Ensuring an Equitable Clean Energy Transition for New York State

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I. List of Important Acronyms

AMI	Area Median Income
ACS	American Community Survey
CAC	Climate Action Council
CBO	Community Based Organizations
CDC	Centers for Disease Control and Prevention
CEJS	Climate and Economic Justice Screening Tool
CLCPA	Climate Leadership and Community Protection Act, also known as the Climate Act (2019)
DAC	Disadvantaged Community which the Climate Leadership and Community Protection Act (2019) requires the Climate Justice Working Group to define through a criteria and mandates that at least 35% of clean energy and energy efficiency investments be directed to DACs[1]
DEI	Diversity, Equity, and Inclusion
DEC	Department of Environmental Conservation
DOH	Department of Health
EV	Electric Vehicle
GIS	Geographic Information System
LMI	Low-to-moderate Income
M/WBE	Minority- and Women-owned Business Enterprises
NEB	Non-energy benefits
NGO	Non-governmental organization
NPL	National Priority List
NSES	Neighborhood Socio-economic Status Index
NYSERDA	New York State Energy Research and Development Agency
PM 2.5	Particulate Matter (2.5 mm)

[1] Climate Action Council, *New York State Climate Action Council Draft Scoping Plan* (New York State, 2021) https://climate.ny.gov.pdf.

PLACES	CDC program meant to provide health information on a small area estimate basis for counties, places, census tracts, and ZIP code tabulation areas across the US; an extension of the 500 Cities Project
RMP	Remediation Management Plan
SMI	State Median Income

II. Key Terms

Benefits	As outlined in the Climate Leadership and Community Protection Act (2019)[2] benefits of spending on clean energy and energy efficiency programs, projects, or investments must reach Disadvantaged Communities. Of note, "benefits" is not explicitly defined in the law.
Barriers	Conditions that affect access and participation in services and commodities.[3]
Distributional Equity	To intentionally share benefits of (energy) programs to groups with distinct obstacles that have not been addressed historically. This main focus of this report will be distributional energy equity.[4]
Environmental Justice (EJ)	Theoretical framework and political movement led for and by communities subjected to environmental racism in favor of systemic change that would remove or mitigate disproportionate pollution and climate risk factors in low-income communities of color; used in the report to describe communities chronically overburdened by environmental health hazards, primarily as a result of political marginalization and racial discrimination.[5]
Energy Equity	See "Equity" below. The scope of this report primarily focuses on establishing processes including metrics to better serve marginalized communities in New York State.
Equity	The theory and practice of redressing systemic injustices in the design of institutions, programs, and policies.[6]
Historically Marginalized Community	For the purpose of this report we will use marginalized communities to reference disadvantaged communities and when referencing the Climate Act legal requirements we will use the legal term disadvantaged communities.
Procedural Equity	To empower historically marginalized communities by implementing inclusive and authentic solutions for their own benefit.[7]
Structural Equity	To institutionalize accountability where decisions are made with an acknowledgement of historical, cultural and institutional systems which have

[2] Climate Action Council, *New York State Climate Action Council Draft Scoping Plan* (New York State, 2021) https://climate.ny.gov.pdf.

[3] NYSERDA, *Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2022). https://climate.ny.gov/NY-Disadvantaged-Communities-Barriers-and-Opportunities-Report.pdf.

[4] Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs* (Urban Sustainability Directors Network, 2014) https://www.usdn.org/final.pdf.

[5] NAACP, *Environmental Justice* (NAACP, 2022) https://nysnaacp.org/environmentaljustice.

[6] Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs* (Urban Sustainability Directors Network, 2014) https://www.usdn.org/final.pdf.

[7] Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs* (Urban Sustainability Directors Network, 2014) https://www.usdn.org/final.pdf.

	benefitted certain groups of people at the cost of disadvantage for subordinated groups.[8]
Transformational Equity	the distinct notion that communities (internally) have the indigenous capacity to govern and sustain themselves and that communities (externally) have voice, influence and agency in regional, state and/or national affairs[9].
Transgenerational Equity	To consider impacts of inequity across generations such that decisions made now do not result in inequitable burden on future generations.[10]

[8] Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs* (Urban Sustainability Directors Network, 2014) https://www.usdn.org/final.pdf.

[9] Stesney, Bridget. "Developing Equitable Parks and Open Spaces Workshop," n.d., 41.

[10] Angela Park, *Equity in Sustainability: An Equity Scan of Local Government Sustainability Programs* (Urban Sustainability Directors Network, 2014) https://www.usdn.org/final.pdf.

III. Executive Summary

Though the effects of climate change manifest differently across the globe, a definite pattern has emerged within the United States that has allowed environmental hazards to go unchecked in vulnerable communities. The U.S. Environmental Protection Agency's 2021 report on climate change and social vulnerability confirmed that the most severe damage from climate change disproportionately impacts underserved communities "who are least able to prepare for, and recover from, heat waves, poor air quality, flooding, and other impacts."[11] Today, New York state is undertaking a radical course-correction of this long-standing pattern, seizing momentum from the Biden Administration's robust climate platform.

To that end, the New York State legislature passed in 2019 the Climate Leadership and Community Protection Act (the Climate Act). The Climate Act aims to achieve 100% zero-emission electricity generation by 2040, while reducing emissions by at least 85% by 2050. These ambitious targets make the Climate Act one of the most aggressive climate change programs in the nation. The Climate Act is also unique in one of its provisions: the bill includes an equity mandate which directs at least 35% of all climate and energy investment benefits to be realized in disadvantaged communities (DACs). With this stipulation in place, New York's state agencies are now required to direct investments and assistance toward its communities that are most in need.

Functioning as the statewide energy agency, the New York State Energy Research & Development Authority (NYSERDA) will play a key role in ensuring an equitable transition to a clean energy economy throughout the state. In accordance with the Climate Act, NYSERDA will focus on realizing benefits in DACs through investments "in the areas of housing, workforce development, pollution, low-income energy assistance, energy, transportation and economic development".[12] Before implementing changes in their existing programs or innovating new ones, NYSERDA must understand its current abilities and performance in adequately serving the state's DACs.

This report establishes NYSERDA's energy equity baseline and illuminates opportunities for growth in both program design and metrics by analyzing three of the agency's programs: NY-Sun Incentive Program, Drive Clean Rebate program, and EmPower NY. The analysis includes a thorough literature review of industry and academic sources, which provides an understanding of NYSERDA's program design and metrics by which efforts in other states, the federal government, academia, and relevant non-profit organizations can be compared to. From there, our team conducted stakeholder interviews and analyzed program-specific data provided by NYSERDA. Once collected, the program data was synthesized and modeled to inform two sets of recommendations: one regarding program design, and another concerning program metrics. These recommendations are the product of our team's research and analysis at a very specific point in time and, as such, must be revisited in the future to ensure NYSERDA's programs are implemented with maximum efficiency and accuracy. The report concludes with a discussion of areas for

[11] U.S. EPA, *EPA Report Shows Disproportionate Impacts of Climate Change on Socially Vulnerable Populations in the United States*" (EPA, 2021). https://www.epa.gov.

[12] New York Senate, *Environmental Conservation, Investment of Funds* (New York Senate, 2020). https://www.nysenate.gov.

future study, including the integration of equity metrics across the agency and within programs that were not initially designed with an equity focus, as well as the best means of collecting sensitive demographic data from program participants.

The following report provides greater detail about our processes, findings, and recommendations, all of which serve to strengthen NYSERDA's energy equity work. The path forward is clear and actionable, and NYSERDA's response to this report's recommendations will help other states and the federal government navigate the task of measuring progress in environmental justice (EJ) communities.

IV. Introduction and Background

Policy Context

In light of accelerating climate change, the New York state legislature passed the Climate Act in 2019. This bill, with goals to achieve 100% zero-emissions from the electric power sector by 2040 and to reduce emissions economy-wide by at least 85% below 1990 levels by 2050, is arguably the most ambitious climate change program in the nation. The law is unique both in scale and implementation: the Climate Act includes a provision mandating that at least 35% of all benefits from clean energy and energy efficiency investments are realized in DACs.

Through this equity mandate, New York officially recognizes the burdens of climate change and other environmental impacts that have historically plagued certain communities across the state - and then aims to correct them. This 35% target defined in the legislation is merely a starting point for addressing historical environmental health and climate vulnerability disparities. The government of New York is hoping to exceed this milestone by delivering 40% of clean energy and energy efficiency benefits of investments to DACs. The Climate Act provides these targets as a baseline, and its codification into law provides a clear timeline for the establishment of a statewide clean energy economy for all. In time, these targeted investments into DACs across the state will provide relief for millions of New Yorkers who have had environmental burdens imposed upon them for decades.

NYSERDA and The Climate Act

To carry out the provisions of the Climate Act, the law established a Climate Action Council (CAC), which has developed a plan to guide New York State's climate and clean energy agenda, and a Climate Justice Working Group (CJWG), which has developed the draft criteria for identifying DACs. The CAC and CJWG work in tandem with state agencies, most notably including the Department of Environmental Conservation and NYSERDA as the state's leading climate and energy policy entities. Other state agencies such as the Department of Health, and the Department of Labor provide additional support. These groups also include representatives from academia and community-based organizations (CBOs). Some of the CBOs represented include New York City Environmental Justice Alliance, UPROSE, and WE Act for Environmental Justice. Together, these stakeholders will ensure that at least 35% of investments in clean energy and efficiency programs, projects, and/or investments serving DACs occur "in the areas of housing, workforce development, pollution, low-income energy assistance, energy, transportation and economic development".[13]

Not long after the passage of the Climate Act, NYSERDA identified the development of a clean energy economy as one of four significant areas of focus in its 2022-2025 Strategic Plan[14]. In advancing the

[13] New York Senate, *Environmental Conservation, Investment of Funds* (New York Senate, 2020). https://www.nysenate.gov.

[14] NYSERDA, *Toward A Clean Energy Future: A Strategic Outlook 2022 Through 2025* (NYSERDA, 2022) https://www.nyserda.ny.gov.pdf.

objectives established by the Climate Act, NYSERDA's portfolio of clean energy investments will be focused on improving energy access and affordability, reducing utility debt, reducing pollution, promoting economic development, and improving workforce development and training. These initiatives will lay the groundwork for a radical overhaul of New York's energy efficiency, clean energy, and energy innovation programs. The investments will be funded by a six billion dollar Clean Energy Fund that was established in 2016 and updated in 2021 to reflect the Climate Act's goals. In order to meet the statewide target of 2040 set in the Climate Act, the agency must define and track progress toward that goal in each of its programs[15]. Ultimately, these efforts will serve to ensure that all communities benefit equitably from the transition to a clean energy economy.

[15] NYSERDA, *Strategic Outlook Plan 2022-2025* (NYSERDA, 2020). https://www.nyserda.ny.gov.

V. Report Objectives and Approach

As graduate consultants to NYSERDA, we were tasked with researching and analyzing a select sample of their programs to discern how clean energy programs can better serve DACs. Our efforts will aid in the development of a framework to track the progress towards building an inclusive clean energy economy and delivering clean energy and energy efficiency investments to key demographics, particularly those defined as DACs, such as low-income communities of color. The programs we prioritize in our research are the NY-Sun Incentive Program (provides incentives to install new grid-connected solar photovoltaic systems), EmPower NY program (energy efficiency improvements for low income residents in single-family and two to four family unit housing), and Drive Clean Rebate program (electric vehicle rebate program). We also conducted research about potential equity metrics that could be applied to NYSERDA programs on an agency wide level to complement the state-wide benefits framework that is currently being developed.

Our efforts were focused on discovering:

- What equity-based program outcome metrics are currently being used by NYSERDA, and how effectively NYSERDA is measuring progress toward achieving energy equity through their programs;
- What equity-based metrics other states and the federal government are using to measure benefits from their programs, and whether NYSERDA should consider them;
- How NYSERDA's current programs are designed to meet the needs of DACs; and
- What the barriers are for DACs to access NYSERDA's programs.

Data Collection Approach and Process

Literature Review:

The objective of the literature review is to inform common measures of energy equity being used in other jurisdictions. The team examined industry and peer-reviewed academic reports and reviewed documents shared by NYSERDA and other state agencies. The team compared NYSERDA's metrics and methodologies to the metrics and tools used by other state and federal agencies to identify and direct program benefits to historically marginalized communities and to track and evaluate program uptake and impact.

Interviews:

As a complement to the literature review, interviews were conducted with industry and community experts. Due to project time constraints that prevented the team from receiving institutional review board approvals to conduct community surveys , interviews with experts and representatives from CBOs were conducted instead. The team also reviewed NYSERDA surveys conducted with program participants to gain insight into the direct perspective of community residents.

The team conducted interviews with 24 stakeholders in March 2022 via video conference calls. See the full list of participants in Appendix III and the full list of interview questions in Appendix IV. Interviewees consisted of:

- NYSERDA Staff - Several teams within NYSERDA are working on integrating equity into their programs and therefore provided insights on implementing projects at the organization. Interviewees included NYSERDA employees from various program teams.
- Representatives from Community Based Organizations (CBOs) - Interviews were conducted with various CBOs who provided insights into the needs and experiences of the communities they serve.
- Out-of-State Government Employees - Many states are making progress and leading the way in energy equity and have experts working through similar challenges. Interviews were conducted with government representatives from Vermont, Colorado, California, Washington, and Washington's King County.
- Other Experts - Experts from national non-governmental organizations (NGOs), academia, and the government were consulted to garner more perspectives. Interviews included experts from Columbia University, ACEEE, Greenlining Institute, among others.

Quantitative Data:

Demographic Data

The team pulled census tract level demographic data from New York State's 2022 Draft Disadvantaged Communities dataset.[16] This dataset provided shapefiles with percentile data for multiple demographic indicators, including race, health, home ownership, EEnglish proficiency, socioeconomic level, pollution levels, home type, and more. It is significant to note that these indicators are not collected from program applicants, but are rather compilations from census data and are given as percentiles at the census tract level.

In order to conduct certain data visualizations, percentage data was needed rather than percentile data. For this task, we sourced from the American Community Survey (ACS), a yearly survey conducted by the U.S. Census Bureau.[17] The team used a 5-year estimate from 2016-2020 from the ACS.

NYSERDA Program Level Data

NYSERDA's program-level data revealed project numbers per census tract for each of the three following programs:

- NY-Sun Incentive Program - This program aims to provide economic incentives to install rooftop and ground mounted solar on-site and off-site of buildings and has geospatial data that can be compared to census data. This dataset also included energy saving by applicant, which was not incorporated since we lacked the specific income of applicants to compare the relative savings to.

[16] NYSERDA, *Draft Disadvantaged Communities (DAC)* (NYSERDA, 2021). https://data.ny.gov
[17] US Department of Commerce, *United States Census Bureau* (U.S. Department of Commerce, 2022). https://data.census.gov

- EmPower NY program - This program aims to provide energy efficiency upgrades, is open to low-income 1-4 unit households and has geospatial data that can be compared to census data.
- Drive Clean Rebate program - This program aims to provide rebates to car purchasers when buying an electric vehicle. The program data used for this project included geospatial data that can be compared to census data as well as program participant survey data. NYSERDA's 2020 Drive Clean Rebate Adoption Survey provides program participant responses that include limited demographic information and purchasing behavior.

Data Analysis

Qualitative Analysis:

The team analyzed energy equity metrics used by other jurisdictions in comparison to New York State's current data collection efforts. The team compared and contrasted current programs, their implementation frameworks, and metrics used across states. Our recommendations on equity metrics were informed by the gap analysis comparing NYSERDA with other agencies across the country seeking to identify DACs. Case studies also illustrated how other jurisdictions are implementing equity in the clean energy transition, who is involved in programs, and what resources are needed to support these programs.

Quantitative Analysis:

The team used New York State's 2022 Draft Disadvantaged Communities dataset, ACS data, and program applicant counts to estimate the breakdown of each demographic involved in each program. As demographic information is only available at the census tract level, not at the applicant level, the percentage of each demographic within a census tract was multiplied by the total number of projects within the same tract to glean the estimated number of program applicants of a given demographic. By summing the estimated number of projects per demographic in each tract, the team was able to estimate the total number of projects per program for 9 different demographics, and then calculate percentages (**Table 1**) while also conducting bivariate regression analysis.

Geospatial Analysis:

By understanding where programs have been successful and for which communities, NYSERDA has an opportunity to learn how to better serve all DACs. Using ArcGIS software, the team overlaid data from the Open Data NY DAC database, the ACS 2016-2020 survey, and NYSERDA DAC demographic data with NYSERDA program data. NYSERDA program level data compared to income, race, English proficiency, and other DAC indicators provides a clearer picture of who NYSERDA programs are benefitting. The team combined and converted all three datasets into shapefiles, with one shapefile layer per program.

ArcGIS Relationship Function

Maps made using the Relationship function create a visual representation detailing which areas and which demographics of New York are being reached by NYSERDA programs, and which are lacking adequate program engagement. Underserved tracts can be easily identified with the Relationship function, with color coding specifically indicating tracts with a high population of an underserved demographic and low

NYSERDA program project numbers. We used the 3 by 3 grid and Quantile method in the Relationship analysis settings. For the purposes of this report we will use the terms “low”, “medium”, and “high”, as is denoted by the key, rather than quantitative deductions, due to limited capacity to deconstruct the GIS Relationship function for quantification. Relationship maps for each program with respect to tract federal poverty percentiles, renter percentiles, and percentage of non-white citizens are embedded within the body of this report. Maps with respect to LMI 80 AMI and English proficiency percentiles, as well as combined non-white population and LMI 80 AMI percentiles, and combined non-white population with federal poverty level percentiles are available in Appendix I.

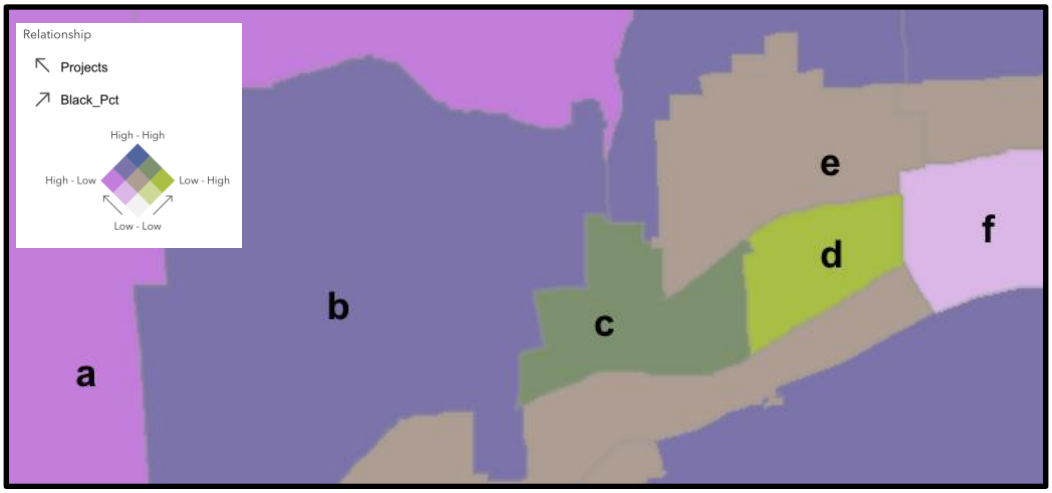


Figure 1. *This capture from an ArcGIS Relationship visualization demonstrates how census tracts west of Binghamton vary in Drive Clean Rebate project number and census percentile for citizens that identify as Black.*

For example, **Figure 1.** represents an area just west of Binghamton, New York. The census tract denoted by **a.** represents Crest View Heights, Tioga County (GEOID 36107020300). It falls into the “High - Low" category, indicating a high project number and a low Black population. The census tract denoted by **b.** also represents Crest View Heights, Broome County (GEOID 36007013301). It falls into the “High - Med" category, indicating a high project number and a medium Black population. The census tract denoted by **c.** represents Endicott Village, Broome County (GEOID 36007013600). It falls into the “Low - High" category, indicating a low project number and a high Black population. The census tract denoted by **d** also represents Endicott Village, Broome County (GEOID 36007013500). It falls into the “Low - High" category, indicating a low project number and a high Black population. The census tract denoted by **e** represents Endicott Village, Broome County (GEOID 36007013400). It falls into the “Med - Med" category, indicating a medium project number and a medium Black population. The census tract denoted by **f** represents Endwell, Broome County (GEOID 36007013100). It falls into the “Med - Low" category, indicating a medium project number and a low Black population.

Limitations

One limitation of the data analysis was that our team was not provided granular address level or program applicant income data due to data privacy reasons. Having address level data could lead to a more refined

GIS analysis. Applicant income data would also serve as an important indicator of the socioeconomic status of the specific communities NYSERDA is reaching.

VI. Findings

Current NYSERDA Equity Metrics Used to Measure Progress towards Building an Inclusive Clean Energy Economy

It is important to acknowledge that using equity metrics to measure how well clean energy programs reach historically marginalized or otherwise disadvantaged communities is a new and evolving practice for state and federal governments across the United States. NYSERDA programs were originally created to target market rate customers and were not designed to serve disadvantaged communities. Therefore, it is to be expected that there are gaps in which communities are able to participate and benefit in clean energy programs currently and a need to improve uptake especially amongst historically underserved and disadvantaged communities. There are also larger systemic barriers that have contributed to the marginalization of communities that clean energy programs can only address to a certain extent. Before the 2019 Climate Act there were a select set of programs that were designed to serve low to moderate income (LMI) communities. However, the Climate Act's equity goals and NYSERDA's recent Strategic Outlook objective of building an inclusive clean energy economy requires a new sense of urgency for the authority to prioritize equity and reshape its programs to better serve disadvantaged communities.

After conducting interviews with various other jurisdictions it became apparent that NYSERDA is a leader in many ways in its approach to working towards advancing energy equity. NYSERDA tracks a variety of metrics which vary across programs. Currently the formal evaluation of programs typically happens on a program specific level. One of the main methods used to evaluate program participation and reach is through program participant surveys. These program participant surveys allow programs to track more demographic-specific information about program participants beyond the information collected through program applications. As part of an internal equity capacity building effort, select program teams have begun to understand and consider how investments and activities are currently designed or can be adapted and developed to benefit disadvantaged communities. Select program teams are participating in this process via self-reporting exercise that estimates how equity considerations are being or can be incorporated into investments and activities, whether and how disadvantaged communities benefit from investments and activities, and whether and how disadvantaged community stakeholder engagement is a specific focus of the team's program planning and development.

