New York State's Regional Greenhouse Gas Initiative Investment Plan

2022 Operating Plan

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

Table of Contents

Acronyms and Abbreviations

BNL	Brookhaven National Laboratory
CBETA	Cornell-Brookhaven Energy Recovery Line Test Accelerator
CEF	Clean Energy Fund
CGC	Cleaner Greener Communities
CH_4	methane
CIGS	copper indium gallium selenide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CU	Cornell University
DC	direct current
DEC	New York State Department of Environmental Conservation
DOE	United States Department of Energy
EEPS	Energy Efficiency Portfolio Standard
EIC	electron-ion collider
EPA	United States Environmental Protection Agency
eRHIC	Electron Relativistic Heavy Ion Collider
ERL	Energy Recovery Line
FY	fiscal year
GHG	greenhouse gas
GJGNY	Green Jobs - Green New York
GW	gigawatts
HPwES	Home Performance with ENERGY STAR®
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt-hours
LIPA	Long Island Power Authority
LMI	low- to moderate-income
MMBTU	million British thermal units
MPP	Multifamily Performance Program
MW	megawatts
MWh	megawatt-hours
N_2O	nitrous oxide
NYCRR	New York Codes, Rules, and Regulations
NYGATS	New York State Generation Attributes Tracking System
NYPA	New York Power Authority
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
PEV	plug-in electric vehicle

PM	performance management
PSC	New York State Public Service Commission
PSEG-LI	Public Service Enterprise Group—Long Island
PV	photovoltaic
R&D	research and development
RE	renewable energy
REC	renewable energy certificate
REDC	Regional Economic Development Council
REV	Reforming the Energy Vision
RGGI	Regional Greenhouse Gas Initiative
RPS	Renewable Portfolio Standard
SBC	System Benefits Charge
SIT	State Inventory Tool
SUNY	State University of New York
W	watts
WAP	Weatherization Assistance Program

Summary of Benefits

The Regional Greenhouse Gas Initiative (RGGI) portfolio presents programs that reduce and avoid GHG and other air pollutant emissions as well as demonstrate New York State's commitment to its environmental goals. Specifically, program investments listed in this update of the operating plan are anticipated to result in significant carbon dioxide equivalent (CO_2e) emission reductions, energy savings, and bill savings as presented in Table 1.

Table 1. Anticipated Remaining RGGI Benefits by Program

Program	Planned Expenditures (millions of dollars)		Net Energy Savings (MMBtu)		Net Electricity Savings or Renewable Energy Generation (MWh)		Net Greenhouse Gas Emission Savings[a] (Tons CO_2e[b])		Cost Benefit Ratio ($/Ton CO_2e)	
	Total Incentives[c]	Total Associated Costs[d]	Annual Savings[e]	Lifetime Savings[f]	Annual Savings[e]	Lifetime Savings[f]	Annual Savings[e]	Lifetime Savings[f]	$/Ton Annual CO2e Savings[g]	$/CO2e EXPECTED LIFETIME Savings[h]
Green Jobs - Green New York										
One-to Four-Family Residential Buildings Program Financing	$56.7	$8.6	426,087	9,800,007	54,244	1,030,631	62,381	1,308,924	985	50
Energy Efficiency										
LIPA Energy Efficiency and Renewable Energy Initiative	$60.0	-	7,236	-	143,763	2,587,725	83,936	1,514,167	715	40
EmPower Plus	$42.8	$5.64	270,861	6,500,662	8	152	19,908	477,751	2,432	101
Renewable Energy										
Community Heat Pump Systems	$8.2	$1.5	75,000	2,250,000	-	-	4,566	136,991	2,124	71
Renewable Heat New York	$0.3	$0.05	337	6,737	62	1,233	174	3,482	1,602	106
NY-Sun Initiative[i]	$17.1	$0.3	-	-	75,852	1,896,294	43,994	1,099,851	290	16
Innovative GHG Abatement Strategies										
Charge NY[j]	$65.8	$30.5	3,575,665	35,756,646	-207,921	-2,079,208	282,478	2,824,775	341	34
Clean Energy Fund										
Clean Energy Fund[k]	$78.8	$21.0	82,893	1,315,195	7,739	128,831	8,863	1,315,195	2,067	76
TOTAL Anticipated Benefits[l]	**$329.7**	**$67.5**	**4,438,079**	**55,629,247**	**73,746**	**3,565,659**	**506,300**	**8,681,136**	**694**	**46**

[a] These emission reductions are associated with both electric and fossil-fuel saving measures. Under a cap-and-invest system, the total number of emission allowances is determined by regulation. Regulated entities can purchase allowances and collectively emit up to the cap that is currently in place. Therefore, in the near term, electric efficiency projects may not decrease the overall amount of emissions going into the atmosphere. However, electric efficiency projects will reduce end users' responsibility or footprint associated with emissions from electricity production.

[b] CO_2e stands for carbon dioxide equivalent and describes the amount of CO_2 that would have the same global warming potential as a given mixture of gases based on factors published by the Intergovernmental Panel on Climate Change.

[c] Inclusive of incentive dollars for expenditures, encumbrances, and contract pre-encumbrances.

[d] Inclusive of all non-incentive expenditures.

[e] Inclusive of savings from all currently operational projects installed since program inception.

[f] Annual Savings multiplied by the lifetime of the measure installed.

[g] The sum of Total Incentives and Total Associated Costs divided by Annual Savings.

[h] The sum of Total Incentives and Total Associated Costs divided by Lifetime Savings.

[i] This initiative was referred to as "NY-Sun Long Island" in previous versions of the RGGI Operating Plan.

[j] Net Energy Savings values represent MMBtu savings from the use of electric vehicles; the electricity required to charge the vehicles is 14,337 MWh cumulative annual and 143,366 MWh lifetime. Expected emission reductions and customer bill savings are net, including both MMBtu that add to the benefits and the electricity required to charge the electric vehicles that subtract from the benefits.

Table notes continued on the next page

Table 1 notes continued

[k] These figures represent a proportional allocation of benefits relative to the percent of RGGI contributions to the total approved CEF budget.

[l] Totals may not sum exactly due to rounding.

The Summary of Benefits provides a quantitative estimate of the benefits associated with deployment programs. Green Jobs - Green New York, Long Island Power Authority (LIPA), Efficiency and Renewable Energy, Community Heat Pump Systems, EmPower Plus, Renewable Heat, NY-Sun, Charge NY, and the Clean Energy Fund (CEF) are the deployment program areas that are expected to realize savings during the current plan timeframe.

Estimated benefits related to the community clean energy or other research and development (R&D) initiatives are not included in benefit calculations. Nevertheless, some benefits can be anticipated from these program areas, including long- and short-term job creation, economic development benefits, efficiency improvements, increased use of renewable energy, pollution prevention, abatement of fuel use, annual electric savings, and associated air emissions reductions. To the extent they are available, these benefits are described in the program description sections of this report.

For the purpose of this report, cumulative lifetime benefits have been calculated for total program investments made through December 31, 2021. Anticipated benefits over the timeline of the budget proposal have been calculated.

Benefit achievements are updated on a quarterly basis and can be found in New York State's RGGI-Funded Programs Status Report. Visit nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports on the NYSERDA website for details.

1 Introduction

1.1 Background

Through the Regional Greenhouse Gas Initiative (RGGI), New York State and its partner states have pioneered the nation's first market-based, cap-and-invest program to help control the carbon dioxide (CO_2) emissions contributing to global climate change. Just as the RGGI program serves as a model for a national greenhouse gas (GHG) emissions reduction strategy, New York State is also creating a national model through its RGGI Operating Plan, demonstrating how strategic investments across disciplines and across the economy can support comprehensive strategies that best advance the carbon dioxide (CO_2) emission reduction goals of the State.

New York State maintains a robust portfolio of clean energy programs and proceeds from the sale of RGGI CO_2 allowances that are used to supplement existing policies and programs. The plan is structured to result in immediate emission reductions, while building capacity for carbon emission mitigation action in the long-term. In accordance with State regulations, this plan implements activities to reduce carbon emissions and pollution through energy efficiency, renewable energy, and support for innovative carbon abatement strategies.

Deep and persistent emission reductions will require changes in the energy consumption patterns of businesses and individuals as well as systemic changes in all energy using sectors of the economy, including buildings and industrial processes, transportation, and power generation. Systemic changes will result from expanding partnerships with industries, education and outreach campaigns to generate clean energy demand from consumers, and continuation of sound government policy to achieve clean energy and emission reduction goals.

To realize both immediate GHG emission reductions as well as create the needed platforms for long-term, self-sustaining changes in energy consumption patterns, the RGGI portfolio of programs will instigate the following:

- Provide substantial benefits to consumers and the environment, resulting in GHG emission reductions from both electricity and other energy sources. By deploying a range of energy efficiency and renewable energy technologies, New York State can realize GHG emissions reductions in the near-term and provide valuable information to consumers and supply-chain participants for self-sustaining markets in these activities.
- Empower communities to make decisions about energy usage that will lead to lower GHG emissions as well as economic and societal co-benefits. By supporting sustainability planning and

implementation of those plans, communities and individuals can guide decision-making that improves localities and simultaneously reduce statewide GHG emissions.

- Employ innovative approaches to increase the adoption of clean energy alternatives in New York State. By using new financing strategies or program approaches targeting specific uses, the portfolio creates an opportunity to increase penetration of existing programs and expands the reach of clean energy programs to communities that may not traditionally take advantage of these options.
- Stimulate new technology development and create a strong clean energy business environment. By supporting entrepreneurial growth, RGGI can advance new economic development strategies for New York State that help to expand the economy and support innovative State products and services that can be exported across the country or around the world.
- Build capacity for long-term GHG reduction. By training workers and partnering with industry, the RGGI program portfolio enables transformative activities through implementation of carbon-reducing projects.

The use of RGGI funds complements activities articulated by Clean Energy Fund (CEF) investment plans. RGGI-funded programs create synergies with existing efficiency and clean energy programs, and furthermore, advance the stated RGGI policies and intended outcomes. The statewide goals of reduced GHG emissions, reduced energy use, accelerated growth in the State's clean energy economy, increased energy efficiency, increased fuel diversity (measured by the overall proportion of renewable electricity generation), reduced criteria pollution and low-income home weatherization are, therefore, enhanced by these complementary resources. As such, the plan is not designed as a standalone portfolio of program activities, nor are RGGI proceeds relied on as a sole source to achieve the State's carbon mitigation goals. Rather, the plan should be considered in context of the other policies and programs that help reduce GHG emissions and has been designed to strengthen and enhance the comprehensive statewide energy policy to best leverage the State's collective resources to achieve its clean energy goals. In short, RGGI will continue to complement NYSERDA's future program activities aimed at reducing GHG emissions in New York State.

Building from the December 2020 version of the RGGI Operating Plan, this plan incorporates feedback and direction received during public stakeholder meetings in December 2021 and May 2022 and subsequent written comments from stakeholders. The scope and approach for allocating the anticipated proceeds was approved by NYSERDA's Board of Directors in June 2022. Overall, the plan covers program investments comprised of the following RGGI funds:

- Anticipated proceeds from auctions to be held during fiscal years 2022–25
- Remaining program funds from prior auction proceeds

The use of previously obtained proceeds that comprise remaining program funds was approved by the board at earlier meetings.

1.2 Regulatory Context

RGGI is a multi-state cooperative effort to reduce GHG emissions from electric power plants by means of a cap-and-invest system. Under RGGI, the participating states designed cap-and-invest programs that set limits on CO_2 emissions from the regulated power plants in participating states. Over time, the cap declines so that CO2 emissions from the power sector subsequently decrease.

The RGGI participating states complete periodic program reviews that include a comprehensive evaluation of program success, program impacts, additional reductions, imports and emission leakage, and offsets. The first regional RGGI Program Review was completed in early 2013 and in December 2017 the participating states completed a second regional program review resulting in updated Model Rule.[1] A third program review began in Summer 2021.

