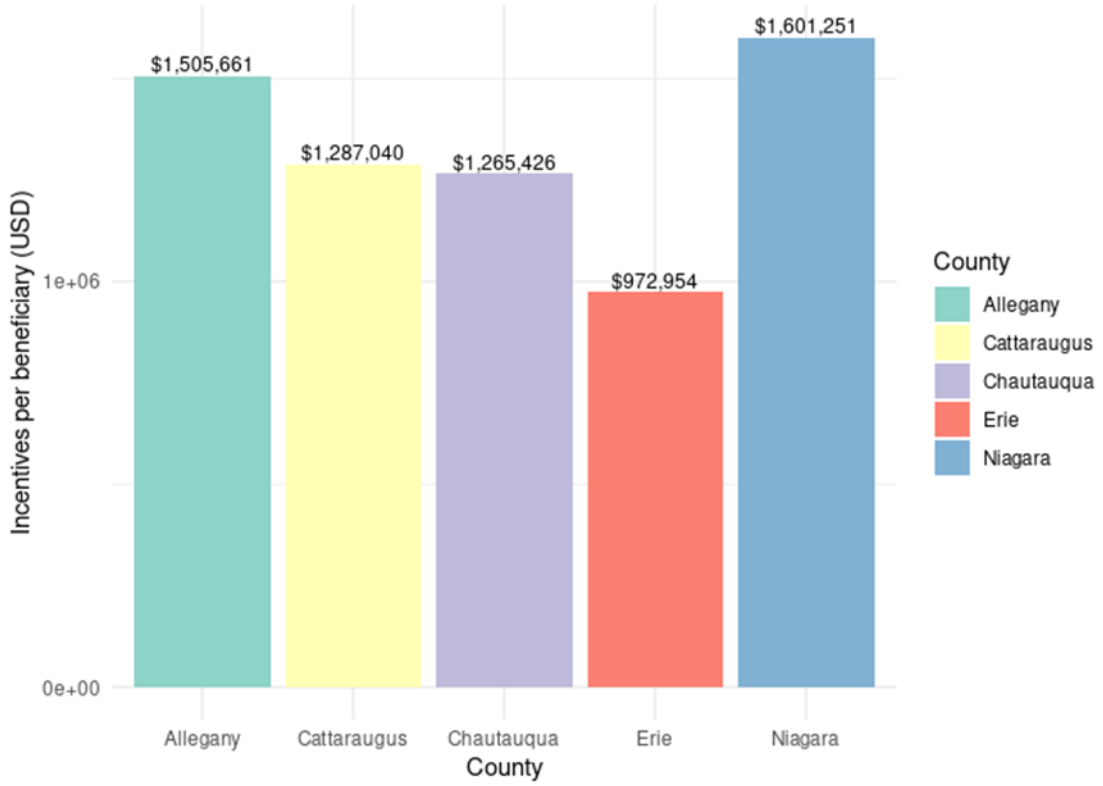

Figure 30: Total incentives per beneficiary by county for NY-Sun Large Commercial program

While Chautauqua and Erie ranked first and second in spending, they rank last in terms of average incentive per project.

Niagara and Allegany, which had the least overall investment, got the highest average incentives per project.