The *Team Self-Assessment of DAC Inclusion and Equity* exercise is designed to help Equity Stewards, those charged with championing equity considerations within each program or support team within NYSERDA, gather insight on how NYSERDA's investments and programs are currently benefiting DACs and identify any areas for improvement. "Benefits" as defined by the exercise include: access, affordability, career pathway, CO_2 reduction, energy savings, health, health-air quality, information, safety, skills development and workforce capacity. According to the 2021 self-assessment exercise outcomes[18], out of 56 existing activities, 71% are currently incorporating or prioritizing DAC consideration. This self-reported estimated prioritization, however, does not always correspond to estimated benefits. On a scale from 0-4, 0 indicating no benefit and 4 indicating benefits meet or are estimated to exceed the 35% minimum threshold established by the Climate Act, reported activities received an average benefit score of 2.5. In other words, benefits are insufficient to meet the 35% threshold. The outcome of estimating DAC stakeholder engagement was 1.8

[18] NYSERDA, *Energy Equity Stewardship Network Team Self-Assessment of Disadvantaged Community Inclusion and Engagement: Summary of Findings* (NYSERDA, 2021).

across all reported activities using a 0-5 scale, with 0 indicating no community involvement and 5 indicating community ownership through democratic participation, which suggests that stakeholder engagement efforts are keeping communities informed but not ensuring communities are playing a leadership role in decision-making processes.

New York's 2021 Disadvantaged Communities Barriers and Opportunities Report[19] provides an overview of challenges New York State must overcome to achieve the Climate Act mandate. The report was crafted by New York State with support by NYSERDA and other state authorities. It is centered around obstacles faced by DACs that hinder participation in state programs. It organizes 19 discrete factors into four key categories to represent the barriers DACs face to participation in state programs. These four categories are:

- Physical and Economic Structures and Conditions
- Financial and Knowledge Resources and Capacity
- Perspectives and Information
- Programmatic Design and Implementation

The Barriers and Opportunities report is less focused on benefits of individual programs, but highlights potential improvements that could lead to a more equitable distribution of program benefits. For this reason, the report serves as a tool for situational awareness for NYSERDA, rather than a barometer of ongoing progress.

The three main programs studied in this report as case studies for how NYSERDA tracks progress towards creating an inclusive clean energy economy through equity metrics are EmPower NY, Drive Clean Rebate, and NY-Sun's Incentive Program.

EmPower NY Program:

The EmPower NY program provides no-cost energy efficiency retrofits to low- to moderate-income single families living in 1-4 unit homes. Community residents apply directly to the program either online or by submitting paper applications by mail, along with documentation verifying their income-eligibility. The program application became available to fill out online in July 2021.[20] The program also has a pilot geo-eligibility tool[21] that uses Housing and Urban Development (HUD) Income Block Data to identify groups where 50% or more of the population of the Census block group have a household income that would qualify them for EmPower NY services. The geo-eligibility tool allows customers to enter their address to determine if they live in a geo-eligible region. Customers who live in a geographically eligible territory are deemed eligible for EmPower NY without needing to show documentation of household income.

[19] New York State Energy Research and Development Authority, New York State Department of Environmental Conservation, New York Power Authority, *New York State Disadvantaged Communities Barriers and Opportunities Report: Report Number 21-35* (NYSERDA, 2021). https://climate.ny.gov.
[20] New York State Energy Research and Development Authority, *EmPower New York* (NYSERDA, 2022). https://www.nyserda.ny.gov.
[21] New York State Energy Research and Development Authority, *Geo Eligible Income Tool* (NYSERDA, 2022). https://www.nyserda.ny.gov.

Until the summer of 2021, EmPower NY only tracked program applicants' Area Median Income (AMI). The program now tracks several metrics through its program application, including the number of household members over 60 years of age, number of household members 17 and younger, veteran and disability status, and race/ethnicity of program recipients. EmPower NY, as well as the Workforce Development Career Pathways program, are examples of programs that track more granular demographic indicators such as age, race/ethnicity, and disability status.[22] These programs can be used as a model for other NYSERDA programs to better track demographic information that will be key to effectively target program benefits in marginalized communities. Additionally, tracking geography, home type, home ownership status, and project type of each project implemented, helps to identify areas of inequity in the distribution of EmPower NY's benefits.

It is important to note the scope of EmPower NY's reach. The program is exclusive to residents living in buildings with up to four housing units or mobile homes. EmPower itself does not focus on upgrades in multifamily housing, but other NYSERDA and utility programs do. However, those programs were not the focus of this study. This is the primary explanation for the large disparity between the number of renters receiving benefits (18%) and the number of homeowners receiving benefits (85%) within the scope of our research. Other explanatory variables for this discrepancy will be examined in the quantitative analysis section. It is also important to distinguish the unique ways that LMI homeowners and tenants experience the benefits of energy savingsReduced utility burdens for tenants may translate to shorter-term accruals of energy savings than homeowners, because they cannot earn equity in their home or transfer ownership of their residence from one generation to the next. With that in mind, the importance of tracking socioeconomic and demographic data such as homeownership status, income, and race/ethnicity is paramount in improving program reach and effectiveness for all DACs, especially renters and communities of color.

Drive Clean Rebate Program:

The Drive Clean Rebate program offers all New York State residents a point-of-sale rebate of up to $2000 for purchase or lease of a new electric car. The program enlist over 60 models of electric cars available for purchase through over 1500 participating dealers across the state.[23]The dealers deduct the rebate amount from the total cost of the car and later file paperwork with NYSERDA for reimbursements on the rebate provided to customers at the time of purchase. NYSERDA also enforces a minimum period of 36 months ownership period for the rebate amount to be effective. A consumer is not subjected to any paperwork.

The Drive Clean Rebate program currently does not track any demographic information in its program application, however the program does track some demographics of program participants through participant surveys such as the 2020 Drive Clean Rebate Adoption survey. The survey was disseminated to all program participants via email. The Adoption survey results show that 8% of survey participants were from areas that met the interim DAC definition prior to the release of the draft DAC criteria in 2022.

[22] Bluemich, Gwendolyn. Interview with Columbia Capstone Team. Personal interview. New York City, February 25, 2022.

[23] *NYSERDA, How the Drive Clean Rebate works* (NYSERDA). *www.nyserda.ny.gov*

Comparatively, 27% of all New Yorkers fall under the interim DAC definition.[24] This interim DAC definition classifies communities as disadvantaged if they are located within census block groups that meet the Housing and Urban Development 50% AMI threshold, and are also located within the DEC Potential Environmental Justice Areas or are located within New York State Opportunity Zones.[25]

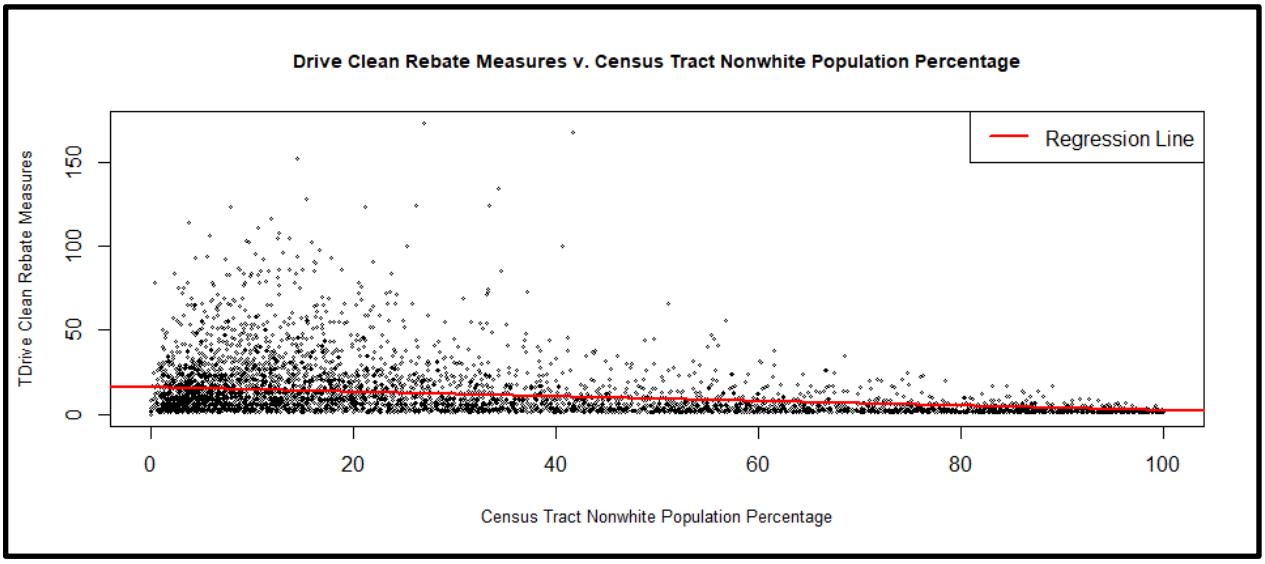
NYSERDA's Drive Clean Rebate program also disproportionately benefits homeowners and New Yorkers living in detached family housing. 85% of survey respondents owned their homes, and 76% occupied detached housing. But recently, the proportion of responses from residents of detached housing has decreased. In the 2018-2019 Adoption Survey report, 84% of respondents occupied detached housing, representing an 8% increase from 2020. These disparities in participation across housing types are consistent for both battery and plug-in hybrid electric vehicles. Demographically, program survey respondents were 75% white males who earned more than the median household income, and over 80% had a 4-year college degree.

The relationship between Drive Clean Rebate program project applications and the percentage of non-white households are negatively associated through regression analysis. Every percentage of non-white population increase in a census tract is assoicated with a decrease of 0.14 projects applied in this census tract at a 99% statistical significance level even though it only explained 6% of the total measures variance.

Model 1 Table. *Bivariate Linear Model Between Total Measures Per Census Tract versus Nonwhite Percentage Population.*[26]

Model Fit:	F(1,4916)=310.03	P = 0.00	R^2 = 0.06	Adj. R^2 = 0.06
Result Type:	**Estimate**	**Standard Error**	**T Statistic**	**P Value**
Intercept Coefficient:	16.33	0.33	49.87	0.00
Nonwhite Population Percentage:	-0.14	0.01	-17.61	0.00

[24] NYSERDA, *NYSERDA Drive Clean Rebate Adoption Survey: 2020 Results Report Number 21-33* (NYSERDA, 2021).
[25] NYSERDA, *Disadvantaged Communities* (NYSERDA, 2022).
[26] NYSERDA. *Transportation_Project_Data_Geospatial* (NYSERDA, 2022), distributed by NYSERDA



Model 1 Figure: *Regression graph of how transport measures in Drive Clean Rebate program varies as the percentage of non-white program applicant population varies*

NY-Sun Incentive Program:

The NY-Sun Incentive Program provides economic incentives to install rooftop and ground mounted solar on residential, commercial, and industrial buildings. The solar projects evaluated for this research included direct on-site solar installations, which provide savings to renters and homeowners who lack space or can't afford purchasing a system independently. New York currently leads the nation with community solar capacity over 1GW, and new incentives like the Inclusive Community Solar Adder[27] and expanded Solar for All[28] direct community solar benefits to DACs.

The NY-Sun Incentive Program application is filled out by contractors on behalf of customers. The NYSERDA website provides a contractor database for program participants to find a solar contractor. Contractors assist customers with assessing the site to determine the best system, filling out the incentive application and determining financing options, and installing the solar project along with submitting all paperwork.[29] Once the application has been submitted, NY-Sun tracks the location of each solar installation and whether the recipient is a single-family household. Solar for All, a program that allows renters, homeowners, single-family and multifamily households to subscribe to energy from community solar projects, successfully focuses on extending the benefits of clean energy to tenants who cannot install solar. However, the program does not have access to community solar subscriber data to track which households receive solar energy credit, as utility providers administer Solar for All and do not share this data with NYSERDA due to privacy constraints.

[27] NYSERDA, *Inclusive Community Solar Adder* (NYSERDA, 2022) https://www.nyserda.ny.
[28] NYSERDA, *Solar For All* (NYSERDA, 2022) https://www3.dps.ny.gov.
[29] NYSERDA, *Solar Program (NY-Sun)* (NYSERDA, 2022). www.nyserda.ny.gov.

NY-Sun is in the early stages of implementing equity metrics, and the program primarily collects this information via program participant surveys. The NY-Sun team is currently working to establish a formal mechanism for gathering and assessing participant and community feedback.[30] Lower participation in DACs can be seen through the customer demographics analysis; only 22% of participating households are located in DACs, according to the Solar Census Tracts Projects Data V2 after calculating the number of projects under drafted DAC.[31] The analysis is derived from the NY-Sun Solar Data comparing the number of programs whether under designated DAC criteria or not. However, it is important to note that, due to the data gap from not tracking solar projects installed on multi-family housing units and the lack of access to community solar subscriber data, the number of DAC households benefiting from solar projects is likely being undercounted.

Beyond these progress measurement mechanisms, interviews with NY-Sun staff indicate the program would greatly benefit from a feedback mechanism that consolidates comments from participants and other stakeholders so that they can identify demographic gaps. NY-Sun staff have conducted surveys and engaged various CBOs, and these efforts should continue to center community-driven, open-ended methods of communication. As NY-Sun's primary point of contact are contractors, one of the main ways they receive feedback on an ongoing basis from communities and participants is through a call line. Though they have a quality assurance team to track the quality of solar installations, customer complaints and non-compliant contractors will not provide enough data to assess the program's effectiveness in terms of reaching LMI and Black, Indigenous, People of Color (BIPOC) households.

In sum, EmPower NY, NY-Sun's Incentive Program, and the Drive Clean Rebate program track certain metrics including income, geography, home ownership status, and home type, and notably EmPower NY tracks race/ethnicity, age and disability status, but these metrics could certainly be expanded and streamlined economy-wide in order to better assure that benefits are being equitably distributed to DACs. NYSERDA acknowledges the barriers of their programs through the Disadvantaged Communities Barriers and Opportunities report. The findings of this report, as well as strategies for overcoming barriers, will be discussed in the next section of this report.

Analysis of DAC Participation in Energy Efficiency and Clean Energy Programs

Our review revealed that some, but not all, of NYSERDA's programs are designed to serve the needs of DACs. NYSERDA's programs were not originally designed with a specific focus on reaching historically marginalized or otherwise disadvantaged communities. However, equitable distribution of benefits into marginalized communities has been a focus, primarily for the EmPower NY program, which was designed to target LMI single family households. The eligibility criteria for EmPower NY also has a large amount of overlap with the current working definition of a DAC. In creating a qualification framework for who is eligible for these programs, NYSERDA has already begun integrating equity as a consideration in some of their largest programs. For example, to qualify for EmPower NY, applicants must be below a certain income threshold which would also categorize those same individuals as being in the DAC category. In general, the team found that the current working definition of a DAC will require NYSERDA to engage with and

[30] Interview with NY-Sun Incentive Program Team. Online. New York, 24 February, 2022
[31] NYSERDA. *Solar_Census_Tracts_Project_Data,* V2 (NYSERDA, 2022), distributed by NYSERDA

serve a higher number of individuals. While the goal of flowing investment and other co-benefits into DACs itself seems simple, the process of attaining it is far more complex and will rely heavily on NYSERDA's ability to directly reach DAC members and the budgets of the programs affecting their ability to increase investment in DACs. Below, NYSERDA's DAC Geo-Eligibility data are visualized using GIS.

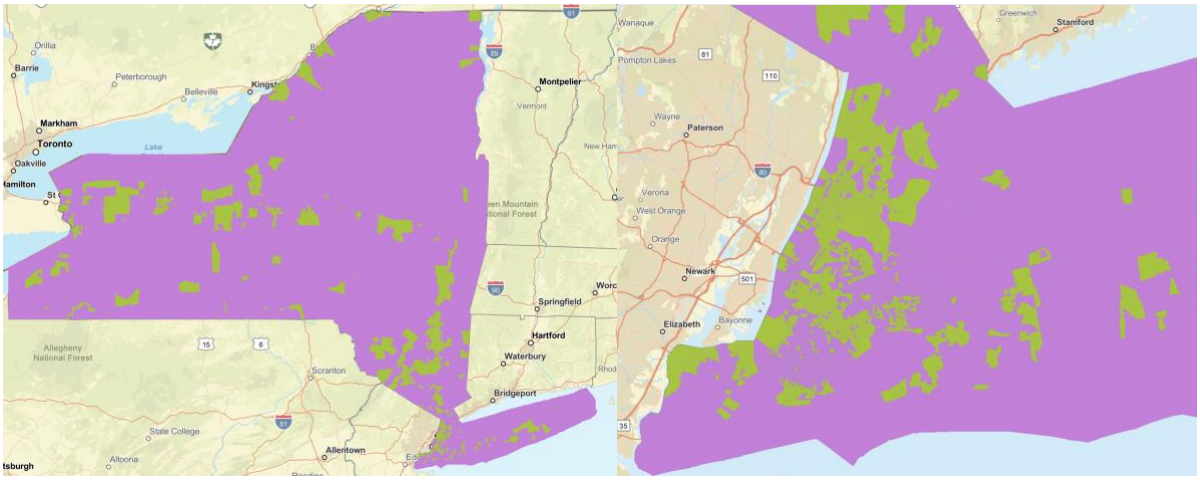


Figure 2. *New York state DAC designated areas (light green) and non-DAC designated areas (light purple). Left: whole state. Right: New York City.*

Table 1 shows that burdened communities such as those living below the poverty line, having limited English proficiency, or facing unemployment are far less likely to engage in any of these programs. NY-Sun is not restricted to serving low income households or draft DACs, but it does have income requirements to receive higher levels of support for single family homes, multifamily affordable housing, and the Inclusive Community Solar Adder program.

Table 1. *The estimated demographics of applicants to three of NYSERDA's programs based on various demographic indicators.*[32]

	EmPower NY Program	Drive Clean Rebate Program	NY-Sun Incentive Program
White	71.3%	79.6%	72.4%
NonWhite	28.7%	20.4%	27.6%
Renters	17.7%	27.4%	27.6%
Limited English	6.1%	6.2%	6.8%
Federal Poverty Line	7.1%	3.3%	3.4%
Disability	12.4%	3.7%	4.2%
Unemployed	5.4%	3.7%	4.2%

[32] The number of applicants per indicator was realized using the ACS 2016 - 2020 survey data for percent of each indicator within each census tract, which was then multiplied by the number of applicants within that census tract. The estimated number of applicants of a certain demographic was then divided by the total number of applicants for that program. Since ACS data relies on survey responses, the percentages here do not necessarily reflect the total eligible population. These figures lay the groundwork for more granular investigation and analysis.

Solar Program Case Study: NY-Sun Incentive Program

The analysis of the NY-Sun Incentive Program data included rooftop and ground mounted solar projects as well as on-site and solar projects. Estimating the reach of community solar amongst households was not included in this analysis, as NYSERDA does not currently have access to community solar subscriber data. New York State is currently leading in the nation for community solar with community solar capacity over 1GW, but further research is needed to fully ascertain the benefits communities are receiving from community solar installations.

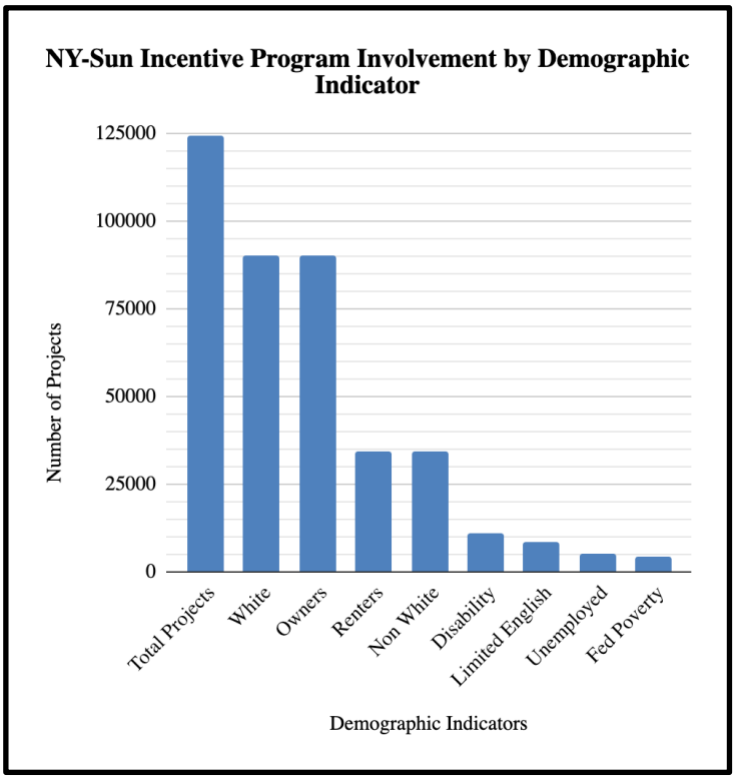


Figure 3. *This figure visualizes customers served by NYSERDA's NY-Sun Incentive Program based on various demographic indicators. The number of projects per indicator was realized using the ACS 2016 - 2020 survey data for percent of each indicator within each census tract, which was then multiplied by the number of projects within that census tract. Data manipulation conducted* ***here*****.**

There is a large and growing gap in the data about the number of households subscribed to a community solar project. There is also incomplete data available about the existence of projects on multi-family housing units which NY-Sun does not currently track. Without knowing how many multifamily buildings or households are in a census tract and comparing it with NY-Sun solar installation data, this analysis is likely undercounting the projects benefitting DACs. It is once again important to acknowledge that this analysis did not analyze benefits derived from community solar projects because NYSERDA does not currently have access to this community solar subscriber data. Community solar subscriptions are a supplement to on-site installations. Without additional research, it is impossible to know how many of these households in rented units may or may not have a community solar subscription.

With this in mind, the following GIS maps demonstrate the nature of the relationships between NY-Sun Incentive Program project numbers and poverty levels, renter levels, and non-white population levels.