Each state is implementing this initiative through individual CO_2 Budget Trading Programs linked through the regional cap-and-invest program. Visit http://www.rggi.org for additional background on the initiative.

In New York State, the RGGI Program has been implemented through two complementary programs: The New York State Department of Environmental Conservation (DEC) established New York State's CO_2 Budget Trading Program (6 NYCRR Part 242, 6 NYCRR Part 200, General Provisions) and NYSERDA established the CO_2 Allowance Auction Program (21 NYCRR Part 507).

The CO_2 Allowance Auction Program established the rules through which New York State will sell most of its CO_2 allowances. The CO_2 Allowance Auction Program [21 NYCRR Part 507.4(d)] also creates the parameters for use of the proceeds from the sale of allowances that will be used to "promote and implement programs for energy efficiency, renewable or non-carbon emitting technologies, and innovative carbon emissions abatement technologies with significant carbon reduction potential." The plan is designed to be consistent with these regulatory requirements.

[1] Visit https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf for more information.

1.3 Program Goals

New York State invests RGGI proceeds to support comprehensive strategies that best achieve the RGGI CO_2 emission reduction goals, which reduce global climate change and pollution through energy efficiency, renewable energy, and carbon abatement technology. Investments will be focused on a complementary mix of electricity-related GHG reduction opportunities and technologies as well as strategies for reductions related to the use of petroleum and natural gas.

Deploying commercially available renewable energy and energy efficiency technologies helps to reduce GHG emissions in the short term. To move the State toward a more sustainable future, RGGI-funded programs work to empower communities to make decisions about energy usage that lead to lower carbon emissions as well as economic and societal co-benefits.

The Climate Leadership and Community Protection Act (Climate Act), signed into law in July 2019, charts a course for New York State to 85% greenhouse gas emissions reduction by 2050, a pathway to a carbon neutral economy, and a goal that 40% of the benefits from investments in clean energy and energy efficiency be realized by disadvantaged communities. This Operating Plan estimates[2] that 43% of commitments from January 2020 through this Plan period are expected to provide benefits to disadvantaged communities based on an interim definition of disadvantaged communities and low-to-moderate-income investments, as the Climate Justice Working Group completes its work to finalize statewide disadvantaged communities criteria.

Funds will also be used to induce additional GHG reductions by establishing the commitments and capacity to curtail GHGs by municipal, institutional, and other public and private sector participants.

1.4 Program Focus and Geographic Scope

RGGI funds have historically been used to support programs ineligible for funding from other sources. Similarly, today RGGI-funded activities complement and enhance CEF initiatives.[3]

Geographic equity of expenditures and benefits will be pursued across the portfolio of programs; however, not on a program-by-program basis. Certain programs may have a limited geographic focus, but

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2 Estimated benefits only coincide with the timeframe reported. Future benefits could be higher or lower.

3 Visit http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={FC3FBD53-FBAC-41FB-A40E-3DA0A5E0866A} for NYSERDA's CEF supplement.

most will be statewide in scope. Outreach activities may be tailored to different regions. Program monitoring and evaluation may lead to adjustments in offerings, such as changes in incentive levels.

1.5 Portfolio Development Criteria

The following criteria were considered in developing the portfolio of programs included in the plan:

- Cost-effectiveness measured by tons of carbon dioxide equivalence reduced per dollar invested.
- Long-range potential for the technology or investment to reduce GHG emissions in New York State.
- Potential to reduce the costs of achieving the RGGI emissions cap.
- Other benefits for New York State such as job creation, leveraging of capital investment to promote economic development, providing health and environmental co-benefits, and enhancing municipal capacity to further reduce GHG emissions.
- Opportunities to reduce the disproportionate cost burden and environmental impacts on low-income families and environmental justice communities.
- Need for funds based upon availability from other funding sources.

These criteria served as guidance for the development of the overall portfolio of programs. They are not weighted; rather, the intention is to qualitatively achieve a strong balance of programs. Furthermore, the minimum or "critical mass" funding level needed to run an effective program is also an important consideration. The diverse portfolio of initiatives presented in the plan will balance the achievement of near-term results with the investment in long-term strategies that will provide sustained, ongoing reductions of GHGs.

Consistent with Part 242-10.3(d)(3), projects that receive funds under a program covered in the plan are not eligible to pursue CO_2 Emissions Offset credits under the CO_2 Budget Trading Program, with the exception of agricultural methane projects. All entities, including compliance entities, may pursue projects under any of the proposed programs in the plan.

2 Overview of Program Funding

This section provides an overview of program funding. Funds available for investment or commitment during the planning period described in this plan are comprised of two components:

- Estimated future proceeds from fiscal years 2022–25
- Remaining program funds

2.1 Assumptions about Auction Proceeds for Operating Plan

Estimated auction proceeds for fiscal years 2022–25 are collectively anticipated to exceed $481 million. For planning purposes, this Operating Plan maintains the future auction proceeds based on an auction allowance price of $8.00, which is sustained through the end of the planning period, and is based on a lookback average of recent auctions, increased by a modest inflationary factor.

2.2 Summary of Proceeds Investment by Program

Table 2 provides a summary of proceeds investment by program and shows how the approximately $2,167 million of funds expected to be made available through RGGI auctions have been, or will be, allocated among programs and other costs through fiscal year 2025.

The table shows cumulative allocations through March 2022 and reflects the planned and actual allocations for fiscal years 2022–2025. The table also summarizes the allocation of all current and planned proceeds through March 31, 2025.

Table 2. RGGI Revenue and Funding Allocation Plan

Category	Program	Cumulative Allocations through March 31, 2022	FY22-23 Plan	FY23-24 Plan	FY24-25 Plan	Cumulative Allocations through March 31, 2025
Proceeds	Number of allowances	435,218,013	20,924,243	20,043,750	19,163,257	495,349,262
	Allowance price	$3.90	$8.00	$8.00	$8.00	$4.40
	RGGI Auction Proceeds	1,697,544,050	167,393,942	160,349,998	153,306,054	2,178,594,044
	Interest Earnings	18,258,081	75,000	78,000	72,000	18,483,081
	Total Revenues	1,715,802,131	167,468,942	160,427,998	153,378,054	2,197,077,125
Renewable Energy	NY SUN NYPA Customer Incentives	29,000,000	1,000,000	-	-	30,000,000
	NY SUN Community Solar/K-solar	7,500,000	-	-	-	7,500,000
	NY SUN Long Island incentives	55,000,000	-	-	-	55,000,000
	Residential PV Plus Storage	-	-	6,000,000	3,000,000	9,000,000
	Renewable Heat NY	10,300,083	-	-	-	10,300,083
	Community Heat Pump Systems	-	5,000,000	4,700,000	-	9,700,000
	Advanced Renewable Energy	2,837,698	-	-	-	2,837,698
	NYS Generation Attributes Tracking System	789,933	-	-	-	789,933
	NYSERDA PV incentives	5,319,821				5,319,821
Energy Efficiency	Clean Energy Workforce Opportunity Program	15,000,000	-	-	-	15,000,000
	LIPA Efficiency and RE	249,600,000	20,000,000	20,000,000	20,000,000	309,600,000
	Energy Storage (LIPA territory)	12,926,434	-	-	-	12,926,434
	NYC Retail Storage	-	-	20,000,000	-	20,000,000
	EmPower Plus	55,475,905	16,000,000	16,000,000	16,000,000	103,475,905
	Pilot Projects with Municipal Utilities	1,000,000	1,000,000	1,000,000	-	3,000,000
	Disadvantaged Communities Schools/ Buildings	13,000,000	12,600,000	17,300,000	6,500,000	49,400,000
	Multifamily Performance Program	15,046,683	-	-	-	15,046,683
	Multifamily Carbon Emissions Reduction	5,833,019	-	-	-	5,833,019
	Solar Thermal incentive	4,226,947	-	-	-	4,226,947
	Municipal Water/Wastewater	1,245,242	-	-	-	1,245,242
	Green Residential Buildings	2,744,601	-	-	-	2,744,601
Innovative GHG Abatement Strategies	Southern Tier Competition (76 West)	11,000,000	-	-	-	11,000,000
	Brookhaven National Lab- ION Collider	25,000,000	-	-	-	25,000,000
	Electric Vehicle/Charge NY	60,000,000	42,400,000	23,000,000	30,900,000	156,300,000
	Advanced Buildings & Industrial Innovations	13,307,654	-	-	-	13,307,654
	Climate Research & Analysis	8,729,296	-	-	-	8,729,296
	Competitive GHG Reduction Pilot	972,650	-	-	-	972,650
	Clean Energy Business Development	5,809,987	-	-	-	5,809,987
	Transportation Research	3,819,311	-	-	-	3,819,311
	Natural Carbon Solutions	-	2,000,000	3,000,000	2,000,000	7,000,000
	Equity and Climate Transformation Research	-	800,000	900,000	900,000	2,600,000
	Climate Mitigation and Resilience Research	500,000	500,000	500,000	-	1,500,000
	PV Manufacturing consortium	8,480,000	-	-	-	8,480,000
	Carbon Sequestration	1,000,000	-	-	-	1,000,000

Table 2 continued

Category	Program	Cumulative Allocations Through March 31, 2022	FY22-23 Plan	FY23-24 Plan	FY24-25 Plan	Cumulative Allocations through March 31, 2025
Community Clean Energy	Cleaner Greener Communities	94,261,895	-	-	-	94,261,895
	Clean Energy Communities	7,273,120	3,000,000	3,000,000	3,000,000	16,273,120
	Climate Smart Communities	7,674,999			-	7,674,999
	Community Energy Engagement	2,400,000	1,000,000	1,000,000	-	4,400,000
	Economic Development Growth Extension	5,843,047	-	-	-	5,843,047
	Energy to Lead	3,000,000	-	-	-	3,000,000
	Renewable/Net-Zero Energy Demonstrations	7,000,000	500,000	-	-	7,500,000
	Healthy New Home Design & Construction Challenge	-	1,000,000	3,000,000	3,000,000	7,000,000
	Workforce Development Talent Pipeline Priority Population	2,000,000	2,000,000	11,000,000	4,000,000	19,000,000
	Clean Energy Hubs	-	3,000,000	3,000,000	4,000,000	10,000,000
	Climate Action Consumer Awareness & Education	-	1,500,000	6,000,000	4,500,000	12,000,000
	Air Monitoring	8,000,000	-	-	-	8,000,000
	Regional Economic Development & GHG Reduction	10,246,443	-	-	-	10,246,443
CEF	Transfer to(from) Clean Energy Fund	164,226,804	22,000,000	22,000,000	22,000,000	230,226,804
Directed	NYS Environmental Tax Credits	179,000,000	-	-	-	179,000,000
	NYS Environmental Protection Fund	10,000,000	5,000,000	5,000,000	5,000,000	25,000,000
	Electric Generation Facility Cessation Mitigation	50,000,000	-	-	-	50,000,000
	Green Jobs-Green NY- Original Legislation	112,000,000	-	-	-	112,000,000
	Green Jobs-Green NY- Additional Funding	154,725,275	29,936,974	4,370,498	14,071,993	203,104,740
	Transfer to Clean Energy Standard	719,424	-	-	-	719,424
	NYS Budget Transfer	90,000,000	-	-	-	90,000,000
	NYS Temporary Budget Transfer	-	-	-	-	-
Administration and Other Non-Program Costs	Program Administration	47,096,359	12,800,000	12,800,000	12,800,000	85,496,359
	Program Evaluation	9,155,429	1,000,000	1,000,000	1,000,000	12,155,429
	Commensurate Benefit/Litigation reserve	21,900,366	-	-		21,900,366
	RGGI Inc Startup Costs	1,598,204	-	-		1,598,204
	RGGI Inc pro-rata costs	10,008,667	825,000	825,000	825,000	12,483,667
	State Cost Recovery	15,289,657	1,673,939	1,603,500	1,533,061	20,100,157
	Total Funding Allocations	**1,638,884,953**	**186,535,913**	**186,998,668**	**155,030,054**	**2,167,449,918**
	Surplus/(Shortfall)	76,917,178	(19,072,971)	(26,584,000)	(1,665,000)	29,595,207
	Cumulative Surplus(Shortfall)	**76,917,178**	**57,844,207**	**31,260,207**	**29,595,207**	**59,190,414**

2.2.1 Program Funding Expansion Plan and Additional Funds

The RGGI Operating Plan Amendment addresses the potential for auction revenues to exceed the estimates being used to develop the operating plan for each year. Allowance auction proceeds may exceed the revenue estimates presented in this multiyear operating plan. Absent unforeseen circumstances, if additional revenue should become available, proceeds could be used to reduce deficits or expand funding for the existing portfolio of RGGI programs to the extent consistent with Part 242, the CO_2 Budget Trading Program regulation. Changes in actual program funding as a result of fluctuating auction revenues are accounted for in the RGGI Quarterly Program Status Reports. Visit nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports on the NYSERDA's website for details.

