

New York State's Regional Greenhouse Gas Initiative Investment Plan

2018 Operating Plan

Final Report | December 2018

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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.

New York State's Regional Greenhouse Gas Initiative Investment Plan

2018 Operating Plan

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Albany, NY

December 2018

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Acronyms and Abbreviations

BNL	Brookhaven National Laboratory
CBETA	Cornell-Brookhaven Energy Recovery Line Test Accelerator
CEF	Clean Energy Fund
CGC	Cleaner Greener Communities
CH ₄	methane
CIGS	copper indium gallium selenide
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
CU	Cornell University
DC	direct current
DEC	New York State Department of Environmental Conservation
DOE	U.S. Department of Energy
EEPS	Energy Efficiency Portfolio Standard
EIC	electron-ion collider
EPA	U.S. Environmental Protection Agency
eRHIC	Electron Relativistic Heavy Ion Collider
ERL	Energy Recovery Line
FY	fiscal year
GHG	greenhouse gas
GJ-GNY	Green Jobs-Green New York
GW	gigawatts
HPwES	Home Performance with ENERGY STAR®
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt-hours
LIPA	Long Island Power Authority
LMI	low- to moderate-income
MMBTU	million British thermal units
MPP	Multifamily Performance Program
MW	megawatts
MWh	megawatt hour
N ₂ O	nitrous oxide
NYCRR	New York Codes, Rules, and Regulations
NYGATS	New York State Generation Attributes Tracking System
NYPA	New York Power Authority
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
PEV	plug-in electric vehicle

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

Summary of Benefits

The Regional Greenhouse Gas Initiative (RGGI) portfolio of programs will reduce and avoid greenhouse gas and other air pollutant emissions and demonstrate New York State’s commitment to its environmental goals. Specifically, program investments listed in this update of the operating plan are anticipated to result in significant CO₂e emission reductions, energy savings, and bill savings as presented in Table 1.

Table 1. Anticipated Remaining RGGI Benefits by Program

Program	Costs (millions of dollars)		Net Energy Savings (MMBtu)		Net Electricity Savings or Renewable Energy Generation (MWh)		Net Greenhouse Gas Emission Savings ^a (Tons CO ₂ e ^b)		Cost Benefit Ratio (\$/Ton CO ₂ e)	
	Total Incentives ^c	Total Associated Costs ^d	Annual Savings ^e	Lifetime Savings ^f	Annual Savings ^e	Lifetime Savings ^f	Annual Savings ^e	Lifetime Savings ^f	\$/Ton Annual CO ₂ e Savings ^g	\$/CO ₂ e EXPECTED LIFETIME Savings ^h
Green Jobs - Green New York										
One-to Four-Family Residential Buildings Program Financing	\$59.8	\$9.0	449,639	10,341,687	57,242	1,087,598	65,829	1,381,273	50	47
Energy Efficiency										
LIPA Energy Efficiency and Renewable Energy Initiative	\$73.0	-	8,798	-	174,791	3,146,243	102,052	1,840,975	40	40
Multifamily Performance Program	\$2.8	\$0.4	109,425	1,702,881	4,868	63,285	10,377	155,013	21	13
EmPower New York	\$0.7	\$0.05	4,262	102,291	-	-	313	7,512	100	75
Home Performance with ENERGY STAR [®]	\$1.2	\$0.15	18,103	434,475	100	1,795	1,507	35,811	37	37
Solar Hot Water (Thermal) Program	\$0.1	\$0.004	389	7,785	1	12	29	579	200	113
Renewable Energy										
Renewable Heat New York	\$0.3	\$0.04	164	3,287	30	602	85	1,699	191	115
NY-Sun Initiative ⁱ	\$27.7	\$0.6	-	-	112,431	2,810,781	65,210	1,630,253	17	14
NYSERDA Solar Electric ^j	\$5.2	\$0.1	-	-	8,948	223,706	5,190	129,750	41	41
Innovative GHG Abatement Strategies										
Charge NY ^k	\$16.9	\$7.8	472,022	4,720,222	-	-	1,804	4,720,222	5	761
Clean Energy Fund										
Clean Energy Fund ^l	\$3.5	\$0.9	3,702	58,733	346	5,753	396	58,733	76	7
TOTAL Anticipated Benefits^m	\$191.2	\$19.1	1,066,504	17,371,361	358,757	7,339,774	252,791	9,961,819	778	1,262