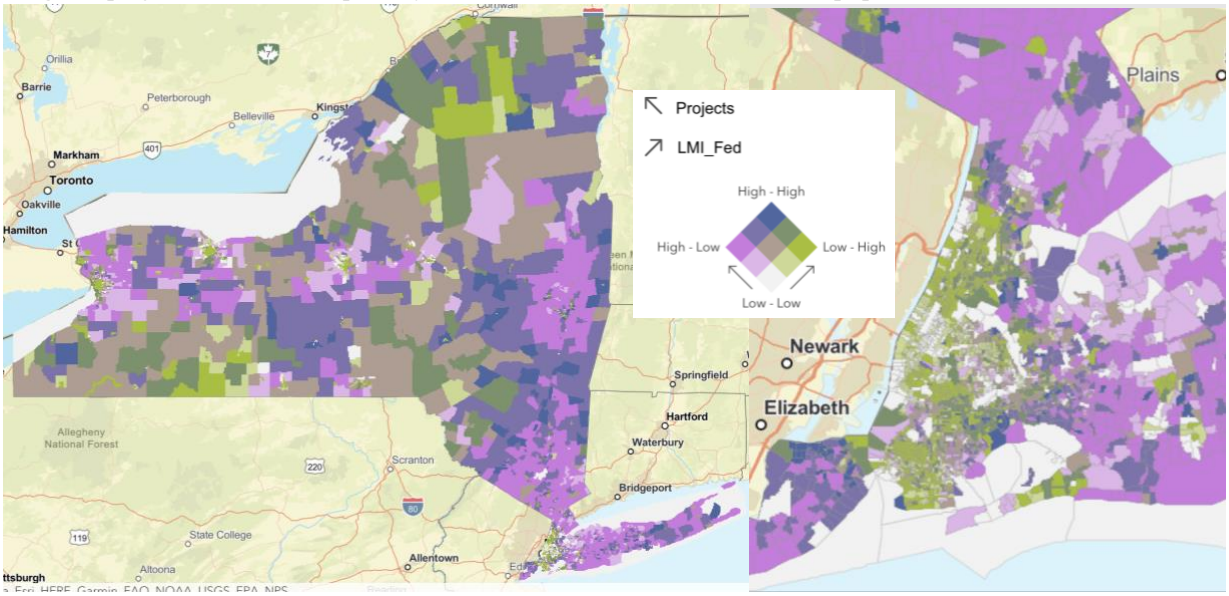


Figure 4. *The number of NY-Sun Incentive Program projects compared to the number of people who are below the federal poverty line. Most of the tracts with high project numbers have a low or medium number of people below the federal poverty line. Green tracts have a high number of people below the federal poverty line and low project numbers. These tracts are concentrated in New York City. However, also note that Manhattan is largely composed of high rise buildings which act as deterrents for on-site solar installations. Additionally, this analysis accounts for on-site installations only and does not account for community solar connections. Therefore there is likely an underrepresentation of service.*

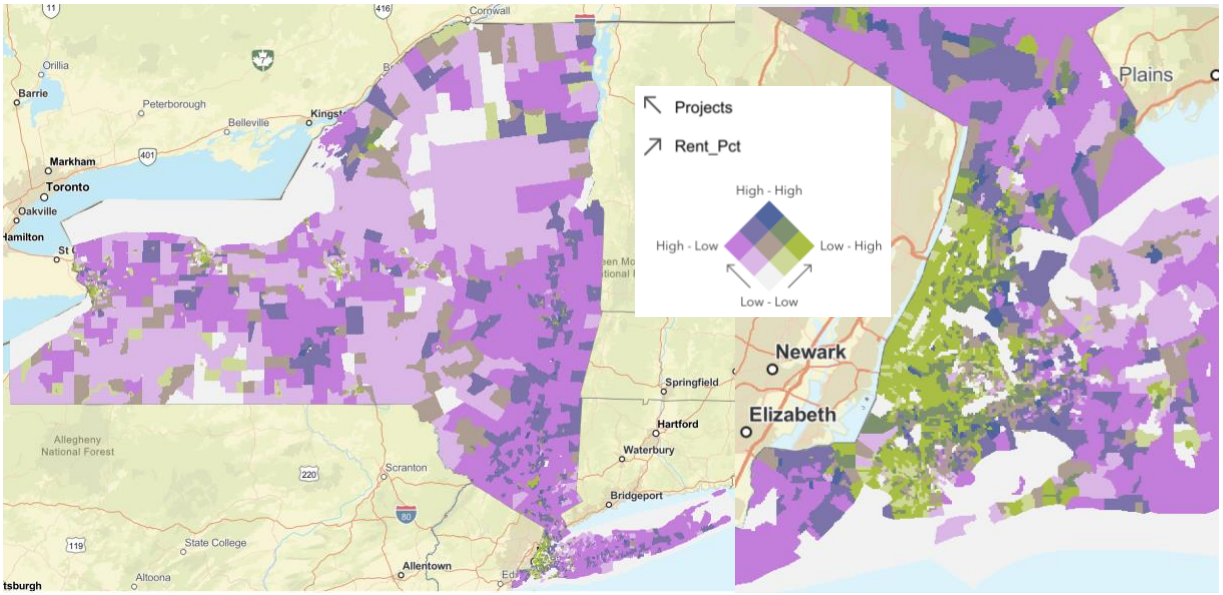


Figure 5. *The number of NY-Sun Incentive Program projects compared to the number of people who live in rented units. Most of the tracts with high project numbers have a low number of people living in rented units. Almost no tracts with a high number of people living in rented units have high project numbers. Green tracts have a high number of people who live in rented units and low project numbers. These tracts are concentrated in New York City. However, also note that Manhattan is largely composed of high rise buildings which act as deterrents for on-site solar installations. Additionally, this analysis accounts for on-site installations only and does not account for community solar connections. Therefore there is likely an underrepresentation of service.*

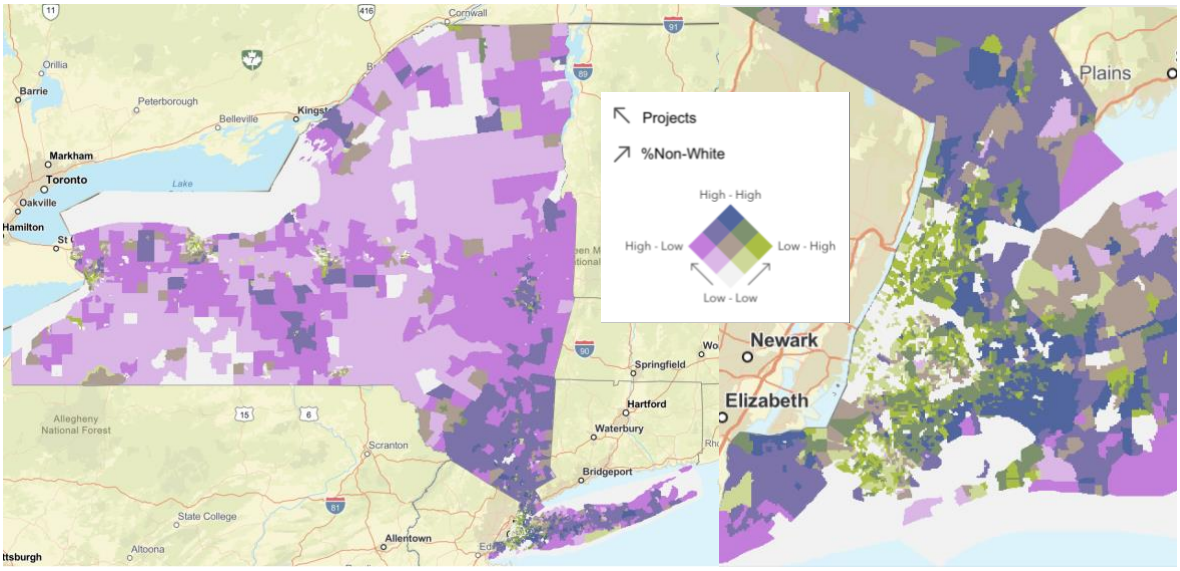


Figure 6. *The number of NY-Sun Incentive Program projects compared to the percent of the population that is not white. Most of the tracts with high project numbers have a low percentage of people who are not white. In the New York City area, most of the tracts with a high project number have a medium percentage of people who are not white. Green tracts have a high percentage of people who are not white and low project numbers. These tracts are concentrated in New York City. However, also note that Manhattan is largely composed of high rise buildings which act as deterrents for on-site solar installations. Additionally, this analysis accounts for on-site installations only and does not account for community solar connections. Therefore there is likely an underrepresentation of service.*

Residential Energy Efficiency Program Case Study: EmPower NY

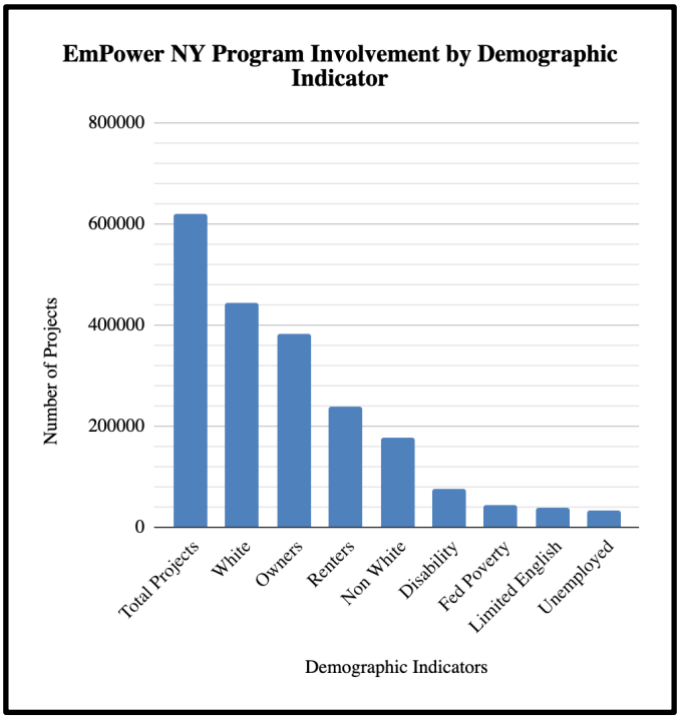


Figure 7. *This figure visualizes customers served by NYSERDA's EmPower NY program based on various demographic indicators. The number of projects per indicator was realized using the ACS 2016 - 2020 survey data for percent of each indicator within each census tract, which was then multiplied by the number of applicants within that census tract. It is important to note that EmPower NY does not serve multifamily housing units, and some of these demographics may be disproportionately represented in multifamily housing units. Data manipulation conducted* ***here*****.**

The existing eligibility criteria for the EmPower NY program is already conducive to serving DACs. In order to participate in the program, a customer must earn 60% or less of the State Median Income (SMI), the same income threshold included in the DAC criteria.[33] Since this eligibility criteria is well-suited for DACs, EmPower NY staff should focus their efforts on increasing awareness and accessibility.

[33] NYSERDA, *EmPower New York* (NYSERDA, 2022). https://www.nyserda.ny.gov.

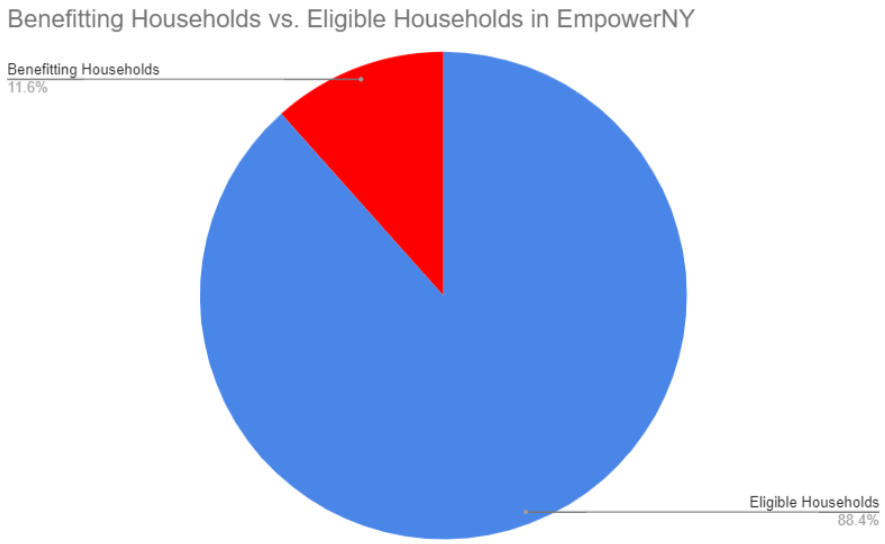


Figure 8. *Total New York households showing number of households that have received EmPower NY upgrades since 2010 vs. households eligible for upgrades.*

The SMI of New York was approximately $64,000 in 2017, which means that any household earning less than $38,400 automatically qualifies. Given these eligibility requirements, approximately 1.1 million households, or 34.8% of total households in New York, qualify for EmPower NY.[34] Since 2010, EmPower NY has completed projects in roughly 128,098 unique households, reaching an estimated 9-12% of households falling below the 60% SMI threshold. As EmPower NY does not serve multi-family households and yet census totals do include multi-family dwellings, it is possible that EmPower has reached a larger portion than this estimate. However, the 1.1M eligible households are DAC eligible from income level alone, not accounting for other factors that designate a community as a DAC. With the new and expanded DAC definition, more households will be eligible for EmPower upgrades - which will ultimately affect the percentage of served households as the number of eligible DAC households (and therefore total eligible households) will increase. It will be important to monitor if and how this ratio changes.

Though the EmPower NY program does not serve multifamily housing, other NYSERDA programs and utility programs that were not included in this study specialize in energy efficiency upgrades for multifamily housing units. Therefore, in areas like New York City with a large quantity of multifamily housing units, census tracts marked as underserved by EmPower NY (green) may be exaggerated. In response to this, the team briefly investigated the effects of removing New York City census tracts from the analysis. The results can be found in the Further Study section. Care should be taken when using the following maps to determine areas that require increased involvement by EmPower NY.

[34] Guzman, Gloria G., *Household Income: 2017* (U.S. Census Bureau, 2017). https://www.census.gov

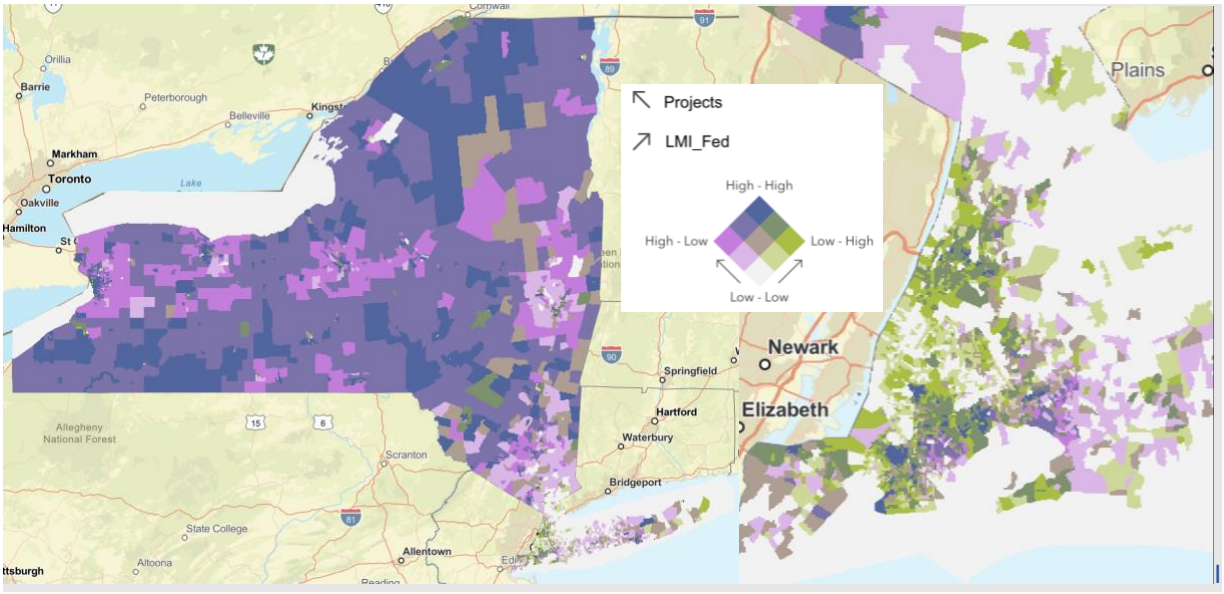


Figure 9. *The number of EmPower NY projects compared to the number of people who make less than the federal poverty level. Most of the tracts with high project numbers have a medium number of people below the federal poverty line. Green tracts have a high number of people below the federal poverty line and low project numbers. These tracts are concentrated in New York City where there is a prevalence of multifamily housing which is not served by the EmPower NY program rather other NYSERDA and utility programs which were not included in this study.*

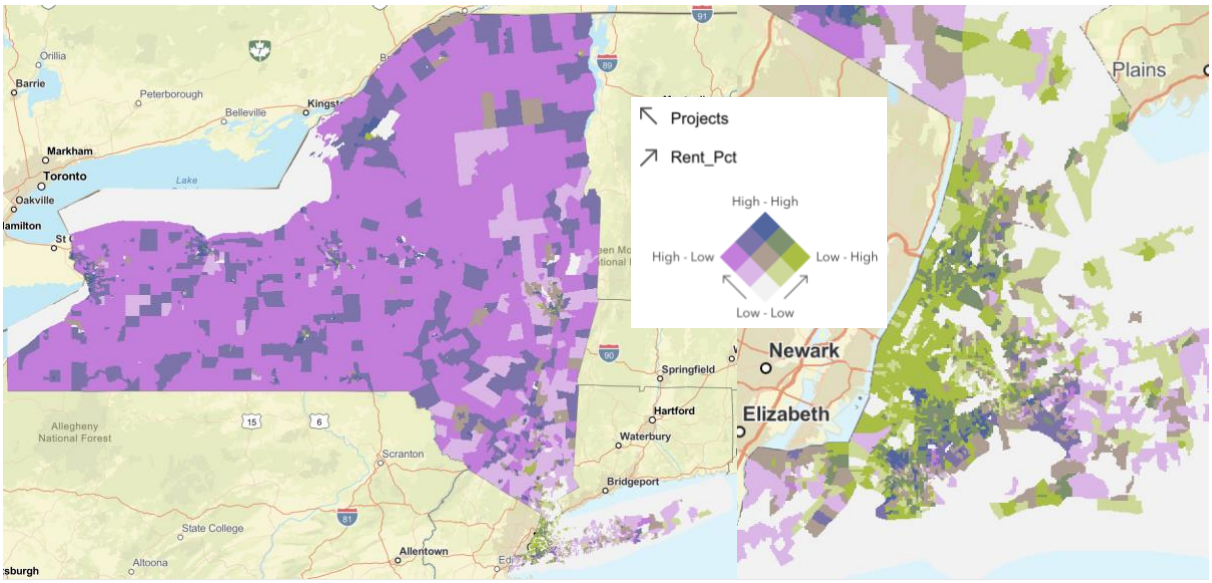


Figure 10. *The number of EmPower NY projects compared to the number of people who live in rented units. Most of the tracts with high project numbers have a low number of people living in rented units. Green tracts have a high number of people living in rented units and low project numbers. These tracts are concentrated in New York City where there is a prevalence of multifamily housing which is not served by the EmPower NY program rather other NYSERDA and utility programs which were not included in this study.*

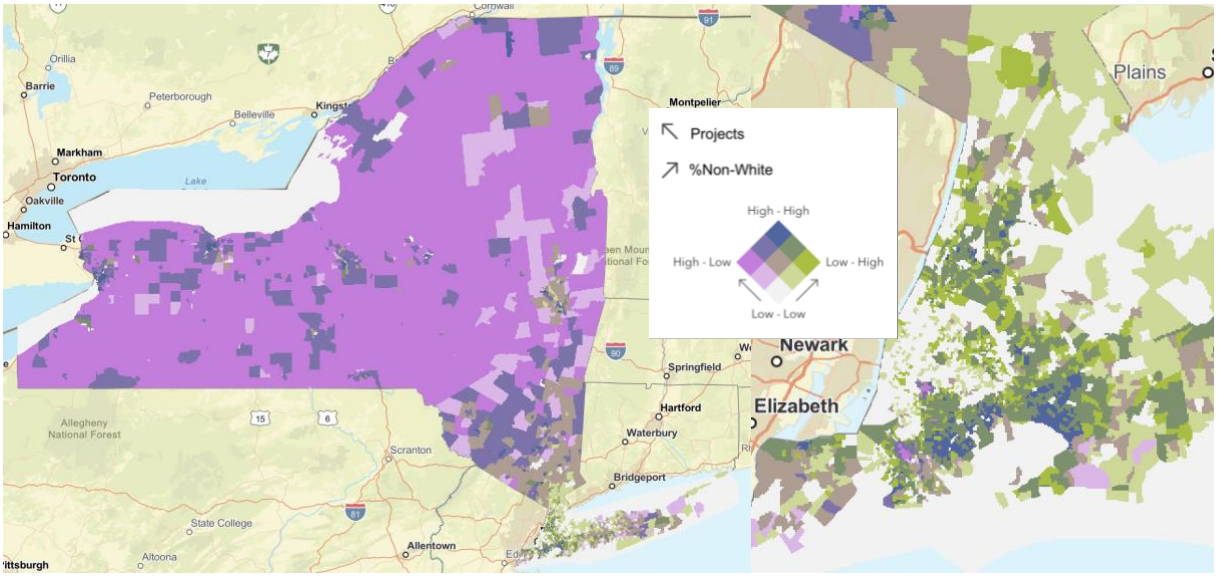


Figure 11. *The number of EmPower NY projects compared to the percent of the population that is not white. Most of the tracts with high project numbers have a low percentage of people who are not white. Green tracts have a high number of people who are not white and low project numbers. These tracts are concentrated in New York City where there is a prevalence of multifamily housing which is not served by the EmPower NY program rather other NYSERDA and utility programs which were not included in this study.*

Clean Transportation Case Study: Drive Clean Rebate

As is demonstrated by **Figure 12** below, NYSERDA's Drive Clean Rebate program largely benefits white applicants. Applicants that are below the federal poverty level, unemployed, have limited English proficiency, or live with a disability are disproportionately under-represented amongst program participants.

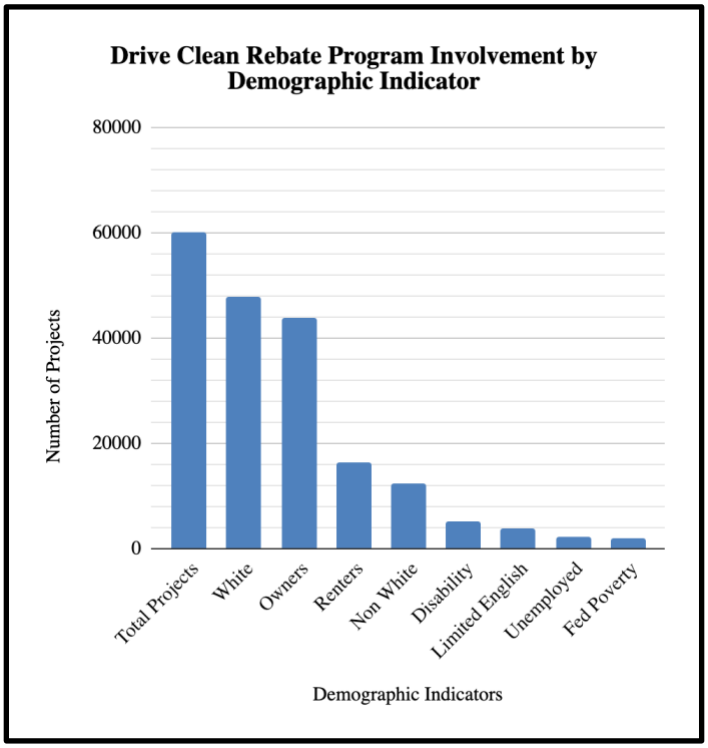


Figure 12. *This figure visualizes customers served by NYSERDA's Drive Clean Rebate program based on various demographic indicators. The number of projects per indicator was realized using the ACS 2016 - 2020 survey data for percent of each indicator within each census tract, which was then multiplied by the number of projects within that census tract. Data manipulation conducted* ***here*****.**

The following GIS maps demonstrate the nature of the relationships between Drive Clean Rebate Program project numbers and poverty levels, renter levels, and non-white population levels. It is important to note as these maps are reviewed that low income customers have compounding barriers to purchasing EVs. This largely contributes to the weak relationship between low income census tracts and program project numbers.