The ensuing sections of the report provide the following information for each program anticipated to have program investments:

- Program Description
- Benefits resulting from program investments (measures of program benefits)

2.2.2 Other Fees and Expenses

Additional information about other fees and expenses that are netted out from total auction proceeds are also shown and described in Table 2.

2.2.3 Repayment of System Benefits Charge Funds

The Public Service Commission issued an Order in Case 05-M-0090, dated August 27, 2007 authorizing up to $3 million of interest earnings from unexpended System Benefits Charge (SBC) funds to be used to finance certain start-up costs of RGGI, Inc., subject to reimbursement of the SBC account. In October 2009, reimbursement of approximately $1.6 million was made to the SBC account, which represented the amount of funds used to finance these start-up costs plus interest.

2.2.4 Ongoing New York Share of RGGI, Inc. Costs

RGGI, Inc. is a nonprofit corporation created to support development and implementation of CO_2 Budget Trading Programs in New York and other participating states. NYSERDA entered

into an agreement for RGGI, Inc. to provide technical and support services for key elements of New York State's CO_2 Budget Trading program that include the following:

- Develop and maintain a system to report data from emissions sources subject to RGGI and to track allowances
- Implement a platform to auction CO_2 allowances
- Monitor the market related to the auction and trading of CO_2 allowances
- Provide technical assistance to the participating states in reviewing applications for emission offset projects
- Create and implement a market monitoring program
- Provide technical assistance to the participating states to evaluate proposed changes to the states' RGGI programs

New York State's share of RGGI, Inc. costs was estimated to be approximately $825,000 per year during the planning period. This estimate is consistent with the New York's portion of the annual operating budgets approved by the RGGI, Inc. Board of Directors for 2021 and 2022.

2.2.5 State Cost Recovery Fee

NYSERDA assessed an annual State Cost Recovery Fee pursuant to Section 2975 of the Public Authorities Law to help support general governmental services provided to NYSERDA. The fee is assessed on all NYSERDA revenues, and NYSERDA allocates this obligation proportionately among all programs and funding sources. The RGGI budget includes an estimate based on the current annual assessment of the fee expected to be allocated to the RGGI funded programs.

2.2.6 Other Budget Components

On December 4, 2009, New York State enacted deficit reduction measures that included the transfer of $90 million in RGGI auction proceeds to the general fund. These actions were taken to improve New York State's long-term fiscal health.

2.2.7 Program Evaluation and Administration

Program evaluation and administration costs have been budgeted for fiscal years 2022–2025 at approximately $1 million and $12.8 million, respectively. This amount reflects the projected funds required to support the continued management of projects from past initiatives, new program activity, and increasing levels of complexity and skills required to transform markets and understand and address needs of disadvantaged communities. This total translates to approximately 8% of the total funding allocations for the planning period, well under best practice benchmarks for general and administrative expenses.

3 Program Descriptions and Accomplishments

3.1 Renewable Energy

3.1.1 Renewable Heat NY

The Renewable Heat NY initiative was a long-term commitment to support the high-efficiency, low-emission, biomass heating industry. Renewable Heat NY program funding was fully allocated in August 2021. The program stopped accepting new project applications and the projects in the pipeline are anticipated to be complete in 2022. The long-term market development strategy for Renewable Heat NY included the following objectives:

- Raise consumer awareness.
- Develop large-scale anchor customers to expand the wood pellet bulk delivery market.
- Promote supply chain development, including workforce training and support for product development, manufacturing, laboratory and field testing, and equipment certification.
- Leverage NYSERDA's issuance of the New York State Wood Heat Report to accelerate the use of biomass for heating using the most efficient low-emission technologies.
- Provide financial incentives to consumers for advanced efficiency and low-emission technologies to reduce upfront costs.
- Provide support so that sustainable forestry practices are available and followed by small and large landowners.

This initiative sought to develop and expand local clusters of activity, thereby meeting the overarching goal of supporting the high-efficiency and low-emission biomass heating industry in the State. Renewable Heat NY provided supply chain and service network development (i.e., workforce development, training, and research and development), along with consumer incentives and financing. NYSERDA is developing a report that summarizes the results of the Renewable Heat NY program.

A market evaluation of the Renewable Heat NY program was completed in the third quarter of 2020. For more information on this evaluation please refer to section F.2. Completed Evaluations in the appendix of this report. The report is available on the NYSERDA website.[1]

Key accomplishments as of this reporting period:

- NYSERDA's training service providers conducted four online training sessions for small biomass boiler systems during Q3 and Q4 of 2021. To date, 22 full-day small biomass boiler trainings and 23 training webinars have been provided since the start of the program.
- A total of 649 installed projects.
- One large commercial pellet boiler project, participating in the Large Biomass Boiler program is under construction.

After Renewable Heat NY program funding was fully allocated in August 2021, pellet stove incentives for income-eligible customers were transitioned to NYSERDA's low- to moderate-income residential programs.

3.1.2 NY-Sun Initiative

The NY-Sun initiative is driving the growth of the solar industry and makes solar technology more affordable for all New Yorkers. The program provides declining incentives for the installation of systems and works to reduce solar electric balance-of-system costs through technology advancements, streamlined processes, and customer aggregation models. The goal is to achieve a sustainable solar industry that does not depend on incentives.

In August 2014, NY-Sun became a statewide program. RGGI funding enabled the participation of customers from the Long Island Power Authority (LIPA), New York Power Authority (NYPA), and municipal power companies. NY-Sun supports end-use solar installations for commercial, industrial, and residential customers as well as electric utility applications to improve the performance of distribution circuits and reduce peak electric load in critical load pockets. These projects assist New York State communities that empower clean energy, healthy communities, and economic development.

Key accomplishments as of this reporting period:

- The Affordable Solar and Storage Predevelopment and Technical Assistance program provides funding to support the development of community-led solar and/or storage projects serving low- and moderate-income households as well as solar-serving multifamily affordable housing properties. As of Q4 2021, 35 project applications have been approved and awarded funding. Three projects are located on Long Island and funded by RGGI with a focus on a range of multifamily affordable housing properties, including those managed by the Long Beach Housing Authority.
- The final Megawatt Block for Long Island residential solar photovoltaic (PV) projects closed in April 2016. A total of 100.3 megawatts (MW) of residential PV (12,636 projects) were built through the MW Block program with RGGI funding.

- The final MW Block for Long Island nonresidential solar PV projects closed in February 2019. There have been 50.9 MW (401 projects) of small commercial PV built in Long Island through the MW Block Program with RGGI funding, and 16.7 MW are still in the pipeline.

An impact evaluation of solar photovoltaic (PV) projects installed under NYSERDA's NY-Sun program from May 1, 2016 through March 31, 2018 was completed in the third quarter of 2020. A subset of solar PV installations under the NY-Sun program benefitted from support by NY Green Bank (NYGB), a division of NYSERDA. Previous installations under the NY-Sun and predecessor programs were evaluated in the NYSERDA Solar Photovoltaic Program Impact Evaluation for 2008 and 2011–2016. The impact evaluation report is available on the NYSERDA website.[2]

3.1.2.1 NYSERDA Solar Electric Program

NYSERDA's Solar Electric Program focuses on reducing GHG emissions in the long term by helping to establish a sustainable market for solar energy statewide that includes targeted financial incentives. These RGGI funds supplement and do not supplant Renewable Portfolio Standard (RPS) funds, supporting installation of systems in regions that do not pay into the RPS.

Key accomplishments as of this reporting period:

- A total of 304 solar electric systems were installed outside Long Island using RGGI funding through December 31, 2021.

3.1.3 New York Generation Attribute Tracking

NYSERDA established the New York Generation Attribute Tracking System (NYGATS) to record electricity generation attribute information in New York State as well as to process such information from energy imported and consumed as a basis for creating tradable generation attribute certificates. Through NYGATS, entities are able to verify and substantiate ownership of renewable energy certificates to either (1) support regulatory compliance, (2) validate environmental attributes in trading markets, or (3) substantiate the fulfillment and verification of voluntary green market product claims. NYGATS also characterizes the attributes of electricity imports and exports and has the capability to interface and exchange information with other certificate tracking systems. The system is used for (1) the creation of annual disclosure labels for New York Load Serving Entities (LSE) under the Environmental Disclosure Program (EDP), (2) generation projects to apply for eligibility under Tier 1 of the Clean Energy Standard (CES), (3) LSEs to substantiate compliance under the CES, and (4) CES progress reporting. Additionally, NYGATS certificates are the instrument to be received by the utilities in exchange for providing the environmental value component of the Value of Distributed Energy Resources (VDER) Phase 1 Value

Stack tariff. As previously ordered by the Public Service Commission (PSC), this project is also supported with System Benefits Charge (SBC) environmental disclosure program funding.

Key accomplishments as of this reporting period:

- Executed the modification in NYGATS to accommodate the Competitive Tier 2 program approved by the Public Service Commission on October 15, 2020.
- As of April 1, 2021, NYGATS was extended an additional five years, but the funding source has changed and is no longer using RGGI funds.

3.1.4 Advanced Renewable Energy Program

The Advanced Renewable Energy Program supports projects that foster the market introduction of a broad range of promising new and advanced renewable energy technologies, including advanced biomass, tidal, and offshore wind technologies.

Key accomplishments as of this reporting period:

- GridMarket LLC has completed a small research project to analyze the characteristics of building load profiles using 15-minute interval meter data in the Con Edison distribution area. The company has also evaluated potential benefits to customers and the grid when applying energy storage technologies to modify load and integrate with renewable generation. The final report has been received by NYSERDA, and activity is complete.
- An Offshore Wind Cost Benefit Study was completed. It assessed the potential costs, ratepayer impacts, environmental benefits, and economic benefits and impacts (job and other macroeconomic influences) to New York State associated with plausible scenarios of future offshore wind energy deployment in the New York Bight through 2025.[3]
- The Offshore Wind Master Plan, funded through the Clean Energy Fund, will include cost studies that build on the work completed for the Offshore Wind Cost Benefit Study.

3.2 Energy Efficiency

3.2.1 LIPA Energy Efficiency and Renewable Energy Initiative

The RGGI funds provided to the Long Island Power Authority (LIPA) ensure that businesses and consumers on Long Island have access to similar clean energy and energy efficiency opportunities that are available throughout the State and to help advance statewide efforts toward achieving the clean energy goals of the 2015 New York State Energy Plan. The funds provided to LIPA have traditionally supported solar incentive programs consistent with the statewide NY-Sun program but have more recently supported energy efficiency programs administered by PSEG Long Island (PSEGLI). In 2016, LIPA, NYSERDA, and PSEGLI had collaborated to launch new approaches envisioned under Reforming the Energy Vision

(REV) to support market transformation objectives, while also achieving greater carbon emissions reductions. Funding and reporting requirements are established through a memorandum of understanding (MOU) between NYSERDA and LIPA. The following are the results from the second half of 2021.