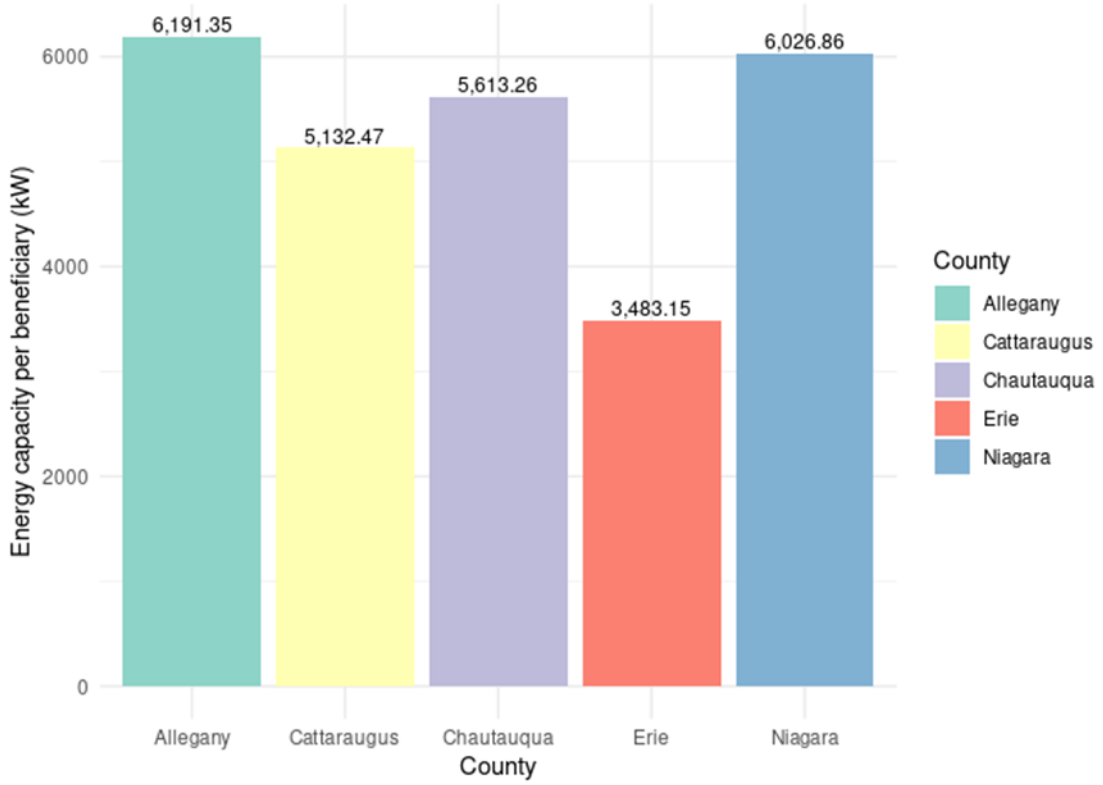

Figure 31: Energy capacity per installed system by county for NY-Sun Large Commercial program

As with small commercial, the average project capacity tracks closely with the average incentive, as we'd expect.

Appendix A

Assumptions

- For residential programs:
  - One project is equivalent to one household. The caveat of this assumption is that we might undercount actual beneficiary households, as one project might also entail multi-family buildings, in which case we will have indirect beneficiaries such as tenants and other occupants of the premise.
  - The racial distribution of the program's beneficiary is assumed to mirror the racial makeup of the population, with imputation done at ZCTA-level. What this means is that if White households account for 20% of a ZCTA population, we assume that 20% of fundings allocated to that ZCTA would go to White households.

Data & Methods

The following datasets were utilized in the analysis:

1. **Western New York Counties and ZIP Codes**: A list of counties and ZIP codes in Western New York, including Erie, Niagara, Chautauqua, Cattaraugus, and Allegany counties.
2. **HUD LMI Income Cutoffs**: County-level income thresholds provided by the U.S. Department of Housing and Urban Development (HUD) to define Low and Moderate Income households based on household size.
3. **ZCTA to County Crosswalk**: A mapping of ZCTAs to counties, accounting for the fact that ZCTAs can cross county boundaries.
4. **ZCTA to PUMA Crosswalk**: A mapping of ZCTAs to Public Use Microdata Areas (PUMAs), recognizing that ZCTAs and PUMAs have a many-to-many relationship.
5. **American Community Survey (ACS) Data**: ZCTA-level demographic data from the 2021 ACS 5-year estimates, including household income distributions and race.
6. **Public Use Microdata Sample (PUMS)**: Household-level data from the 2021 ACS 5-year PUMS, providing detailed information on household size, income, and race.
7. **Energy Efficiency Program Data**: Records from NYSERDA's Empower, Assisted, and NY-Sun programs, detailing project costs, incentives, energy savings, and project locations.