^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 Annual Savings multiplied by the lifetime of the measure installed

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

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

ⁱ This initiative was referred to as “NY-Sun Long Island” in previous versions of the RGGI Operating Plan

^j This initiative was referred to as “NY-Sun NYPA” in previous version of the RGGI Operating Plan

Table notes continued on the next page

Table 1 notes continued

- ^k Net Energy Savings values represent MMBtu savings from the use of electric vehicles; the electricity required to charge the vehicles is 14,337 MWh cumulative annual and 143,366 MWh lifetime. Expected Emission reductions and customer bill savings are net, including both MMBtu that add to the benefits and the electricity required to charge the electric vehicles that subtract from the benefits.
- ^l These figures represent a proportional allocation of benefits relative to the percent of RGGI contributions to the total approved CEF budget.
- ^m Totals may not sum exactly due to rounding.

The Summary of Benefits provides a quantitative estimate of the benefits associated with deployment programs. Green Jobs - Green New York, Long Island Power Authority (LIPA) Efficiency and Renewable Energy, Multifamily Performance Program, EmPower, Home Performance with ENERGY STAR[®], Solar Thermal, Renewable Heat, NY-Sun, Charge NY, and the Clean Energy Fund (CEF) are the deployment program areas that are expected to realize savings during the current Plan timeframe.

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

For the purpose of this report, cumulative lifetime benefits have been calculated for total program investments made through March 31, 2018. Anticipated benefits over the timeline of this budget proposal have been calculated.

Benefit achievements are updated on a quarterly basis and can be found in New York State's RGGI-Funded Programs Status Report which are available on NYSERDA's website at: nyserdera.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports.

1 Introduction

1.1 Background

Through the Regional Greenhouse Gas Initiative (RGGI), New York State and its partner states have pioneered the nation's first market-based, cap-and-invest program to help control the carbon dioxide (CO₂) emissions contributing to global climate change. Just as the RGGI program serves as a model for a national greenhouse gas (GHG) emissions reduction strategy, New York State is also creating a national model through its RGGI Operating Plan, demonstrating how strategic investments across disciplines and across the economy can support comprehensive strategies that best advance the CO₂ emission reduction goals of the State.

New York State maintains a robust portfolio of clean energy programs, and proceeds from the sale of RGGI CO₂ allowances are used to supplement existing policies and programs. The plan is structured to result in immediate emission reductions, while building capacity for long-term carbon emissions mitigation action. In accordance with State regulations, this plan implements activities to reduce carbon emissions and pollution through energy efficiency, renewable energy, and support for innovative carbon abatement strategies.

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

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

- Provide substantial benefits to consumers and the environment, resulting in GHG emission reductions from both electricity and other energy sources. By deploying a range of energy efficiency and renewable energy technologies, New York State can realize GHG emissions reductions in the near-term and provide valuable information to consumers and supply-chain participants for self-sustaining markets in these activities.

- Empower communities to make decisions about energy usage that will lead to lower GHG emissions as well as economic and societal co-benefits. By supporting sustainability planning and implementation of those plans, communities and individuals can guide decision-making that improves localities and simultaneously reduce statewide GHG emissions.
- Employ innovative approaches to increase the adoption of clean energy alternatives in New York State. By using new financing strategies or program approaches targeting specific uses, the portfolio creates an opportunity to increase penetration of existing programs and expands the reach of clean energy programs to communities that may not traditionally take advantage of these options.
- Stimulate new technology development and create a strong clean energy business environment. By supporting entrepreneurial growth, RGGI can advance new economic development strategies for New York State that help to expand the economy and support innovative State products and services that can be exported across the country or around the world.
- Build capacity for long-term GHG reduction. By training workers and partnering with industry, the RGGI program portfolio enables transformative activities through implementation of carbon-reducing projects.