Rebate spending for the second half of 2021 totaled $19.7 million against total annual budgeted RGGI funds of $20 million, resulting in 178,633 megawatt-hour (MWh) savings. The majority of the spending ($10.1 million) consisted of payments to businesses through PSEGLI's Commercial Efficiency Program (CEP). PSEGLI's Home Comfort central air conditioner program and PSEGLI's Efficient Products program were among the residential programs that were supported. The Efficient Products program includes support of LED light bulbs, pool pumps, appliance recycling and room air conditioners. To date, over $249 million in RGGI funds have been spent, resulting in a cumulative total savings of 1,075,679 MWh and 35,035 million British thermal units (MMBtu).

PSEGLI has implemented several initiatives in support of New York State's clean energy goals. Long Island has been recognized as the first region of the State where all 18 Clean Energy Community grant awards have been claimed, with each community earning the designation as a Clean Energy Community. PSEG Long Island will continue to coordinate with NYSERDA around supporting communities by promoting the grant projects that will result from these awards. In support of statewide goals related to beneficial electrification, PSEG Long Island has focused on cold climate heat pump solutions for residential and commercial customers. Additionally, the Home Energy Management program was launched in the third quarter of 2017. The program consists of Home Energy Reports that are sent to 440,000 residential customers and an interactive portal which provides a disaggregation of electric usage and savings tips. The program was enhanced in the fourth quarter of 2017 to include a Home Energy Analyzer which is open to all residential customers to input home profile information for a customized energy plan. Additionally, the online Marketplace, which offers customers a variety of energy efficiency products, has been enhanced to include the sale of electric vehicle chargers.

Key accomplishments for this reporting period:

- More than $10 million in rebates were paid to Long Island businesses saving 54,722 MWh as part of PSEGLI's Commercial Efficiency Program as incentive for over 1,444 energy-efficiency projects installing measures such as lighting, HVAC systems, and efficient motors.
- During the second half of 2021 PSEGLI Residential Efficient Products program resulted in savings of 116,169 MWh for total incentive payments of $5.5 million, including rebates of more than $2.8 million to PSEGLI residential customers for the purchase of light bulbs at local retailers. The remaining incentives paid for efficient product measures, such as catalog LED light bulbs, pool pumps, appliance recycling, and room air conditioners.
- PSEGLI residential customers were provided with incentives of over $2.8 million to install 1,687 energy-efficient central air conditioning projects as part of PSEGLI's Home Comfort (formally known as Cool Homes) program, saving 1,264 MWh in Q3 and Q4 of 2021.

3.2.2 Residential Efficiency Services

NYSERDA currently offers a suite of programs that provide comprehensive energy efficiency services for single and multifamily existing buildings and new construction, including low-income households. In addition to energy savings, these programs provide significant health and safety benefits through comprehensive testing and verification, improved air quality, and improved comfort. Previously, RGGI funds were used to fill gaps in residential energy efficiency services, offering incentives to implement energy efficiency measures related to petroleum fuel opportunities or opportunities on Long Island and municipal electric districts that were not supported through the Energy Efficiency Portfolio Standard (EEPS). However, the Clean Energy Fund initiatives are fuel neutral, and the Long Island Power Authority now administers more comprehensive residential energy efficiency programs; therefore, RGGI funds are used to support petroleum fuel opportunities for customers of municipal electric utilities. Coordination of RGGI funds with programs offered by municipal electric utilities allows efficiency contractors to provide comprehensive energy efficiency services to the home, expands the number of households served, and ensures that opportunities for carbon reduction measures are not lost.

3.2.2.1 Multifamily Performance Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.2.2.2 Multifamily Carbon Emission Reduction Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.2.2.3 EmPower New York

NYSERDA's EmPower New York (EmPower) program offers no-cost energy efficiency services to low-income (i.e., HEAP-eligible) homeowners and renters. These services include electric reduction and home performance measures such as appliance replacement, energy-efficient lighting, insulation, and air sealing. On-site energy education offers customers additional strategies for managing their energy costs. Participating contractors with certifications for the work they are performing provide services. Currently, 185 EmPower contractors are assisting in RGGI-funded projects.

Historically, EmPower used RGGI funding to serve low-income applicants that heat with oil and propane and were ineligible for EEPS funding. Currently, RGGI funds continue to support petroleum fuel efficiency measures in households served by municipal electric utilities. These energy efficiency measures aid in the reduction of GHG emissions and provide long-term carbon reductions.

Key accomplishments as of this reporting period:

- Across New York State, 97 low-income households were served during Q3 and Q4 of 2021, bringing the total to 7,284 low-income households served under EmPower New York with RGGI funding through December 31, 2021.

An impact evaluation for this program was recently completed and is summarized in the Program Evaluation section. A follow-up study is currently underway and is anticipated to be completed in Q1 2022; future reports will highlight findings from the study.

3.2.2.4 Green Residential Buildings Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.2.2.5 Home Performance with ENERGY STAR®

Home Performance with ENERGY STAR (HPwES) is a comprehensive energy efficiency services program for existing one- to four-family homes and low-rise[4] residential buildings. On December 31, 2019, the market rate component of HPwES was sunset; however, the moderate rate component of HPwES, Assisted Home Performance with ENERGY STAR (AHPwES), which serves homeowners with

incomes less than 80% of area median income, remains an active program offering. The program uses a network of certified contractors to (1) perform diagnostic testing on the home, (2) recommend improvements, (3) determine the payback period for those improvements, and (4) install improvements selected by the homeowner. As of December 31, 2021, 148 contractors are active in AHPwES.

The program uses RGGI funds for municipal electric households for oil and propane efficiency measures, such as replacing inefficient oil and propane heating equipment, air sealing, insulation, and other measures that have a direct impact on reducing GHG emissions from oil and propane consumption. Income-qualified homeowners are eligible for incentives to make energy improvements. HPwES applicants may also qualify for GJGNY assessment and financing programs.

Key accomplishments as of this reporting period:

- During Q3 and Q4 2021, 51 energy efficiency projects were completed at a contracted value of $420,201, bringing the total to 9,730 energy efficiency projects completed at a contracted value of $93.4 million.
- Of these recently completed projects, 100% were AHPwES, which serves homeowners with incomes less than 80% of area median income. As indicated above, the market rate component of HPwES ended in December 2019, and the remaining pipeline projects have been processed. Moving forward, it is expected that the only remaining project submissions will be AHPwES projects.

An impact evaluation for this program was recently completed and is summarized in the Program Evaluation section. A follow-up study is currently underway and is anticipated to be complete Q1 2022; future reports will highlight findings from the study.

3.2.2.6 Solar Thermal Incentive Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.2.2.7 Low-Rise Residential New Construction Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.2.3 Municipal Water and Wastewater Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.3 Innovative Greenhouse Gas Abatement Strategies

3.3.1 Industrial Innovations Program

The Industrial Innovations program is a longer-term program that supports development and demonstration of technologies with substantial GHG reduction potential and technologies relevant to New York State manufacturing industries and building systems. Funded projects will focus mainly on innovations that reduce the use of fossil fuels, have high-replication potential for the State's manufacturing base, and are likely to be cost-effective. Projects will focus on technical innovations, including thermal-efficiency improvements for fossil-fuel based processes and alternative processes that eliminate the use of fossil fuels directly and indirectly for technologies that bring about thermal destruction of byproducts. Projects also may include changes in material input and development of advanced controls, provided they directly bring about GHG reduction.

In 2014, two Manufacturing Innovations solicitations were issued: PON 2858 (Ultraviolet Light and Electron Beam Process Innovation and Market Transformation [UV/EB]) and PON 2927 (Transformative Technologies for Energy-Efficient Manufacturing [TTEEM]). These solicitations sought to advance the materials, methods, and machine tools used to mass-produce cleantech products, and thus reduce the GHG footprint of factories producing cleantech products, as well as reduce the cost of goods.

Key accomplishments as of this reporting period:

- A project with SulfCrete of Long Beach, NY continues to move forward—leveraging $750,000 in federal funding from the United States Department of Energy (DOE) to supplement the $400,000 NYSERDA funding award—is benefiting from the involvement of Brookhaven National Labs for the commercial scale-up and demonstration of SulfCrete, a clean, energy-efficient alternative to conventional Portland cement concrete. The project management team is undergoing action to extend the project contract expiration to the end of 2022.
- A project with Sweetwater Energy involving building or installing manufacturing processes to supply cellulosic and lignin-based products is in progress from previous quarters and continues to make advancements. The NYGB has engaged Sweetwater Energy, Sweetwater is evaluating whether to engage in partnership or bring the project to closure.

3.3.2 Climate Research and Analysis Program

The Climate Research and Analysis Program supports research studies, demonstrations, policy research and analyses, and outreach and education efforts. Through these activities, the program addresses critical climate change related problems facing the State and the region, including the needs of environmental justice communities.

Key accomplishments as of this reporting period:

- Work has continued on research projects concerning climate change adaptation. A project on changes in hazardous algal blooms under future climate conditions is nearing completion.
- Through the Community Risk and Resiliency Act (CRRA) process, the DEC previously adopted the NYSERDA supported ClimAID projections for New York State as the official sea level rise projections for the State. NYSERDA staff continued to participate in an interagency working group to coordinate efforts on CRRA and the Climate Act. NYSERDA will continue to engage with this group, offering suggestions and support when appropriate.

3.3.3 Clean Energy Business Development

The Clean Energy Business Development program seeks to support emerging business opportunities in clean energy and environmental technologies while maintaining the goal of carbon mitigation.

Key elements of the program include the following:

- Providing financial support to leverage private investment in early-stage and growth-stage clean energy companies in New York State and accelerate the market introduction of innovative energy efficiency, renewable energy, or carbon abatement technologies.
- Advancing the transition of clean energy technologies or technologies that improve the energy efficiency of industrial processes from the development/demonstration stage to the launch of commercial-scale manufacturing or application.
- Developing and supporting a portfolio of programs designed to translate clean energy technology research into commercially viable business enterprises.

As part of the effort to bring private investment to early-stage clean energy companies in New York State, NYSERDA is working with the impact investment group, Investors' Circle, to develop a local network in New York City branded as Investors' Circle New York (IC NY). The group held monthly meetings/events to bring together the impact/social investing community in the New York Metropolitan Area, introduced clean energy investment opportunities to IC NY members, and provided feedback to the clean energy companies on how to successfully pitch to the impact/social investing community. IC NY is working to form and grow an effective and sustainable local network that will foster early-stage

and growth-stage impact/social investments in clean energy companies in NYS. Additionally, IC NY worked to create stronger ties to key segments of the impact/social investor community, including foundations, family offices, sovereign wealth funds, and high-net-worth individuals.

Energy storage is an enabling technology important to the market penetration and value of intermittent renewable energy resources such as solar and wind. Financial support for the New York Battery and Energy Storage Technology Consortium (NY-BEST) Test and Commercialization Center in Rochester is partially provided by RGGI. The center is a wholly owned subsidiary of NY-BEST and operated by DNV, a technical advisory services firm. The lab's grand opening occurred on April 30, 2014 and conducted the first test on May 28, 2014. In addition, in March 2015, the BEST Test and Commercialization Center BTCC received the American Association for Laboratory Accreditation for International Organization for Standardization (ISO) 17025 Lab Quality.

76West is an initiative focused on clean energy business development in the Southern Tier. As outlined in the 2015 State of the State address, this $20 million investment will catalyze a clean energy business cluster that builds on the local strengths and assets of the Southern Tier.

The Photovoltaic Manufacturing Consortium (PVMC) is a $5 million effort with more than 40 industrial collaborators as members or affiliates. Its goal is to accelerate the development, commercialization, manufacturing, field testing, and deployment of next-generation solar electric and lightweight photovoltaic systems.

