

New York State Regional Greenhouse Gas Initiative-Funded Programs Status Report

Semiannual Status Report through December 31, 2018

Final Report | June 2019

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NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

NYSERDA Record of Revision

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New York State Regional Greenhouse Gas Initiative-Funded Programs

Semiannual Status Report through December 31, 2018

Final Report

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New York State Energy Research and Development Authority

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Acronyms and Abbreviations

AHPwES	Assisted Home Performance with ENERGY STAR®
DEC	NYS Department of Environmental Conservation
CBO	constituency-based organization
CGC	Cleaner, Greener Communities
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalents
EEPS	Energy Efficiency Portfolio Standard
EFC	New York State Environmental Facilities Corporation
EPA	U.S. Environmental Protection Agency
ERP	Energy Reduction Plan
GHG	greenhouse gas
GJGNY	Green Jobs - Green New York
HPwES	Home Performance with ENERGY STAR®
kW	kilowatt
kWh	kilowatt-hour
LIPA	Long Island Power Authority
MMBtu	million British thermal units
MPP	Multifamily Performance Program
MW	megawatt
MWh	megawatt-hour
NYPA	New York Power Authority
DOL	New York State Department of Labor
OBR	On-Bill Recovery Financing Program
PON	Program Opportunity Notice
PV	photovoltaic (also known as solar electric)
RFP	request for proposals
RGGI	Regional Greenhouse Gas Initiative
RPS	Renewable Portfolio Standard
SBC	System Benefits Charge
ST	solar thermal
WFD	Workforce Training and Development

1 Introduction

In New York State, the Regional Greenhouse Gas Initiative (RGGI) program has been implemented through two complementary regulations: The New York State Department of Environmental Conservation (DEC) established the State's Carbon Dioxide (CO₂) Budget Trading Program (6 NYCRR Part 242, 6 NYCRR Part 200, General Provisions), and the New York State Energy Research and Development Authority (NYSERDA) established the CO₂ Allowance Auction Program (21 NYCRR Part 507). This report is prepared pursuant to the State's RGGI Investment Plan (2018 Operating Plan) and provides an update on the progress of programs through the quarter ending December 31, 2018. It contains an accounting of program spending; an estimate of program benefits; and a summary description of program activities, implementation, and evaluation. An amendment providing updated program descriptions and funding levels for the 2017 version of the Operating Plan was approved by NYSERDA's Board on January 23, 2018.

The State invests RGGI proceeds to support comprehensive strategies that best achieve the RGGI CO₂ emission reduction goals. These strategies aim to reduce global climate change and pollution through energy efficiency, renewable energy, and carbon abatement technology. Deploying commercially available renewable energy and energy efficiency technologies help to reduce greenhouse gas (GHG) emissions from both electricity and other energy sources in the short term. To move the State toward a more sustainable future, RGGI funds are used to empower communities to make decisions that prompt the use of cleaner and more energy-efficient technologies that lead to lower carbon emissions as well as economic and societal co-benefits. RGGI helps to build capacity for long-term carbon reduction by training workers and partnering with industry. Using innovative financing, RGGI supports the pursuit of cleaner, more efficient energy systems and encourages investment to stimulate entrepreneurial growth of clean energy companies. All of these activities use funds in ways that accelerate the uptake of low-to-zero emitting technologies.

2 Summary of Portfolio and Program Benefits

This section provides an overview of the expected quantifiable benefits with expended and encumbered funds through this quarter related to carbon dioxide equivalent (CO₂e) reductions, energy savings, and participant energy bill savings.¹ For more information on the methodology used to calculate CO₂e reductions and energy bill savings, see Appendix A. For a list of former program names, reference Appendix B. Appendix C shows the detailed benefit results.

NYSERDA begins tracking program benefits once project installation is complete and provides estimated benefits for projects under contract that are not yet operational (pipeline benefits). Estimated benefits are based on the expected lifetime benefits from installed and pipeline savings. The metrics presented in this section are estimates and not evaluated unless otherwise noted. Future evaluation and status reports will present the results as they are available. Program benefits are reported prior to the financial reporting of funds spent as fund transfers may lag behind the installation date. At this time, the program benefits include some projects that are jointly supported by other non-RGGI funding sources administered by NYSERDA.

The estimated cumulative annualized and expected lifetime benefits as of December 31, 2018, at the portfolio and program levels, are shown in Table 1 and Table 2, respectively.² To highlight the diversity and effectiveness of the RGGI portfolio, this report includes success stories of projects that are advancing the previously stated strategies.

Table 1. Summary of Expected Cumulative Portfolio Benefits through December 31, 2018

Benefits through December 31, 2018 ^a	Net Greenhouse Gas Emission Savings ^b (Tons CO ₂ e ^c)	Total Net Fuel Savings (MMBtu)	Net Efficiency Electricity Savings (MWh)	Net Renewable Energy Generation (MWh)	Total Net Electricity Savings/Generation (MWh)	Energy Bill Savings to Participating Customers (\$ Million)
Cumulative Annualized Installed Savings^d	1,054,532	3,065,149	965,217	318,680	1,283,897	\$292.9
Cumulative Annualized Pipeline Savings^e	63,506	231,718	37,221	47,815	85,037	\$15.5
Cumulative Annualized Committed Savings^f	1,118,038	3,296,867	1,002,438	366,496	1,368,934	\$308.4
Expected Lifetime Total Savings^g	20,762,489	62,466,470	17,446,899	8,243,824	25,690,723	\$6,062.6

^a Cross-program overlap for projects that received any combination of a Green Jobs - Green New York (GJGNY) assessment, a GJGNY loan, or a RGGI-funded incentive through the Home Performance with ENERGY STAR[®] Program, NY-Sun Program or Renewable Heat NY Program has been removed.

^b These emission reductions are associated with both electric and fossil-fuel saving measures. Under a cap-and-trade 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.

^c CO₂e stands for carbon dioxide equivalent and describes the amount of CO₂ 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.

^d Inclusive of savings from all currently operational projects installed since program inception.

^e Inclusive of savings from all projects under a signed contract and projects with an application received that are not yet operational.

^f The sum of savings from Installed Savings and Pipeline Savings.

^g The expected benefits over the lifetime of all operational projects, projects under a signed contract, and projects with an application received that are not yet operational. See Table A-4 in Appendix A for the measure-life assumptions.

Table 2. Summary of Expected Cumulative Annualized Program Benefits through December 31, 2018

Program	Costs (millions of dollars)		Net Energy Savings (Annualized MMBtu)			Net Electricity Savings or Renewable Energy Generation (Annualized MWh)			Net Greenhouse Gas Emission Savings ^a (Annualized Tons CO ₂ e ^b)			Cost Benefit Ratio (\$/Ton CO ₂ e)	
	Total Incentives ^c	Total Associated Costs ^d	Installed Savings ^e	Pipeline Savings ^f	Total Committed Savings ^g	Installed Savings ^e	Pipeline Savings ^f	Total Committed Savings ^g	Installed Savings ^e	Pipeline Savings ^f	Total Committed Savings ^g	\$/Ton CO ₂ e Savings ^h	\$/CO ₂ e EXPECTED LIFETIME SAVINGS ⁱ
Green Jobs - Green New York													
One- to Four-Family Residential Buildings Program Assessments	\$25.9	\$1.0	992,301	-	992,301	12,669	-	12,669	78,701	-	78,701	342	15
One-to Four-Family Residential Buildings Program Financing	\$119.6	\$19.4	677,016	23,383	700,398	87,473	3,830	91,303	99,913	3,910	103,822	1,338	64
Multifamily Performance Program Assessments	\$3.3	\$1.4	769,668	9,378	779,046	52,018	829	52,847	79,538	1,030	80,568	58	4
Small Commercial Energy Efficiency Program Financing	\$1.6	\$0.3	8,179	-	8,179	760	-	760	957	-	957	1,929	111
Energy Efficiency													
LIPA Energy Efficiency and Renewable Energy Initiative	\$179.6	-	18,889	-	18,889	817,210	-	817,210	475,449	-	475,449	378	21
Multifamily Performance Program	\$13.0	\$2.1	443,723	47,648	491,371	19,740	2,120	21,860	43,030	4,621	47,650	317	21
Multifamily Carbon Emissions Reduction Program ^l	\$5.7	\$0.2	-	-	-	-	-	-	45,151	-	45,151	129	10
Empower New York	\$25.9	\$1.8	155,608	350	155,958	70	-	70	11,459	27	11,487	2,409	101
Home Performance with ENERGY STAR ^o	\$21.2	\$2.9	327,961	75	328,036	1,829	1	1,831	27,291	6	27,296	882	37
Green Residential Building Program	\$2.5	\$0.3	36,548	-	36,548	1,573	-	1,573	3,084	-	3,084	890	40
Solar Hot Water (Thermal) Program	\$4.1	\$0.1	14,217	44	14,261	22	0	22	1,057	3	1,061	3,998	200
Low-Rise Residential New Construction Program	\$0.8	-	8,874	1,712	10,586	-	-	-	604	117	720	1,171	49
Renewable Energy													
Renewable Heat New York	\$8.6	\$1.2	3,998	160	4,157	990	21	1,011	2,338	57	2,394	4,109	205
NY-Sun Initiative	\$63.6	\$1.2	-	-	-	194,844	47,969	242,813	113,009	27,822	140,831	461	18
NYSERDA Solar Electric	\$5.2	\$0.1	-	-	-	2,040	-	2,040	1,183	-	1,183	4,495	180
Community Clean Energy													
Regional Economic Development & GHG Reduction ^k	\$0.8	\$8.8	-82,448	5,502	-76,946	-	3,735	3,735	35,140	2,490	37,630	257	14
Clean Energy Communities ^l	\$12.2	-	298,783	-	298,783	127,945	-	127,945	93,032	-	93,032	132	9
Innovative GHG Abatement Strategies													
Charge NY ^m	\$4.8	\$1.4	100,246	-	100,246	-4,820	-	-4,820	1,804	-	1,804	3,469	192
Clean Energy Fund													
Clean Energy Fund ⁿ	\$13.7	\$3.7	122,137	159,699	281,836	7,765	31,158	38,923	23,675	27,286	50,961	341	21
Cross-Program Overlap ^o	N/A	N/A	-830,548	-16,233	-846,781	-38,232	-4,627	-42,860	-83,335	-3,862	-87,197	N/A	N/A
TOTAL Annualized Cumulative Benefits^p	\$513.0	\$45.9	3,065,149	231,718	3,296,867	1,288,717	85,037	1,373,753	1,053,081	63,506	1,116,587	501	N/A
TOTAL Expected Lifetime Cumulative Benefits^p	\$513.0	\$45.9	58,679,620	3,786,850	62,466,470	23,953,134	1,785,787	25,738,921	19,493,376	1,269,113	20,762,489	N/A	27