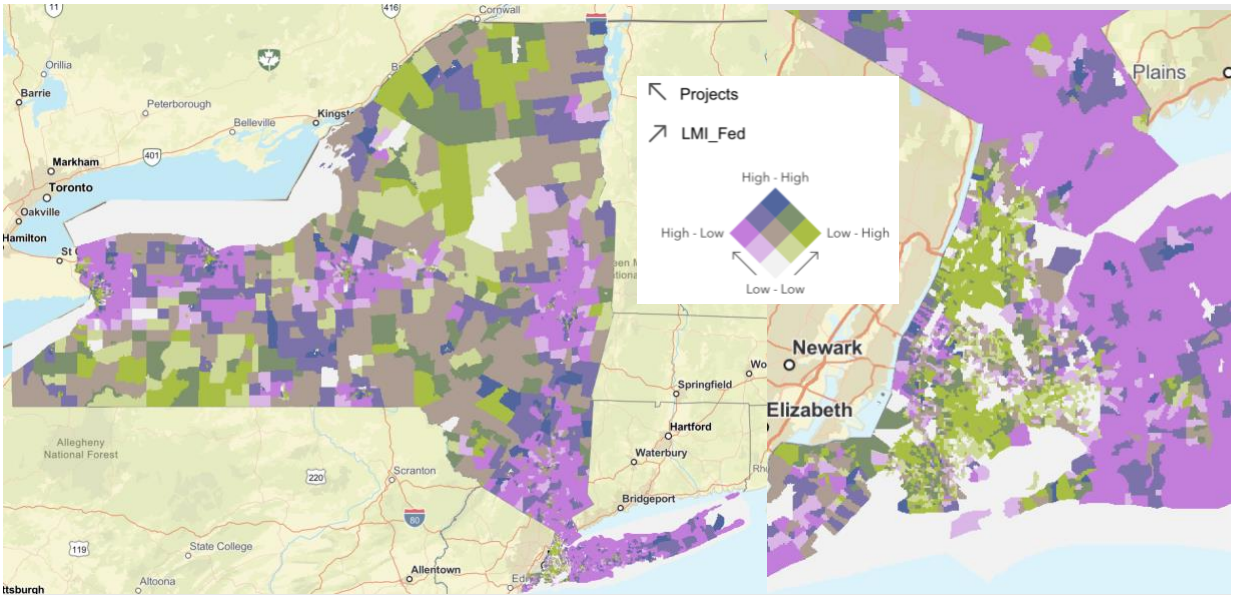


Figure 13. *The number of Drive Clean Rebate projects compared to the number of people who are below the federal poverty line. Most of the tracts with high project numbers have a low number of people below the federal poverty line. Green tracts have a high number of people below the federal poverty line and low project numbers. Significantly, LMI customers face financial barriers to purchasing a new car and are less likely to be inclined to do so.*

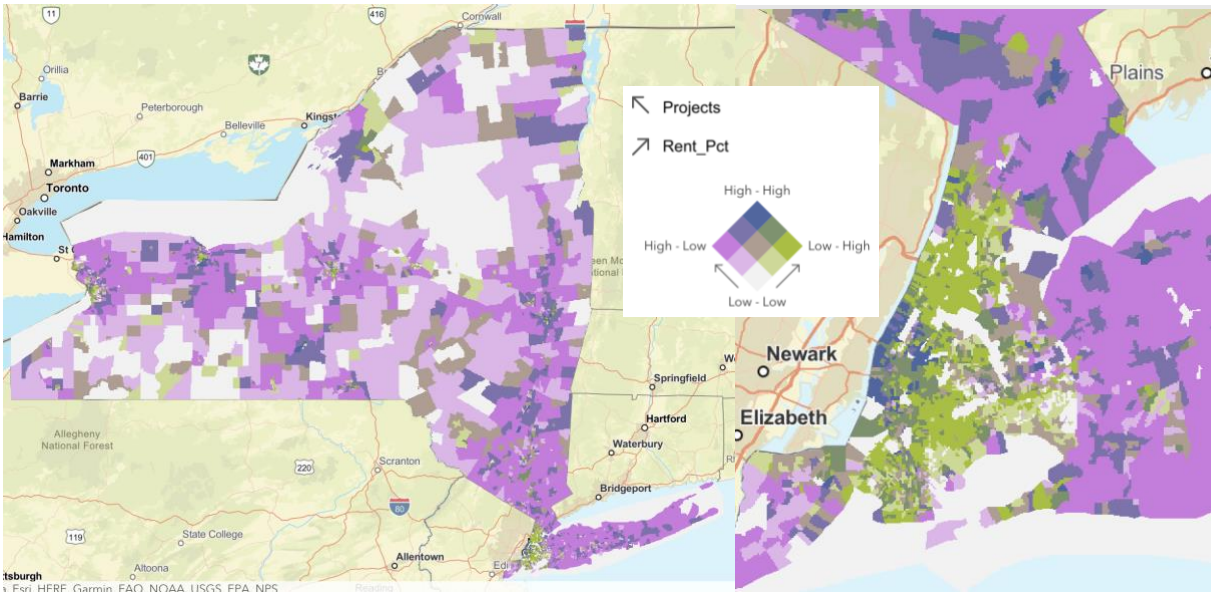


Figure 14. *The number of Drive Clean Rebate projects compared to the percentage of people who live in rented units. Most of the tracts with high project numbers have a low percentage of people who live in rented units. Green tracts have a high percentage of people who live in rented units and low project numbers. These tracts are concentrated in New York City. Significantly, citizens of New York City are less likely to own vehicles than those in other parts of the state due to the compact nature of the city and its extensive public transportation network.*

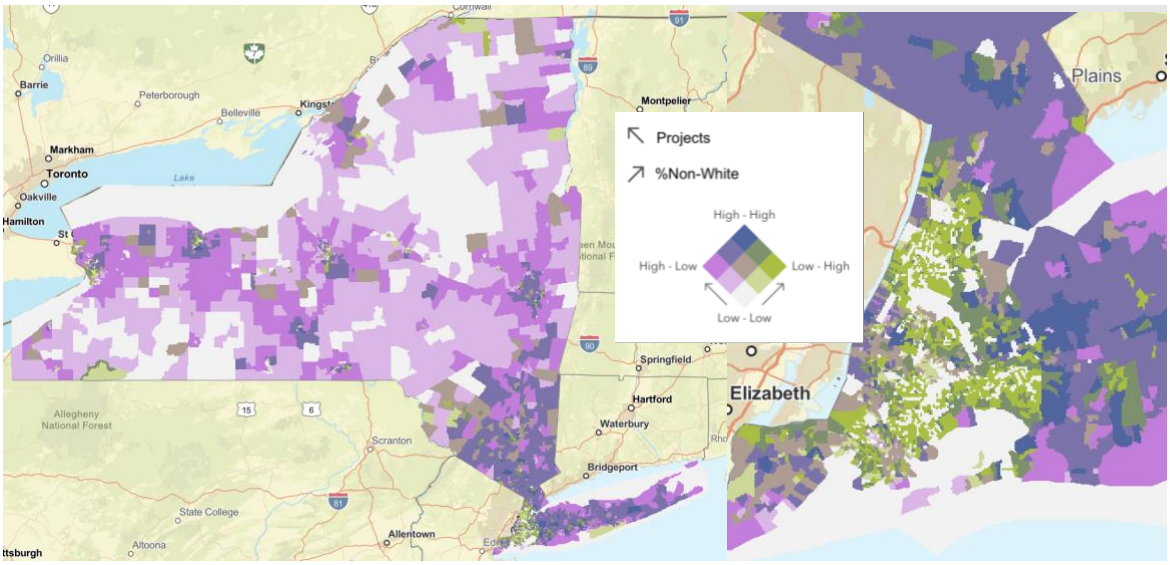


Figure 15. *The number of Drive Clean Rebate projects compared to the percentage of people who are not white. Most of the tracts with high project numbers have a low or medium percentage of people who are not white. Green tracts have a high percentage of people who are not white and low project numbers. These tracts are concentrated in New York City.*

Analysis of Barriers to DAC Inclusion in Energy Efficiency and Clean Energy Programs

Community-based organizations and experts around the state noted a litany of barriers preventing historically marginalized communities from accessing NYSERDA's clean energy programs—many of which are already well-known to NYSERDA. As required by the Climate Act, NYSERDA completed a Barriers Report[35] in December of 2021, which assessed the primary barriers throughout the agency. In order to supplement this research with original findings, our interviews and literature review focused on program-specific barriers for the three clean energy programs within the scope of our research. For continuity, we sorted our barriers according to the same categories used within the 2021 Barriers Report, as outlined below:

- **Physical and Economic Structures and Conditions** include barriers associated with homeownership versus renting, inadequate building infrastructure, and state offerings not meeting community needs.
- **Financial and Knowledge Resources and Capacity** includes barriers associated with limited access to capital or technical knowledge necessary to identify and take advantage of state programs.
- **Perspectives and Information** includes barriers associated with lack of trust in service providers based on historical neglect and unfulfilled promises, as well as a general lack of awareness of programmatic efforts.
- **Programmatic Design and Implementation** includes barriers associated with inadequacies within programs including a lack of resources, past assessment and benchmarking, and inability to meet the specific needs of communities.

[35] NYSERDA, *Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2022). https://climate.ny.gov/NY-Disadvantaged-Communities-Barriers-and-Opportunities-Report.pdf.

Physical and Economic Structures and Conditions:

With regards to the NY-Sun Incentive Program and EmPower NY, several CBOs noted that the age or condition of the existing housing stock in LMI and BIPOC communities is a barrier for access—many people are facing larger issues than energy efficiency or renewable generation, and must prioritize their efforts accordingly. One of the largest barriers for the NY-Sun Incentive Program to overcome is that the open space required for distributed solar is typically tied to wealthier homeowners. With regard to the Drive Clean program, there was consensus amongst experts and community stakeholders that EV rebates are ill-suited to serve communities that largely rely on public transportation, and that they hope to see New York State continue to strengthen its emphasis on improving overall transit access and decarbonizing buses.

In more rural regions of the state, community members reported that a primary barrier is the small local governments, which lack the capacity and/or interest to connect with NYSERDA on their clean energy programs. Additionally, the EmPower NY program is under-resourced in these rural areas, which makes the participation process lengthy and frustrating due to a shortage of solar contractors in the area and limited local assistance for residents in these communities. This issue was echoed by EmPower NY staff, who acknowledged that NYSERDA program implementation has suffered from a lack of bandwidth for projects in some regions.

Financial and Knowledge Resources and Capacity:

All of the CBO's interviewed heralded NYSERDA's Regional Clean Energy Hubs (in which money is distributed directly to community groups for clean energy outreach and awareness-raising activities) as a step in the right direction. However, several groups reported that the request for proposal (RFP) process can be restrictive for some community groups (see Programmatic Design and Implementation).

Another barrier to the NY-Sun Incentive Program and Drive Clean Rebate program that was mentioned by all of the community groups is that people lack the technical expertise and time to develop their applications. It is, however, important to point out that the NY-Sun Incentive and Drive Clean Rebate program applications are filled out by a third party (solar contractor and car dealer respectively) and not by the customer directly. The concerns community groups raised demonstrate the need for more information sharing and technical support for community residents to first learn about these program opportunities, understand the process for applying and then receive support to identify a contractor that can assist with the application process. Specifically, community groups raised the issue that NYSERDA largely relies on DAC residents to have reliable access to digital devices and internet, be aware of services, find the application online, demonstrate proof of income, and apply using a social security number, all of which may be barriers to LMI and BIPOC communities.

Perspectives and Information:

There are also specific barriers when it comes to reporting and tracking the demographic information of participants. Several representatives of CBOs agreed that collecting demographic data is crucial, however doing so is a difficult and time-intensive undertaking. Therefore, they requested that NYSERDA ensure that metrics are strategically prioritized and that community organizations partnering with them receive funding allocated specifically for this purpose. Others added that community members do not like providing their demographic information to groups they do not know or trust, which makes it hard to track benefits or connect them with programs for which they qualify. Given that many NYSERDA program applications are filled out on behalf of community residents by contractors, it is important to consider what demographic data residents would feel comfortable sharing with a contractor or what information a contractor might have access to through other means besides what data is collected through an application. A lack of community trust in utilities and government is another significant barrier to program access and participation. Many expert organizations interviewed believe that state agencies must form transformational connections with communities and work directly with CBOs in a way that is not extractive—mutual interest, accountability, and transparency is necessary. Trust-building is paramount to collecting sensitive information from communities and cannot be rushed. Hence, partnerships with grassroots stakeholders will be essential to bridging divides because EJ organizations already have longstanding trust and engagement with DAC residents. NYSERDA will have to maintain a sustained presence in DACs and place considerable effort into understanding and remediating challenges CBOs face when working with government agencies. Conversely, a challenge expressed by NYSERDA program operators is verifying the demographic and income information of potential participants, as they do not want to create a barrier for participation.

Programmatic Design and Implementation:

While it is clear that NYSERDA program operators have made an effort to improve program design for the benefit of priority population access, there are still barriers that exist across all studied programs. Like many state agencies, NYSERDA relies on an RFP contract process to select contractors to administer programs such as the Regional Clean Energy Hubs. However it is important to note that the Regional Clean Energy Hub contracts and associated funding will be awarded directly to community groups who are more effective messengers and partners for frontline communities. In interviews, CBOs reported that the RFP process is difficult for small, under-resourced community groups, especially those without a dedicated development team or prior experience replying to NYSERDA RFPs. Though not all of NYSERDA's programs and RFPs require a CBO to have official nonprofit status in order to be eligible for funding, some of the most well-connected community groups might not have the expertise or capacity to apply for a NYSERDA contract.

EmPower NY's Geo-eligibility Tool is an important method for effectively targeting historically marginalized communities in a way that also removes barriers for communities to qualify for and access program benefits. The Geo-eligibility Tool removes the barrier of community residents needing to show documentation of household income by qualifying eligibility based on if a resident lives in a geographically eligible territory. The pilot tool should be seen as a model for how other energy efficiency and clean energy programs can reform their program design to improve access to program benefits for disadvantaged communities. The EmPower NY program plans to expand the pilot tool to include more geographically eligible regions after further study on the tool's effectiveness and on what additional

parameters should be considered when determining geo-eligible areas. EmPower NY can partner with geospatial researchers and community groups to identify relevant geographic areas that should be deemed geo-eligible. The program should also consider other indicators besides income to identify geographically eligible regions, such as indicators in the draft DAC criteria including race/ethnicity, climate risks due to the historical marginalization of BIPOC communities, and the disproportionate burdens and vulnerabilities they face as a result of systemic inequities.

EmPower NY specifically faces a programmatic barrier for the segment of disadvantaged communities that live in rental homes due to various factors including income, urban density, and a lack of affordable housing available. Because EmPower NY only serves single family, 1-4 unit households, there are inherent limitations to how accessible the program can be to all households and especially renters, since only a portion of single family households are typically rented and due to the split-incentive issue with building owners. While only 54% of New Yorkers own homes, over 82% of EmPower NY projects have been completed in owned single-family homes, which only comprises 30.5% of New York households.[36] 85% of the owned single-family homes comprising EmPower's dataset are owned rather than rented. One primary barrier preventing participation by rental properties is that landlords must approve of the weatherization and energy efficiency upgrades, though the benefits largely accrue to the tenants (the split incentive dilemma). Many absentee landlords across the state are already under-attentive to their tenants' needs, and renters strategically save their requests for more important health or safety issues, such as fixing broken appliances, heat, or air conditioning. Even landlords that might be interested in the program suffer from a lack of trust in the state, and express concern that EmPower NY contractors might cite and fine them for negligence, or even rescind their Certificate of Occupancy. While NYSERDA has communications online assuring landlords that decreasing tenant utility burdens improves their capacity to pay rent, the EmPower program still struggles to overcome substantial perceptions of risk.

Overall, community groups find it difficult to keep up with the way that eligibility and benefits from NYSERDA clean energy programs change over time. There seemed to be an information gap in the understanding community groups had of how program application processes worked. For example, several interviewers mentioned the time-consuming and inaccessible nature of the paperwork needed to participate in the Drive Clean Rebate program. There may be a misunderstanding of how to participate in the Drive Clean Rebate program. For this program, car dealers fill out all program paperwork and send a final short form for the car buyer to sign which the dealer then sends to NYSERDA and the customer receives their rebate immediately. The information disconnect presents an opportunity for NYSERDA to improve how it shares and communicates information about program offerings to communities.

Program-Specific Observations:

Empirically, one of the largest disparities in the EmPower NY program uptake rate is correlated to renter vs. owner status. Out of a total 128,098 project upgrade measures that have been completed through this program since 2010, just 25,255 of them occurred in rentals (**Figure 16**).[37] This is a mere 19.8% percent of the total as compared to the 79.9% of upgrades that occurred in owner-occupied single family homes.

[36] U.S. Census Bureau, *Homeownership Rate New York* (Federal Reserve Bank of St. Louis, 2022).
[37] NYSERDA. Empower NY Data (May 1, 2022), distributed by NYSERDA

According to the U.S. Census, 53.9% of New Yorkers own their homes with the remaining 46.1% rent.[38]

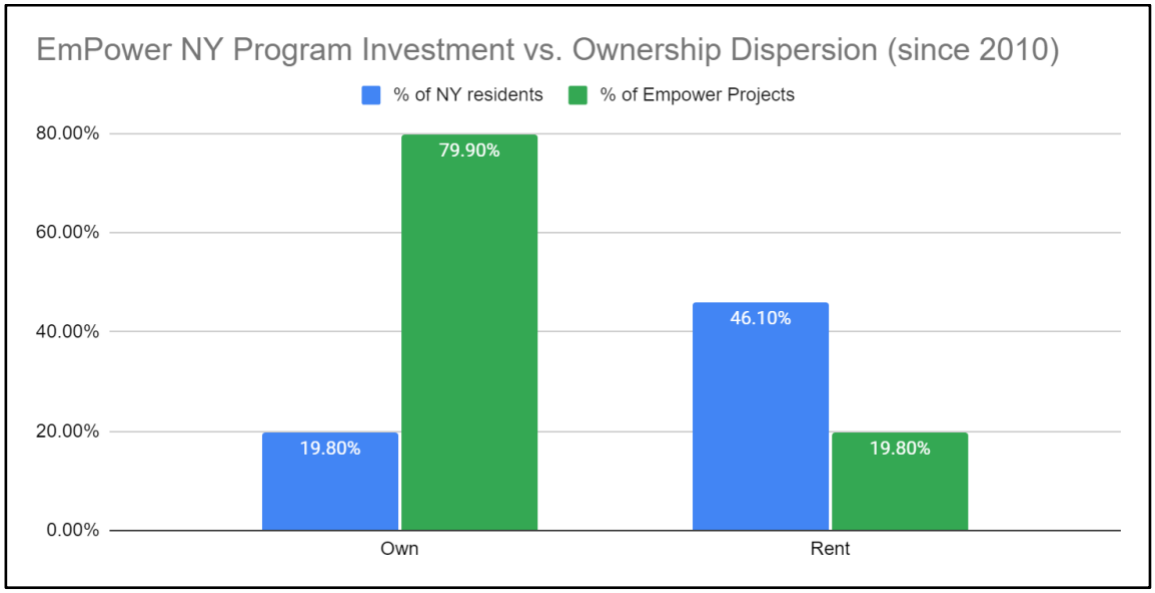


Figure 16. *EmPower program investment by home ownership compared to state ratio.*

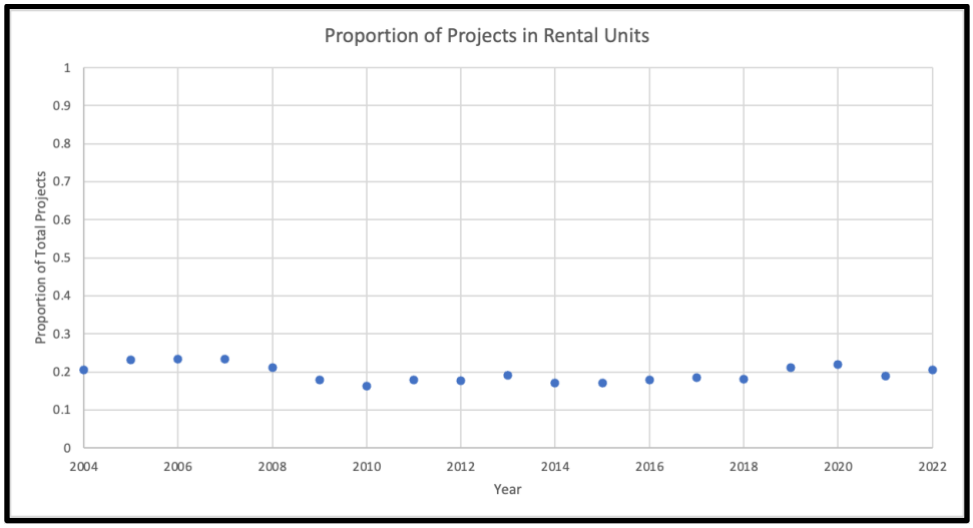


Figure 17. *The proportion of EmPower NY program investment in rental units since 2004.*

Since the program started in 2004, the proportion of projects in rental units has remained relatively unchanged (**Figure 17**). During this same time period rental rates fluctuated between 44-49%.[39] Over this time period, projects in rental units have consistently received less investment.

It is clear that obtaining landlord consent is a significant barrier for EmPower NY to reach priority populations who cannot afford to own a home. This is likely due in part to differing incentives between

[38] U.S. Census Bureau *U.S. Census Bureau QuickFacts: New York* (U.S. Census Bureau, n.d.) https://www.census.gov/quickfacts/NY.
[39] U.S. Census Bureau, *Homeownership Rate New York* (Federal Reserve Bank of St. Louis, 2022).

renters and homeowners in regards to having these projects done. For a homeowner, this type of work will raise the value of the house whereas a renter does not have any equity in the investment. It also begs the question of whether landlords are barriers to renters taking advantage of upgrades. If a landlord owns a building and is against pursuing these upgrades for any reason, it leaves the renter without the agency to install an energy efficiency upgrade.