The use of RGGI funds complements activities articulated by Clean Energy Fund (CEF) investment plans. RGGI-funded programs create synergies with existing efficiency and clean energy programs, and furthermore, advance the stated RGGI policies and intended outcomes. The statewide goals of reduced GHG emissions, reduced energy use, accelerated growth in the State’s clean energy economy, increased energy efficiency, increased fuel diversity (measured by the overall proportion of renewable electricity generation), reduced criteria pollution and low-income home weatherization are, therefore, enhanced by these complementary resources. As such, the plan is not designed as a standalone portfolio of program activities, nor are RGGI proceeds relied upon as a sole source to achieve the State’s contribution towards national or global carbon mitigation goals. Rather, the plan should be considered in context of the other policies and programs that help reduce greenhouse gas emissions, and has been designed to strengthen and enhance the comprehensive statewide energy policy to best leverage the State’s collective resources to achieve its clean energy goals.¹ In short, RGGI will continue to complement NYSERDA’s future program activities aimed at reducing greenhouse gas emissions in New York State.

¹ See “The Energy to Lead: 2015 New York State Energy Plan” available at <http://energyplan.ny.gov>.

Building from the September 2015 version of the RGGI Operating Plan, this plan incorporates feedback and direction received during a public stakeholder meeting in December 2017 and subsequent written comments from stakeholders. The scope and approach for allocating the anticipated proceeds was approved by NYSERDA's Board of Directors in January 2018. Overall, the plan covers program investments comprised of the following RGGI funds:

- Anticipated proceeds from auctions to be held during fiscal years 2018–21
- Remaining program funds from prior auction proceeds

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

1.2 Regulatory Context

RGGI is a nine-state cooperative effort to reduce GHG emissions from electric power plants by means of a cap-and-trade system.² Under RGGI, the participating states initially designed cap-and-trade programs that cap CO₂ emissions from power plants through 2015 and then lower the cap by 10% by 2018.

The RGGI participating states complete periodic program reviews that include a comprehensive evaluation of program success, program impacts, additional reductions, imports and emissions leakage, and offsets. The first regional RGGI Program Review was completed in early 2013 and in December 2017 the participating states completed a second regional program review resulting in updated Model Rule.³

Each state is implementing this initiative through individual CO₂ Budget Trading Programs linked through the regional cap-and-trade program. Additional background on the initiative can be found at <http://www.rggi.org>.

² The RGGI-participating states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

³ https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf

In New York State, the RGGI Program has been implemented through two complementary programs: The New York State Department of Environmental Conservation (DEC) established New York State's CO₂ Budget Trading Program (6 NYCRR Part 242, 6 NYCRR Part 200, General Provisions) and NYSERDA established the CO₂ Allowance Auction Program (21 NYCRR Part 507).

The CO₂ Allowance Auction Program established the rules through which New York State will sell most of its CO₂ allowances. The CO₂ Allowance Auction Program [at 21 NYCRR Part 507.4(d)] also creates the parameters for use of the proceeds from the sale of allowances that will be used to “promote and implement programs for energy efficiency, renewable or non-carbon emitting technologies, and innovative carbon emissions abatement technologies with significant carbon reduction potential.” The plan is designed to be consistent with these regulatory requirements.

1.3 Program Goals

New York State invests RGGI proceeds to support comprehensive strategies that best achieve the RGGI CO₂ emission reduction goals, which reduce global climate change and pollution through energy efficiency, renewable energy, and carbon abatement technology. Investments will be focused on a complementary mix of electricity-related GHG reduction opportunities and technologies, as well as strategies for reductions related to the use of petroleum and natural gas.