Table notes are on the next page

Table 2 continued

- ^a These emission reductions are associated with both electric and fossil-fuel saving measures. Under a cap-and-trade 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 CO₂e stands for carbon dioxide equivalent and describes the amount of CO₂ 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 Inclusive of savings from all projects under a signed contract and projects with an application received that are not yet operational.
- ^g The sum of savings from Installed Savings and Pipeline Savings.
- ^h The sum of figures in columns Total Incentives and Total Associated Costs divided by the columns Total Committed Savings.
- ⁱ The sum of figures in columns Total Incentives and Total Associated Costs divided by the expected lifetime committed savings. Inclusive of cross-program overlap.
- ^j The Multifamily Carbon Emissions Reduction Program is a fuel-switching program and does not claim any energy or bill savings.
- ^k The Regional Economic Development and GHG Reduction program consists of 15 unique projects. The costs for all 15 projects are included in this table although only a subset of these projects actually report quantifiable energy benefits. The negative MMBtu savings are due to a manufacturing project that switched from burning #6 residual oil to natural gas and a transportation project that switched from burning diesel fuel to compressed natural gas (CNG). CNG is slightly less efficient than diesel from an energy perspective but results in carbon emission reductions.
- ^l The Clean Energy Communities Program budget is comprised of funding from both RGGI and CEF. These figures represent the proportion of RGGI funds allocated to the Clean Energy Communities program.
- ^m Net Energy Savings values represent MMBtu savings from the use of electric vehicles; the electricity required to charge the vehicles is removed from this table as this induced electricity consumption is the result of beneficial electrification. 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.
- ⁿ These figures represent a proportional allocation of benefits relative to the percent of RGGI contributions to the total approved CEF budget.
- ^o Cross-program overlap accounts for projects that received any combination of a GJGNY assessment, a GJGNY loan, or a RGGI-funded incentive through the Home Performance with ENERGY STAR® Program, NY-Sun Program or Renewable Heat NY Program.
- ^p Totals may not sum exactly due to rounding.

3 Funds

3.1 Proceeds

As of December 31, 2018, NYS sold more than 366 million CO₂ allowances and received more than \$1,184 million in auction proceeds. In addition, more than \$14.5 million in interest was earned on the RGGI portfolio and more than \$2.7 million in interest was earned on the Green Jobs - Green New York (GJGNY) program. Nearly \$13 million in interest earnings were allocated on the RGGI portfolio and more than \$1.7 million in interest earnings were allocated to the GJGNY program. The allocated interest earnings are reinvested for program implementation and distributed across various RGGI programs. Detailed auction proceeds and total funds for NYS RGGI are presented in Appendix D and Appendix E, respectively. Total NYS RGGI funds are listed in Table 3, and detailed auction proceeds for NYS RGGI are visually displayed in Figure 1.

Table 3. New York State's RGGI Auction Results and Funds through December 31, 2018

Source: RGGI, Inc. and NYSERDA

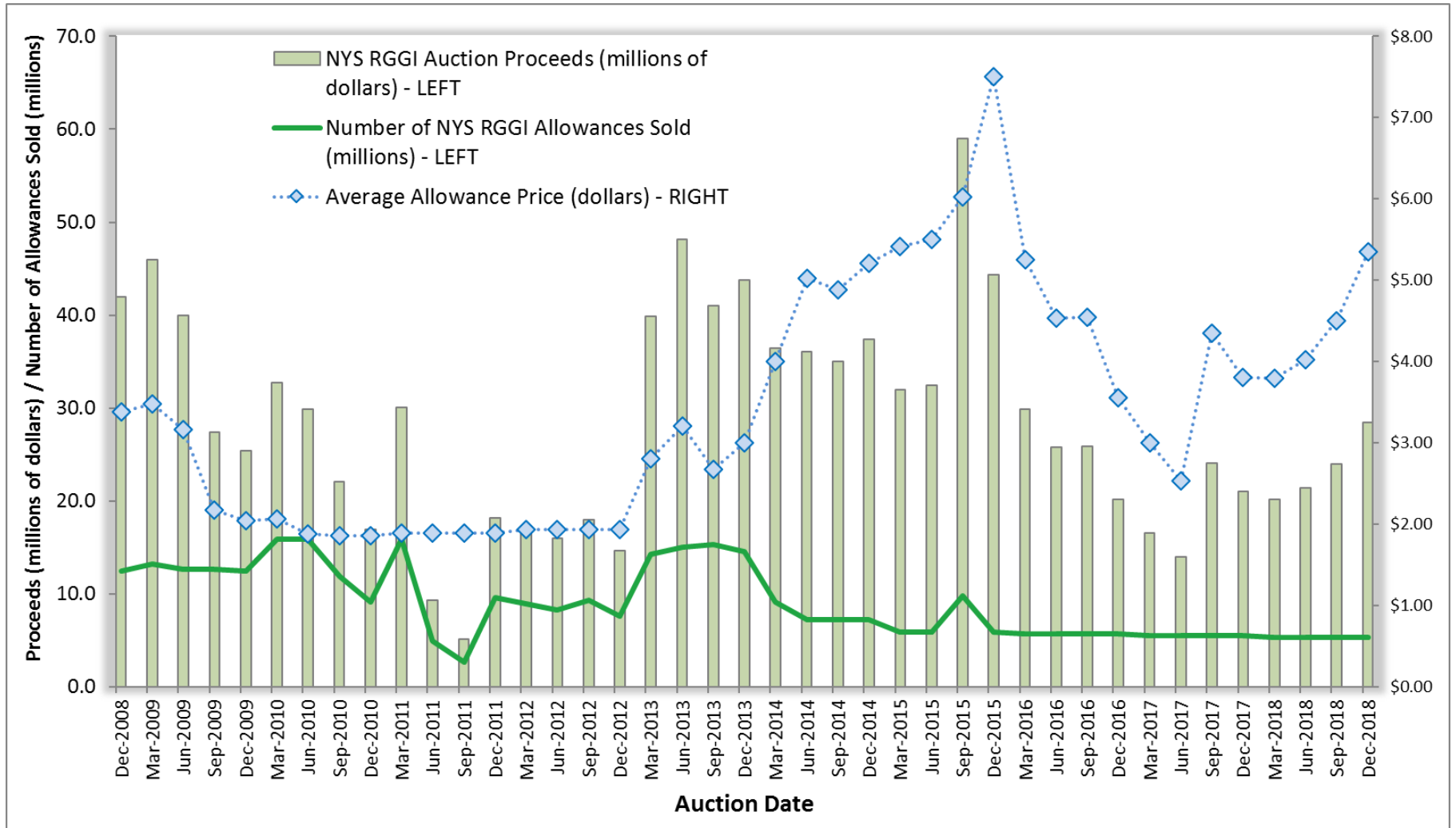
Fund Category^a	NYS Allowances Sold	Cumulative Funds
First Control Period Total	144,305,904	\$336,282,535
Second Control Period Total	128,764,643	\$391,950,232
Third Control Period Total	72,401,365	\$345,078,005
Fourth Control Period Total	21,294,281	\$94,014,250
RGGI Auction Proceeds	366,766,193	\$1,167,325,022
RGGI Portfolio Interest Earnings		\$14,550,253
GJGNY Program Interest Earnings		\$2,755,905
TOTAL Funds^b		\$1,184,631,180

^a The first control period for fossil fuel-fired electric generators took effect on January 1, 2009 and concluded on December 31, 2011. The second control period took effect on January 1, 2012 and concluded on December 31, 2014. The third control period took effect on January 1, 2015 and concluded on December 31, 2017. The fourth control period took effect on January 1, 2018 and extends through December 31, 2020.

^b RGGI program budgets have been increased based on anticipated auction revenues from the approved FY 2017-2018 Operating Plan. These amounts have been allocated but not been received due to the timing of receipt of the proceeds.

Figure 1. New York State's RGGI Auction Results through December 31, 2018

Source: RGGI, Inc.



3.2 Budget

Financial data for the approved RGGI programs through December 31, 2018, are presented in Table 4 through Table 6. Table 4 presents the current expended, encumbered, and committed funds for each program and reflects how the more than \$1,245 million of approved funds are distributed across the eight major program areas and other costs:

- Renewable Energy
- Energy Efficiency
- Innovation GHG Abatement Strategies
- Community Clean Energy
- GJGNY
- NY Green Bank
- Clean Energy Fund
- Clean Energy Standard

Table 5 and Table 6 present the financial data for the approved GJGNY program and NY Green Bank, respectively, through December 31, 2018.

Table 4. Available Funding and Financial Status through December 31, 2018 (millions of dollars)

Source: NYSERDA

	Budgeted Funds ^a	Expended Funds ^b	Open Encumbrances ^c	Pre-Encumbrances ^d	Committed Funds ^e	Remaining Balance ^f
Renewable Energy						
Renewable Heat NY	10.3	8.4	1.2	0.2	9.8	0.5
NY-Sun	82.5	48.3	10.8	0.2	59.3	23.2
NYSERDA Solar Electric Programs	5.3	5.3	0.03	-	5.3	-
NY Generation Attribute Tracking	0.8	0.3	0.5	-	0.8	-
Advanced Renewable Energy	2.8	2.8	-	-	2.8	-
Total Renewable Energy	101.7	65.2	12.4	0.4	78.1	23.6
Energy Efficiency						
LIPA Energy Efficiency and Renewable Energy Initiative	179.6	171.0	8.7	-	179.6	-
Residential Efficiency Services	81.1	78.7	1.9	0.2	80.8	0.3
Municipal Water and Wastewater	1.2	1.2	-	-	1.2	-
Clean Energy Workforce Opportunity	15.0	15.0	-	-	15.0	-
Total Energy Efficiency	277.0	265.9	10.5	0.2	276.7	0.3
Innovative GHG Abatement Strategies						
Industrial Innovations	13.0	9.1	4.0	-	13.1	-
Climate Research and Analysis	8.7	8.0	0.7	-	8.7	-
Clean Energy Business Development	25.3	21.0	2.9	0.04	23.9	1.4
Charge NY	23.5	6.0	0.2	0.01	6.2	17.3
Transportation Research	3.8	3.7	0.2	-	3.8	0.02
Carbon Capture and Sequestration	1.0	1.0	-	-	1.0	-
Advanced Buildings	1.6	1.5	-	-	1.5	0.1
Competitive Greenhouse Gas Reduction Pilot	1.0	1.0	0.0	-	1.0	-
Brookhaven National Laboratory Ion Collider	25.0	21.2	3.8	-	25.0	-
Total Innovative GHG Abatement Strategies	103.0	72.5	11.7	0.0	84.3	18.8
Community Clean Energy						
Climate Smart Communities	7.7	4.9	0.4	-	5.3	2.4
Economic Development Growth Extension	7.2	5.7	0.5	-	6.2	1.1
Cleaner, Greener Communities	98.6	58.7	37.0	1.8	97.5	1.1
Clean Energy Communities	2.6	0.18	1.1	0.5	1.7	0.8
Regional Economic Development and Greenhouse Gas Reductions	10.3	9.6	0.7	-	10.3	-
REV Campus Competition	3.0	1.2	1.3	0.5	3.0	-
Total Community Clean Energy	129.4	80.3	40.9	2.8	123.9	5.4
Other Costs ^g						
Deficit Reduction Plan (DRP) Transfer ^h	90.0	90.0	-	-	-	-
Con Edison Smart Grid Program ⁱ	21.9	21.9	-	-	21.9	-
Program Administration ^j	31.0	29.3	0.04	-	29.3	1.7
Metrics and Evaluations	9.2	4.8	1.0	-	5.8	3.3
RGGI Inc. Costs ^k	9.5	8.5	0.2	0.8	9.6	-
New York State Cost Recovery Fee	11.9	11.5	-	-	11.5	0.4
Unallocated Interest Earnings	-	-	-	-	-	-
Environmental Tax Credit	110.0	110.0	-	-	110.0	-
Other Costs	30.0	30.0	-	-	30.0	-
OTHER COSTS TOTAL	313.5	306.0	1.2	0.8	218.1	5.4
SUBTOTAL	924.6	790.0	76.8	4.3	781.1	53.6
Green Jobs - Green New York						
Green Jobs - Green New York	208.4	188.9	1.3	28.6	218.8	(-10.4) ^m
NY Green Bank						
NY Green Bank	52.9	52.0	-	-	52.0	0.9
Clean Energy Fund						
Clean Energy Fund	58.5	9.1	10.3	-	19.4	39.0
Clean Energy Standard						
Clean Energy Standard	0.7	-	-	-	-	0.7
TOTAL ⁿ	1,245.1	1,039.9	88.4	32.9	1,071.3	82.9