Equity Metrics: How Other Jurisdictions are Measuring Benefits and Progress towards Building an Inclusive Clean Energy Economy

The metrics used in order to track and measure how well programs reach and benefit disadvantaged communities are crucial to ensuring the development of an inclusive clean energy economy for all New Yorkers. As NYSERDA ramps up their investments in DACs, understanding the equity-based outcome metrics used by other jurisdictions is critical. Most jurisdictions within the U.S., including many of the states from which representatives were interviewed (Colorado, Vermont, etc.) have not yet developed metrics to measure the benefits of their clean energy programs. It is also important to note that some states have developed program-specific equity-based metrics without developing comprehensive EJ screening tools or DAC definitions. Measuring benefits of equity-based programs is oftentimes not a straightforward process; NYSERDA would benefit from implementing some of the practices put in place by other jurisdictions, as well as methods suggested by experts, NGOs and research organizations. It is important to note that at this time there is some ambiguity regarding how benefits will be measured. The following jurisdictions will be referenced as case studies, with certain unique benefits highlighted that could potentially be included in NYSERDA's definition of benefits. At this time and given the amount of information available, the level of comparison is somewhat limited. However, benefits being utilized by the jurisdictions below can be supplemented by the recommendations from experts that follow.

Case Studies:

California

California uses the CalEnviroScreen 4.0 tool to determine areas that are necessary for further investment within the state on the basis of pollution exposure and population characteristics. California's benefits include financial benefits, which in this context would include investment from the Greenhouse Gas Reduction Fund, the Intercity Rail Capital Program, and proceeds from the state's cap-and-trade program. CalEnviroScreen results are also used to direct the Department of Toxic Substances Control in terms of areas for prioritization, and to indicate where solar electricity generation capacity must be increased under the Green Tariff Shared Renewables Program.[40]

Additionally, environmental metrics are tracked using average pollution exposure rates within CalEnviroScreen score ranges in order to make sure that any environmental improvement is being equitably distributed. For example, a report released earlier this year found that diesel particulate emissions decreased across the state, but the highest rate of decrease was exhibited within communities that were in the top

[40] Office of Environmental Health Hazard Assessment, *Using CalEnviroScreen* (Office of Environmental Health Hazard Assessment, 2022). https://oehha.ca.gov/calenviroscreen/how-use.

quartile of environmental risk, as calculated via CalEnviroScreen scores.[41] This data was collected to analyze the distribution of pollution reductions as a result of other programs, and ensure that benefits of these programs were being equitably distributed. This should serve as an example to NYSERDA of how metrics used to define DACs can also be used to track environmental improvements.

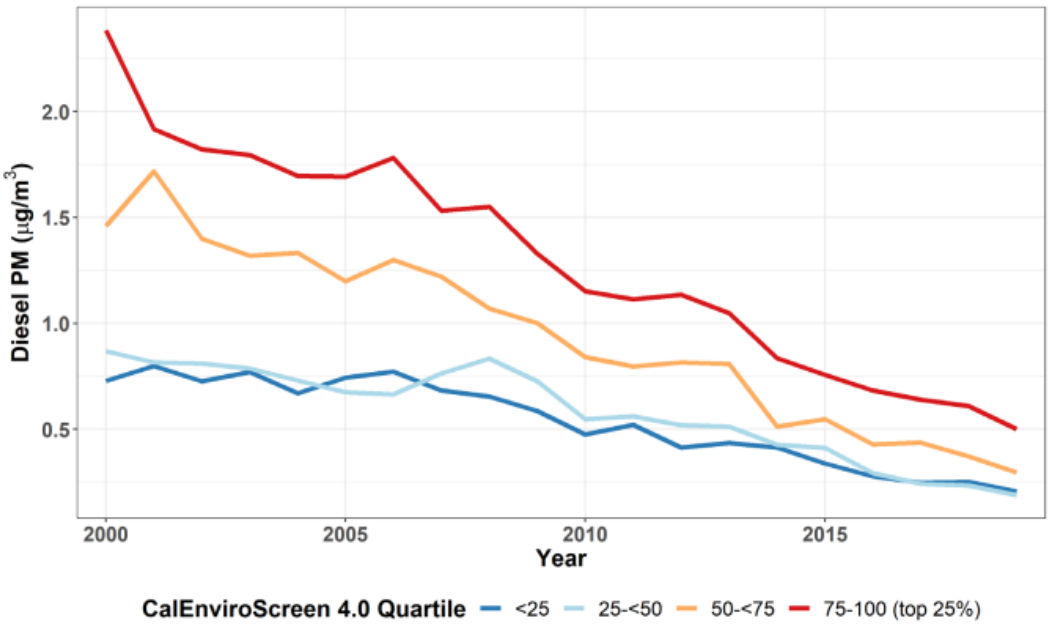


Figure 18. *Diesel particulate matter trend by CalEnviroScreen 4.0 quartile from 2000-2019.*[42]

Washington

The next tool is the Washington Environmental Health Disparities Map. This tool is notable in the sense that it was created in collaboration with Front and Centered, a community based EJ coalition, along with Washington state agencies and other organizations. Aside from tracking environmental and health impacts that can be used to inform policy and investment decisions (like other tools), this tool is specifically meant to improve community engagements. A 2019 paper written by stakeholders involved in the map's creation listed potential benefits as reciprocal knowledge translation, improved community-stakeholder relationships, and improvements to the map that would come about as new concerns are identified and data sources are developed to respond to community concerns.[43]

Oregon

[41] Laurel Plummer, et al. Office of Environmental Health Hazard Assessment, *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities: Progress Toward Reducing Inequities* (Office of Environmental Health Hazard Assessment, 2022). https://oehha.ca.gov.

[42] Laurel Plummer, et al. Office of Environmental Health Hazard Assessment, *Impacts of Greenhouse Gas Emission Limits Within Disadvantaged Communities: Progress Toward Reducing Inequities* (Office of Environmental Health Hazard Assessment, 2022). https://oehha.ca.gov.

[43] Esther Min, et al. "The Washington State Environmental Health Disparities Map: Development of a Community-Responsive Cumulative Impacts Assessment Tool." Int. J. Environ. Res. Public Health 16, 22 (2019): 4470, https://doi.org/10.3390/ijerph16224470.

Oregon passed a House Bill in 2021 that requires the Public Utility Commission to establish a list of equity metrics in order to track and assess state expenditures within the lens of environmental justice. While Oregon will release a list of equity-based metrics, metrics have been recommended for inclusion by the Oregon Energy Trust for implementation.[44] Included in these recommended metrics are energy-related metrics that could be assigned to individual programs or projects, including energy efficiency and renewable energy development. There are also financial metrics, including cost/benefit ratios, and program metrics including staffing and customer satisfaction. The last category of metric suggested was diversity, equity, and inclusion (DEI), which would be utilized to manage organizational change towards procedural justice and anti-racism. DEI, as suggested by the Energy Trust, includes measures of community engagement, mandated implicit bias training for all hiring managers, and the development of a trade ally dashboard to track diverse spending and stakeholder participation.

Minnesota

The Minnesota Department of Commerce created an initiative called Connecting Low-Income Communities Through Efficiency and Renewable Sources (CLICERS) which was meant to reduce energy burden in low-income communities through weatherization and solar PV installations.[45] The program specific metrics are:

- Geography (urban, suburban, or rural)
- Percent energy burden
- Bill structure
- Fuel type
- Energy measures (energy efficiency, conservation, solar integration, behavioral change, and health and safety measures)
- Barriers to access
- Income type
- Dwelling type
- Income level
- Age of housing
- Ownership structure

Programs like CLICERS can serve as examples for metrics to be utilized in tracking benefits associated with specific clean energy programs, including NY-Sun Incentive Program and EmPower NY. It should be noted that EmPower NY already tracks some of these metrics. However, additional NYSERDA programs could model their benefit evaluation process based on EmPower NY, CLICERS, and other relevant programs.

US EPA

[44] Public Utility Commission of Oregon, *2022 Performance Measure Recommendations for Energy Trust of Oregon*, (Public Utility Commission of Oregon, 2022). https://www.energytrust.org.pdf

[45] U.S. DOE, *Issue Brief: Using Data to Set Priorities and Track Success of Low-Income Energy Programs* (U.S. DOE, 2022). https://betterbuildingssolutioncenter.energy.gov.

The US EPA's co-benefits risk assessment health impacts screening and mapping tool, or COBRA, uses existing data and potential future conditions to explore how various changes in air pollution from changes in policies or programs can affect human health on a county, state, regional, or national level.[46] The tool then translates human health impacts into a monetary value by using a 'value of statistical lives' saved approach, as well as a cost-of-illness approach that estimates healthcare costs and opportunity costs associated with missing work due to illness. Health impacts considered by COBRA include infant and adult mortality, non-fatal heart attacks, hospitalizations due to respiratory or cardiovascular issues, bronchitis, asthma impacts, and more. This tool is available for decision-making, and is centered around ensuring that policymakers have the knowledge to implement policies that will have the most benefit in terms of the health and financial wellness of communities.This tool has been cited by the New York State Department of Public Service and Ecology and Environment, the Virginia Department of Planning and Budget, the California Energy Commission, and NYSERDA's Offshore Wind Master Plan report.[47] COBRA is recommended for future use, and the health impacts and quantification of health-related benefits could be implemented within NYSERDA to track benefits of various programs.

Table 2. *Benefits utilized by California, Washington, Minnesota, Oregon, and the US EPA via the COBRA tool. Table excludes financial investment as a benefit, as this is a common outcome of EJ programs and screening tools.*

	California	**Washington**	**Minnesota**	**Oregon**	**COBRA**
Environmental and Energy Benefits	Department of toxic Substances Control action, GHG/co-pollutant reduction, MW of solar installation		Energy efficiency, energy conservation, solar integration, percent energy burden	Energy efficiency, renewable energy development	
Equity and Community Benefits		Reciprocal knowledge translation, improved community-stakeholder relationships	Barriers to access, income type, dwelling type, age of housing, ownership structure, bill structure	Internal DEI measures and training	
Health-Related Benefits					Mortality, non-fatal heart attacks,

[46] U.S. EPA. *User's Manual for the Co-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) Version: 4.1.* (U.S. EPA, 2021). https://www.epa.gov.pdf

[47] U.S. EPA. *Publications that Cite EPA's CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool.* (U.S. EPA, 2021). https://www.epa.gov.pdf

					respiratory and cardiovascular hospitalizations, bronchitis, asthma impacts; quantified financial impacts of health outcomes
Financial and Programmatic Success				Project financial integrity, benefit/cost ratios, market transformation, program delivery efficiency, customer satisfaction, staffing	

Other Recommendations

A common idea of how to measure benefits utilized by multiple jurisdictions is to measure the amount of investment, in terms of dollars spent, in communities that are classified as DACs or have a high EJ score using the factors laid out above. However, dollars spent is not always a direct reflection of the benefits received by communities. Other financial metrics would include performance indicators for clean energy programs, including the amount of money saved by people participating in equity-based programs.[48] Across interviews, experts warned that utilizing financial benefits in this context should be done carefully. It was noted that when equating monetary investment with benefits, it should be done in a transparent manner to ensure that 40% of benefits are truly being allocated to DACs. Additionally, a NY Department of Environmental Conservation employee acknowledged that monetary benefits incentivize government agencies to act, such that health benefits can be quantified in terms of dollars saved not only by an individual but the entire state, as many LMI individuals rely on Medicare and Medicaid.

Another method of tracking benefits of programs would be to analyze program participation, as in the number of people directly served by a specific program, or a program's participation rate, which is the proportion of potential or eligible participants who actually do participate in a program.[24]

An additional category of benefits exists within these programs, and are referred to as 'non-energy benefits' (NEBs). These include increased comfort, noise reduction, health and safety benefits, increased occupant productivity due to decreased illness and a more comfortable environment, and aesthetics.[49] Though some

[48] VEIC, *The State of Equity Measurement: A Review of Practices in the Clean Energy Industry* (VEIC, 2019). https://www.veic.org.

[49] American Council for an Energy-Efficient Economy, *The 2017 State Energy Efficiency Scorecard* (American Council for an Energy-Efficient Economy, 2017). https://www.aceee.org.

of these benefits are difficult to quantify or track, such as comfort or aesthetics, some benefits can be monitored consistently in order to analyze the benefits a community receives as a result of these programs. This can be done partially by continuously tracking health information and impacts, which would be a similar approach to that used by the US EPA's COBRA tool. To quantify the health and safety benefits of a program, particularly one aimed at implementing energy solutions that would improve air quality, jurisdictions should track the number of emergency room visits due to asthma attacks or myocardial infarction, and identify regions where the number has increased or decreased.

It is important to note here that some metrics might not be appropriate for specific programs. For example, a NYS Department of Health official mentioned that it is complex to attribute benefits from installation of rooftop solar towards health outcomes. Similarly, ownership is a valuable metric in terms of NY-Sun and Drive Clean, but not necessarily for EmPower NY. Additionally, it should be noted that there are certain challenges associated with gathering and utilizing health-related information that are important to consider. A significant barrier is privacy and security regulations. Certain health information is protected under the Standards for Privacy of Individually Identifiable Health Information under the Health Insurance Portability and Accountability Act (HIPAA).[50] Additionally preserving a secure medical system is crucial for patient trust, and accessing health data should be done thoughtfully. Additional challenges include the fact that patients' health and personal information changes constantly which makes consistent tracking difficult, and that health data can come in various forms ranging from encrypted digital data, hard-copy paper records, to photos.[51] These challenges should be considered and addressed if NYSERDA uses health-related information to track the benefits of their programs.

Tracking NEBs was also recommended by multiple experts interviewed. NEBs proposed by experts within community groups include greenhouse gas emission reductions, long-term high wage job creation, ownership opportunities and distance to clean energy jobs. Experts also emphasized the importance of tracking health metrics to measure the health benefits received by community members. However, some interviewees noted that health metrics like diabetes and asthma rates are both complex and ineffectively tracked, which makes it difficult to attribute changes to any one intervention. Some of these measures may take years to show improvement, but they are still important for tracking the long term success of equity-based programs and EJ screening tools.

Another approach recommended by the Urban Institute is to take a more systemic and holistic view of a community's equity in order to classify them as disadvantaged, and to measure the success of certain programs.[52] Proposed dimensions include:

- Historical legacies: understanding past instances of systemic injustice in order to better inform a current understanding of equity.

[50] U.S. Department of Health & Human Services, *Summary of the HIPAA Privacy Rule* (U.S. Department of Health, 2022). https://www.hhs.gov.
[51] Pubrica. *What Are the Existing Challenges in the Medical Data Collection Process?* (Pubrica, 2020). https://pubrica.com.
[52] Carlos Martin and Jamal Lewis, *The State of Equity Measurement: A Review for Energy-Efficiency Programs* (Urban Institute, 2019).

- Awareness of populations: ensuring that agencies and individuals that measure equity are aware and focused on historical treatment of various groups, as well as groups that may be uniquely disadvantaged in the present.
- Inclusion of other voices: including and engaging with community members throughout the conceptualization, design, and monitoring of any programs created to benefit communities.
- Access discrimination: measuring the ability of different groups of interest to become aware of, apply for, or access any service.
- Output differences: measuring and monitoring the treatment and performance that various groups receive when being provided a service.
- Disparate impacts: measuring mid- and long-term outcomes of programs.

While some of these metrics may serve better as indicators within the DAC definition, such as disparate impacts, output differences, or historical legacies, some may serve as useful benefit metrics. For example, utilizing measures under the category of 'inclusion of other voices' could lead to tracking the proportion of staff or contractors that is demographically in line with the population being served. 'Awareness of populations' could be an important benefit indicator, as this would correlate with program participation and could indicate communities that are not being appropriately targeted for outreach. These types of indicators are important measures of benefits, and would provide a strong indication of whether or not benefits are being equitably distributed within NYSERDA programs.

DAC and Screening Tool Metrics:

At the time of this report, New York has released a draft DAC definition similar to those used by other jurisdictions, including California, Maryland, Washington, and the US EPA. The metrics utilized by these tools generally fall into four categories

- Pollution and environmental risk metrics
- Health-related metrics
- Socioeconomic and demographic metrics
- Measurements of climate risks

The factors proposed within the DAC definition can be viewed in comparison to other jurisdictions' tools in Appendix II. The metrics utilized within the DAC screening criteria are crucial not only for identifying communities in need of further investment, but can also be used to track program benefits. Similar to how California utilizes CalEnviroScreen data to track the decrease in air pollution and analyze the distribution of the decrease, NYSERDA could track changes in various metrics in order to quantify benefits associated with various programs.

The socioeconomic and demographic information tracked by various screening tools and jurisdictions are important to illustrate how equity is being pursued. The table below shows the socioeconomic and demographic factors used by California, Maryland, and Washington, as well as the federal government's Climate and Economic Justice Screening tool and the NY DAC definition, neither of which has been made official at the time of this report.

Table 4. *Socioeconomic factors utilized by the listed EJ screening tools*

	US EPA	CA	MD	WA	NY
Educational attainment/higher ed enrollment rate	X	X		X	X
Housing burden	X	X		X	X
Linguistic isolation/lack of English proficiency	X	X	X	X	X
Poverty/Low-Median income population	X	X	X	X	X
Unemployment	X	X	X	X	X
Percent non-white			X	X	X
Transportation expense				X	
Individuals under age 5			X		
Individuals over age 64			X		X
Housing Vacancy Rate					X
Percent single-parent households					X
Historical redlining					X
Percent renter-occupied homes					X
Manufactured homes					X
Homes built before 1960					X
Percent without internet					X

Common socioeconomic factors used to classify communities as disadvantaged are linguistic isolation, income level or percentage of population that is below a certain level of poverty, unemployment, housing burden, and education level. Though these factors are not necessarily being used to track the progress of energy programs, they could be incorporated into benefit metrics. For example, tracking program participation, a potential benefit metric, broken down by race, income, home type could serve as a helpful analytical technique in examining how equitably program benefits are being distributed.

VII. Recommendations

The following recommendations were developed after careful consideration of the literature review, available data, and insights gained from NYSERDA teams, CBOs, experienced professionals and experts in the field. They should assist NYSERDA in integrating additional equity metrics and identifying program design improvements to increase program participation within DACs. The recommendations are analyzed from the perspective of efficiency, economic feasibility, and timeframes. Recommendations have been included for the agency overall and specific programs. Further evaluation and analysis needs to be conducted to further develop these recommendations.

Equity Metrics

The following metrics are recommended on the basis of our research on what other state jurisdictions are trying to implement as well as from our interviews with CBO and experts. A more detailed explanation of the proposed metrics can be found in Appendix IV.

Economy-Wide:

- **Socioeconomic and demographic metrics:**
    - **Program participation:** The number of people directly served by a specific program or participation rate with a breakdown of specific demographics of the people served to track the effective distribution of benefits among communities. Tracking program participation relative to eligible households over time in each Economic Zone to identify the areas where outreach efforts should be expanded. As well tracking participation distribution (proportion of total population of DAC's) to serve as a benchmark for program participation rates. Participation information is tracked across certain NYSERDA programs, but should be implemented on an economy-wide level to better understand how program benefits are being distributed.
    - **Race/Ethnicity:** Race is a strong predictor of where most of industrial pollution exists.[53] People of color including Black, Hispanic and Asian-Americans are disproportionately exposed to direct sources of pollution. NYSERDA is planning on using race and ethnicity as an indicator within their new DAC definition, and we reaffirm that choice.[54] Race is currently not tracked by many jurisdictions due to certain legal conflicts. However, it was recommended that NYSERDA track race as a means of ensuring an equitable distribution of benefits from multiple experts in interviews, with the caveat that tracking race and other sensitive information should be done in tandem with building trust within the relationship, and should not be rushed. As is discussed in "Perspectives and Information," multiple CBO representatives expressed the importance of collecting demographic information, but that the undertaking must be directly funded and that metrics must be strategically prioritized. They further contributed that community members must have established trust with the agency collecting their information for greatest efficacy.

[53] Hiroko Tabuchi and Nadja Popovich, *People of Color Breathe More Hazardous Air. The Sources Are Everywhere* ((The New York Times, 2021),). https://www.nytimes.com.

[54] A T Geronimus, *To Mitigate, Resist, or Undo: Addressing Structural Influences on the Health of Urban Populations* (U.S. National Library of Medicine, 2000). https://www.ncbi.nlm.nih.gov.

    - **Income:** Income is a basic demographic indicator that should be used to measure program reach to DACs. Income type is measured within Minnesota's CLICERS program.
    - **Holistic and Historical Equity Metrics:** As suggested by a study from the Urban Institute referenced above, certain equity measures including inclusion of voices, historical legacies, and awareness of populations could be used to track the progress of achieving equity through NYSERDA's programs.
- **Pollution and environmental metrics**: NYSERDA should track levels of pollution, and analyze whether programs meant to decrease pollution (particularly air pollution) are successful. This could be done by tracking:
    - **Co-pollutant reductions**: Similar to how California analyzes reductions in diesel particulate matter based on CalEnviroScreen scores to study where benefits are being realized (see figure XX), NYSERDA could track pollutant levels across the state in order to ensure that benefits from clean energy programs are being felt in DACs.
    - **GHG emissions reductions:** This metric was mentioned in interviews with the NYSERDA experts and community leaders. It is also a firm indicator of success in clean energy projects that are aimed at reducing emissions. Other jurisdictions, including California and Oregon, are or are planning to use energy-related benefit metrics that relate to GHG reductions, including renewable energy development and increased energy efficiency.
- **Health-related metrics**: NYSERDA could continue to cite the EPA's COBRA tool in order to quantify the health impacts and resulting financial implications of various projects or regulations that are implemented. Additionally, some of the health-related metrics (asthma impacts, hospitalizations due to cardiovascular and respiratory issues, etc.) could be incorporated into NYSERDA's benefits frameworks and tracked independently, if possible.
- **Built Environment metrics:**
    - **Building type (residential: single family, multifamily, commercial, industrial)**
    - **Home-owner status:** Home ownership would be a helpful factor to track in order to ensure that benefits are being equally distributed amongst home owners and those who rent their homes. This information is currently tracked by some NYSERDA programs, but should be included in the benefit analysis for all programs.
    - **Home value:** Which is measured by tax assessment, comparable sales listings or actual sales, is another indicator of housing inequality.[55] Housing conditions and the improvements made can be used as proxies for comfort, health, and productivity of community members who live there.[56]

Additional Non-Energy Co-Benefits: Non-energy benefits are positive impacts that result from improved environmental conditions. Apart from direct energy savings from using energy efficient equipment, better air quality, reduced noise levels or green space can potentially improve attendance at work or increase productivity. An example of NEB would be measuring change in HDI using household income and quality

[55] Carlos Martin and Jamal Lewis, *The State of Equity Measurement. A Review for Energy-Efficiency Programs* (The Urban Institute, 2019).

[56] Samantha Friedman, *Nativity Status and Racial/Ethnic Differences in Access to Quality Housing: Does Homeownership Bring Greater Parity?* (Taylor & Francis, 2010). https://www.tandfonline.com.

of life to determine any improvement of wellbeing and quality of life after program implementation.[57] Non-energy benefits tracked by other jurisdictions include improved community-stakeholder relationships (Washington) and the satisfaction of program recipients in terms of the service and benefits that they have received (Oregon).