Key accomplishments as of this reporting period:

- Investors' Circle New York continued to hold meetings for the impact/social investment community in metropolitan New York through the end of its contract in 2020. The project resulted in several startup pitches and two investments in New York State clean technology startups.
- The fifth round of the 76West Clean Energy Business Competition was launched in January 2020. Some 183 applications were received by the March 2, 2020 due date. The 76West Pitch Competition, featuring the 20 finalists, was held in Q3 2020. Four winners from 2020 have been awarded $2.5 million, including a $1 million top prize and three $500,000 prizes.

3.3.4 Charge NY

Charge NY will pursue three main strategies to promote plug-in electric vehicle (PEV) adoption by consumers across New York State. First, NYSERDA developed and implemented a rebate program for PEVs starting in 2017, accelerating purchases of PEVs by reducing higher upfront costs. Second,

NYSERDA will invest in marketing and awareness-building activities to build interest in PEVs among the general public. A focus on building greater public knowledge and awareness of the capabilities of PEVs is essential to spur more private investment in PEV purchases and PEV charging stations. This work may also include other market development activities, such as policy and business model development studies that support new ways for critical stakeholders, such as utilities, local governments, and car dealers, to get involved in the PEV market. Third, NYSERDA will also support the installation of PEV charging stations at workplaces and multifamily buildings—location types that have been seen to be effective motivation for PEV adoption, based on usage data reported from previous installations. Regions of the State that have seen faster PEV adoption will be identified for additional charging station support, which ensures investments in infrastructure support areas with the greatest potential for additional PEV drivers. Charge NY will also initiate the deployment of a network of direct current (DC), fast charge stations across the State.

Key accomplishments as of this reporting period:

- Through December 2021, NYSERDA has issued more than 54,000 rebates. The program reached new heights in 2021, with rebate applications through the second half of the year more than double the number from the same period in any previous year. As of Q1 2021, the Drive Clean Rebate program is entirely funded with RGGI proceeds. Outreach for the program included booths at the New York International Auto Show in 2018 and 2019, which was done in collaboration with other NYS agencies, ConEdison, Northeast States for Coordinated Air Use Management (NESCAUM), and the Greater New York Auto Dealers Association (GNYADA).
- NYSERDA launched a brand-neutral PEV consumer awareness campaign, *Drive Change. Drive Electric.* in collaboration with other northeastern states and 16 automakers in March 2018. The campaign aims to inform potential car buyers about the benefits of driving electric vehicles. The partners have reached consumers through paid and organic social media marketing, earned media, and a website, DriveElectricUS.com.
- In September 2018 NYSERDA launched Charge Ready NY, a charging station deployment program that provides $4,000 rebates for the installation of EV charging stations at public, workplace, and multiunit dwelling locations and $4,500 rebates for stations installed in Disadvantaged Communities. Through December 2021, over 3,600 charging ports have been installed and applications have been approved for another 350.

3.3.5 Transportation Research

The goal of the Transportation Research Program is to commercialize technologies, products, systems, and services that provide superior GHG reduction. Activities include product development, performance validation, field testing, policy development, and business assistance to help emerging technologies achieve successful commercialization. This program has not received new funding in several years and is

winding down. Work on these contracts is coming to a close. For the final open project, Unique Energy Solutions is in the process of upfitting 12 electric delivery trucks for United Parcel Service (UPS), six of which are complete.

3.3.6 Carbon Capture, Recycling, and Sequestration

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.3.7 Advanced Buildings

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.3.8 Competitive Greenhouse Gas Reduction Pilot

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.3.9 Brookhaven National Laboratory Ion Collider

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.4 Community Clean Energy

3.4.1 Climate Smart Communities

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.4.2 Economic Development Growth Extension Program

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.4.3 Cleaner Greener Communities

The Cleaner Greener Communities (CGC) program was announced in the 2011 State of the State address. In coordination with the Climate Smart Communities program, the program provided support for development and implementation of a variety of sustainability strategies to help ensure that the State's ongoing investments in infrastructure aid in moving communities and
New York State as a whole toward a self-sustaining, more environmentally sound future. The program encouraged communities to use public-private partnerships and develop regional sustainable growth strategies in areas such as energy efficiency, renewable energy, low-carbon transportation, and other carbon reductions. The program emphasized activities associated with smart growth, creation of green jobs, building green infrastructure, investing in environmental justice communities, and strengthening environmental protection.

Key accomplishments as of this reporting period:

- All contracts from the third round of funding have been previously executed. There are currently only 23 projects that remain open—the rest have been closed.

3.4.4 Regional Economic Development and Greenhouse Gas Reduction Program

The Regional Economic Development and Greenhouse Gas Reduction (REDGHG) Program supports projects identified as priority initiatives consistent with the New York State's Regional Economic Development Council (REDC) initiative and are not otherwise provided financial support by other NYSERDA programs or initiatives. REDGHG (1) provides cost-share funding for energy efficiency, clean and renewable energy, and/or innovative carbon abatement projects that address the regional priorities of the REDCs, (2) supplies results in strategic investments, and (3) builds the capacity in the region to participate in the State's clean energy economy. REDGHG focuses on several end uses, including transportation, manufacturing and industrial process, buildings, agriculture, municipal processes, renewable electric generation, and district energy.

3.4.5 Reforming the Energy Vision Campus Competition Program

The Energy to Lead Competition is a competitive solicitation issued by NYSERDA's REV Campus Challenge initiative. The program challenges colleges and universities across the State to develop and implement plans to advance building decarbonization and innovative, cost-effective clean energy solutions on their campuses and local communities. Institutions are encouraged to incorporate students, curriculum integration, and community engagement into their projects. Proposals with the best solutions

to achieve deep energy savings and combat climate change through energy efficiency, renewables, or GHG emission reductions will win approximately $1 million each to help implement their plans. There were three rounds of the Energy to Lead Competition, which is no longer accepting applications.

Proposals for the first round of the Energy to Lead Competition were due April 4, 2016. NYSERDA received 40 proposals from 33 institutions. The winning institutions and their proposed projects were announced on May 16, 2016, and included two awards funded through RGGI:

- Bard College's Micro Hydro for Macro Impact project will use local dams to develop micro hydropower. The project is expected to avoid 335 metric tons of GHG emissions annually, equivalent to taking 70 cars off the road annually.
- The State University of New York at Buffalo will implement the Localizing Buffalo's Renewable Energy Future project, which will install 100 MW of clean solar power throughout the city. The implementation involves partnership with the City of Buffalo and several not-for-profit and educational partners.

In August 2017, NYSERDA launched a second round of the Energy to Lead Competition with proposals due January 29, 2018. NYSERDA received 24 proposals from 19 institutions. The winning institutions and their proposed projects were announced on October 22, 2018 and included one award funded through RGGI:

- Suffolk County Community College will implement net zero energy components during construction of its Renewable Energy and STEM Center. The project will showcase clean energy technologies to the broader community, promote student engagement in clean energy projects, and integrate curricula to develop a qualified workforce.

In September 2019, NYSERDA launched a third round of the Energy to Lead Competition with proposals due February 22, 2020. NYSERDA received 18 proposals from 17 institutions. The winning institutions were announced on June 8, 2021 and included one award funded through RGGI:

- The City College of New York Building Performance Lab will develop a control based, systematic process for facilities staff and building operators to increase their ability to effectively manage and properly commission major energy consuming systems on campus. The project will deploy, test, and document a systematic process to engage students and facility staff in implementing building automation, system-based procedures that offer control of electricity use.

Key accomplishments as of this reporting period:

- The State University of New York at Buffalo and its partners finalized the power purchase agreement (PPA) for offsite solar, which will enable the University to achieve their goal of 100% of purchased

electricity to be renewable energy. The University will issue a Request for Proposals based on the finalized PPA terms to solicit offsite solar vendors. In addition, the university's sustainable living learning lab project, Garden, Relax, or Work (GRoW) Home, has been frequently leveraged by students and faculty as a learning and meeting space. The installation of 22,600 ground mount solar panels is complete and expected to be operating in 2022. The installation of rooftop panels at four core campus buildings has been approved and installation is expected to complete by Q4 2022.

- Bard College filed an application with the Federal Energy Regulatory Commission (FERC) on May 1, 2019 for an exemption from licensing for the Annandale micro hydropower project. Bard is awaiting FERC approval for the micro hydro project. In addition, a local law was passed that supports and eases the installation of micro hydropower facilities, which directly benefits Bard's project.
- Suffolk County Community College has been steadily moving forward with the construction of their net zero Renewable Energy & Science, Technology, Engineering, and Math (STEM) Center, an academic building. Construction of the building is expected to be complete Q3 2022.
- The City College of New York Building Performance Lab has been assessing building equipment use and operations as well as establishing baselines from energy-use data. The project team has developed a training strategy for facility staff and operators. Students have been heavily involved in the project's ongoing data collection and training development.

3.4.6 Clean Energy Communities

In the fall of 2015, NYSERDA, through the third and final round of the Cleaner, Greener Communities (CGC) program, awarded three contracts for regionally based outreach and technical assistance services to support NYSERDA's new Clean Energy Communities program. These services expand on the efforts undertaken previously through Climate Smart Communities (CSC) and Economic Development Growth Extension (EDGE). In addition, communities that receive the Clean Energy Communities designation will be eligible to apply for grants to implement innovative clean energy projects.

The statewide Clean Energy Communities program, which is co-funded through the Clean Energy Fund (CEF), supports local governments with a common platform and the coaching, facilitation, technical assistance, and expertise for implementing the local-level policies and planning needed to drive future clean energy market activities. These local-level actions accumulate and help to deliver the regional sustainable growth strategies encouraged by the CGC program, consistent with the regional sustainability and economic development plans. The Clean Energy Communities program also complements the New York State Department of Environmental Conservation's (DEC) Climate Smart Communities Certification Program by assisting communities working toward certification.

Key accomplishments:

- Clean Energy Communities Coordinators have helped 730 communities complete and submit 2,547 High Impact Actions, 2,325 of which were completed after the program launch, through the Clean Energy Communities program.
- Three hundred and eighty-nine communities completed at least four High Impact Actions and became designated Clean Energy Communities.

A market evaluation of the Clean Energy Communities program was completed in the fourth quarter of 2019. For more information on this evaluation please refer to section F.2. Completed Evaluations in the appendix of this report. Additionally, an impact evaluation was completed in Q4 2021.

3.4.7 Community Energy Engagement

In November of 2017, NYSERDA launched its Community Energy Engagement Program (CEEP), which is co-funded through the Clean Energy Fund (CEF), to build awareness and increase uptake of local renewable and energy efficiency solutions. Through this program, trusted, local organizations conduct energy awareness and education to residential, multifamily, and small business customers with an emphasis on increasing the amount of funding and financing leveraged for the completion of clean energy projects and solutions. Additionally, the initiative focuses on improving energy affordability and increasing deployment of distributed energy resources for community members of all income levels, with an emphasis on low- to moderate-income (LMI) households and communities.

Ten competitively selected organizations provide engagement services in each of the Economic Development Regions, as defined by Empire State Development. These organizations deploy trusted, local Community Energy Advisors who engage with residents, small businesses, and multifamily building owners on how to reduce energy use and greenhouse gas emissions. Community Energy Advisors help increase energy literacy and local understanding of the value of clean energy and reduced energy use. The face-to-face approach and focus on low- to moderate-income residents and communities is a strategy to help ensure the Community Energy Engagement Program makes the greatest impact. In Q3 and Q4 2021, the advisors continued predominantly virtual outreach and engagement activities due to the ongoing COVID-19 pandemic and continue limited in-person outreach activities.

Key accomplishments as of this reporting period:

Community Energy Advisors have conducted outreach to approximately 5,615 potential customers regarding clean energy opportunities, resulting in more than 9,464 opportunities for clean energy

programs. Opportunities are referrals to NYSERDA or non-NYSERDA clean energy programs that are self-reported by the Community Energy Advisors (Advisors). Advisors continued outreach on targeted programs focused on NYSERDA programs, with a focus on residential programs such as Assisted Home Performance with ENERGY STAR®, Empower New York and Home Performance with ENERGY STAR®, with 2,614, 2,543 and 1,432 opportunities (leads) self-reported as of December 31, 2021, respectively.