Table notes are on the next page

Table 4 continued

- ^a Includes auction proceeds and allocated interest on the RGGI and GJGNY portfolios. The allocation is consistent with the budget presented in the RGGI Operating Plan.
- ^b Invoices processed for payment by NYSERDA.
- ^c Remaining funding obligated under a contract, purchase order, or incentive award.
- ^d Planned funding for contracts awarded and under negotiation; and planned funding under active development through open solicitations with upcoming proposal due dates, adjusted so that the sum of the project commitments does not exceed the figures in the Budgeted Funds column. NYSERDA's annual audited financial statements may reflect project commitments in excess of the figures in Budgeted Funds. These commitments are expected to decrease over time due to project attrition and differences in estimated versus actual costs.
- ^e The sum of figures in columns Expended, Encumbered, and Pre-Encumbered funds.
- ^f The difference between figures in columns Budgeted Funds and Committed Funds.
- ^g The values for figures in rows Program Administration, Metrics and Evaluation, and the NYS Cost Recovery Fee represent aggregate funds and commitments for RGGI-funded activities, NOT including GJGNY. For information on GJGNY finances, refer to Table 5.
- ^h On December 4, 2009, NYS enacted numerous deficit reduction measures that included the transfer of \$90 million in RGGI auction proceeds to the General Fund following the global financial crisis.
- ⁱ On December 22, 2009, NYSEDA's Board approved a proposed consent decree that resolves the legal challenge to the State's RGGI program. In October 2010, State Supreme Court Judge Thomas J. McNamara signed a Stipulation and Order of Discontinuance signed by all the parties, thereby formally ending the litigation. The parties to the consent decree presently estimate that the total commensurate benefit for the calendar years 2009–2017 is \$20.8 million and agreed to dedicate such funds for the development of smart grid technologies in the Con Edison territory. The budget reflects allocations that are intended to fund NYSEDA's estimated liability for each calendar year control period consistent with the timing of estimated cash payments due to Con Edison. NYSEDA is also responsible for certain additional costs that may be incurred through 2017. NYSEDA's annual audited financial statements show an amount expended of \$18 million to reflect these additional estimated costs that were required to be recorded. The litigation period ended December 31, 2016. This Plan Amendment notes that total paid by NYSEDA is \$21,900,366.
- ^j Includes NYSEDA's upfront administrative expenses related to the development and implementation of the CO₂ Budget Trading Program, the CO₂ Allowance Auction program, and the RGGI Operating Plan.
- ^k The first-year budget includes RGGI Inc. start-up costs and the State's share of ongoing RGGI Inc. expenses. RGGI Inc. is a nonprofit corporation created to support development and implementation of the CO₂ Budget Trading Program.
- ^l The Electric Generation Facility Cessation Mitigation Program was enacted in the 2015-2016 New York State Budget and is designed to support communities that are transitioning local economies that have been reliant on fossil fuel power plants as a source of financial support. For more information see the Final 2016 RGGI Operating Plan Amendment at: <https://www.nyserda.ny.gov/Researchers-and-Policymakers/Regional-Greenhouse-Gas-Initiative/Useful-Documents>.
- ^m The Residential Financing figures include certain loans issued, but where proceeds from bonds to finance the pledged loans is received subsequently. The Residential Financing figures also includes pre-encumbrances for approved loans not yet issued, which will be funded from additional funds to be transferred to GJGNY and not yet reflected in the column Budgeted Funds shown in this table.
- ⁿ Totals may not sum exactly due to rounding.

Table 5. Green Jobs - Green New York Available Funding and Financial Status through December 31, 2018 (Millions of Dollars)

Source: NYSERDA

	Budgeted Funds ^a	Expended Funds ^b	Open Encumbrances ^c	Pre-Encumbrances ^d	Committed Funds ^e	Remaining Balance ^f
Workforce Development, Outreach and Marketing						
Workforce Development	7.3	6.8	0.04	-	6.8	0.5
Outreach and Marketing	15.9	15.8	-	0.02	15.9	0.03
Total Workforce Development, Outreach and Marketing	23.2	22.6	0.04	0.02	22.7	0.5
Residential						
Energy Assessment Incentive	26.9	25.9	-	0.01	25.9	1.0
Implementation Costs	1.0	1.0	-	-	1.0	-
Financing: Loans	115.0	279.3	-	26.8	306.1	
Financing: Loan Repayments	-	(32.3)	(0.0)	-	(32.3)	
Financing: Implementation Costs	-	16.1	0.6	0.1	16.7	
Financing: Bond Proceeds	-	(130.2)	-	-	(130.2)	
Financing: Bond Issue Costs	-	3.8	0.2	0.01	4.0	
Financing: Short Term Note	-	(30.0)	-	-	(30.0)	
Total Financing	115.0	106.6	0.8	26.9	134.3	(-19.3)^g
Total Residential	142.9	133.5	0.8	26.9	161.2	(-18.3)^g
Multifamily						
Energy Assessments	3.3	3.3	0.0	-	3.3	0.01
Implementation Costs	1.4	1.4	-	-	1.4	-
Financing: Loans	3.5	3.9	0.0	-	3.9	
Financing: Loan Repayments	-	(3.2)	-	-	(3.2)	
Financing: Implementation Costs	0.3	0.2	0.1	-	0.3	
Total Financing	3.8	0.8	0.1	-	0.9	2.9
Total Multifamily	8.5	5.5	0.2	-	5.6	2.9
Small Commercial						
Energy Assessments	8.6	7.0	-	1.2	8.2	0.4
Implementation Costs	1.0	0.9	-	0.2	1.0	-
Financing: Loans	3.8	2.4	-	-	2.4	
Financing: Loan Repayments	-	(0.9)	-	-	(0.9)	
Financing: Implementation Costs	0.3	0.3	0.2	-	0.5	
Total Financing	4.0	1.8	0.2	-	2.1	2.0
Total Small Commercial	13.7	9.8	0.2	1.4	11.3	2.3
SUBTOTAL	188.4	171.3	1.2	28.3	200.8	(12.8)^g
Other Costs						
Program Administration	11.9	11.7	0.0	-	11.7	0.2
Program Evaluation	5.6	3.4	0.1	-	3.5	2.1
New York State Cost Recovery Fee	2.5	2.4	-	-	2.4	0.1
Unallocated Interest Earnings	-	-	-	-	-	-
OTHER COSTS TOTAL	20.0	17.5	0.1	-	17.6	2.4
TOTAL^h	208.4	188.9	1.3	28.3	218.4	(10.4)^g

- ^a Includes auction proceeds and allocated interest on the GJGNY funds. The allocation is consistent with the budget presented in the RGGI Operating Plan.
- ^b Invoices processed for payment by NYSERDA.
- ^c Remaining funding obligated under a contract, purchase order, or incentive award.
- ^d Planned funding for contracts awarded and under negotiation; and planned funding under active development through open solicitations with upcoming proposal due dates, adjusted so that the sum of the project commitments does not exceed figures in Budgeted Funds. NYSERDA's annual audited financial statements may reflect project commitments in excess of figures in Budgeted Funds. These commitments are expected to decrease over time due to project attrition and differences in estimated versus actual costs.
- ^e The sum of figures in columns Expended, Encumbered, and Pre-Encumbered Funds.
- ^f The difference between figures in columns Budgeted Funds and Committed Funds.
- ^g The Residential Financing figures include certain loans issued, but where proceeds from bonds to finance the pledged loans is received subsequently. The Residential Financing figures also includes pre-encumbrances for approved loans not yet issued, which will be funded from additional funds to be transferred to GJGNY and not yet reflected in the Budgeted Funds column shown in this table.
- ^h Totals may not sum exactly due to rounding.

**Table 6. NY Green Bank Available Funding and Financial Status through December 31, 2018
(Thousands of Dollars)**

Source: NYSERDA

	Budgeted Funds ^a	Expenses and Loan Assets ^b	Open Encumbrances ^c	Pre-Encumbrances	Committed Funds ^d	Remaining Balance ^e
Program Costs						
NY Green Bank	47,567	47,567	-	-	47,567	0
SUBTOTAL	47,567	47,567	-	-	47,567	0
Other Costs						
Program Administration	4,234	4,234	-	-	4,234	-
Program Evaluation	969	69	-	-	69	900
New York State Cost Recovery Fee	156	125	-	-	125	31
OTHER COSTS TOTAL	5,359	4,427	-	-	4,427	932
TOTAL^f	52,926	51,995	-	-	51,995	932

^a The allocation is consistent with the budget presented in the RGGI Operating Plan. NY Green Bank funding being reported here is only NY Green Bank funds that were transferred from RGGI. The actual NY Green Bank budget is higher.

^b Expenses and Loan Assets means, in any period, the aggregate funds that have been advanced by NY Green Bank subject to the terms of executed investment and financing agreements that remain in force during that period, expressed in dollars. Expenses and Loan Assets reflect only funds actually advanced. Many transactions involve provision of credit enhancements by NY Green Bank that, by their nature, are contingent obligations not generally intended to be fully drawn against or funded. In addition, many NY Green Bank investments are “delayed draw” in that funds are not deployed until project sponsors meet certain development milestones over a time period necessary to originate, develop and construct a large number of smaller, distributed, clean energy projects.

^c Open Encumbrances means, in any period, the aggregate funds to be provided by NY Green Bank pursuant to executed investment and financing agreements that remain in force during that period, without such funds having been deployed, expressed in dollars.