Program Specific:

Program specific metrics utilized by other states depend on the type of program, but common metrics include energy specific metrics, such as enhanced energy efficiency, energy costs saved, and the amount of electricity generated by renewable sources as a result of the program. An existing program utilizing these metrics, as well as equity metrics including the ownership structure of the project and the existing barriers to access, is the CLICERS program in Minnesota. Additionally, the metrics suggested to the state of Oregon by the Oregon Energy Trust serve as examples of program specific metrics and include the cost/benefit ratio of the project, and satisfaction of those being served by specific programs. For more potential metrics, a detailed description of potential program specific equity metrics available are listed in Appendix IV and Appendix V.

Solar Programs (i.e. NY-Sun Incentive Program)

- **Energy utility savings:** Compared to wealthy households, low income households spend three times more of their income on energy.[58] Estimating energy costs savings through any savings from the utility bill of individuals participating in the program will indicate direct program benefits. It is currently under consideration at Efficiency Vermont.

Residential Energy Efficiency Programs (i.e. EmPower NY)

- **Regional participation:** Tracking how program enrollment changes as a function of clean energy workforce investment is a relevant measure given the contractor shortage in downstate Economic Zones as referenced by Southern Tier CBOs in stakeholder interviews.

NYSERDA has started to explore the possibility of integrated health-related outcomes within their programs, as exemplified by the Healthy Homes Value-Based Pilot program, which aims to allocate health-related benefits and healthcare savings as a benefit of the program.[59] However, tracking health related outcomes is a complex undertaking.[60] It is difficult to attribute health improvements to NYSERDA programs exclusively due to confounding variables and notably, a lack of granular data. For example, indoor air quality, CO_2 reductions. In addition, communities cite privacy concerns for their reluctance to share health related data with public agencies. If NYSERDA wants to track health-related metrics, it would

[57] Bethel Tarekegne and Grace Pennell, *Review of Energy Equity Metrics* (Pacific Northern National Laboratory, 2021). https://www.pnnl.gov.
[58] ACEEE, *Supporting Low-Income Energy Efficiency: A Guide for Utility Regulator* (ACEEE, 2021). https://www.aceee.org.
[59] NYSERDA, *New York State Healthy Homes Value-Based Payment Pilot Residential Service Providers* (NYSERDA). https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt000000ZnkDVEAZ.
[60] NYSERDA, *New York State Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2021). https://www.nyserda.ny.gov.

require a considerable amount of investment in long-term study to find out the relationship between variables such as indoor air quality, nutrition/hunger, heat-related illness, carbon monoxide poisoning hospitalizations, educational performance, and EmPower NY funded energy efficiency renovations. There is an emphasis on measuring benefits using costs-savings on healthcare expenditures as a result of clean energy and energy efficiency programs.

Clean Transportation EV Programs (i.e. Drive Clean Rebate)

- **Air quality index score changes over time compared to participation rates:** Transition to EVs reduces net carbon emissions and has the added benefit of reducing air pollutants such as particulate matter which have an effect on medical conditions such as asthma[61]. Measuring the change of $PM_{2.5.}$ over time and comparing it to participation rates can be used as a proxy for health benefits.
- **Proximity to EV charging infrastructure in DACs:** One of the main drivers of demand for EVs is charging infrastructure, especially its proximity to one's home[62] Ensuring close proximity of EV charging infrastructure to DACs would increase affordability and reduce range anxiety.

NYSERDA could utilize California's method of evaluating their programs. California evaluates the Transformative Climate Communities program in four phases: 1) baseline data collection 2) process evaluation 3) outcome evaluation and 4) impact evaluation. NYSERDA would benefit from this type of evaluation framework, taking into consideration the types of benefits that would be appropriate to measure for different programs.

Program Design

The following recommendations have the potential to increase NYSERDA program participation within DACs and better allocate program benefits. Many of the proposed recommendations were also identified as a priority in the 2021 New York State DAC Barriers and Opportunities report. We have grouped the agency wide recommendations into five cross cutting categories:

- Implementation of Regional Clean Energy Hubs
- Trust building
- Coordinated entry
- Sufficient communications
- Internal capacity building

A more detailed comparison of the proposed program design solutions to the program barriers they address and any associated equity metrics to track progress towards achieving equitable outcomes, can be found in Appendix IV.

Agency Wide:

[61] Jordan L. Schnell et al., *Air Quality Impacts from the Electrification of Light-Duty Passenger Vehicles in the United States* (Atmospheric Environment, 2019). https://www.sciencedirect.com.

[62] Kathryn Canepa, Scott Hardman, and Gil Tal, *An Early Look at Plug-in Electric Vehicle Adoption in Disadvantaged Communities in California* (Transport Policy, 2019). https://www.sciencedirect.com.

Implementation of Regional Clean Energy Hubs

NYSERDA's Regional Clean Energy Hubs have the potential to provide a holistic, multidisciplinary approach to ensure that all New Yorkers have equal access to the benefits of the state's clean energy transition.[63] All community groups (listed in Appendix VII) expressed interest and excitement at the opportunity represented by the Hubs, both to increase access to benefits from communities and leverage their efforts around a clean and just energy transition. In order to ensure the implementation of the Regional Clean Energy Hubs (Hubs) responds to community needs, our most salient recommendation is to leverage trusted community messengers through long-term, full time positions in the Hubs. In regards to the procedural aspect of the Hubs, stakeholders highlighted the urgency of guaranteeing accountability and transparency in engagement and review protocols, by working in collaboration with community partners throughout the process. In addition, it will be crucial for NYSERDA to offer RFP assistance to groups applying for Hubs so that they can have all the information, tools, and capacities to submit adequate and sufficient applications. Stakeholders also recommended that NYSERDA require contractors to report on the diversity of their staff in their application regarding RFP processes, so that NYSERDA can develop and analyze regional diversity requirements, and then cap contractors' incentives if they fail to meet diversity requirements. Finally, in regards to the funding, CBOs stressed flexibility about where and how groups spend their resources as a key value Regional Clean Energy Hubs should support. In their words, communities have the best knowledge of where money should go to satisfy community needs, and limitations on how to spend resources can sometimes deepen benefit distribution gaps.

Trust Building

Strengthening mutual trust between DACs and NYSERDA, is a key element to improve participation in programs, as well as making sure that benefits are widespread. The most salient recommendation from stakeholders regarding trust building, refers to involving community members in shaping programs, through co-design mechanisms, before they are taken to communities as a final product. Likewise, NYSERDA should train contractors and turn them into allies of NYSERDA by circulating information through them to CBOs. NYSERDA is already undergoing a process to more deeply collaborate with historically marginalized communities in the design and implementation of programs through forthcoming initiatives such as the NY-Sun Community Solar co-design process and a new government to community stakeholder body tentatively called the Energy Equity Collaborative.[64,65] In regards to outreach, community members highlighted the importance of carrying out outreach activities with the community, such as events at organizations, parks, connecting with local elected officials who can share info with constituents, and providing information through schools or faith platforms/organizations. Once programs are developed in hand with the communities, a systematic process to get early and rapid feedback from program participants should be put in place. This would involve gathering feedback at every point of the program from the application process to end of participation. In addition, establishing DEI reporting and accountability protocols amongst partnered contractors to encourage hiring from historically under-represented groups,

[63] NYSERDA, *Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2022), 22-23. https://climate.ny.gov/NY-Disadvantaged-Communities-Barriers-and-Opportunities-Report.pdf.
[64] NYSERDA, *Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2022), 21, 56. https://climate.ny.gov/NY-Disadvantaged-Communities-Barriers-and-Opportunities-Report.pdf.
[65] Rogers, Chris. Interview with Columbia Capstone Team. Personal interview. New York City, February 24, 2022.

will be crucial for people of color, women, disabled, and gender-expansive workers to participate more broadly in the clean energy economy.

Case Study: Illinois Future Jobs Act

In 2016, the Future Energy Jobs Act (FEJA) provided that it is the policy of the State of Illinois to move toward 100% clean energy by 2050, by putting the state on a path to 40% renewable energy by 2030, and 50% by 2040. For this, it makes changes to the Illinois Power Agency (IPA) Act to double the state's investment in renewable energy. FEJA includes provisions to make solar energy more available to low- and moderate-income communities. The legislation heavily invests directly in CBOs through actions such as:

- **Clean Jobs Workforce Network Hubs Program,** establishing 13 program delivery hub sites that leverage community-based organizations to ensure members of equity-focused populations have dedicated and sustained support to enter and complete the career pipeline for clean energy and related sector jobs.
- **Energy Transition Navigators** program to provide education, outreach, and recruitment to equity-focused populations to ensure they are aware of workforce development programs.
- **Three Climate Works Hubs** which will be administered by Illinois Department of Commerce and Economic Opportunity (DCO) and will recruit, prescreen, and provide pre-apprenticeship training to equity focused populations.
- **Clean energy contractor incubator program** to provide access to low-cost capital and financial support for small clean energy businesses and contractors.
- **Clean energy primes contractor accelerator program** to mentor and support businesses and contractors through business coaching and operational support.
- **Jobs and environmental justice grant program** to provide upfront and seed capital to support community ownership and development of renewable energy projects.
- **Energy Workforce Advisory Council** within DCEO to make recommendations to the state on clean energy workforce programs.[66]

Coordinated Entry

Ensuring communities have relevant information regarding program applications, and making sure NYSERDA programs communicate with each other, is essential to improving accessibility and community participation. Shifting to a Coordinated Entry policy for DAC households will increase education and uptake of NYSERDA programs. We recommend that any outreach coordinator funded by Climate Act-coordinated agencies should collect sufficient data to determine prospective household eligibility for all services from which they could benefit. While this is a more labor-intensive process, it eliminates the burden of having to repeat the process multiple times over. Regional Clean Energy Hubs will be an essential asset because the community partners running them will be able to provide the hands-on assistance necessary to complete a catch-all intake form. Likewise, the trust DAC residents have for Hub staff will allow for greater willingness to share household information, including valuable equity metrics. While the Coordinated Entry

[66] Citizens Utility Board, *Future Energy Jobs Act* (Citizens Utility Board, 2022). https://www.citizensutilityboard.org

System model will require a considerable information technology investment and interagency collaboration, developing a secure, online portal for CBOs to match DAC households with energy programs they are eligible for will streamline enrollment.

A longer-term iteration of this approach would include an interagency database accessible to Regional Clean Energy Hub CBOs, Climate Act Agencies, and utility providers to engage under-enrolled DAC households who are co-eligible for government benefit programs in NYSERDA and other state agencies. Legal factors and data security are serious concerns that make this expansion of Coordinated Entry more time intensive.

Sufficient Communications

Making sure program communications are in all relevant languages for communities is essential for sufficient outreach. Our stakeholder interviews with CBOs revealed some NYSERDA program documents are not available in relevant languages for the communities. For this reason, it will be crucial for NYSERDA to update language accessibility protocols such that translated documents for program outreach/application are available in at least the ten most commonly spoken non-English languages. This should be complemented by providing additional document translation and interpretation services for place-based outreach informed by demographics of the community support. Lastly, in order to better assist community members, NYSERDA should ensure translators and interpreters have access to outreach/application materials catered to those with limited literacy, vision impairments, or other needs impede their ability to read documents.

Internal Capacity Building

Cultural competency and DEI capacity building within the agency itself is essential to understanding what behaviors NYSERDA should adopt to identify community assets, adequately assess RFPs, and craft culturally relevant and appropriate communications. Considering the importance that Regional Clean Energy Hubs will play in empowering communities in the state's energy transition, it will be important for NYSERDA to carry out training sessions and tools to navigate the Regional Clean Energy Hub RFP process and other similar RFP processes in order to make contracting processes less arduous for grassroots organizations. Likewise, NYSERDA should train RFP reviewers on how to evaluate equity benefits~~,~~ so that they can accurately assess value. Lastly, various stakeholders mentioned in their interviews the importance of NYSERDA staff to consider all levels of equity as proposed by the Urban Sustainability Directors Network (USDN): Procedural equity; Distributional Equity; Structural Equity; Transgenerational Equity; Transformational Equity.

Program Specific:

Solar Programs (e.g. NY-Sun Incentive Program)

NYSERDA must craft messaging that is specific to the needs and values of the community. M/WBE contractors who share cultural backgrounds with DAC residents can aid in making solar more familiar in neighborhoods where word-of-mouth referrals are scarce. To that end, NYSERDA should consider adding

an M/WBE filter on their contractor search tool. When combined with the current geo-location functionality, the filter can help DAC residents overcome reservations they have about trying a technology that is under-represented in their communities. Additionally, NY-Sun needs a proactive feedback mechanism to reduce reliance on complaint-based customer feedback phone lines. They might consider taking inspiration from "nudging" systems like SMS alerts like the one used in a Columbia University study that tracked trends in energy burden during the early months of the COVID-19 pandemic.[67]

Residential Energy Efficiency Programs (e.g. EmPower NY)

Our stakeholder interviews revealed opportunities to address critical information and installation capacity gaps amongst community and contractor stakeholders. EmPower NY program staff should conduct a survey of past participants from DACs, in order to assess whether the interventions provided were worth the time and effort spent in the application process. If respondents are dissatisfied with their energy efficiency outcomes, the EmPower NY team should analyze how they could increase the potential benefits for participants. The EmPower NY team should partner with NYSERDA's Workforce Development program in order to greatly expand the number of energy efficiency contractors in more rural areas of the state.

Clean Transportation EV Programs (e.g. Drive Clean Rebate)

The 2020 Drive Clean Rebate Adoption survey showcased the urgency to increase the program's access to DACs. The more immediate opportunity to increase involvement of DACs is for NYSERDA to consider introducing rebates for used EVs proportional to the value of the car in order to make the price competitive to that of a traditional gasoline vehicle. This rebate could be proportional to the value of the car, but could make the price competitive compared to that of a traditional gasoline vehicle. In addition, one of the major findings from the Drive Clean Rebate interview suggests the lack of relationship with dealerships within DACs. Building a strategic relationship with dealerships and ensuring its close proximity to DACs can increase participation and raise awareness.Eventually, NYSERDA should consider expanding the program to include a used vehicle buy-back program to take fossil-fuel burning vehicles off the road, and facilitate proper vehicle disposal. Lastly, NYSERDA could consider a "Cash for Clunkers" program where cars that get less than 18 miles per gallon (mpg) can be traded in for a credit towards an electric vehicle.

Case Study: Washington State "Cash for Clunkers" Program [68]

Officially known as the Car Allowance Rebate System, or CARS, the program is meant to boost new-vehicle sales and to take gas-guzzlers off the road in Washington State. Consumers can receive a credit of either $3,500 or $4,500 for the purchase of a new vehicle when trading in a car less than 25 years old that gets 18 mpg or less. The amount the buyer gets depends on their "clunker" and what they buy. Participating new car dealers will apply the credit, reducing the price paid for purchases or lease, and the government reimburses the dealer.

[67] Christoph J. Meinrenken et al., *New Data Suggest COVID-19 Is Shifting the Burden of Energy Costs to Households* (Columbia Climate School, 2020). https://news.climate.columbia.edu.

[68] Washington State Attorney General Office, *Cash for Clunkers questions answered* (Washington State, 2021). https://www.atg.wa.gov.

VIII. Further Study

This research project was intended to be an initial attempt at exploring possible energy equity metrics NYSERDA can use on an economy-wide level to measure and track progress towards achieving an inclusive clean energy economy and ensuring access to benefits from clean energy and energy efficiency programs are equitably distributed. Further research should be conducted on how easily NYSERDA can integrate equity metrics into its programs and in an economy-wide metrics framework. It should be noted that in-depth research has not been done to differentiate between program level and economy-wide metrics, and this will require further study.

Research into the ease with which health data could be acquired should be conducted in order to consider health-related metrics, within a NYSERDA equity metrics framework. Difficulties involved with obtaining and tracking health data have been discussed[69].

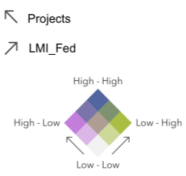
[69] NYSERDA, *New York State Disadvantaged Communities Barriers and Opportunities Report* (NYSERDA, 2021). https://www.nyserda.ny.gov.

In tracking and utilizing equity-based metrics, NYSERDA should be conscious of how DAC needs may change over time. As populations and demographics shift, communities deemed disadvantaged may change, and NYSERDA should remain up-to-date in terms of their understanding of risks facing communities. Alongside tracking equity-based metrics, NYSERDA may want to revisit other state's metrics and guidelines in the coming years to examine lessons learned from their equity progress.

The research conducted for this report highlighted various challenges in regards to ensuring energy efficiency and clean energy programs are inclusive and benefit all communities. The research highlighted the challenge that NYSERDA faces of ensuring that programs are accessible to and benefit historically marginalized communities when many of its programs were not originally designed with an equity focus. The research also shed light on the various nuances and challenges that exist in analyzing program reach using demographic data. There are many contextual considerations that need to be factored in order to accurately model what communities are participating in and benefitting from clean energy programs such as program scope limitations, systemic barriers that are outside the control of what individual programs can address, physical considerations including housing type and building type, data privacy requirements, and data availability.

The geospatial and statistical analysis methodology that was used to model program participation and distribution of benefits can be used by climate and energy-focused government institutions and programs to inform program design processes and program evaluation systems. Further research should be conducted to determine how to collect relevant data, in particular sensitive demographic program participant data that is key to evaluating programs reaching out to disadvantaged communities. Modeling program participation by overlaying program data and publicly available demographic data using geospatial, statistical and multivariate regression analysis is an effective methodology that institutions can use in the interim or as a supplemental form of evaluation. Governments looking to achieve equity and ensure that benefits from energy efficiency and clean energy programs are distributed equitably can use this analysis to estimate whether programs are reaching and benefitting historically marginalized communities.
As previously stated, a major barrier preventing EmPower NY from reaching DACs is acquiring landlord consent in renter-occupied buildings. Stakeholders recommended several potential options to address this programmatic challenge. In the long term, some stakeholders pointed out that EmPower NY is unlikely to get adequate buy-in from landlords until participation is a legislative requirement. To this end, NYSERDA might consider further research into the viability of a state-wide energy efficiency standard for rental properties and how and when compliance could be best enforced.

Another element for further study is determining representative mapping methods. As acknowledged in our findings, New York City contains highly anomalous census tracts, due to the high quantity of multi-family rental units and the relatively low car ownership. In response to this, we created a map excluding all New York City census tracts (**Figure 19**) to see how our GIS visualization may shift.



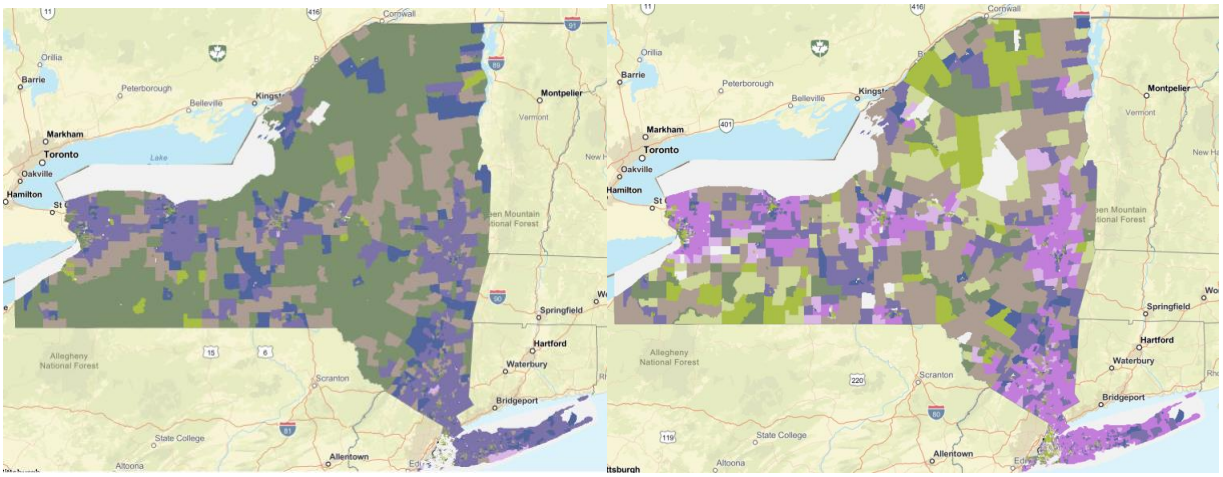


Figure 19. *The number of Clean Transportation projects compared to the number of people who are below the federal poverty line. All New York City census tracts were deleted from the dataset used for the map on the left, although curiously few census tracts within the city remained likely due to discrepancies between data from different years. The map on the right is a copy of* ***Figure 13*** *for reference, which uses the same dataset and includes all census tracts.*

The map above (left) represents the same data as is visualized in **Figure 13** (right)**,** the relationship between Drive Clean EV Rebate project quantity and ACS percentile for federal poverty (LMI Fed). **Figure 19** demonstrates a stronger relationship between project number and high federal poverty percentile. There are, therefore, fewer tracts that represent high LMI Fed and low project number, which may help NYSERDA prioritize census tracts beyond the city for further investment. Further study should determine whether and how excluding New York City tracts increases the overall efficacy of the visual representation.