Source	Program/Details	Link
HUD	FY 2021 Income Limits	FY 2021 Income Limits
US Census	American Community Survey (ACS) 2021	ACS 2021
NYSERDA	Empower	Empower
NYSERDA	Assisted Home Program	Assisted Home Program
NYSERDA	New York Sun	New York Sun

Data Preparation

Mapping ZCTAs to Counties and PUMAs

- **Assigning ZCTAs to Counties**: Each ZCTA was assigned to the county containing the majority of its population. This simplifies the analysis by creating a one-to-one relationship between ZCTAs and counties.
- **Assigning ZCTAs to PUMAs**: Similarly, ZCTAs were linked to the PUMA where the largest share of their population resides.

HUD LMI Income Thresholds

- HUD income cutoffs for LMI households were compiled for each county and household size (up to 10 members). These thresholds define the maximum income a household can earn to be considered Low Income (up to 60% of Area Median Income) or Moderate Income (up to 80% of Area Median Income).

ACS Data Processing

- **Household Income Data**: The total number of households in each income bracket was obtained for all ZCTAs in New York State.
- **Race and Income Data**: The number of households in each income bracket was further broken down by race categories: White, Black, Asian, Native (including American Indian and Pacific Islander), and Other.

PUMS Data Processing

- **Household Size Distribution**: The distribution of household sizes within each PUMA was calculated using PUMS data. This information is critical because LMI thresholds vary with household size.
- **Race Categorization**: Household race was determined based on the race of the householder, aligning with the race categories used in the ACS data.

Estimating LMI Households

Challenges

- **Lack of ZCTA-Level Household Size Data**: The ACS does not provide a breakdown of households by size and income at the ZCTA level.

Approach

- **Applying PUMA Household Size Distributions to ZCTAs**: It was assumed that the distribution of household sizes in a ZCTA mirrors that of its corresponding PUMA.
- **Calculating LMI Percentages**:
    1. **Estimating Households by Size and Income**: The number of households in each ZCTA was estimated for each combination of income bracket and household size.
    2. **Determining LMI Status**: For each household size, the proportion of households in each income bracket that fall below the LMI thresholds was calculated using the HUD income cutoffs.
    3. **Aggregating Results**: The estimated numbers of Low Income, Moderate Income, and total LMI households were summed for each ZCTA and race group.

Program Data Analysis

Data Cleaning

- **Removing Invalid ZIP Codes**: ZIP codes corresponding to P.O. boxes or those not present in the ACS data were excluded to ensure consistency.

Aggregating Program Metrics

- **Project Counts and Financials**: For each program (Empower, Assisted, NY-Sun Residential, Small Commercial, and Large Commercial), the total number of projects, total incentives provided, and energy savings were calculated at both the ZIP code and county levels.
- **Focusing on Western New York**: The analysis was narrowed to include only the counties and ZIP codes within Western New York, aligning with the study's regional focus.

Analysis and Validation

Sanity Checks

- **Data Consistency**: Multiple checks were performed to ensure that the aggregated household counts and demographic distributions matched across datasets (e.g., comparing total households from different sources).
- **Method Validation**: Alternate methods were used to estimate LMI households to validate the primary approach, yielding consistent results.

Endnotes

[1] This may be an underestimate of the program's penetration, because we are assuming that each project benefits a single household. However, a project could benefit small residential buildings with up to 4 households.

[2] Empower doesn't cover all energy efficiency measures, however. Spray foam, for example, is not typically covered.

[3] NYSERDA did not provide any data for Empower before 2018, possibly because the program had not launched yet.

[4] This is likely underestimate, given our assumption that each project benefits a single household. In reality, Empower projects can be done in buildings with one to four units.

[5] These shaky relationships could be due to differences in electricity and gas prices across counties, or impefections in NYSERDA's energy and bill savings estimation methodology.

[6] Note that NY-Sun is not the most significant subsidy available for rooftop solar, there are also federal and state tax credits. See Switchbox's recent report.

[7] Making this assumption will likely cause us to understimate the percentage of minority-race housholds with solar, because we may, for instance, misattribute a solar project to a Black household that actually went to White household in that zip code.