^d The sum of Expenses and Loan Assets, Open Encumbrances, and Pre-Encumbrances.

^e The difference between Budgeted Funds and Committed Funds.

^f Totals may not sum exactly due to rounding.

4 Program Descriptions and Accomplishments

4.1 Renewable Energy

4.1.1 Renewable Heat NY

The Renewable Heat NY initiative is a long-term commitment to help the high-efficiency, low-emission biomass heating industry reach scale. The long-term market development strategy for Renewable Heat NY includes 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 Biomass Heating Roadmap 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 in the early years, which will phase down as the market achieves scale and upfront costs decrease.
- Provide support so that sustainable forestry practices are available and followed by small and large landowners.

In many respects, developing this market will inherently require capturing the benefits of local scale. Installation and pellet supply economics will demonstrate an economic service radius effect; workforce development and customer awareness will show gains from local density. Consequently, this initiative seeks to develop and expand clusters of activity, thereby meeting the overarching goal of supporting the high-efficiency and low-emission biomass heating industry in NYS.

Renewable Heat NY is providing supply chain and service network development (i.e., workforce development, training, and research and development), along with consumer incentives and financing. These activities are not geared toward resource acquisition, but rather will position the market to be sustainable over the long term. There will be a reduction in investments of incentives and staff resources as the private market develops.

Key accomplishments as of this quarter:

- Twenty-three new research projects have been contracted as a result of proposals received from PON 3027: Energy and Environmental Performance of Biomass-Fired Heating Equipment. These projects are addressing needs identified through the Renewable Heat NY program, and support the development and advancement of a high-efficiency, low-emissions biomass thermal industry in NYS.
- NYSERDA's training service provider conducted one online and one in-person training sessions this quarter. Enrollment of qualified installers is ongoing.
- Renewable Heat New York (RHNY) PON 3010 was revised and released on August 22, 2018. All related Program Manuals, forms and attachments have been revised to be clear, concise, and consistent in format and terminology, resulting in a more user-friendly program experience.
- The installation of 41 pellet stoves, bringing the total to 536 installed projects.
- Ongoing feasibility studies and reviews by technical consultants related to development of large commercial projects. Two large commercial pellet boiler projects are in process.

4.1.2 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 of 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 NYS communities that empower clean energy, healthy communities, and economic development.

Key accomplishments as of this quarter:

- In Q4 2018, the fourth round of Solarize campaigns concluded outreach. Campaigns were located in the Long Island, Capital District, Western NY, Mid-Hudson Valley, and Southern Tier regions. Out of the 12 awarded campaigns, six are focused on community solar, with the remaining on rooftop residential. Overall, this round resulted in residential rooftop installations totaling approximately 1.9 megawatts (MW) and 120 community solar subscriptions across the State.
- The Affordable Solar Predevelopment and Technical Assistance program—which provides funding to support the development of community solar projects serving low- and moderate-income households as well as solar serving multifamily affordable housing properties—approved 18 project applications through Q4 2018, with 13 predevelopment projects under contract statewide. Of these, one contracted predevelopment project is located on Long Island and funded by RGGI.
- The final MW Block for Long Island residential solar photovoltaic (PV) projects closed in April 2016. A total of 100.3 MW of residential PV (12,635 projects) were built through the MW Block program with RGGI funding.
- There have been 28.6 MW (301 projects) of small commercial PV built in Long Island through the MW Block Program with RGGI funding, and 33.1 MW are in the pipeline.

4.1.2.1 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 quarter:

- There were a total of 221 solar electric system installations outside of Long Island using RGGI funding through December 31, 2018.

4.1.1 New York Generation Attribute Tracking (NYGATS)

NYSERDA established the New York Generation Attribute Tracking System (NYGATS) to record electricity generation attribute information within NYS, and to process generation attribute information from energy imported and consumed within the State 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 support regulatory compliance, to validate environmental attributes in trading markets, or to 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 the creation of annual disclosure labels for New York Load Serving Entities (LSE) under the Environmental Disclosure Program (EDP), for generation projects to apply for eligibility under Tier 1 of the Clean Energy Standard (CES), for LSEs to substantiate compliance under the CES, and for 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 quarter:

- Compliance with RES and ZEC obligations for the first year of the CES was successfully accomplished through NYGATS
- Settlement of 2017 generation and load data resulting in the creation of EDP labels and composition of the NY System Mix, which is the basis for reporting on progress towards CES goals
- NYSERDA Tier 1 REC quarterly sales to LSEs executed in NYGATS.

4.1.2 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 quarter:

- GridMarket LLC has completed conducting a small research project to analyze the characteristics of building load profiles using 15-minute interval meter data in the Con Edison distribution area and evaluating the potential benefits to customers and the grid of 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, economic benefits and impacts (job and other macroeconomic impacts) to New York State associated with plausible scenarios of future offshore wind energy deployment in the New York Bight through 2025.
- The Offshore Wind Master Plan, that is funded through the Clean Energy Fund, will include cost studies that build on the work completed for the Offshore Wind Cost Benefit Study.

4.2 Energy Efficiency

4.2.1 LIPA Energy Efficiency and Renewable Energy Initiative

The RGGI funds provided to 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 towards 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). During 2016, LIPA, NYSERDA and PSEGLI have collaborated to launch new approaches envisioned under 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. Following are the results from the second half of 2018.

Rebate spending for the second half of 2018 totaled \$20.2 million against total annual budgeted RGGI funds of \$34.6 million, resulting in 142,374 megawatt-hour (MWh) savings. The majority of the spending (\$8.6 million) consisted of payments to businesses through PSEGLI's Commercial Efficiency Program (CEP). PSEGLI's Cool Homes 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 \$179.6 million in RGGI funds has been spent, resulting in a cumulative total savings of 817,210 MWh and 18,889 million British thermal units (MMBtu).

PSEGLI has implemented a number of new initiatives in support of Reforming the Energy Vision (REV). Recently, 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. Combined Heat and Power (CHP) is another innovative measure that PSEGLI is implementing. Eight projects have been pre-approved, with anticipated savings of 10,140 MWh and total estimated rebate of \$2.3 million. Additionally, the Home Energy Management program was launched in the third quarter of 2017. The program consists of Home Energy Reports that will be sent to 340,000 residential customers and an

interactive portal which provides a disaggregation of electric usage and savings tips. The program was enhanced in the fourth quarter to include a Home Energy Analyzer wherein customers input home profile information for a customized energy plan. An enhanced marketplace information and listing of energy efficiency products and services that the customer can purchase is in planning in addition to High Usage Alerts, consisting of advance notifications to alert customers of potential high usage.

Key accomplishments for this reporting period:

- Over \$8.6 million in rebates were paid to Long Island businesses saving 47,276 MWh as part of PSEGLI's Commercial Efficiency Program as incentive for over 1,253 energy efficiency projects installing measures such as lighting, HVAC systems, and efficient motors.
- During the second half of 2018, PSEGLI Residential Efficient Products program resulted in savings of 90,102 MWh for total incentive payments of \$7.7 million, including rebates of \$5.8 million to PSEGLI residential customers for the purchase of light bulbs at local retailers. The remaining incentives were 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 more than \$692,000 to install 2,816 energy efficient central air conditioning projects as part of PSEGLI's Cool Homes program, saving 1,732 MWh in Q3 and Q4 of 2018.

4.2.2 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, which 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 for 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.

4.2.2.1 Multifamily Performance Program

The Multifamily Performance Program (MPP) serves residential buildings with five or more units. Funds are targeted at efficiency measures that help to reduce on-site oil, non-firm natural gas, steam, and propane energy demand in multi-unit residential buildings. All buildings receive program support for energy assessments to determine cost-effective measures, expected energy savings, and installation costs. Projects also receive implementation incentives to support the installation of measures identified by program supported assessments.

Key accomplishments as of this quarter:

- Through December 31, 2018, 102 energy efficiency projects were completed, representing efficiency upgrades to 25,614 units.

4.2.2.2 Multifamily Carbon Emission Reduction Program

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

4.2.2.3 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 that are Building Performance Institute GoldStar contractors provide services. Currently, 167 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 quarter:

- Across New York, 51 households were served during Q3 and Q4, bringing the total to 7,078 households served under EmPower New York with RGGI funding through December 31, 2018.

4.2.2.4 Green Residential Buildings Program

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

4.2.2.5 Home Performance with ENERGY STAR® (HPwES)

Home Performance with ENERGY STAR (HPwES) is a comprehensive energy efficiency services program for existing one- to four-family homes and low-rise³ residential buildings. The program uses a network of Building Performance Institute (BPI) GoldStar contractors to perform diagnostic testing on the home, recommend improvements, determine the payback period for those improvements, and install improvements selected by the homeowner. As of December 31, 2018, 172 contractors are active in HPwES.

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, and 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 quarter:

- During Q3 and Q4, 49 energy efficiency projects were completed at a contracted value of approximately \$335,000, bringing the total to 9,465 energy efficiency projects completed at a contracted value of \$91.85 million.
- Of these recently completed projects, 41% were Assisted HPwES, which serves homeowners with incomes less than 80% of area median income.

4.2.2.6 Solar Thermal Incentive Program

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

4.2.2.7 Low-Rise Residential New Construction Program

NYSERDA's Low-Rise Residential New Construction Program⁴ (LRNCP) includes the New York ENERGY STAR Certified Homes Program and the New York Energy \$mart designation for certain low-rise, multi-unit buildings and gut rehabilitation projects. Funded primarily through the Energy Efficiency Portfolio Standard, this program is designed and intended to encourage the construction

of new single-family homes and low-rise residential dwelling units that operate more energy efficiently and reduce long-term GHG emissions, are more durable, and provide a healthier environment for their occupants. Starting in July 2013, RGGI funded the MMBtu-savings component of the LRNCP incentive for projects using propane or oil as the primary heating fuel. Although more than 165 builders participate in this program statewide, 24 builders have constructed homes eligible for RGGI incentives so far. RGGI funds were fully committed as of Q3, 2015.

Key accomplishments as of this quarter:

- One dwelling unit was constructed; the cumulative total of new dwelling units constructed to date is 263.
- The total private sector funds leveraged to date is \$1.04 million.
- One project (72 units) remains under contract in this program.

4.2.3 Municipal Water and Wastewater Program

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

4.3 Innovative GHG Abatement Strategies

4.3.1 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 NYS 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 quarter:

- A project with SulfCrete of Long Beach, NY—leveraging \$750,000 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. Recent project progress includes collaboration with concrete manufacturer Roman Stone Construction Company of Bay Shore, NY, for compiling a list of products selected for demonstration and their rationale for selection, such as size, shape, and manufacturability.
- Projects in progress from previous quarters continued to make advancements during this quarter.

4.3.2 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 quarter:

- Work has continued on research projects concerning climate change adaptation. Several projects were completed during this period, including a project on the health impacts of power outages and warm weather, which was posted to the [NYSERDA website](#).