IX. Appendices

Appendix I: Maps

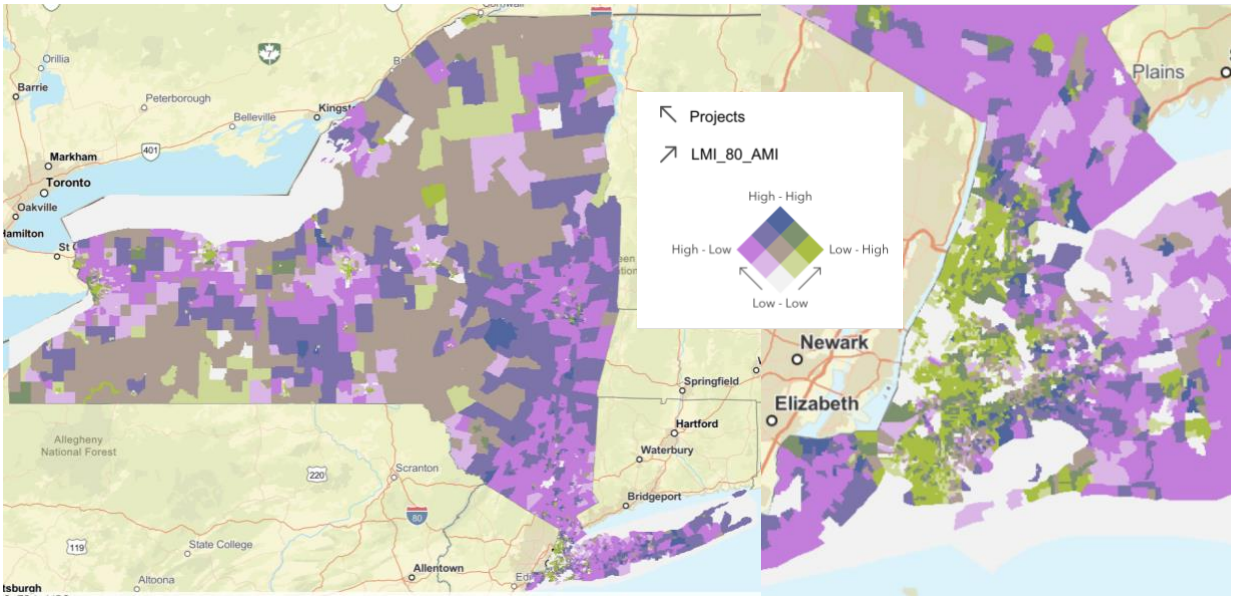


Figure 20. *The number of NY-Sun projects compared to the percentile ranking of the census tract for people who make less than 80% of the area median income. Most of the tracts with high project numbers have a low or medium number of people below 80% median income. Green tracts have a high number of people below 80% of the median income and low project numbers. These tracts are concentrated in New York City.*

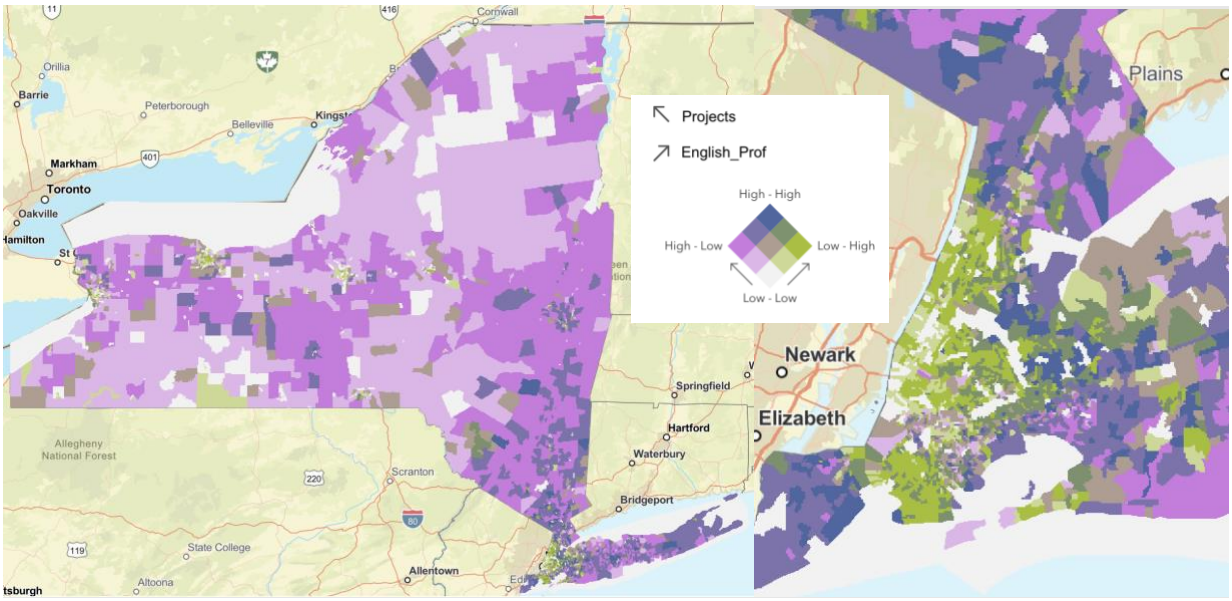


Figure 21. *The number of NY-Sun Incentive Program projects compared to the percentage of households with low English proficiency. Most of the tracts with high project numbers have a low percentage of households with low English proficiency. Green tracts have a high percentage of households with low English proficiency and low project numbers. These tracts are concentrated in New York City.*

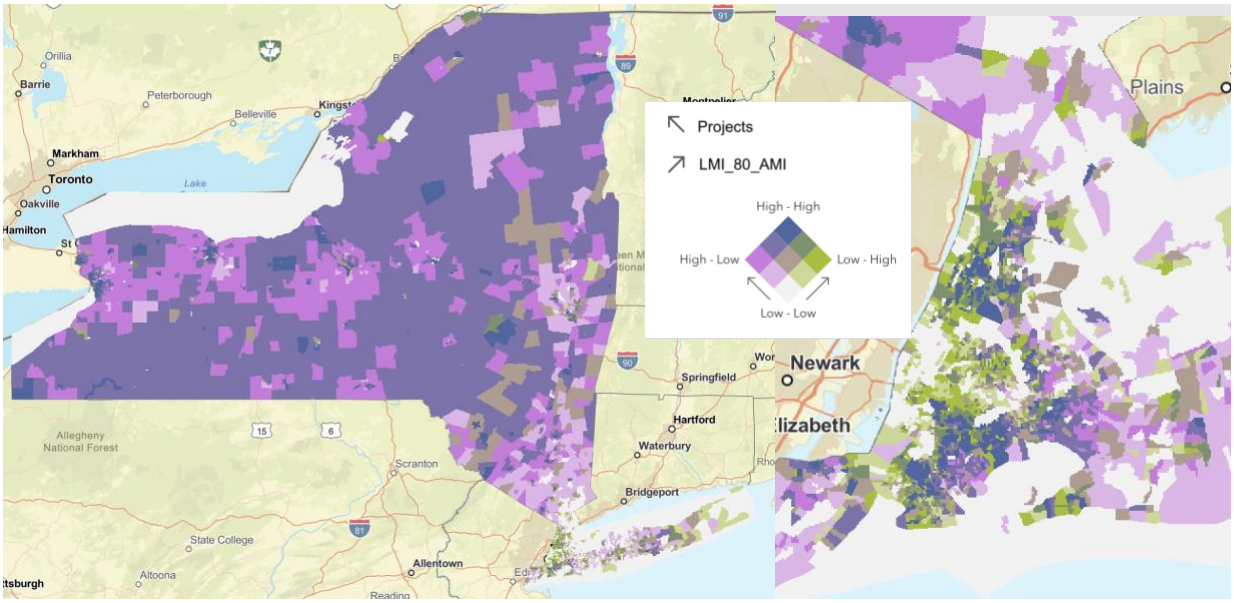


Figure 22. *The number of EmPower projects compared to the number of people who make less than 80% of the area median income. Most of the tracts with high project numbers have a medium number of people below 80% median income. Green tracts have a high number of people below 80% median income and low project numbers. These tracts are concentrated in New York City.*

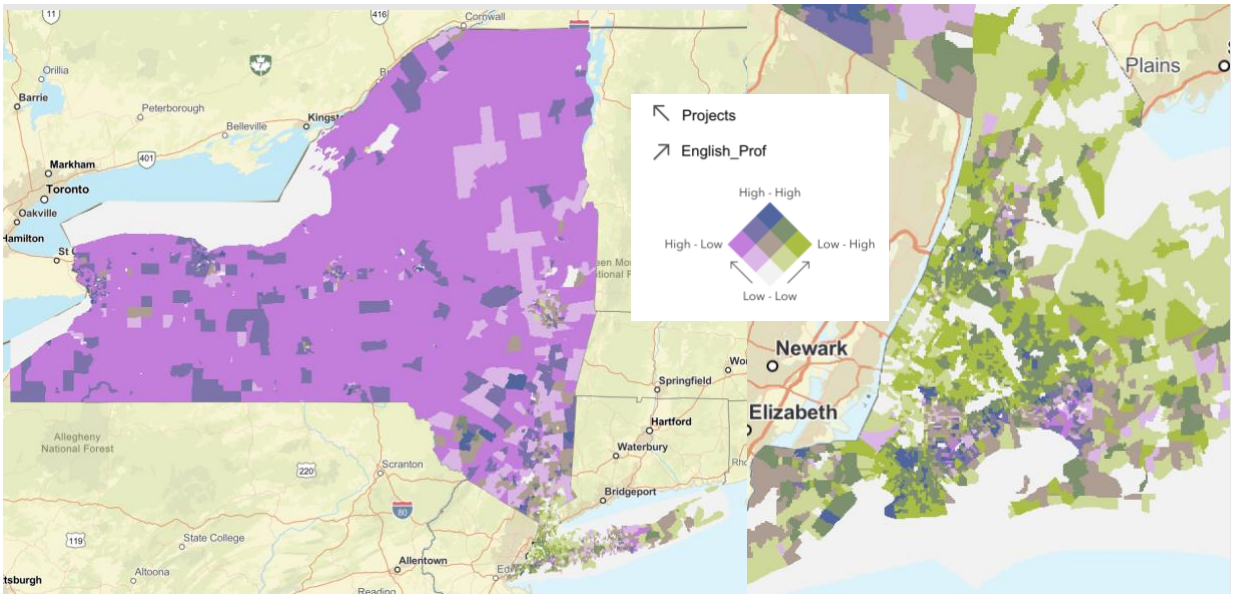


Figure 23. *The number of EmPower NY projects compared to the percentage of households with limited English proficiency. Most of the tracts with high project numbers have a low percentage of households with limited English proficiency. Green tracts have a high percentage of households with limited English proficiency and low project numbers. These tracts are concentrated in New York City.*

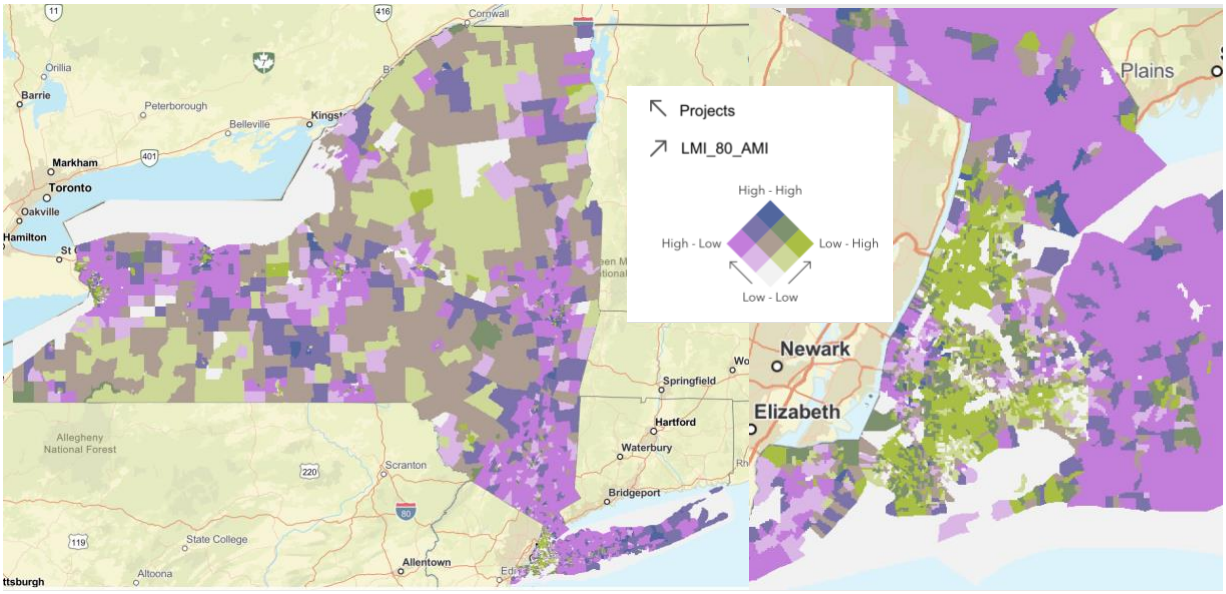


Figure 24. *The number of Clean Transportation projects compared to the number of people who make less than 80% of the area median income. Most of the tracts with high project numbers have a low number of people below 80% median income. Green tracts have a high number of people below 80% median income and low project numbers. These tracts are concentrated in New York City.*

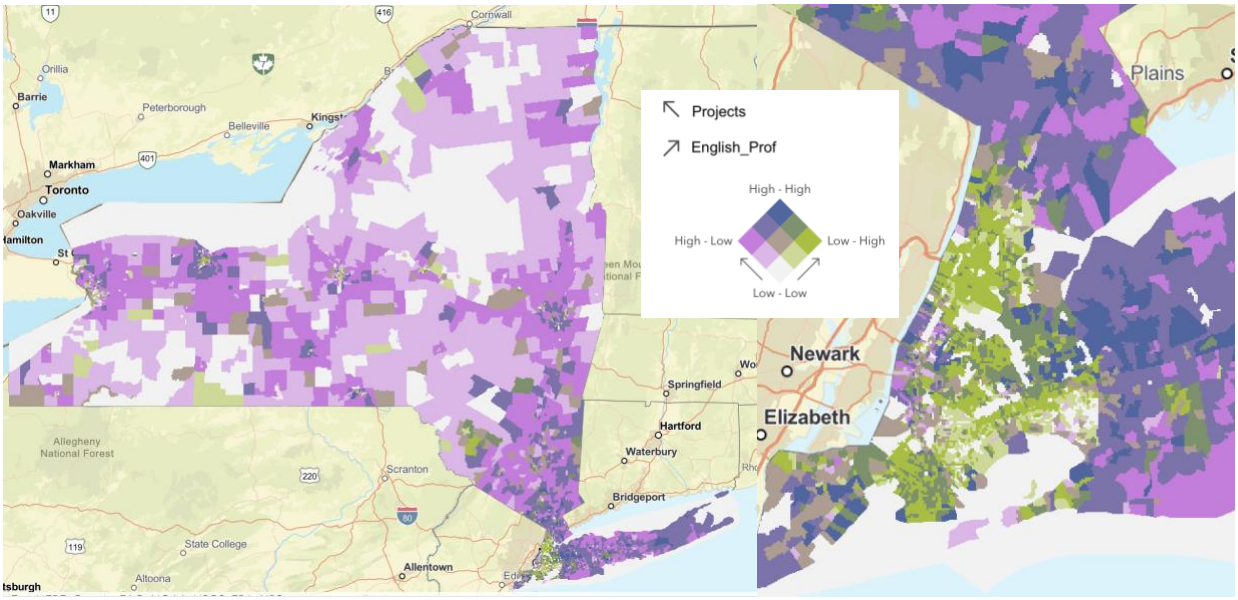


Figure 25. *The number of Clean Transportation projects compared to the percentage of households with low English proficiency. Most of the tracts with high project numbers have a low or medium percentage of households with low English proficiency. Green tracts have a high percentage of households with low English proficiency and low project numbers. These tracts are concentrated in New York City.*

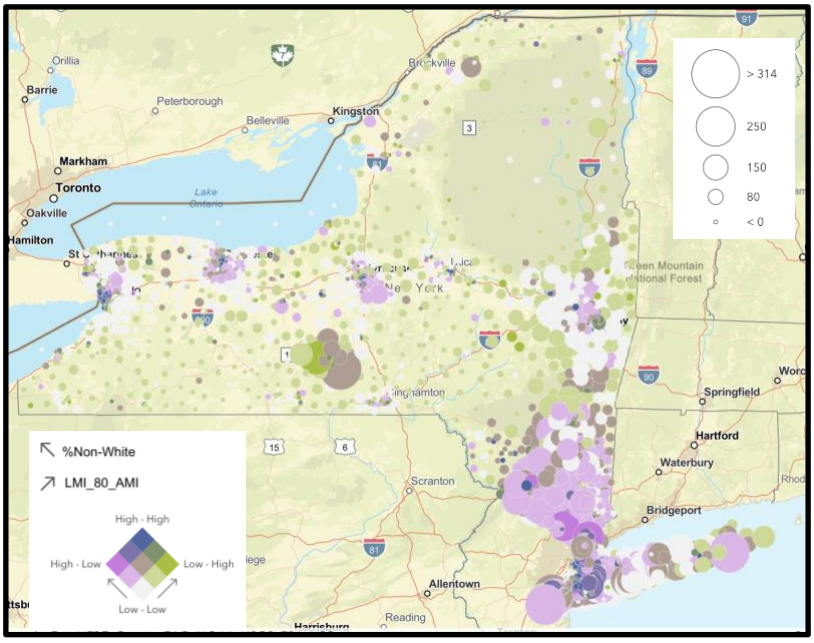


Figure 26. *The number of NY-Sun Incentive Program projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white and the percentage of the population that is below 80% of the area median income. Small dots are most frequently green in color while larger dots are most frequently pink in color. This means that tracts with low project numbers frequently contain a high population percentage below 80% of the area median income, and a low population percentage that is not white. Tracts with large project numbers more frequently have a medium population percentage that is not white and a low population percentage that is below 80% of the median area income.*

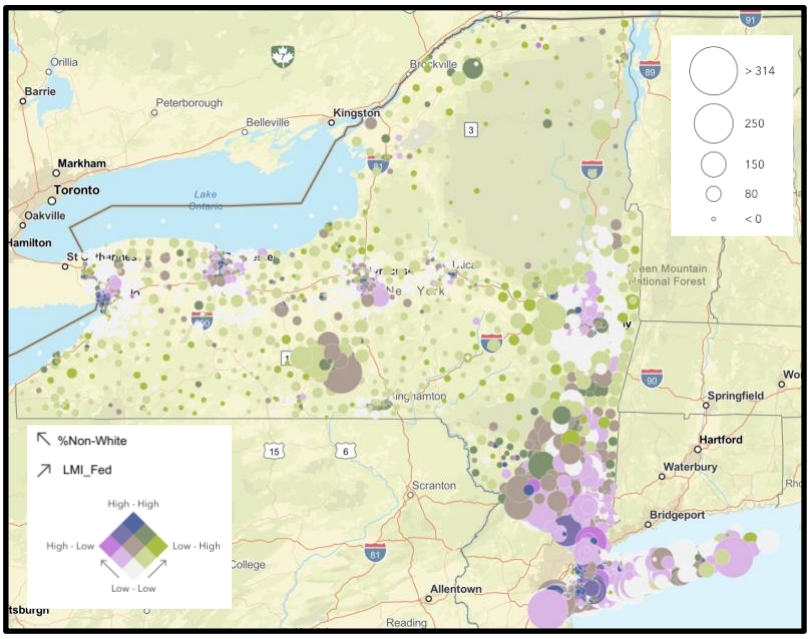


Figure 27. *The number of NY-Sun Incentive Program projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white*

and the percentage of the population that is below the federal poverty level. Small dots are most frequently green in color while larger dots are most frequently pink in color. This means that tracts with low project numbers frequently contain a high population percentage below the federal poverty level and a low population percentage that is not white. Tracts with large project numbers more frequently have a medium population percentage that is not white and a low population percentage that is below the federal poverty level.

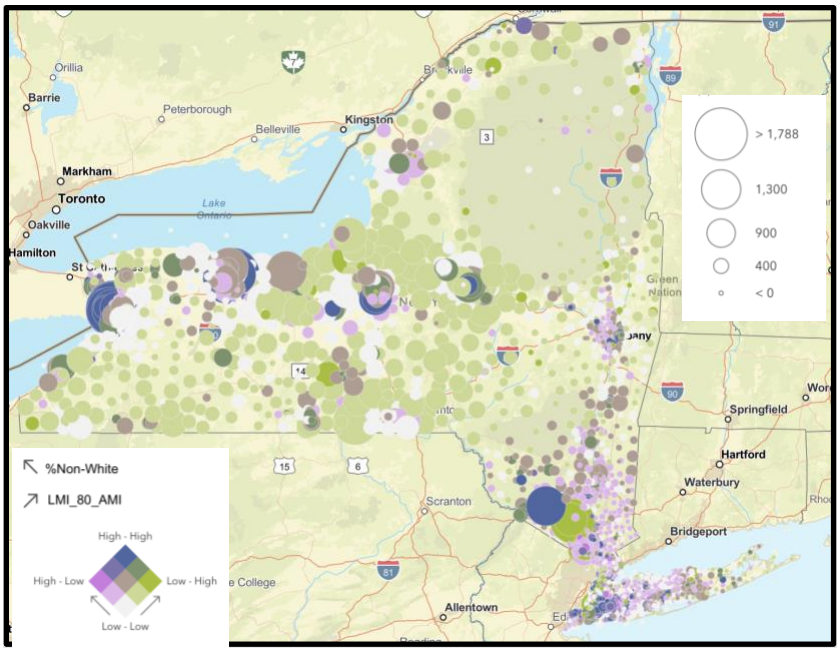


Figure 28. *The number of EmPower projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white and the percentage of the population that is below 80% of the area median income. Small dots are most frequently light green or pink in color. Those which are light green represent tracts with low project numbers, a low percentage of people who are not white, and a medium percentage of people who are below 80% of the area median income. Those which are pink in color represent tracts with low project numbers, a medium percentage of people who are not white, and a low percentage of people who are below 80% of the area median income.*

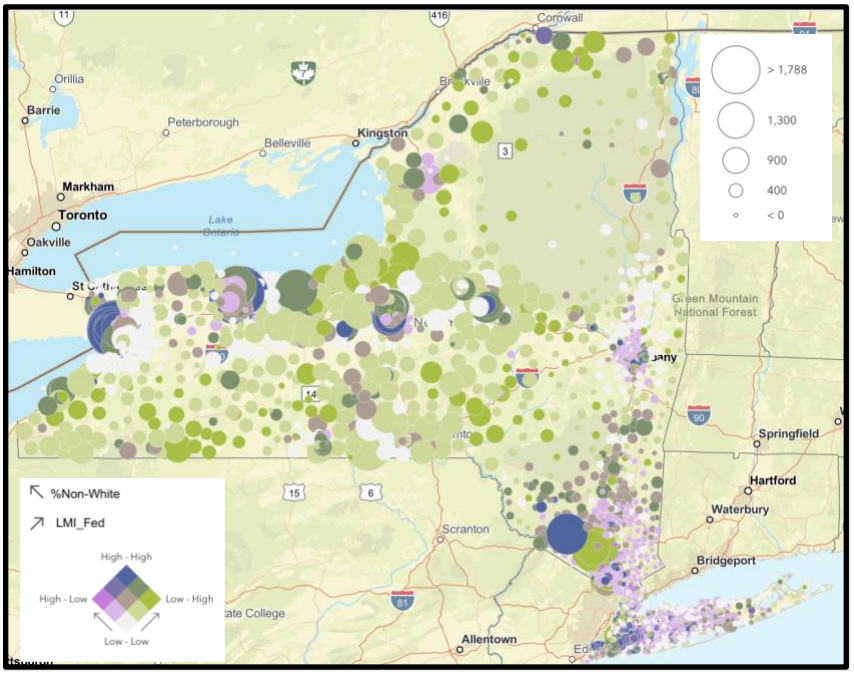


Figure 29. *The number of EmPower NY projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white and the percentage of the population that is below the federal poverty level. Small dots are most frequently light green or pink in color. Those which are light green represent tracts with low project numbers, a low percentage of people who are not white, and a medium percentage of people who are below the federal poverty level. Those which are pink in color represent tracts with low project numbers, a medium percentage of people who are not white, and a low percentage of people who are below the federal poverty level.*