Deploying commercially available renewable energy and energy efficiency technologies helps to reduce GHG emissions in the short term. To move the State toward a more sustainable future, RGGI-funded programs work to empower communities to make decisions about energy usage that lead to lower carbon emissions as well as economic and societal co-benefits. RGGI-funded programs also help to build capacity for long-term GHG reduction by training workers and partnering with the clean energy 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. These activities use funds in ways that accelerate the uptake of low-emitting technologies.

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

1.4 Program Focus and Geographic Scope

RGGI funds have historically been used to support programs ineligible for funding from other sources. Similarly, today RGGI-funded activities complement and enhance CEF initiatives.⁴

Geographic equity of expenditures and benefits will be pursued across the portfolio of programs; however, not on a program-by-program basis. Certain programs may have a limited geographic focus, but most will be statewide in scope. Outreach activities may be tailored to different regions. Program monitoring and evaluation may lead to adjustments in offerings, such as changes in incentive levels.

1.5 Portfolio Development Criteria

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

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

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

⁴ NYSERDA’s CEF supplement is available at:
<http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={FC3FBD53-FBAC-41FB-A40E-3DA0A5E0866A}>

Consistent with Part 242-10.3(d)(3), projects that receive funds under a program covered in the plan are not eligible to pursue CO₂ Emissions Offset credits under the CO₂ Budget Trading Program, with the exception of agricultural methane projects. All entities, including compliance entities, may pursue projects under any of the proposed programs in the plan.

2 Overview of Program Funding

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

- Estimated future proceeds from fiscal years 2018–21
- Remaining program funds

2.1 Assumptions about Auction Proceeds for Operating Plan

Estimated auction proceeds for fiscal years 2018–21 are collectively anticipated to exceed \$330 million. For planning purposes, it was assumed that the average 2018 allowance price would be \$5.05, the average 2019 allowance price will be \$5.35, and the average 2020 allowance price will be \$5.68. The planning horizon for this operating plan is three fiscal years in order to bring commitments in line with projected future revenue by the end of the three-year period.

2.2 Summary of Proceeds Investment by Program

Table 2 provides a summary of proceeds investment by program and shows how the approximately \$1,445 million of program funds made available through RGGI auctions have been, or will be, allocated among programs and other costs through fiscal year 2021.

The table shows cumulative allocations through March 2018 and reflects the planned and actual allocations for fiscal years 2018–2021. The table also summarizes the allocation of all current and planned proceeds through March 31, 2021.