- Through the Community Risk and Resiliency Act (CRRA) process, the DEC previously adopted the NYSERDA-supported ClimAID projections for NYS 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. NYSERDA will continue to engage with this group, offering suggestions and support when appropriate.
- Discussions are continuing with the U.S. Climate Alliance, including coordination with past and ongoing NYSERDA and NYS climate research and the potential for building a clearinghouse for that national entity based on the New York Climate Change Science Clearinghouse.

4.3.3 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 NYS 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 NYS, NYSERDA is working with the impact investment group, Investors' Circle to develop a local network in New York City, which has been 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 GL. 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 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 quarter:

- Investors' Circle New York continued to hold monthly meetings for the impact/social investment community in metropolitan New York through the end of 2018. In addition, Investors' Circle New York held another roadshow event this year to better engage and network with prospective and active impact/social investors across Upstate New York.
- The fourth round of the 76West Clean Energy Business Competition was launched on December 12, 2018 and applications are due April 15, 2019. The 76West Pitch Competition featuring the 20 finalists will be held in Q3 2019. The six winners from the third round of the competition are actively working to develop and scale their businesses primarily in the Southern Tier of New York State.

4.3.4 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 will develop and implement 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, municipal lots, 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 that 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 quarter:

- Through December 2018, NYSERDA has issued over 12,000 rebates. Outreach for the campaign included a booth at the New York International Auto Show in March 2018, 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 in collaboration with other Northeast states and 16 automakers in March 2018. The campaign aims to inform potential car buyers about the benefits of driving electric vehicles.
- 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 multi-unit dwelling locations.

Success Story 1:

New York State Supports the Purchase of Electric Vehicles

RGGI funds are supporting the Drive Clean Rebate, which provides rebates of up to \$2,000 to New York residents for the purchase or lease of a new electric car from participating dealers. Since the rebate was launched in March 2017, more than 12,000 rebates totaling about \$16.75 million have been approved, supporting the Governor's goal to reduce greenhouse gas emissions 40% by 2030. Rebates have been approved for more than 35 different types of cars in all 62 counties across New York State.

4.3.5 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 a number of years and is winding down.

Key accomplishments as of this quarter:

- Unique Energy Solutions has continued to refine its design for manufacturing as it gears up to deliver 12 electric delivery trucks to UPS.
- Unique Technical Solutions has been supporting the MTA's electric bus demonstration program through data collection and analysis to inform bus routing and logistics.

Projects that were part of the Locomotive Idle Reduction Program (partially RGGI funded), which installed U.S. Environmental Protection Agency (EPA) SmartWay-verified idle reduction equipment on locomotives, remain in use and are reducing fuel use and emissions from these locomotives while saving the short line railroads money.

4.3.6 Carbon Capture, Recycling, and Sequestration

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

4.3.7 Advanced Buildings

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

4.3.8 Competitive Greenhouse Gas Reduction Pilot

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

4.3.9 Brookhaven National Laboratory Ion Collider

Cornell University (CU) and the Brookhaven National Laboratory (BNL) are designing, building, and commissioning the Cornell-BNL ERL Test Accelerator (CBETA), a four-pass, 150 MeV electron Energy Recovery Linac (ERL) that is a prototype for advanced technology to be used in the future BNL eRHIC accelerator.

This pilot-scale facility is located at Cornell University where all field testing/validation will occur. The work is being conducted at Cornell to fully leverage an existing \$32 million facility located on Cornell's campus. This results in significant overall cost savings for the ERL project.

BNL will manage all aspects of the initiative and serve as the project contractor. The contract cost to NYSERDA is \$25 million and the project is expected to complete by April 2020.

Timely and successful testing/validation of the pilot-scale ERL will allow BNL to submit a competitive proposal to the DOE to secure an award to build and operate an electron-ion collider (EIC) on BNL's campus that includes a full-scale ERL as a major sub-system component of the eRHIC accelerator.

Key accomplishments as of this quarter:

- The Cornell and BNL teams worked jointly towards the core fabrication and construction phase of the project.
- The teams will be preparing the entire CBETA loop and for initial beam commissioning and beam operations in spring 2019.
- The last Halbach girder plates, each bearing 8 permanent magnets, were shipped from BNL to Cornell in December. Installation on the experimental floor began, with approximately 40% of the table-plate combinations in place at the end of January.
- HVAC, water, and electrical system utility upgrades were carried out in Q4 2018, but not to completion. Network and control system infrastructures were also installed.

4.4 Community Clean Energy

4.4.1 Climate Smart Communities

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

4.4.2 Economic Development Growth Extension Program (EDGE)

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

4.4.3 Cleaner, Greener Communities

Governor Cuomo announced the Cleaner, Greener Communities (CGC) program in his 2011 State of the State address. In coordination with the Climate Smart Communities program, this program provides 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 NYS as a whole toward a self-sustaining, more environmentally sound future. The program encourages 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 emphasizes activities associated with smart growth, creation of green jobs, building green infrastructure, investing in environmental justice communities, and strengthening environmental protection.

A process evaluation for the Cleaner, Greener Communities program was completed in the second quarter of 2016. For more information on this evaluation please refer to Section F.2.7 in the appendix of this report.

Key accomplishments as of this quarter:

- NYSERDA negotiated contracts for the third round of funding (\$25 million) for Phase II of the CGC program, which includes 17 projects. Sixteen contracts have been executed. One contract is still under negotiation.

4.4.4 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 Governor Cuomo's Regional Economic Development Council (REDC) initiative and are not otherwise provided financial support by other NYSERDA programs or initiatives. REDGHG provides (1) 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) results in strategic investments, and (3) builds the capacity within 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.

4.4.5 Reforming the Energy Vision Campus Competition Program

Governor Cuomo's Energy to Lead Competition is a competitive solicitation issued by NYSERDA that challenges colleges and student-led coalitions across the State to develop and implement plans to advance clean energy on their campuses or in their local communities in new ways. The three groups that propose the best solutions for an innovative clean energy project in energy efficiency, renewables, or GHG emission reduction will win \$1 million each to help implement their plans. The Request for Proposals for the Energy to Lead Competition was released January 22, 2016. Three informational webinars were held and NYSERDA posted answers to frequently asked questions on their website.

The college/student teams are to submit plans for projects demonstrating innovations in one or more of the following:

- Business model: A new way of paying for a project, lowering costs, or creating new revenue streams.
- Community engagement: An approach to build on an on-campus project to advance clean energy in the surrounding community.
- Curriculum integration: A model for integrating project construction, implementation, or operations into student coursework, workforce training, or internships.

Proposals for the Energy to Lead Competition were due April 4, 2016. NYSERDA received 40 proposals from 33 institutions. The three winning institutions and their proposed projects were announced on May 16, 2016, and are as follows:

- 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.
- 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.
- Broome Community College's Geothermal Learning Laboratory project includes installing a closed loop geothermal system that uses the heat energy stored in the earth; real-time, public data-sharing about the system's operations; and development of hands-on, geothermal material for secondary schools.

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.

Key accomplishments as of this quarter:

- The State University of New York at Buffalo has nearly completed the development of an RFP for solar developers, which will include opportunities for on-site solar PV at locations throughout the City of Buffalo. The anticipated launch of the RFP is Q1 2019. In addition, the university's Garden, Relax, or Work (GRoW) Home, the institution's sustainable living project which took second-place at the U.S. Department of Energy's 2015 Solar Decathlon, opened in exhibition mode on September 26, 2018 and is being used for a variety of activities from renewable energy student engagement to Western NY sustainability business development. Work has begun to move the GRoW Home to the north campus where it will become a permanent clean energy engagement center.
- The Broome Community College Sustainability Sandbox and Geothermal Learning Laboratory are open and operating, acting as a new space for science courses, including the new Clean Energy Systems Design course, as well as meetings of student clubs and the institution's sustainability committee. Students and faculty have begun research and development of a draft green revolving fund with the hope of receiving administrative approval in 2019.
- Bard College formally initiated the federal site permitting process for installing a micro hydropower project on campus, including convening a public meeting on October 20, 2018 and submitting the Initial Consultation Document to the Federal Energy Regulatory Commission. Bard College is also finalizing its Micro Hydro NY website, a launchpad for information about small dams and micro hydropower, which is set to launch in 2019.

4.4.6 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 roll up 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 (CSC) Certification Program by providing assistance to communities working toward certification.

Key accomplishments as of this quarter:

- Clean Energy Communities Coordinators have helped 516 communities complete and submit 1,419 High Impact Actions, 1,264 of which were completed after program launch, through the Clean Energy Communities program.
- Two hundred thirty-three communities completed at least four High Impact Actions and became designated Clean Energy Communities.

4.4.7 Community Energy Engagement

In November of 2017, NYSERDA launched its Community Energy Engagement Program, 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 with 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. Additionally, the initiative focuses on improving energy affordability and increasing deployment of distributed energy resources for community members of all income levels, with a focus on low- to moderate-income (LMI) households and communities.

Ten competitively selected organizations provide engagement services in each of the 10 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. By engaging directly with residents, small businesses, and multifamily building owners, Community Energy Advisors will 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 will ensure the Community Energy Engagement Program makes the greatest impact.

Key accomplishments as of this quarter:

- Community Energy Advisors have conducted outreach to over 1,200 potential customers regarding clean energy opportunities, of which more than 300 expressed interest in applying for programs.
- Community Energy Advisors also continue to network and collaborate with partner organizations, including, but not limited to, contractors, local nonprofits, utility service representatives, and local social service agencies.
- Community Energy Advisors conducted targeted program outreach focused on promoting the Solar for All program and the Energy Study Aggregation Program.

4.5 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 2018 Annual Report, issued in October 2018, presents financial data for the approved GJGNY programs through June 30, 2018.

The 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.

Success Story 2:

New York State Supports Communities Using Clean Energy

RGGI funds continue to support the Clean Energy Communities initiative which recognizes local government leaders throughout the State for implementing energy efficiency, renewable energy, and sustainable development projects in their communities. Recent municipalities that earned the Clean Energy Community designation include the Village of Tully and the City of Oneonta. Once they receive the designation, communities often have the opportunity to apply for funding for additional clean energy projects.

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 GJGNY is nearly fully committed or expended. In order to maintain required elements of the Act, NYSERDA included GJGNY initiatives in the planning of the CEF.⁵ NYSERDA is working with stakeholders to incorporate lessons learned from GJGNY into CEF planning to ensure benefits from the GJGNY initiatives continue, particularly those benefitting the LMI sector.

4.5.1 Assessments

One- to Four-Family Residential Buildings Program Assessments

HPwES is a comprehensive energy efficiency services program for existing one- to four-family homes. Participating Building Performance Institute (BPI) GoldStar contractors conduct comprehensive home energy assessments and upgrades. Free and reduced-cost home energy assessments are available to homeowners in NYS through the GJGNY Act of 2009, which drives increased participation in this program and cuts additional GHG emissions.