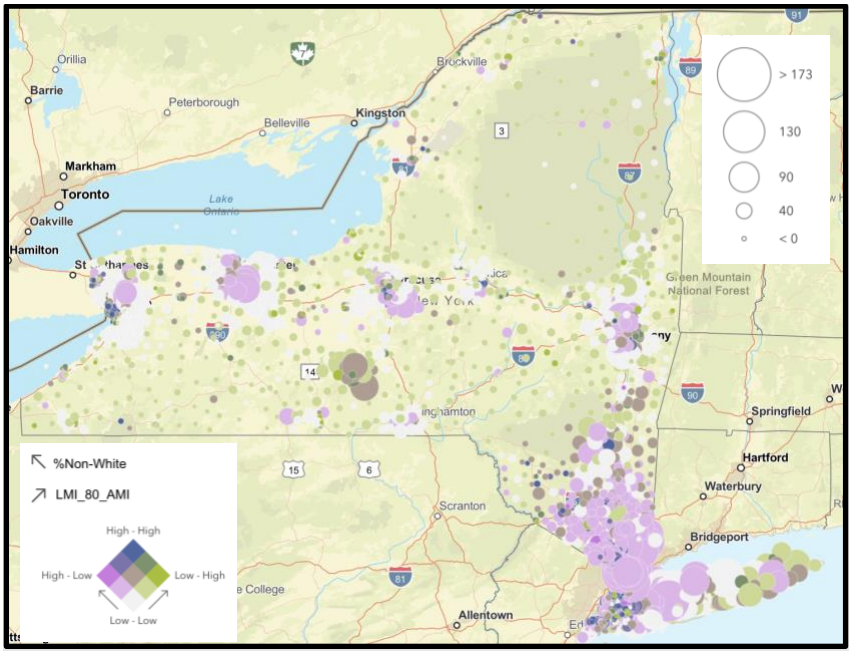


Figure 30. *The number of Clean Transportation projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white and the percentage of the population that is below 80% of the area median income. Small dots are most frequently light green in color. Those which are light green represent tracts with low project numbers, a low percentage of people who are not white, and a medium percentage of people who are below 80% of the area median income.*

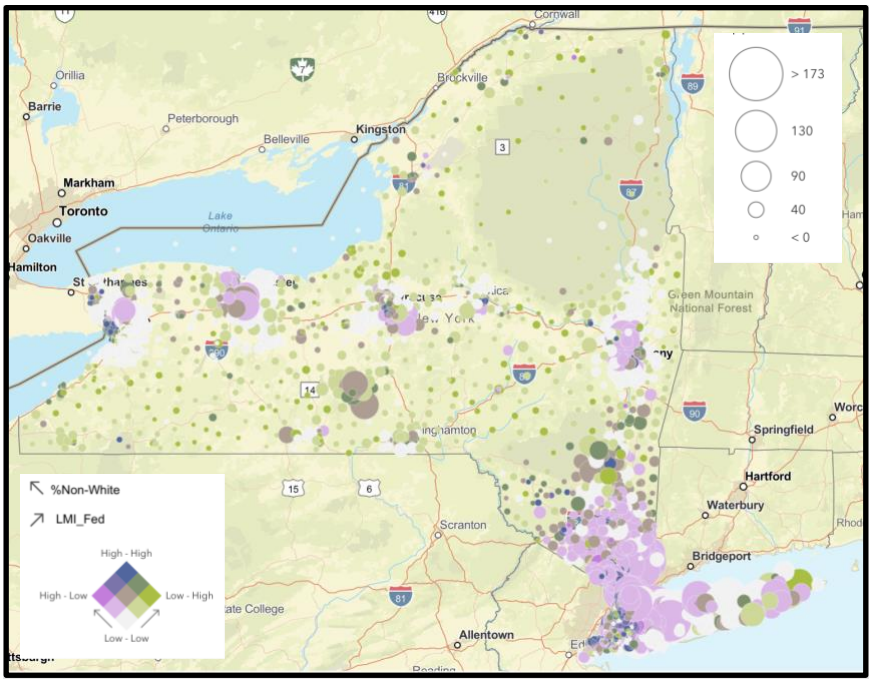


Figure 31. *The number of Clean Transportation projects are demonstrated by the size of the circles. The color of the circle represents the relationship between the percentage of the population that is not white and the percentage of the population that is below the federal poverty level. Small dots are most frequently light green in color. Those which are light green represent tracts with low project numbers, a low percentage of people who are not white, and a medium percentage of people who are below the federal poverty level.*

Appendix II: DAC Criteria and EJ Screening Tool Indicators

Table 1. *Pollution and environmental factors used by EJ screening tools compared with NYSERDA's draft DAC definition*

	US EPA	CA	MD	WA	NY
Ozone		X	X	X	
PM 2.5	X	X	X	X	X
Diesel PM emissions	X	X	X	X	
Drinking water quality		X			
Wastewater discharge	X		X	X	X
Children's lead risk from housing/general lead paint exposure	X	X	X	X	
Pesticide use		X			
Toxic releases		X	X	X	
Traffic	X	X	X	X	X
Cleanup sites		X			X
Risk Management Plan (RMP) sites	X		X	X	X
Superfund sites				X	
NPL sites	X		X		
Groundwater Threats		X			
Treatment storage and disposal facilities			X		
Hazardous waste facilities/generators	X	X		X	
Impaired water bodies/watershed failure		X	X		
Solid waste sites/facilities		X			
Energy burden	X				X
Respiratory hazard			X		
Benzene Concentration					X
Major oil storage facilities					X
Power generation facilities					X
Active landfills					X
Municipal waste combustors					X
Scrap metal processors					X
Industrial/manufacturing/mining land use					X

Table 2. *Health-related factors*

	US EPA	CA	MD	WA	NY
Asthma rates/emergency visits or discharges	X	X	X		X
Cardiovascular disease/myocardial infraction discharges	X	X	X	X	X
Low birth weight		X	X	X	X
Diabetes	X				
Low life expectancy/premature deaths	X				X
COPD emergency department visits					X
Percent without health insurance					X
Percent with disabilities					X

Table 3. *Socioeconomic factors*

	US EPA	CA	MD	WA	NY
Educational attainment/higher ed enrollment rate	X	X		X	X
Housing burden	X	X		X	X
Linguistic isolation/lack of English proficiency	X	X	X	X	X
Poverty/Low-Median income population	X	X	X	X	X
Unemployment	X	X	X	X	X
Percent non-white			X	X	X
Transportation expense				X	
Individuals under age 5			X		
Individuals over age 64			X		X
Housing Vacancy Rate					X
Percent single-parent households					X
Historical redlining					X
Percent renter-occupied homes					X
Manufactured homes					X
Homes built before 1960					X
Percent without internet					X

Table 4. *Climate risk factors*

	US EPA	CA	MD	WA	NY
Expected agricultural loss/amount of agircultural land	X				X
Expected building loss rate	X				
Expected population loss rate	X				
Extreme heat projections					X
Flooding in coastal/tidally influenced areas					X
Low vegetative cover					X
Driving time to hospitals/urgent care					X

Appendix III: Agency Wide Program Design and Impact Metric Recommendations

Table 5. *Agency wide recommendations for the implementation of Regional Clean Energy Hubs*

Implementation of Regional Clean Energy Hubs				
Opportunity: Regional Clean Energy Hubs have the potential to provide a holistic, multidisciplinary approach to ensure that all New Yorkers have equal access to the benefits of the State's clean energy transition				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	**Metric**
Leverage trusted community messengers through	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	Increase partnerships with CBO´s	% of community members that have positions in

long-term, full time positions in the Regional Clean Energy Hubs			Increase community access to clean energy programs, services, and resources Improvement of stakeholder trust in service or provider Increase of under-represented groups participation in the clean energy economy	Regional Clean Energy Hubs
Establish accountability and transparency in engagement and review protocols in collaboration with community partners in regards to the implementation	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	Improvement of stakeholder perceptions of NYSERDA's transparency and accountability Improvement of stakeholder trust in service or provider	# of people participating in engagement and review # of partnerships with CBOs
Offer RFP Assistance to groups applying for Hubs	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program eligibility constraints and application requirements may eliminate certain communities.	Increase community access to clean energy programs, services, and resources	% of DAC pertaining groups selected in Hubs
Provide groups with flexibility on how they spend funding	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program not well designed for community members.	Increase $ distributed to DAC communities Increase community access to clean energy programs, services, and resources Increase of under-represented groups	% of flexible funding

			participation in the clean energy economy	
Require contractors to report on the diversity of their staff in their application regarding RFP processes	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	Increase community access to clean energy programs, services, and resources Increase of under-represented groups participation in the clean energy economy	% of DAC individuals in contractor´s staff

Table 6. *Agency wide recommendations for trust building*

Trust Building				
Opportunity: Strengthening trust from DACs towards NYSERDA, and vice versa, is a key element to improve participation in programs, as well as making sure that benefits are widespread				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	Metric
Develop program codesign processes with community members	Perspectives and Information Programmatic Design and Implementation	Communities may have a lack of trust in the program or service provider. Program not well designed for community members. Program outreach may be insufficient or misaligned.	Increase community access to clean energy programs, services, and resources Improvement of stakeholder trust in service or provider Increase of under-represented groups participation in the clean energy economy	# of program co-Design sessions with CBOs
Carry out outreach activities with the community, such as events-at organizations, parks, connecting with local elected officials who can share info with	Perspectives and Information Programmatic Design and Implementation	Communities may have a lack of trust in the program or service provider. Program outreach may be insufficient or misaligned.	Improvement of stakeholder perceptions of NYSERDA's transparency and accountability Improvement of stakeholder trust in	# of events and sessions with DACs

constituents, and providing information through schools or faith platforms/organizations.		Program resources may be insufficient or inconsistent	service or provider Increase # of DAC participants in NYSERDA programs	
Develop a systematic process to get early and rapid feedback from program participants. This involves gathering feedback at every point of the program from the application process to end of participation.	Perspectives and Information Programmatic Design and Implementation	Communities may have a lack of trust in the program or service provider. Program resources may be insufficient or inconsistent	Improvement of stakeholder perceptions of NYSERDA's transparency and accountability Improvement of stakeholder trust in service or provider	# of feedback and comments from program participants
Train contractors and turn them into allies of NYSERDA by circulating information through them to CBOs.	Perspectives and Information	Communities may have a lack of trust in the program or service provider.	Improvement of stakeholder perceptions of NYSERDA's transparency and accountability Improvement of stakeholder trust in service or provider Increase of under-represented groups participation in the clean energy economy	# of Trained Contractors
Establish DEI reporting and accountability protocols amongst partnered contractors to encourage hiring from historically under-represented groups	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program not well designed for community members.	Increase community access to clean energy programs, services, and resources Improvement of stakeholder trust in service or provider Increase of under-represented groups	% of hires of historically underrepresented groups

			participation in the clean energy economy	

Table 7. *Agency wide recommendations for coordinated entry*

Coordinated Entry				
Opportunity: Ensuring communities have relevant information regarding program application, and making sure NYSERDA programs communicate with each other, is essential to improve accessibility and community participation.				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	Metric
Establish a "No-Wrong Door" policy for DAC households to participate in NYSERDA programs	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Programs may lack sufficient coordination Program eligibility constraints and application requirements may eliminate certain communities.	Increase community access to clean energy programs, services, and resources Increase community access to program information	# of DAC households participating in various programs
Inform consumers of all programs for which they are eligible based on a single intake form.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program eligibility constraints and application requirements may eliminate certain communities.	Increase community access to clean energy programs, services, and resources Increase community access to program information	# of forms filled
Develop a portal for CBOs/utility providers to match DAC households with energy programs they are eligible for.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Programs may lack sufficient	Increase community access to clean energy programs, services, and resources	# of matches

		coordination Program eligibility constraints and application requirements may eliminate certain communities.		
Create an interagency data-sharing database to better target outreach to DAC households who are co-eligible for government benefit programs in NYSERDA and other state agencies	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Programs may lack sufficient coordination Program eligibility constraints and application requirements may eliminate certain communities.	Increase community access to clean energy programs, services, and resources Increase access to community data + voices to inform programs and policies	% of individuals participating in various NYSERDA programs
Share program information and data with Hubs and other NY State Agencies	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Programs may lack sufficient coordination	Increase community access to clean energy programs, services, and resources Increase access to community data + voices to inform programs and policies	

Table 8. *Agency wide recommendations for sufficient communications*

Sufficient Communications				
Opportunity: Making sure program communications are in all relevant languages for communities is essential for sufficient outreach.				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	Metric

Update language accessibility protocols such that translated documents for program outreach/application are available in at least the ten most commonly spoken non-English languages.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program resources may be insufficient or inconsistent Program not well designed for community members.	Increase # of non-English speaking residents who participate in programs	% of non-English speakers participating in program
Provide additional document translation and interpretation services for place-based outreach informed by demographics of the community.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program resources may be insufficient or inconsistent Program not well designed for community members.	Increase # of non-English speaking residents who participate in programs	% of non-English speakers participating in program
Ensure translators and interpreters have access to outreach/application materials to better prepare them to assist community members, especially those with limited literacy, vision impairments, or other needs impede their ability to read documents	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned Program resources may be insufficient or inconsistent Program not well designed for community members..	Increase # of non-English speaking residents who participate in programs	% of non-English speakers participating in program

Table 9. *Agency wide recommendations for internal capacity building*

Internal Capacity Building				
Opportunity: Cultural competency and DEI capacity building within the Agency itself is essential to understanding what behaviors NYSERDA should adopt to identify community assets, adequately assess RFPs, and craft culturally relevant and appropriate communications				
Recommendation	**Barrier Category**	**Barrier**	**Outcome**	**Metric**

		Description		
Carry out training sessions and tools to navigate the Clean Energy Hub RFP process in order to make it less arduous for grassroots organizations.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	Increased knowledge of staff on Clean Energy Hub RPFs	# of training sessions % of trained NYSERDA employees
Train RFP reviewers on how to evaluate equity benefits	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program resources may be insufficient or inconsistent	Increased knowledge of staff on Clean Energy Hub RPFs	# of training sessions % of trained NYSERDA employees on equity
Develop frameworks to make sure programs and processes consider all equity elements as proposed by the Urban Sustainability Directors Network (USDN): Procedural equity; Distributional Equity; Structural Equity;Transgenerational Equity;Transformational Equity	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program resources may be insufficient or inconsistent		% of programs that consider levels of Equity

Appendix IV: Program Specific Design Recommendations

Table 10. *Design recommendations for NY-Sun Incentive Program*

NY-Sun Incentive Program				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	**Metrics**

Develop programs to educate community members on the benefits of energy efficiency and energy savings .	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program personnel resources may be insufficient or inconsistent	Increase community access to clean energy programs, services, and resources Improvement of stakeholder trust in service or provider Increase of under-represented groups participation in the clean energy economy	# of such programs for DACs
Add an M/WBE filter for contractor search on the website.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program resources may be insufficient or inconsistent		
Develop proactive feedback protocol using new communication modalities	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Communities may have a lack of trust in the program or service provider.	Improvement of stakeholder trust in service or provider	# of new communication modalities
Offer grant funding for community solar programs as opposed to rebate funding	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program not well designed for community members	Increase community access to clean energy programs, services, and resources Increase of under-represented groups participation in the clean energy economy	% of grant funding

Table 11. *Design recommendations for EmPower NY Program*

EmPower NY				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	**Metric**

Tie weatherization into renter/landlord assistance funding.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program not well designed for community members. Program eligibility constraints and application requirements may eliminate certain communities.	Increase DAC access to program Increase $ distributed to DAC communities	% renter-occupied properties participating in EmPower NY
Adhere closely to the DAC definition as it may include a wider portion of the population rather than qualifying individuals based on income alone.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program eligibility constraints and application requirements may eliminate certain communities.	Increase DAC access to program	% of indicators different from income % of individuals who qualify based on other criteria different from income
Survey the DAC households or contract CBOs to ensure that energy efficiency upgrades address the needs of residents	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	Improvement of stakeholder trust in service provider Staff have increased access to community data + voices to inform programs and policies	# of surveys
Invest in workforce development in rural areas of the state to resolve the contractor shortage	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.	DAC households/ communities receive more investment and workforce development opportunities	# of contracts with individuals from rural areas
Pursue legislation that will require minimum energy efficiency standards for rental properties	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned.		

Table 12. *Design recommendations for Drive Clean Rebate Program*

Drive Clean Rebate Program				
Recommendation	**Barrier Category**	**Barrier Description**	**Outcome**	**Metric**
Introduce rebates for used EVs proportional to the value of the car in order to make the price competitive to that of a traditional gasoline vehicle.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program eligibility constraints and application requirements may eliminate certain communities. Program not well designed for community members.	Increase DAC access to program	# of rebates for used EVs
Expand to include a used vehicle buy-back program.	Programmatic Design and Implementation	Program outreach may be insufficient or misaligned. Program eligibility constraints and application requirements may eliminate certain communities. Program not well designed for community members.	Increase DAC access to program	

Appendix V: List of Experts and Professionals

Table 13. *List of addressed experts and professionals*

Name:	**Affiliation:**
Abigail McHugh-Grifa	Rochester People's Climate Coalition
Adam Flint	NY Network for a Sustainable Tomorrow (NY NeST)
Adam Ruder	NYSERDA
Adele Ferranti	NYSERDA
Adriana Espinosa	DEC

Amanda Dewey	American Council for an Energy-Efficient Economy (ACEEE)
Ana Baptista	The New School's Tishman Environment and Design Center
Annel Hernández	Columbia School of International and Public Affairs
Anthony Eggert	California Energy Commission
Ariel Drehobl	American Council for an Energy-Efficient Economy (ACEEE)
Beth Offenbacker	NYSERDA
Bryndis Woods	Applied Economics Clinic
Chris Rogers	NYSERDA
Claire McIlvennie	Vermont Department of Public Service, Efficiency and Energy Resources Division
Dave McCabe	NYSERDA
Dr. Elizabeth Boulton	NYSERDA
Emi Wang	Greenlining Institute
Gwen Bluemich	NYSERDA
Gwendolyn Bluemich	NYSERDA
Hana Creger	Greenlining Institute
Hillel Hammer	NYSERDA
Jasmine Graham	WE ACT for Environmental Justice (WE ACT)
Jason Zimbler	NYSERDA
Jill Henck	Adirondack North Country Association (ANCA)
Justin Schott	University of Michigan- School for Environment and Sustainability
Kathleen Petrie	King County, Washington
Keith Hay	Colorado Energy Office
Luisa Freeman	NYSERDA
Michael Furze	Washington State Energy Office
Monique Fitzgerald	Long Island Progressive Coalition
Neil Muscatiello	NYS Department of Health
Ryan Madden	Long Island Progressive Coalition
Sameer Ranade	NYSERDA

Appendix VI: Interview Questions

Table 14: *Interview questions for NYSERDA employees*

NYSERDA Employees
What are the equity-based metrics currently being used by NYSERDA, and how effectively is NYSERDA measuring progress from their programs?
Who participates in your programs? (regional, demographic aspects)
What are the current methods NYSERDA is using to reach out to DAC? How can they increase engagement

amongst them?
How do community members provide feedback to NYSERDA on their programs?
What kind of feedback have you received from those who participate in your program?Has the team acted on the feedback and in which way?
Which programs have been most successful in terms of public engagement, or positive feedback?
How do you know when a program is successful? Assuming equity is a factor, how is equity defined with regard to program goals?
What challenges has NYSERDA confronted in program outreach and engagement previously? How?
Do you measure the success of all of your programs? If so, how often do you remeasure?
How do you ensure active participation? What outreach measures have you taken to increase participation and increase awareness about these programs?
What's happening in the White House (White House Council of Environmental Quality not mentioning race)?
Any other helpful information you can provide us with? (Ex. Who in the communities should we talk to?)

Table 15: *Interview questions for CBO representatives*

Representatives from Community Based Organizations
Upcoming Efforts + Impact of Climate Act Legislation:
How has your organization or the community you serve participated in NYSERDA or NY State climate policy-making processes? Is your organization participating in the Climate Justice Working Group? The Energy Equity Collaborative? The Regional Clean Energy Hubs?
Is your community generally aware of their opportunity to receive benefits from renewable energy, energy efficiency and other climate-related projects from the state's efforts? What about the increased opportunity as a result of the 2019 Climate Act?
What types of metrics do you think NYSERDA should use to measure and track the allocation of benefits to disadvantaged communities?
How can NYSERDA ensure benefits reach all different communities that make up what the state is defining as a "disadvantaged community"? For example, how can NYSERDA ensure its programs benefit communities of color of all different income backgrounds?
What specific demographic information should NYSERDA add to its program applications to support its tracking of benefits to disadvantaged communities?
Has the community seen an effort from the state to increase their access to renewable energy, increase energy affordability and equity and provide green workforce training opportunities? If so, what is the consensus on the

success and progress of that effort?
Specific NYSERDA Programs:
Has your organization or have residents in the community you serve ever engaged with any of the following NYSERDA programs: NY-Sun Incentive Program; Clean Transportation EV Rebates Program; EmPower NY; Workforce Development Career Pathways Program?
If yes, can you tell us about the experience? What is your view of these programs?
How often do residents in your community participate in those programs?
Do you feel that these programs are applicable, accessible, and/or affordable to you/your community?
Recommendations for Overcoming Barriers
How can NYSERDA reform the specific programs we mentioned to make them more accessible and beneficial to historically marginalized communities?
What kind of incentives or programmatic adjustments would you/your community need in order to participate in these programs?
Do you have any recommendations for how NYSERDA can best share information about its programs to the communities you serve?

Table 16: *Interview questions for out-of-state government employees*

Out-of-State Government Employees
What equity-based metrics are other states (including federal gov't) using to measure benefits from their programs? Should NYSERDA integrate them?
Does your state have a legal definition for disadvantaged communities? If so, what is it? If not, why? Has this definition (or a lack thereof) helped or hindered your agency's efforts?
What are the most salient energy equity issues in your state?
What are the main challenges in identifying and reaching disadvantaged communities in your state?
What energy equity programs have you implemented in disadvantaged communities to date? Have they been successful?
Has your state experienced any legal or legislative barriers to measuring progress towards energy equity?
Has your state experienced any legal or legislative benefits in measuring progress towards energy equity?
Does your state have any plans to expand or revise your current equity-based metrics? Why or why not?
Have any elements of your current metric framework been inspired by efforts in other states or by the federal government?
Who participated from the community? Who were champions within the state agencies?

How did you decide which metrics to use to track benefits?

Table 17: *Interview questions for other experts*

Other Experts
What program or policy reforms are recommended to increase the adoption of NYSERDA clean energy and energy efficiency programs by disadvantaged communities?
What definition of disadvantaged community do you use? Why?
In your experience, what are the most salient barriers that DAC face in benefiting/participating in clean energy/energy efficiency programs programs in the US?
What has already been done in the field to address these barriers?(If familiar with the NY context, what has been done in New York City specifically, and what has been done elsewhere in the country and world that is relevant? What has worked, what hasn't?
What should be the priorities to approach these barriers?
What should be the key considerations to take into account when engaging underserved communities (outreach strategies)?
What makes an equity measure effective?
What are some examples of successful equity measures?
Are there any robust systems in place that have proven successful?
Any other helpful information you can provide us with? (others we should be talking into?)

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