Advisors also promoted the Solar for All program for low-income households to receive a no cost solar subscription and the Green Jobs Green New York (GJGNY) Energy Study Program for small businesses and nonprofits to obtain a reduced cost energy efficiency study and an energy study report detailing recommended energy efficiency measures. As of December 31, 2021, there were 374 Solar for All and 179 GJGNY Energy Study opportunities (leads) self-reported by the CEEP contractors.

Advisors continued to leverage their social media platforms and other channels (e.g., email blasts, newsletters, etc.) for outreach and engagement. Other examples of the strategies deployed during the past two quarters include the following:

- In Q3 2021, the majority of the Community Energy Advisors time was focused on conducting targeted outreach to high-priority Home Energy Assistance Program (HEAP) recipients referred to NYSERDA to help them access NYSERDA programs including, but not limited to, EmPower New York and Solar for All. This was part of a pilot under a Memorandum of Understanding (MOU) between NYSERDA and the Office for Temporary Disabilities and Assistance (OTDA), with the goal of assisting frequent users of HEAP to address energy efficiency issues, thereby, assisting approximately 1,299 individuals in avoiding disruptions in their utility service.
- In September 2021, community partners brought to NYSERDA's attention that Queens County residents suffered heating loss due to catastrophic flooding from the remnants of Hurricane Ida that affected up to 166 residents in the East Elmhurst and Flushing area of New York City. From September through December 2021, Community Energy Advisors in New York City worked as part of team including NYSERDA, Neighborhood Housing Services (NHS) of Queens, Kinetic Communities, along with energy contractors to assist a portion of these residents with "no heat" emergencies by installing heat pumps to aid in long-term resiliency.
- Community Energy Advisors continued to network and collaborate with partner organizations, including, but not limited to, local sustainability committees, local offices for the aging, county departments of social services, chambers of commerce, energy contractors, utilities, community

action associations, housing assistance providers, elected officials, and other locally based organizations and nonprofits.

- Targeted regionally specific initiatives to implement pilot projects to expand outreach efforts, address barriers to participation in clean energy and potentially drive increased adoption of energy efficiency and other clean energy solutions continued in the second half of 2021 and continued to be impacted by the pandemic and related restrictions on in-person interactions resulting in delays and impacts to project scopes for each of the following regionally specific initiatives:
    - Mobile Powerhouse (Southern Tier region)—A high-performance tiny home to reach people where they are, with hands-on, interactive exhibits on energy efficiency, heating, lighting, solar, and other green technologies. The Powerhouse is designed to help visitors understand how these technologies work, estimate potential savings, and learn about clean energy action steps they can take in their own home or business. This project pivoted to virtual tours and provided a limited number of group tours to "pods" of visitors due to pandemic restrictions. This pilot resulted in 121 opportunities as of December 31, 2021.
    - Energy Navigator Expansion (Mid-Hudson region)—A train-the-trainer project to build local capacity of local volunteer peer educators to provide information and advising around issues such as energy efficiency, renewable heat and power, etc. in their communities. This project trained and deployed four volunteer groups (cohorts) of Energy Navigators, with two cohorts in the Mid-Hudson region, one in the North Country and one in the Southern Tier. This project pivoted to virtual train-the-trainer sessions and was able to train Energy Navigators in each of the four cohorts as outlined above to conduct outreach in the second half of 2021. This pilot resulted in 85 opportunities as of December 31, 2021.
- Roundtable for Energy Affordability in Low-Income Groups and Neighborhoods (REALIGN) (Mid-Hudson region)—Project to pilot stakeholder engagement by hosting a series of facilitated sessions of other service providers and agencies to develop a "no wrong door" referral system to better address gaps in services and increase participation in available programs. As of December 31, 2021, four virtual roundtables and a virtual stakeholder event were hosted to encourage deeper coordination among service providers and stakeholders. This pilot engaged a total of 46 different partners and other service providers including, but not limited to, utilities (RG&E, NYSEG, ConEd), local municipalities (Ulster and Dutchess County), and non-governmental organizations such as Bedford 2030, Action Toward Independence, etc.

- Healthy Homes Evaluator pilot (Capital Region)—Project to pilot ways to reduce the number of unsuccessful deferred home energy projects due to health and safety hazards. This project will implement a comprehensive home evaluation and energy assessment and provide gap funding to implement clean energy projects for ten homes. This project was delayed to due to restrictions on in-person energy audits and some energy contractors and residents not yet comfortable with non-household members in their property or residence. This pilot resulted in 46 project opportunities as of December 31, 2021.

CEEP is expected to be extended through June 30, 2022 to ensure continuity between CEEP and the launch of the new Regional Clean Energy Hubs initiative. A process and market evaluation for CEEP was completed in Q4 2021. For more information on this evaluation please refer to section F.2. Completed Evaluations in the appendix of this report.

3.4.8 Priority Population Workforce Development

NYSERDA has committed more than $120 million, including $19 million in RGGI funds, to support workforce development and training initiatives. These efforts will help train and prepare more than 40,000 New Yorkers for growing clean energy job opportunities and assist clean energy businesses in recruiting, hiring, and training workers. More importantly, these efforts prioritize training programs for the State's most underserved populations—low-income individuals, veterans, disabled workers, single parents, the formerly incarcerated, and individuals from disadvantaged communities—and will also help integrate displaced workers into the clean energy industry. NYSERDA has provided funding to support important partnerships with labor, colleges and universities, community-based organizations, non-for-profits, manufacturers, trade associations, and others, to ensure workers are trained through continuing education courses, certificate programs, degree programs, internships, apprenticeships, and on-the-job training. Additionally, NYSERDA supports clean energy businesses, transitioning fossil fuel workers, and new entrants into the workforce through the three initiatives summarized below. To date, the majority of RGGI funds are earmarked for these three programs which prioritize

Success Story:

NYSERDA Launches Climate Justice Fellowship Program

The Climate Justice Fellowship program, launched in September 2021, will prepare the next generation of clean energy workers by funding internships and on-the-job training for individuals residing in historically disadvantaged communities or from priority populations. To support 150 fellowship opportunities, 6 million dollars are available over three years. Selected fellows will work with community-based organizations, universities, municipalities, and clean energy businesses to support community engagement activities, clean energy project development and implementation, partnership building, or other projects that advance climate justice and clean energy priorities in disadvantaged communities.

funding and, in some cases, offer higher incentives for individuals from disadvantaged communities and priority populations.

NYSERDA's Internship and On-the-job Training programs provide a wage subsidy to clean energy businesses and organizations, helping reduce the risk of hiring and training new workers in many emerging fields, including high-efficiency HVAC and energy efficiency.

- **The Clean Energy Internship** program introduces the clean energy industry and relevant career experiences to students, recent graduates, and individuals from disadvantaged communities.

- **The On-the-Job Training** program**,** administered in partnership with the Department of Labor, provides higher incentive levels and flexible participation options for small businesses, minority- and women-owned businesses, businesses hiring heat pump workers, and businesses hiring members of priority populations and disadvantaged communities.
- **The Climate Justice Fellowship** program funds the professional development, training, and mentoring for 150 full-time fellows to work on climate justice initiatives, ensuring an equitable clean energy transition for all New Yorkers, but especially for those disproportionately burdened by environmental health hazards and those who could benefit the most from clean energy.

3.5 Green Jobs - Green New York

Green Jobs - Green New York (GJGNY) provides funding for energy assessments, low-cost financing for energy upgrades, and technical and financial support to develop a clean energy workforce. GJGNY is a statewide effort to strengthen communities through energy efficiency, and uses constituency-based organizations (CBO) to support program outreach in underserved communities. GJGNY enables New Yorkers to make a significant difference in homes, businesses, and neighborhoods—making them more comfortable, sustainable, and economically sound. GJGNY is administered by NYSERDA and made available by the Green Jobs - Green New York Act of 2009. The GJGNY 2021 Annual Report issued in October 2021, presents financial data for the approved GJGNY programs through June 30, 2021.[5]

The Green Jobs - Green New York Act allocated $112 million in funding from the State's share of the RGGI to support GJGNY. In consultation with the GJGNY Advisory Council, NYSERDA sub-allocated the funding, including interest earnings, across the various program components prescribed by the GJGNY Act. In addition to the RGGI funds, NYSERDA received a U.S. Department of Energy Better

Buildings grant in the amount of $40 million, of which $18.6 million supports GJGNY financing or outreach. On occasion, NYSERDA also supplemented the GJGNY program funding with additional RGGI funds where needed to ensure uninterrupted program services.

By far the greatest demand for GJGNY funding generates from the residential revolving loan fund, with issued loans totaling its original allocation in less than three years. The residential revolving loan fund is now maintained primarily through proceeds from the sale of bonds, along with limited RGGI funds. More details regarding the bond issuance process and sustainability of the loan fund are in the annual report.

Funding allocated to individual components of Green Jobs - Green New York is nearly fully committed or expended. In order to maintain required elements of the GJGNY Act, NYSERDA included GJGNY initiatives in the planning of the CEF.[6] NYSERDA is working with stakeholders to incorporate lessons learned from GJGNY into CEF planning to ensure benefits from the initiatives continue, particularly those benefitting the LMI sector.

A measure adoption rate assessment of GJGNY residential energy audit-only projects was completed in the fourth quarter of 2020. For more information on this evaluation please refer to section F.2. Completed Evaluations in the appendix of this report.

3.5.9 Assessments

One- to Four-Family Residential Buildings Program Assessments

HPwES is a comprehensive energy efficiency services program for existing one- to four-family homes. As of January 1, 2020, the HPwES program is no longer active; however, the Assisted HPwES program (available to LMI one- to four-family homes) remains active. Participating certified contractors conduct comprehensive home energy assessments and upgrades. Free and reduced-cost home energy assessments are available to homeowners in New York State through the GJGNY Act of 2009, which drives increased participation in this program and cuts additional GHG emissions.

Key accomplishments as of this reporting period:

- A total of 33 GJGNY funded assessments were completed in Q3 and Q4 2021, bringing the total to 99,933 residential GJGNY assessments completed with RGGI funds; 92,842 (93%) were provided at no cost to the customer.

- Of the program's cumulative 53,874 completed residential units that use a GJGNY assessment and/or GJGNY financing, 22,974 (43%) units are associated with income-qualified Assisted HPwES customers.
- Constituency-based organizations assisted with the completion of 3,170 units, or 6% of all completed GJGNY residential retrofits.

An evaluation of GJGNY audit-only projects was recently completed and a summary of results can be found in section F.2. Completed Evaluations in the appendix of this report.

Multifamily Performance Program Assessments

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

Small Commercial Energy Efficiency Program Assessments

This program is now closed. Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.5.10 Financing

One- to Four-Family Residential Financing

GJGNY financing is available to participants to finance the installation of recommended energy efficiency improvements with the possibility of reimbursement through energy savings. Net-metered technologies, including solar electric systems, are also eligible for GJGNY financing. The Smart Energy Loan, the innovative On-Bill Recovery (OBR), and the Residential Renewable Energy Tax Credit Bridge Loan (Bridge Loan) option are the three low-interest rate financing options available through GJGNY, which enable more projects, resulting in greater reductions of GHG emissions.

Key accomplishments as of this reporting period:

- A total of 33,267 loans have been issued totaling $401.97 million.
- Assisted HPwES and market rate customers make up 63% of all GJGNY loans issued as of December 31, 2021, representing 47.9% of the total loan funds.
- A total of 10,050 OBR Loans have closed, valued at approximately $149.95 million, and 160 Bridge Loans, valued at approximately $1.7 million.
- Of the total 33,267 loans closed, 11,436 are solar loans valued at approximately $194.99 million.
- 210 ground source heat pump loans have closed, valued at nearly $4.7 million.