Effective for new applications submitted as of January 1, 2017, GJGNY funded audits in territories not covered by the Clean Energy Fund or PSEG Long Island's HPwES Program, specifically municipal electric territories. NYSERDA's Home Performance with ENERGY STAR Program is using Clean Energy Funds for home energy assessments in participating electric utility territories and are reported separately.

Key accomplishments as of this quarter:

- A total of 121 GJGNY funded assessments were completed in Q3 and Q4, bringing the total to 99,569 residential GJGNY assessments completed with RGGI funds; 92,498 (93%) were provided at no cost to the customer.
- Of the program's cumulative 41,134 completed residential units that use a GJGNY assessment and/or GJGNY financing, 14,980 (36%) units are associated with income-qualified Assisted HPwES customers.
- Constituency-based organizations assisted with the completion of 2,944 units, or 7% of all completed GJGNY residential retrofits.

Multifamily Performance Program Assessments

Through GJGNY, the Multifamily Performance Program provides financing and co-funding for comprehensive energy assessments and the development of an Energy Reduction Plan (ERP), serving market-rate and low- to moderate-income residential buildings with five or more units to increase adoption of clean energy in NYS. The needs of the multifamily sector are addressed by working with developers, building owners, and their representatives to improve the energy efficiency, health, safety, and security of multifamily residential buildings—targeting potential participants who are committed to the implementation of energy-related improvements. NYSERDA offers incentives to install eligible measures outlined within the ERP. Each incentive is subject to funding availability from the EEPS or RGGI. Per-unit incentives are available for projects predicted to achieve the 15% energy reduction threshold. Additional performance payments apply to eligible projects that predict and achieve savings of more than 20%.

Key accomplishments as of this quarter:

- A total of 316 assessments were completed through December 2018, of these 50% are associated with affordable housing.
- Of the program cumulative 61,795 residential units served with installed measures, 30,853 units (50%) are associated with affordable housing.

Small Commercial Energy Efficiency Program Assessments

The GJGNY Small Commercial Energy Efficiency Program stopped accepting applications on December 31, 2016 and wrapped up all program activities in the first quarter of 2017. This program offered energy assessments and technical assistance to help small businesses and not-for-profit organizations improve their energy efficiency and reduce their energy costs to support the goal of increasing clean energy project adoption statewide. The program offered free energy assessments, along with technical assistance, to help identify economically viable improvements that could yield substantial annual energy savings. GJGNY offered energy assessments to small businesses and not-for-profits with an average electric demand of 100 kW or less and 10 employees or fewer. Regional firms were competitively selected by NYSERDA to provide assessments and technical assistance within this program opportunity.

Starting in Q1 of 2019, NYSERDA started offering subsidized energy studies (assessments) for GJGNY-eligible small businesses and not-for-profit organizations. Eligible⁶ small businesses and not-for-profit organizations may choose to receive an energy audit on a cost-shared basis via NYSERDA's FlexTech program⁷ or Energy Study Aggregation Program with a participating FlexTech Consultant.⁸

Key accomplishments:

- Through the program's end, February 2017, a total of 3,367 GJGNY-funded assessments had been completed.
- The 2015 Small Commercial Energy Efficiency Program Impact Evaluation reported 44% of the energy savings recommended through program audits were implemented, resulting in an estimated total of 1,481 GJGNY-funded completed projects through February 28, 2017.

4.5.2 Financing

One- to Four-Family Residential Financing

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

Key accomplishments as of this quarter:

- A total of 24,025 loans have been issued totaling \$282.6 million.
- Assisted HPwES customers make up 40% of the Home Performance loans issued, representing 30% of the total loan funds.
- A total of 8,009 OBR Loans have closed, valued at approximately \$112.8 million.
- Of the total 24,025 loans closed, 7,601 are solar electric loans valued at approximately \$126.9 million.
- Ten ground source heat pump loans have closed, valued at approximately \$202,000.
- There are 51 renewable heat or solar thermal loans of which 49% 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 quarter:

- Through December 31, 2018, 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 low-interest financing to help small businesses and not-for-profit organizations improve their energy efficiency and reduce their 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. Fifteen lenders have agreed to offer either Participation Loans or OBR loans.

Key accomplishments as of this quarter:

- A total of 44 OBR Loans have been closed with a total value over \$1.4 million, which represents 93% of the total financing value over \$1.5 million.
- A total of 31 Participation Loans have closed with a value of \$2.1 million. NYSERDA's share of the total value is \$999,892.

4.5.3 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 NYS. 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 NYS 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 June 2018, a total of 4,116 New Yorkers were trained in a range of energy efficiency and renewable energy courses.

While most GJGNY-funded training partnership agreements ended by December 2016, NYSERDA entered into an agreement in April 2017 with Green City Force (GCF), a Brooklyn-based provider of training and job placement support to disadvantaged young adults. Prior to the latest investment of GJGNY funding, GCF was under contract to offer clean energy training and internships to 75 program participants through a contract funded under the System Benefits Charge (SBC). The addition of \$60,000 in GJGNY funding has allowed GCF to expand its network of employer partners resulting in additional opportunities for internships, apprenticeships, and job placement for program participants and alumni. Additionally, participants and alumni now receive assistance with resume development, job readiness coaching, and job search assistance as well as support services including referrals to subsidized child care services and transportation assistance. GJGNY funding is being used to support these job development and placement services, and two full-time career and alumni managers have been hired to support program participants and graduates.

Through December 2018, a total of 121 students have participated in Green City Force's training program. Of those trained, 35 are currently employed in the clean energy sector, 18 have completed internships, and 19 are scheduled to begin internships with Green City Force's Social Enterprise team working on the New York City Housing Authority's (NYCHA) Energy Performance Contract projects. The remaining trainees are completing additional training/certification to better prepare them for internships and employment in the clean energy sector. As a result of site visits to Con Edison's Learning Center, two employed graduates work as Customer Service Representatives for Con Edison.

As part of their industry related training, current and former participants of Green City Force's training engaged in electrical training through Solar One, which provided participants introductory knowledge of electrical theory and hands-on experience wiring series and parallel circuits, three-way switches, lighting fixtures, and circuit breaker boxes—along with an overview of energy conservation methods and energy efficient lighting.

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 of this report.

4.6 NY Green Bank

NY Green Bank, a division of NYSERDA, is a \$1 billion investment vehicle established to attract private sector capital to accelerate clean energy deployment in NYS. NY Green Bank works to increase the size, volume, and breadth of clean energy investment activity throughout the State, expand the base of investors focused on NYS clean energy, and increase clean energy participants' access to capital. To do so, NY Green Bank collaborates with the private sector to develop transaction structures and

methodologies that overcome typical clean energy investment barriers. NY Green Bank focuses on opportunities that create attractive precedents, standardized practices, and road maps that capital providers can willingly replicate and scale. As funders "crowd in" to a particular area within the clean energy landscape, NY Green Bank moves on to other areas that have attracted less investor interest.

To solve client problems in real-time and address capital provider needs, NY Green Bank operates comfortably within private sector time horizons and commercial norms. Visit www.greenbank.ny.gov for more information on NY Green Bank's growing portfolio and how industry participants and capital providers can do business with NY Green Bank.

Key accomplishments as of this quarter:

- Closed six transactions from June 30, 2018 - December 31, 2018.
- Filed quarterly Metrics Report No. 16 on August 14, 2018 and No. 17 on November 14, 2018 with the Public Service Commission (PSC)
- NY Green Bank's overall investments to date reached \$675.0 million through December 31, 2018
- Continued to grow NY Green Bank cumulative revenues.
- Through ongoing business development activities, achieved an active pipeline of potential investments progressing towards close at the end of the quarter of \$574.0 million.

4.7 Program Evaluation

Several RGGI evaluation studies are underway or in the planning stages as of the fourth quarter of 2018. 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**⁹ 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, two major baseline studies received support from RGGI evaluation funds are described in the following sections.

4.7.1 Evaluation of Energy Efficiency and Other Deployment Programs

Home Performance with ENERGY STAR: The Green Jobs - Green New York (GJGNY) audit program was started in 2010 to provide homeowners in New York State free or reduced cost energy audits and encourage installation of energy efficiency measures through the Home Performance with ENERGY STAR (HPwES) Program. Customers who choose to install measures suggested in the audit can elect to either use a NYSERDA Home Performance contractor through HPwES or to install measures on their own. This second type of customer, a GJGNY audit-only recipient who installs measures outside of the HPwES Program, generates savings; however, these savings are not captured or recorded as contributing toward the State's energy goals. A study was completed in 2016 evaluating savings from audits conducted between December 2010 and August 2013. A follow-up study is slated to begin in mid-2019 and will encompass audits completed from 2014 to 2018.

An impact analysis of Home Performance GJGNY On-Bill Recovery projects is underway using pre- and post-retrofit energy bills. As appropriate, future results will be summarized in this report. In addition, an impact evaluation of Home Performance and EmPower New York is underway and will include RGGI funds; future results will be summarized in this report.

Industrial Innovations: Evaluation plans for this program may be considered in the future.

4.7.2 Building Stock Studies

NYSERDA has undertaken two major baseline studies to assess residential and commercial markets across a broad range of customer segments and energy measures. The goals of these studies are (1) to 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 NYS in the next three, five, and 10 years. Although these large studies are supported by SBC funding, RGGI funds are supplementing the budget to allow for robust data collection on fuel measures.

The Residential Baseline study was completed in the fourth quarter of 2014. The final report is available on NYSERDA's website and the data set is available on Open NY.¹⁰ A solicitation to update this study was issued in the second quarter of 2018 and draft results are expected in Q2 2019. The Commercial Baseline study is underway with an anticipated completion date of Q3 2019.

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 CO₂ Reductions

Emissions factors translate the energy savings data into annual GHG emissions 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,¹¹ emissions for gases other than carbon dioxide are converted into carbon dioxide equivalent units (CO₂e) through multiplication with their appropriate Intergovernmental Panel on Climate Change (IPCC) global warming potential value,¹² 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 ₂ O)	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 CO₂e values represent aggregate CO₂, CH₄, and N₂O 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 Sector¹³

	Transport (lb CO₂e/MMBtu)	Residential (lb CO₂e/MMBtu)	Commercial (lb CO₂e/MMBtu)	Industrial (lb CO₂e/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

A marginal emission factor of 1,160 pounds of CO₂e/MWh estimates emission reductions associated with electricity use reductions for all sectors.¹⁴ Although electricity savings may not lead to near-term emission reductions under the RGGI CO₂ cap, savings will potentially reduce imports of electricity to NYS; the demand for CO₂ 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

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 (AFTP)

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

F.1 Closed Programs

F.1.1 Green Residential Buildings Program (GRBP)

The Green Residential Building Program (GRBP), established under Public Authorities Law 1872, was a market transformation initiative designed to change the building practices of the residential construction industry for single-family homes and multifamily homes with up to 11 dwelling units. The GRBP offered incentives to owners who obtain a certification stating that their newly constructed residences meet or exceed Leadership in Energy and Environmental Design (LEED®) or National Green Building Standard guidelines, as well as other GRBP program-specific energy efficiency and health and safety requirements. Buildings meeting GRBP requirements will help reduce energy use and GHG emissions, save water and other natural resources, use sustainable building materials, reduce waste, and improve indoor air quality. Sixty-nine contractors participated in this program. Per the enabling law, the application deadline was October 31, 2013; therefore, the program is now closed to new applications. The following data represent only those projects where RGGI funded the incentive, which represents 82% of the program activity.

Key accomplishments:

- In Total, 440 RGGI-funded projects were completed.

F.1.2 Solar Thermal Incentive Program

NYSERDA's Solar Thermal Incentive Program incentivizes the installation of solar thermal technologies for the production of hot water to displace electric heated hot water systems. Approximately 100 contractors participate in this program. Accounting for funding from the Renewable Portfolio Standard (RPS) program to displace electrically heated domestic hot water, RGGI support for the Solar Thermal Incentive Program encourages the use of heating fuels other than electricity. GJGNY financing is also available for these projects.

The revised program, released on March 20, 2015, provides cash incentives for the installation of new solar thermal (hot water) systems by an eligible installer or contractor. Incentives are available on a first-come, first-served basis. Incentives are applied to the total project cost based on displaced kilowatt hours. The program allows combination systems (systems that provide domestic hot water and space heating); however, incentives are only provided on the portion of the solar thermal system output that offsets hot water production.

Key accomplishments:

- In total, 14,216 MMBtu's have been saved through 180 projects and their solar thermal contribution to domestic hot water.

F.1.3 Carbon Capture, Recycling, and Sequestration

This program area aims to build the State's capacity for long-term GHG emissions reduction by researching strategies to prevent emissions from releasing into the atmosphere. The program focuses on the following:

- Assessing and demonstrating carbon capture, reuse, compression, and transport technologies.
- Characterizing and testing the State's geological sequestration potential.
- Supporting the development of carbon capture and sequestration demonstration projects in NYS.

The program's largest supported project was TriCarb, located in Rockland County, NY. TriCarb leveraged NYSEERDA funding with more than \$8 million of U.S. Department of Energy funds to investigate the potential for geological sequestration in the Newark Basin.

Key accomplishments:

- The Newark Basin, extending through southeastern New York, northern New Jersey, and into eastern Pennsylvania, could potentially be used for the sequestration of carbon dioxide in the region surrounding New York City.
- This project characterized geological formations of the Newark Basin to determine whether these formations represent an opportunity for large-scale sequestration of carbon dioxide, through seismic analysis and gathering geological data.
- The geological characteristics of some of the formations do offer some potential for sequestration. More research would be needed before such an operation was undertaken.
- The project was completed in Q3 and has now been closed.

F.1.4 Advanced Buildings

Electricity and fossil fuel use in buildings are a major contributor of overall GHG emissions. The goal of the Advanced Buildings Program is to drive technology development and commercialization of innovative building technologies for existing buildings and new construction that offer greater energy efficiency, accelerate the integration of renewables into buildings, offer resiliency, and enable net zero energy building.

Key accomplishments:

- The final report for the Energiesprong/Transition Zero assessment has been completed. The report has been made public and will be used to drive interest in RetrofitNY.

F.1.5 Competitive Greenhouse Gas Reduction Pilot

This pilot program was initiated to support market-ready projects that reduce GHG emissions at electric generating facilities in the State. The projects selected were based on a combination of requested dollar-per-ton GHG emission reduction, expected level of GHG emission reduction, and the technical merit/replication of the project across the power plant fleet in NYS. It was anticipated that projects could include, but not be limited to, supply-side energy efficiency and advanced controls resulting in cost-effective GHG emissions reductions.

Key accomplishments:

- Both projects awarded under this program continue operating with improved performance. The Con Ed East River Generating Station CGGR project completed its third and final year of operation and resulted in a 453% improvement in emissions rate reduction post modification. The project has also delivered emissions benefits of 83% and 393% reductions in its first and second year of operation respectively. The Caithness Long Island Energy Center CGGR has delivered emission reductions of 143% and 83% in its first two years of operation.

Due to historic poor participation in this pilot program, the program was terminated in Q4 2016 and no further requests for proposal will be sought. The two projects awarded under the first program RFP will continue to be managed to verify performance and final results will be reported in mid-2019.

F.1.5 Municipal Water and Wastewater Program

The Municipal Water and Wastewater Program provided a unique opportunity to coordinate RGGI climate change goals and funding with American Recovery and Reinvestment Act (ARRA) and the EPA goals and funding while installing infrastructure to improve the environment and keep NYS waters clean and healthy. This program was co-managed by the NYS Environmental Facilities Corporation (EFC) and NYSERDA. EFC secured ARRA and Green Project Reserve Funds from the EPA to bolster efforts to finance wastewater infrastructure via the Clean Water State Revolving Fund Program. Wastewater plants installed through the program are energy-efficient, thus minimizing carbon emissions and improving their economic and environmental performance.

Selected projects received RGGI-funded technical analyses to identify costs and savings associated with energy efficiency, process improvement, and carbon abatement opportunities in support of EPA-funded grants and financing for plant upgrades. The program was one of five national recipients of the States Stepping Forward Program Award for excellence by the American Council for an Energy-Efficient Economy.

Key accomplishments:

- Technical energy analyses completed for projects in 59 communities.
- Through January 2017:
 - Communities have installed systems resulting in annual savings of 19,503 MWh and 51,425 MMBtu.
 - New York City was still installing systems which will result in additional annual savings of 13,336 MWh.

F.1.6 Multifamily Carbon Emission Reduction Program

The Multifamily Carbon Emissions Reduction Program (MCERP) provided financial assistance and technical support to owners of multifamily buildings converting their heating systems from #6 fuel oil to cleaner fuel alternatives. Less carbon-intensive fuels include ultra-low sulfur #2 fuel oil, biodiesel and biodiesel blends, natural gas, and renewable energy (geothermal and solar thermal). MCERP was positioned to encourage early adoption of New York City's phase-out of #6 oil and, as such, has contributed to an overall improvement in NYC's air quality. Converting #6 fuel oil-heated buildings to cleaner fuels reduces carbon emissions, improves air quality, and produces positive public health

benefits. City-wide conversions have resulted in 69%and 23%reductions in airborne sulfur dioxide and soot concentrations, respectively. These benefits are concentrated in low-income areas of NYC, where poor air quality leads to higher rates of asthma and other respiratory illnesses, especially in children and the elderly.

Key accomplishments:

- In total, 144 multifamily buildings have converted from burning #6 oil to cleaner alternatives, primarily natural gas or a blend of natural gas and #2 oil, through the Multifamily Carbon Emissions Reduction Program.

F.1.7 Economic Development Growth Extension Program (EDGE)

The EDGE Program facilitated by Regional Outreach Contractors performs on-the-ground outreach, education, and marketing of NYSERDA program opportunities to residents, businesses, institutions, and local governments across the State to promote the value of energy efficiency, sustainable growth practices, clean energy technologies, and innovations using carefully constructed public-private partnerships. The program aligns with Governor Cuomo’s Regional Economic Development Council (REDC) initiative and provides direct support to advance the strategic priorities and regionally significant projects identified in each region. NYSERDA is providing a greater level of education and adoption of energy efficiency and renewable energy practices at the community level.

The EDGE Program concluded April 30, 2016. In August of 2016, NYSERDA launched the Clean Energy Communities Program, which builds upon the successes of the EDGE Program. The Clean Energy Community Program provides grants, direct technical support to communities, and recognition to local governments that demonstrate leadership in the area of clean energy.

Key accomplishments:

- A total of 1,102 partnerships were developed that may help to identify and assist in customer engagement.
- A total of 1,489 public outreach activities, such as events, presentations, or other speaking engagements were conducted.
- A total of 4,117 projects were referred to various NYSERDA programs.
- A total of 3,215 project referrals from partners were received.

F.1.8 Emerging Technology/Accelerated Commercialization Program

NYSERDA's Emerging Technology/Accelerated Commercialization (ETAC) initiative seeks to accelerate market uptake of commercially available, but underused building technologies and strategies, in the residential sector that will deliver significant and measurable energy savings and GHG emissions reductions. While NYSERDA recognizes the significant value in the ETAC program and its alignment with RGGI investment objectives, funds previously allocated to this program were repurposed for other initiatives. The ETAC program continues to seek to identify and overcome barriers to full market adoption of new and/or underutilized technologies through other NYSERDA program resources.

F.1.9 Climate Smart Communities

Established in 2009, the Climate Smart Communities (CSC) Program is comprised of a network of local governments across the State that have committed, by adopting the Climate Smart Communities Pledge, to reduce greenhouse gas (GHG) emissions and better prepare for unavoidable changes in climate. In addition to NYSERDA, the CSC program works in partnership with five other State agencies: The DEC, the Department of State (DOS), the Public Service Commission (PSC), the Department of Transportation (DOT), and the Department of Health (DOH).

In March 2011, NYSERDA issued a competitive solicitation to select contractors for a three-year CSC Regional Coordinators Pilot Program. The goal of this pilot program is to create and implement a strategic plan for engaging local governments in the CSC program, producing measurable results for climate protection and adaptation within each region, and developing important elements of guidance for local governments. The main outreach and technical assistance components of the three-year pilot program ended in November 2015. NYSERDA will continue to offer similar outreach and technical assistance to communities through the new Clean Energy Communities program which launched in August of 2016. In the meantime, NYSERDA is working with utilities to ensure that communities have access to their aggregated energy use data for clean energy and sustainability planning purposes.

Key accomplishments as of this quarter:

- NYSERDA is continuing to work with the Joint Utilities to build out the Utility Energy Registry, a statewide platform designed to collect aggregated energy use data for communities on an ongoing basis. In April 2018, the Public Service Commission issued the Order Adopting the Utility Energy Registry (Case #s 17-M-0315, 16-M-0411, and 14-M-0224). NYSERDA expects to make data available on its website in Q3 2018, with full-platform launch in Q4 2018.