- 586 air source heat pump loans have closed, valued at nearly $8.9 million.
- There are 81 renewable heat loans of which 15% represent assisted customers.

Multifamily Performance Program Financing

Launched in 2011, financing through the Multifamily Performance Program under GJGNY includes programs and incentives for owners, facility managers, developers, and condo/co-op boards of multifamily buildings with five or more units to support the goal of increased clean energy adoption statewide. These programs make it easier to assess, fund, implement, and measure energy efficiency upgrades that improve building performance and reduce costs. Participation loans are available through the program in which a participating lender issues a loan to a multifamily building owner for a qualifying energy efficiency project, with NYSERDA participating in the funding of 50% of the loan (up to a maximum of $5,000 per unit or $500,000 per building) at 2% interest, and the lender setting the interest rate on its share of the loan.

Key accomplishments as of this reporting period:

- 23 loans closed totaling $12.1 million. NYSERDA's share of the total loan value is $3.9 million.

Small Commercial Energy Efficiency Program Financing

The GJGNY Small Commercial Energy Efficiency Program offers financing to help small businesses and not-for-profit organizations improve their energy efficiency and reduce energy costs to support the goal of increased clean energy adoption statewide. In June 2011, NYSERDA launched the Participation Loan product to small business and not-for-profit customers. NYSERDA provides 50% of the loan principal, up to $50,000 at 2% interest and the participating lender provides the remaining loan principal at its market interest rate. In June 2012, NYSERDA launched the OBR Loan for small business and not-for-profit customers, making a NYSERDA loan available for up to $50,000 at 2.5% interest to finance recommended energy efficiency improvements. Customers can then repay their loan through a charge on their utility bill. In July 2019, NYSERDA increased its interest rate for both Participation Loans and OBR Loans to the Wall Street Journal Prime Rate of Interest + 200 basis points, fixed at closing. Sixteen lenders have agreed to offer Participation Loans. OBR loans are generated through one lender.

Key accomplishments as of this reporting period:

- A total of 49 OBR Loans have been closed with a total value of $1.6 million, which represents 94% of the total financing value of $1.7 million.

- A total of 37 Participation Loans have closed with a value of $2.1 million. NYSERDA's share of the total value is $1.2 million.

Predevelopment Financing

In March 2021, NYSERDA provided $3 million in GJGNY funding and entered into a direct contract with New York City Energy Efficiency Corporation (NYCEEC), a not-for-profit lender, to issue predevelopment loans (including Integrated Physical Needs Analysis [IPNA]), Investment Grade Energy Assessment (IGEA) studies, or similar predevelopment energy/engineering studies to assess energy efficiency improvements and renewable energy installations in eligible buildings located in New York State). NYCEEC will issue loans for which NYSERDA provides 100% of the loan principal, up to $150,000, at 0% interest and will also issue loans which NYSERDA provides 25% of the loan principal, up to $500,000, between [0% and 5%]. Though we expect most loans will be at 0% to help reduce the interest rate to the borrower, NYCEEC provides the remaining loan principal and will set their rate.

Key accomplishments as of this reporting period:

- A total of 5 loans were issued by NYCEEC under the program.
- Thirty-three percent of the Maximum Commitment of the loans has been disbursed, with $66,250 in funding provided toward the commitment.
- Average Principal Balance for all loans was $6,500 at the end of 2021 Q3 and was $11,041 at the end of 2021 Q4.

Loan Loss Reserve Financing

NYSERDA provided $10 million of GJGNY funding to fund a Loan Loss Reserve (LLR) Program and launched an open solicitation accepting applications in December 2020. The Loan Loss Reserve/Credit Enhancement provides support for financing products which support clean energy improvements in residential (1–4 unit) dwellings, small commercial (100 employees or less), not-for-profit and multifamily (5+ unit) buildings (Eligible Properties) located in New York State communities. The Loan Loss Reserve will provide reimbursement for defined losses on individual transactions.

Key accomplishments as of this reporting period:

- A total of 1 new application was approved, with 4 total program participants approved at this time.
- A total of $500,000 awarded for the residential sector support this quarter, with the total awarded as follows:
    - $1,000,000 for residential sector support
    - $1,000,000 for multifamily sector support

- $102,214 for affordable multifamily sector support
- A total of $0 used for reimbursement for losses.

3.5.11 Workforce Development, Outreach, and Marketing

Workforce Development

The GJGNY Workforce Training and Development (WFD) initiative complements other NYSERDA and New York State Department of Labor (DOL) programs targeted at preparing individuals for energy efficiency, solar thermal, and solar electric careers in New York State. WFD programs also help to build the State's capacity for long-term carbon reduction and facilitate energy education programs that will help build a clean energy future. Specifically, WFD efforts under GJGNY seek to expand energy-specific content in State Registered Apprenticeship and third-party accredited building trades programs. Expectations are to increase access to technical training workshops for skills enhancement and certification. In addition, the WFD programs are expected to bridge the gap between training and employment through on-the-job training incentives for businesses seeking to hire and train new workers while reaching out to low-income communities to expand training opportunities. From the program's inception through its conclusion in March 2019, a total of 4,184 New Yorkers were trained in a range of energy efficiency and renewable energy courses.

NYSERDA issued PON 3982 On-the-Job Training (OJT) for Energy Efficiency and Clean Technology Program Opportunity Notice, which includes approximately $520,000 in GJGNY workforce training funds that will be made available to eligible New York State employers outside of the SBC service territory. This program supports wages for new hires on a first-come, first-served basis for eligible clean energy businesses. The program includes higher wage subsidies for employers that hire workers with additional barriers to employment. NYSERDA has executed OJT agreements in Long Island service territory using GJGNY funding with businesses seeking to hire new employees. To date, 67 people have been hired and approximately $511,492 in wages and training subsidies have been awarded GJGNY funds.

Outreach and Marketing

GJGNY provided community-based outreach, enabled one-to-one assistance with the process of participating in the program to deliver services in underserved communities. GJGNY also provided outreach services in targeted communities through constituency-based organizations (CBO), which located residents, businesses, not-for-profits, multifamily building owners, and potential workforce

candidates to participate in the program. The results of the outreach efforts were detailed in previous reports, which identified what strategies worked best for their teams. Although the GJGNY outreach funding is depleted and the CBO program is no longer active, community outreach and regional engagement utilizing constituency and other locally based organizations continue under the Community Energy Engagement Program (CEEP). For additional information about that program refer to section 4.4.7 Community Energy Engagement of this report.

3.6 NY Green Bank

The NY Green Bank has replenished its funding from the RGGI Portfolio and therefore will no longer provide programmatic updates in this report. Updates can be found in the metrics report filed quarterly with the Public Service Commission.[7] Refer to Appendix F: Closed RGGI-Funded Programs and Completed Evaluations for more information.

3.7 Energy Storage

In April 2019, NYSERDA launched a deployment incentive program for bulk and retail energy storage projects on Long Island. NYSERDA made available approximately $55 million in financial incentives.[8] Retail incentives for projects up to 5 MWs were deployed for residential or commercial storage projects, and these funds continue to be committed. In 2021, NYSERDA agreed to transfer the remaining $40 million of unallocated RGGI storage incentives to LIPA to support energy efficiency in return for LIPA committing to have a minimum of 200 MWs of energy storage deployed within their service territory by 2025. This includes storage procured through a bulk storage RFP that (Public Service Enterprise Group–Long Island) PSEG-LI issued to procure at least 155 MWs of bulk storage.[9]

Programmatic updates are provided in the annual State of Storage Report.[10]

3.8 Program Evaluation

Several RGGI evaluation studies are underway or in the planning stages as of the second quarter of 2021. The study objectives and timing are discussed in the following sections. Other study plans are also in development and will be detailed in future quarterly reports. The following types of evaluation activities are being performed:

- **Impact Evaluation** measures the outcomes and benefits of a program, calculates the cost-effectiveness of the program, and compares the outcomes to the program goals.

- **Market Evaluation** develops an understanding of markets and market actors, provides information to support program design and delivery, and tracks changes in markets over time.
- **Process Evaluation** reviews oversight and operations, gauges customer satisfaction, and recommends process and efficiency improvements.
- **Logic Model Reports** inform evaluation work by documenting the relationships between program activities; activity outputs; and the short-, medium-, and long-term outcomes the program intends to induce.
- **Evaluation Readiness Reviews**[11] help identify whether a program has various factors in place that will ensure an evaluation is justified, feasible, and likely to provide useful information.

In addition, building and facility stock studies receiving support from RGGI evaluation funds are described in sections 3.8.1 and 3.8.2.

3.8.12 Evaluation of Energy Efficiency and Other Deployment Programs

An update to the Home Performance and EmPower New York Programs evaluation is currently underway. This impact evaluation will reassess the realization rates in light of programmatic changes that occurred subsequent to the evaluation study period. This analysis is expected in 2022.

Clean Energy Communities: An impact evaluation encompassing the first direct assessment of programmatic impacts of the Clean Energy Communities initiative was completed in Q4 2021.

Key findings and associated recommendations from the Clean Energy Communities Impact Evaluation include the realization rates for High-Impact Actions (HIAs) assessed through the impact evaluation ranged from 8%–116% for electricity; 22%–167% for natural gas; and 9%–122% for renewable energy generation. Further, the Clean Energy Communities program used HIA-specific approaches to develop total program impact estimates. While most of these methods were reasonable for forecasting purposes, they were not appropriate for claiming program reported gross annual impacts. Using forecasted estimates to report gross annual impacts led to low-realization rates for some HIAs. Insufficient measure-level documentation resulted in a challenging verification process.

The final study can be found on the NYSERDA website: https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2021-NYSERDA-Clean-Energy-Communities-Impact-Evaluation-Report.ashx

Clean Energy Engagement: A process and market evaluation was completed for Clean Energy Engagement in Q4 2021. The evaluation findings indicate the Clean Energy Engagement Program was

successful in raising awareness of energy efficiency options and encouraging participation in clean energy programs by new customers, including LMI households. However, there are difficulties reaching multifamily buildings due to competing interests between tenants and landlords. There is room for program improvement by streamlining the application process across NYSERDA programs.

The final study can be found on the NYSERDA website: https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2021-NYSERDA-Community-Energy-Engagement-Program-Evaluation-Report.ashx

NY Green Bank Financial Market Evaluation: An evaluation to assess NY Green Bank (NYGB) market transformation activities is currently underway. This evaluation is the first update to the 2019 NY Green Bank Financial Market Transformation Baseline Study. In addition to updating baseline metrics from the 2019 study, this evaluation includes case studies showcasing achievements of NYGB. The results of this evaluation will be used to inform NYGB, NYSERDA, and the financial community of the progress NYGB has made in achieving its goals, which include addressing market barriers and financing gaps, increasing investor confidence, and achieving scale in clean energy financing since the baseline activities in the 2019 NYGB Financial Market Evaluation. This evaluation is currently underway, and results are anticipated in the fourth quarter of 2022.

3.8.13 Building and Industrial Facility Stock Studies

NYSERDA has undertaken major building stock studies to assess residential and commercial markets across a broad range of customer segments and energy measures. The goals of these studies have been to (1) better understand building stock and associated energy use, including saturations of energy-consuming measures, penetrations of energy-efficient equipment, building characteristics and energy management practices and (2) use this information to estimate the technical, economic, and achievable energy efficiency opportunities in New York State in the next three, five, and 10 years. These studies have been supported by the System Benefits Charge (SBC), Energy Efficiency Portfolio Standard (EEPS), CEF and RGGI funds; RGGI funds have supplemented the budget to allow for robust data collection on fuel measures.

A building stock assessment of the multifamily sector commenced in the first quarter of 2021. While this Multifamily Building Stock Study is funded through a separate funding portfolio, outcomes from the study will have broad applicability. The overall objective of the study is to evaluate and develop a baseline of the existing multifamily building stock and associated energy use, including the saturations of

energy consuming equipment (electric, gas, and other fuels), the penetrations of energy-efficient equipment, renewables, and energy-management practices. Results of this study are expected in Q1 2023.

In the first quarter of 2021, NYSERDA released an RFP to procure a contractor to conduct a comprehensive statewide industrial stock baseline study for key industry subsectors identified by the research. A team of evaluation consultants was competitively selected, and this work is underway. While the work is funded through a separate funding portfolio, the outcomes from the study will have broad applicability. It will help identify the industries, industrial facilities, and end-uses that offer opportunities for greenhouse gas reductions, energy efficiency, beneficial electrification, and renewable energy for achieving the New York State Climate Leadership and Community Protection Act's (Climate Act) 2050 goals and beyond. Results from the secondary analysis phase of this work are anticipated early in Q3 2022, while the comprehensive analysis is anticipated Q4 2023.

An update to the Residential Building Stock Assessment is planned to be scoped in 2022.

Appendix A. Savings Calculations Methodology

This appendix describes the general methods and assumptions used to calculate the energy savings, emission reductions, bill savings, and cost-effectiveness metrics presented in this report.

A.1 Energy Savings

Annual energy savings values are based on the past performance of publicly funded energy efficiency programs and information obtained from various sources of technical literature.

A.2 CO_2 Reductions

Emissions factors translate the energy savings data into annual GHG emission reduction values. The GHGs evaluated in the report include carbon dioxide, methane, and nitrous oxide. Because each of these gases has a different global warming potential,[12] emissions for gases other than carbon dioxide are converted into carbon dioxide equivalent units (CO_2e) through multiplication with their appropriate Intergovernmental Panel on Climate Change (IPCC) global warming potential value,[13] shown in Table A-1.

Table A-1. Global Warming Potentials

These values represent a 100-year time horizon.

Source: Intergovernmental Panel on Climate Change, 1995. Second Assessment: Climate Change.

Gas	Global Warming Potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous Oxide (N_2O)	298

NYSERDA uses the emission factors shown in Table A-2 to calculate emissions from on-site fuel combustion derived from the U.S. Environmental Protection Agency (EPA) emission coefficients. The CO_2e values represent aggregate CO_2, CH_4, and N_2O emissions. If a program covers more than one sector, then the estimated reduction is based on a calculated average emission factor for the affected sectors.

Table A-2. Fuel Combustion Emission Factors by Sector[14]

	Transport (lbs CO_2e/MMBtu)	Residential (lbs CO_2e/MMBtu)	Commercial (lbs CO_2e/MMBtu)	Industrial (lbs CO_2e/MMBtu)
Coal	N/A	224.8	211.4	203.7
Natural Gas	117.2	117.2	117.2	114.5
#2 Oil/Distillate/ Diesel	163.0	162.9	162.9	162.9
#6 Oil/Residual	N/A	N/A	166.0	166.0
Kerosene	N/A	161.2	161.2	161.2
Propane	136.1	136.1	136.1	136.1
Gasoline	158.0	N/A	N/A	N/A
Aviation Fuel	159.2	N/A	N/A	N/A
Wood	N/A	18.2	18.2	4.1
Steam	N/A	106.1	106.1	N/A

For projects installed prior to 2016, a marginal emission factor of 1,160 pounds of CO_2e/MWh estimates emission reductions associated with electricity use reductions for all sectors.[15] When a project is installed and committed from 2016 onward, a marginal emission factor of 1,103 pounds of CO_2e/MWh is applied to estimate emission reductions associated with electricity use reductions for all sectors. Although electricity savings may not lead to near-term emission reductions under the RGGI CO_2 cap, savings will potentially reduce imports of electricity to NYS; the demand for CO_2 allowances, leading to a possible future reduction in the cap; and the carbon footprint of end users, as they will be responsible for a smaller percent of the emissions associated with electricity production.

A.3 Bill Savings

Annual bill savings values for each program are estimated by multiplying the energy savings by sector-specific fuel price data.

Table A-3 shows fuel prices by sector. Electricity and natural gas prices represent average values for six service territories weighted by the percentage of RGGI projects located in each utility area, excluding basic service charges.

Table A-3. Fuel Prices by Sector[a]

Sector	Electricity ($/kWh)	Natural Gas ($/MMBtu)	Fuel Oil/ Distillate ($/MMBtu)	Propane ($/MMBtu)
Residential	0.18	8.57	27.54	37.01
Commercial	0.16	5.09	21.77	25.07
Industrial	0.12	5.09	22.74	31.04
Transportation	0.05	N/A	26.93	N/A
C&I	0.14	5.09	22.23	28.06

Sector	Residual ($/MMBtu)	Kerosene ($/MMBtu)	Wood ($/Cord)	Coal ($/MMBtu)	Gasoline ($/MMBtu)
Residential	N/A	29.84	7.83	N/A	N/A
Commercial	14.75	29.84	N/A	5.78	N/A
Industrial	14.75	24.64	N/A	4.24	N/A
Transportation	N/A	N/A	N/A	N/A	N/A
C&I	14.75	27.24	N/A	5.01	28.36

[a] For electricity and natural gas, prices are an average of July 2012 and January 2013 prices as reported by the NYS Department of Public Service billing data. http://www3.dps.ny.gov/W/PSCWeb.nsf/All/C56A606DB183531F852576A50069A75D?OpenDocument For all other fuel types, prices reflect 2014 retail prices as reported in NYSERDA's Patterns and Trends- NYS Energy Profiles: 1997–2014 (NYSERDA 2016).

Table A-4. Program Measure Life Assumptions

Average savings-weighted measure life, shown by program, is used to calculate expected lifetime benefits.

Program	Electricity Measure Life	Fuels Measure Life
GJGNY—Single-Family Residential Assessment Component	18	24
GJGNY—Single-Family Residential Loan Component	19	23
GJGNY—Multifamily Residential Assessment Component	13	15
GJGNY—Small Commercial Loan Component	13	21
RGGI—Multifamily Performance Program	13	15
RGGI—Multifamily Carbon Emissions Reduction Program	N/A	13
RGGI—EmPower New York	N/A	24
RGGI—Home Performance with ENERGY STAR	18	24
RGGI—Green Residential Building Program	18	24
RGGI—Solar Thermal Incentive Program	N/A	20
RGGI—Low-Rise Residential New Construction Program	18	24
RGGI—NYSERDA Solar Photovoltaic Initiative	25	N/A
RGGI—Cleaner, Greener Communities	15	15
RHNY—Boilers	20	20
RHNY—Pellet Stoves	20	20
LIPA Efficiency	18	NA
LIPA Photovoltaic and Efficiency Initiative	25	N/A
Regional Economic Development and GHG Reduction	18	18
Charge NY	10	10

Appendix B. Former Program Names

Table B-1. Former Program Names

Current Program Name	Formerly Known As
Residential Efficiency Services	Residential Space and Water Heating
Municipal Water and Wastewater	Water and Wastewater Efficiency; Water and Wastewater Energy Efficiency
Industrial Innovations	Industrial Process Improvements; Advanced Building Systems and Industrial Process Improvements
Transportation Research	Advanced Transportation Development
Clean Energy Business Development	Clean Technology and Industrial Development
Power Systems	Advanced Power Technology Program (APTP)

Appendix C. Summary of Portfolio Benefits

Table C-1. Summary of Portfolio Benefits

Visit: https://data.ny.gov/Economic-Development/Summary-of-Portfolio-Benefits-from-RGGI-funded-Pro/euip-iahh on OpenNY.

Table C-2. Summary of Fuel Savings by Type

Visit: https://data.ny.gov/Energy-Environment/Fuel-Savings-by-Type-from-RGGI-Funded-Projects/3dbk-8jiw on OpenNY.

Appendix D. NYS RGGI Auction Proceeds

Table D-1. NYS RGGI Auction Proceeds

Visit: https://data.ny.gov/Energy-Environment/New-York-State-RGGI-Auction-Proceeds/vxtc-b4mv on OpenNY.

Appendix E. Total NYS RGGI Funds

Table E-1. NYS RGGI Funds

Visit: https://data.ny.gov/Energy-Environment/New-York-State-RGGI-Funds/bkzt-72yv on OpenNY.

Appendix F. Closed RGGI-Funded Programs and Completed Evaluations

Information on Closed RGGI-Funded Program and Completed Evaluations can be found in the most recent RGGI Status Report: https://www.nyserda.ny.gov/About/Publications/Program-Planning-Status-Reports/RGGI-Reports

Endnotes

[1] https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2020-Renewable-Heat-NY-Market-Evaluation-Report-Final.pdf

[2] https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/NYSERDA-Solar-Photovoltaic-Program-Impact-Evaluation-Executive-Summary-Final.pdf

[3] https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/Offshore-Wind-Policy-Options-Paper.pdf

[4] HPwES low-rise buildings encompass buildings with three stories or less, with eight units or less, and are constructed using building techniques common to one- to four-family homes. They must be served by residential-scale heating equipment with a maximum rating of 300,000 Btu. Taller residential buildings that fit these criteria are also eligible. Examples include brownstones, row housing, and other urban-style buildings.

[5] Green Jobs Green New York Annual Report https://www.nyserda.ny.gov/About/Publications/GJGNY-Advisory-Council-Reports

[6] The Clean Energy Fund (CEF), one of Reforming the Energy Vision's (REV) three strategic pillars, is designed to deliver on the State's commitment to reduce ratepayer collections, drive economic development, and accelerate the use of clean energy and energy innovation. It will reshape the State's energy efficiency, clean energy, and energy innovation programs. Visit http://www.nyserda.ny.gov/About/Clean-Energy-Fund for more details regarding CEF planning.

[7] New York Green Bank Public Filings https://greenbank.ny.gov/Resources/Public-Filings

[8] This funding, originally allocated to the NY Green Bank, has been returned to the RGGI portfolio as the bank has recouped on the original investment.

[9] https://www.psegliny.com/aboutpseglongisland/proposalsandbids/2021bulkenergystoragerfp

[10] http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7bAFCF8BDC-F0A5-4DA5-AB40-EB26C0D7F123%7d

[11] Formerly known as Evaluability Assessment.

[12] A global warming potential is a measure that estimates how much a given mass of a GHG contributes to global warming. Calculations span over a specific time interval, which is 100 years for the IPCC Second Assessment Report values.

[13] IPCC, 2007. Fourth Assessment: Climate Change 2007. This inventory uses potentials from the IPCC Fourth Assessment Report, rather than values from more current assessments. The Fifth Assessment Report was released in 2014–15. New York DEC regulation Part 242 1.2 (49) uses the Third Assessment values, while the EPA GHG Reporting Rule and the NY GHG Inventory and Forecast use the Fourth Assessment. Reconciliation between methodologies will be investigated as part of the program implementation and evaluation process.

[14] Beginning with Q4 2016, NYSERDA updated emission factors for natural gas, #2 oil, #6 oil, kerosene, propane, wood and steam to be consistent with emission factors used in the updated NYS Greenhouse Gas Inventory (https://www.nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/Energy-Statistics). These factors are derived from EPA's February 2016 State Inventory Tool release (https://www.epa.gov/statelocalclimate/state-inventory-and-projection-tool). Steam emission factors have been updated to be consistent with New York City's updated Greenhouse Gas Inventory http://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/NYC_GHG_Inventory_2014.pdf

[15] Per the Clean Energy Advisory Council (CEAC) Metrics, Tracking and Performance Assessment (MTPA) Working Group, NYSERDA has adopted a marginal electricity grid emission factor of 1,103 pounds CO2e/MWh for projects completed after 2015 (http://documents.dps.ny.gov/public/MatterManagement/MatterFilingItem.aspx?FilingSeq=190731&MatterSeq=50399). Projects completed prior to 2016 will maintain the 1,160 pounds CO2e/MWh previously used, based on analysis of grid emissions at that time. Carbon emissions reductions are now expressed in terms of metric tons. Reports published prior to August 2020 represented carbon emissions in short tons.