F.2 Completed Evaluations

F.2.1. Green Jobs - Green New York Jobs Quantification Study

This study quantified the direct, indirect, and induced jobs created/retained from the GJGNY program, including those in disadvantaged communities. The study also examined changes in worker skill level and wages resulting from GJGNY. NYSERDA issued the final reports for both phases of the study in November 2013. Both Phase 1 and Phase 2 reports are posted on NYSERDA's website.¹⁵ An update to the 2013 study was completed in two phases in the fourth quarter of 2016. This update is available on NYSERDA's website.¹⁶

F.2.2. Multifamily Performance Program Process/Market Evaluation

A major Process/Market Evaluation of the SBC/EEPS-funded MPP was undertaken to assess the RGGI fuel efficiency incentive activity and GJGNY assessment/loan activity. This study was finalized in the third quarter of 2014 and published on the NYSERDA website.¹⁷

F.2.3. Multifamily Performance Program Impact Evaluation

A major Impact Evaluation of the SBC/EEPS-funded MPP assessed the effects of RGGI fuel efficiency incentives. The work included measurement and verification of energy savings, and attribution analysis of projects completed from 2009 through 2011. The finalized study is available on NYSERDA's website.¹⁸

F.2.4. Economic Development Growth Extension Process Evaluation

A Process Evaluation for this program was finalized in the third quarter of 2015 and published on the NYSERDA website.¹⁹

F.2.5. Multifamily Carbon Emission Reduction Program

An Impact Evaluation for this program measured and verified the energy and emission effects attributable to the program. This evaluation was completed in the fourth quarter of 2015. The final report is available on NYSERDA's website.²⁰

F.2.6. GJGNY Small Commercial Energy Efficiency Program

NYSERDA conducted an Impact Evaluation to quantify the measure adoption rate over time and the degree to which the audit program influenced participants' decision-making regarding recommended measures that they have installed. The study was finalized in December 2015 and reported 44% of the recommended energy savings were implemented. The final report is available on NYSERDA's website.²¹

F.2.7. Cleaner Greener Communities (CGC) Program

A process evaluation of NYSERDA's Cleaner Greener Communities (CGC) program was completed in two waves and finalized in the second quarter of 2016. Wave One of this evaluation research was completed revealing a number of opportunities for NYSERDA to help regions implement their Phase I plans and achieve their sustainability goals. Wave Two revealed opportunities for communities to overcome common barriers to engaging in efficiency and sustainability activity and to encourage further investment in sustainability across the State's diverse regions. A summary of the findings from Waves One and Two are posted on NYSERDA's website.²²

F.2.8. GJGNY Constituency-Based Organization (CBO) Program

The assessment of CBO-related activities is complete. This assessment was coordinated with HPwES process evaluation and includes surveys with CBO-affiliated HPwES participants, partial participants (GJGNY audit recipients), and contractors. This study was finalized in the fourth quarter of 2015 and is available on NYSERDA's website.²³

F.2.9. Home Performance with ENERGY STAR Program

A Process/Market Evaluation of the SBC/EEPS-funded HPwES was utilized to assess the RGGI fuel efficiency incentive activity and GJGNY assessment/loan activity. This Process/Market Evaluation study was completed in Q4 2015 and is available on NYSERDA's website.²⁴

Home Performance with ENERGY STAR Program: An Impact Evaluation of the Green Jobs - Green New York "assessment only" was completed in the fourth quarter of 2016. This evaluation assessed the impacts of those who received a GJGNY-funded audit and installed measures on their own in the absence of incentives.²⁵

The impact evaluation of HPwES unregulated fuels²⁶ projects was finalized in the fourth quarter of 2016 and published on NYSERDA's website.²⁷ The projects (completed in 2011 through 2013) encompassed cost-effective oil and propane efficiency measures, such as replacing inefficient oil and propane heating equipment and other measures that have a direct impact on reducing GHG emissions from oil and propane consumption.

F. 2.10. Green Jobs - Green New York Jobs Quantification Study

Green Jobs - Green New York Jobs Quantification Study: An update to the 2013 study on this topic was completed in the fourth quarter of 2016. This study quantified direct, indirect, and induced jobs created or retained from the GJGNY program, including those in disadvantaged communities. The study examined changes in worker skill level and wages resulting from GJGNY. The results of the two phases of this study are available on NYSERDA's website.²⁸

F.2.11. Advanced Transportation Research Program

A Logic Model for this program was completed in Q3 2015 and published on the NYSERDA website.²⁹ Six Impact/Market Impact case studies for a select group of program-supported technologies were completed in Q1 2017 and published on the NYSERDA website.^{30,31,32,33,34,35}

F.2.12. Community Solar NY Program

A Logic Model report for this program was finalized in Q3 2015 and published on the NYSERDA website.³⁶

F.2.13 Residential Non-Energy Impact Study

A study was conducted to identify and begin to quantify measurable non-energy effects from residential programs, including HPwES and the Green Residential Building Program. This study was jointly supported with RGGI and other NYSERDA funds. The major results show that insulation, ENERGY STAR home design, and air sealing measures are the readiest for a cost-effective primary research effort to further substantiate their related NEI values for enhancing program design, marketing efforts, and cost-benefit analysis. The study was finalized in Q1 2017 and is posted on NYSERDA's website.³⁷

F.2.14. Wastewater Energy Efficiency Program

An impact evaluation of the Wastewater Efficiency Program was completed in the first quarter of 2017. The Program provided objective and customized energy-related information and opportunities to customers that targeted the customer's specific energy and business needs. The impact evaluation confirmed the study-recommended savings that customers adopted. The study is available on NYSERDA's website.³⁸

F.2.15. Advanced Transportation Research

An impact evaluation of the Wastewater: A Logic Model for this program was completed in Q3 2015 and is posted on NYSERDA website.³⁹

F.2.16. Advanced Transportation Research

A Market Characterization Assessment of the Transportation Program was completed in the second quarter of 2017. This assessment focused on three areas: electric vehicles, public transportation, and mobility management. "Mobility management" encompasses a variety of strategies designed to reduce transportation demand and congestion, including intelligent and adaptive transportation systems and transportation demand management. This market assessment includes a description of the current state of the clean transportation market in New York State and the identification of remaining barriers to adoption in key market segments that will be used for planning and strategy development by the Transportation Program. The findings of this assessment are provided a five-volume market characterization analysis of clean transportation in New York State and available on the NYSERDA website.⁴⁰

F.2.16. Clean Energy Business Development

A Market Characterization of NYSERDA's Clean Energy Business Development (CEBD) program was finalized in the second quarter of 2017. This evaluation research found that the NYS cleantech ecosystem is vibrant, with many active early-stage companies commercializing cleantech innovations, and a rich array of resources is available to support the NYS entrepreneurial ecosystem. While there are many early-stage companies, they face significant hurdles in growing at the speed and scale that may be possible. Access to resources is uneven and can be time-consuming, which can impede company growth. A summary of the findings from this research are posted on NYSERDA's website.⁴¹

F.2.17. Power Systems Program

An Impact Evaluation of the Clean Power Technology Innovation (CPTI) program, previously known as the Power Systems program, was completed in the second quarter of 2017. This evaluation was conducted in two phases. Phase 1 included a review of the contracts funded by CPTI to better understand the scope of funding recipients and to prioritize activities for Phase 2. The Phase 2 research consisted of an in-depth investigation of three Core Product technologies identified during Phase 1: PV, wind, and energy storage. The maturation of the products funded by the program, as well as the grantees' perceptions of the value of NYSERDA funding, operational activities, and project support were evaluated. Findings from this research are posted on NYSERDA's website.⁴²

Endnotes

- ¹ These metrics represent the benefits that can be discretely counted at this time and typically associated with traditional deployment programs. These programs include Green Jobs - Green New York, Residential Efficiency Services, NY-Sun, Renewable Heat NY, and LIPA Efficiency and Renewable Energy. These metrics do not reflect emission reductions, participant bill savings, and other possible benefits resulting from non-deployment programs such as Transportation Research and Clean Energy Communities. Therefore, the benefits associated with the overall RGGI portfolio are anticipated to be greater than the subset of programs represented here.
- ² Cumulative annual benefits are reflective of the annual impacts from all currently operational projects installed, projects under a signed contract and projects with an application received that are not yet operational since program inception. Expected lifetime benefits are reflective of the total impacts over the entire effective useful lifetime of the measures associated with all currently operational projects installed, projects under a signed contract and projects with an application received that are not yet operational since program inception. Please see Table A-4 in Appendix A for the measure-life assumptions.
- ³ 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.
- ⁴ Low-rise residential new construction is a dwelling unit(s) contained within residential buildings of not more than three stories in height. Additionally, residential buildings that are more than three stories in height and determined to be eligible to participate in the EPA's ENERGY STAR® Certified Homes program are considered for eligibility on a case-by-case basis. Dwelling units "gut-rehabbed" or fully rehabilitated are also considered by NYSERDA for eligibility on a case-by-case basis.
- ⁵ 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.nyserdera.ny.gov/About/Clean-Energy-Fund> for more details regarding CEF planning.
- ⁶ Small businesses and not-for-profit corporations must pay a System Benefits Charge through their electric utility to be eligible for these NYSERDA programs.
- ⁷ Visit nyserdera.ny.gov/All-Programs/Programs/FlexTech-Program for information about NYSERA's FlexTech Program.
- ⁸ Visit nyserdera.ny.gov/All-Programs/Programs/Energy-Study-Aggregation-Program for information about NYSERDA's Energy Study Aggregation Program.
- ⁹ Formerly known as Evaluability Assessment.
- ¹⁰ Residential Statewide Baseline Study of New York State, nyserdera.ny.gov/Residential-Statewide-Baseline-Study-of-New-York-State.aspx and the associated data on Open NY (<https://data.ny.gov/en/browse?q=RSBS>)
- ¹¹ 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.
- ¹² 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.
- ¹³ 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.nyserdera.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).

- 14 With the submittal of its Clean Energy Fund Investment Plan Budget Accounting and Benefits Chapter on February 22, 2016, NYSEDA adopted the NYS Public Service Commission’s recommendation in its January 21, 2016 Order Establishing the Benefit Cost Analysis Framework that New York’s GHG emissions factor methodology shift from an average grid emission profile to a marginal grid emission profile. Due to this shift, beginning in 2016, New York’s factor to calculate GHG emissions reductions has changed from 625 pounds CO₂e/MWh to 1,160 pounds CO₂e/MWh. The emissions reductions calculated for this report reflect the new factor of 1,160 pounds CO₂e/MWh.
- 15 The GJGNY jobs quantification studies, Phase 1 and Phase 2, are on NYSEDA’s website: nyserda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/NYES-Evaluation-Contractor-Reports/2013-Reports/NMR-Group.aspx
- 16 Assessment of Job Impacts of the Green Jobs-Green New York Program (Phase 1), <https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/GJGNY-Jobs-Analysis-Phase-I.pdf>. Economic Impacts of the Green Jobs-Green New York Program (Phase 2), <https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/GJGNY-Jobs-Analysis-Phase-II.pdf>
- 17 Multifamily Performance Program/Process Evaluation and Market Characterization, nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-MPP-Process-Evaluation.pdf
- 18 Multifamily Performance Program Impact Evaluation (2009–2011), nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/Evaluation-Contractor-Reports/2015-Reports
- 19 Economic Development Growth Extension Process Evaluation, nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/economic-development-growth-extension-process-evaluation.pdf
- 20 RGGI Multifamily Carbon Emissions Reduction Program Impact Evaluation (2011–2012); http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/MCERP_IMPT_RP_FINAL.pdf
- 21 GJGNY Small Commercial Energy Efficiency Program, <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-Small-Comm-Impact-Evaluation-July-2010-December-2013.pdf>
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