Table 2. RGGI Revenue and Funding Allocation Plan

	Program	Cumulative Allocations through March 31, 2018	FY 18-19 Plan	FY 19-20 Plan	FY 20-21 Plan	Cumulative Allocations through March 31, 2021
Proceeds	Number of allowances	350,795,050	21,094,177	20,298,765	20,531,664	412,719,656
	Allowance price	\$3.14	\$5.05	\$5.35	\$5.68	\$3.47
	RGGI Auction Proceeds	1,099,822,149	106,586,042	108,655,989	116,577,981	1,431,642,160
	Interest Earnings	13,338,487	191,000	108,000	87,000	13,724,487
	Total Revenues	1,113,160,636	106,777,042	108,763,989	116,664,981	1,445,366,647
Renewable Energy	NY SUN NYPA incentives (Solar Electric)	20,000,000	-	-	-	20,000,000
	NY SUN Community Solar/K-solar	7,500,000	-	-	-	7,500,000
	NY SUN Long Island incentives	55,000,000	-	-	-	55,000,000
	Renewable Heat NY	10,300,083	-	-	-	10,300,083
	Advanced Renewable Energy	2,856,074	-	-	-	2,856,074
	NYS Generation Attributes Tracking System	789,933	-	-	-	789,933
	NYSERDA PV incentives	5,319,821	-	-	-	5,319,821
Energy Efficiency	Clean Energy Workforce Opportunity Program	15,000,000	-	-	-	15,000,000
	LIPA Efficiency and RE	153,650,000	25,950,000	25,000,000	25,000,000	229,600,000
	EmPower NY	27,330,148	200,000	200,000	200,000	27,930,148
	Home Performance with Energy Star	25,145,757	300,000	300,000	300,000	26,045,757
	Multifamily Performance Program	16,591,791	-	-	-	16,591,791
	Multifamily Carbon Emissions Reduction	5,833,021	-	-	-	5,833,021
	Solar Thermal incentive	4,342,677	-	-	-	4,342,677
	Municipal Water/Wastewater	1,245,242	-	-	-	1,245,242
	Green Residential Buildings	2,744,601	-	-	-	2,744,601
Innovative GHG Abatement Strategies	Electric Vehicle/Charge NY	17,000,000	6,500,000	5,000,000	-	28,500,000
	Southern Tier Competition (76West)	11,000,000	-	-	-	11,000,000
	Brookhaven National Lab-ION Collider	25,000,000	-	-	-	25,000,000
	Advanced Buildings	1,572,248	-	-	-	1,572,248
	Industrial Innovations	13,043,987	-	-	-	13,043,987
	Climate Research & Analysis	8,735,913	-	-	-	8,735,913
	Competitive GHG Reduction Pilot	1,013,533	-	-	-	1,013,533
	Clean Energy Business Development	8,257,924	-	-	-	8,257,924
	Transportation Research	3,932,086	-	-	-	3,932,086
	PV Manufacturing consortium	8,500,000	-	-	-	8,500,000
	Carbon Sequestration	1,000,000	-	-	-	1,000,000

Table 2 continued

	Program	Cumulative Allocations through March 31, 2018	FY 18-19 Plan	FY 19-20 Plan	FY 20-21 Plan	Cumulative Allocations through March 31, 2021
Community Clean Energy	Cleaner Greener Communities	99,127,115	-	-	-	99,127,115
	Clean Energy Communities	2,800,000	-	-	-	2,800,000
	Climate Smart Communities	7,674,999	-	-	-	7,674,999
	Community Energy Engagement	1,400,000	-	-	-	1,400,000
	Economic Development Growth Extension	5,843,047	-	-	-	5,843,047
	Energy to Lead	3,000,000	-	-	-	3,000,000
	NY Prize Phase 3 (Placeholder - Long Island Projects)	-	8,000,000	-	-	8,000,000
	Regional Economic Development & GHG Reduction	10,293,230	-	-	-	10,293,230
CEF	Transfer to Clean Energy Fund	56,250,000	2,228,156	2,228,156	2,228,156	62,934,468
	Transfer to NY Green Bank	52,926,434	-	-	-	52,926,434
Directed	Transfer to State - Env. Tax Credits	87,000,000	23,000,000	23,000,000	23,000,000	156,000,000
	Electric Generation Facility Cessation Mitigation Program	30,000,000	-	-	15,000,000	45,000,000
	Transfer to Green Jobs-Green NY-Original Legislation	112,000,000	-	-	-	112,000,000
	Transfer to Green Jobs-Green NY-Additional Funding	91,625,275	19,000,000	19,000,000	19,000,000	148,625,275
	Transfer to Clean Energy Standard	719,424	-	-	-	719,424
	NYS Budget Transfer	90,000,000	-	-	-	90,000,000
	NYS Temporary Budget Transfer	-	-	-	-	-
Administration and Other Non-Program	Program Administration	28,814,566	3,250,000	3,250,000	3,250,000	38,564,566
	Program Evaluation	11,755,429				11,755,429
	Commensurate Benefit/Litigation reserve	21,900,366	-	-	-	21,900,366
	RGGI Inc Start-up Costs	1,598,204	-	-	-	1,598,204
	RGGI Inc pro-rata costs	7,374,780	1,000,000	1,000,000	1,000,000	10,374,780
	State Cost Recovery	10,595,055	1,004,934	748,502	825,979	13,174,471
	Total Funding Allocations	1,185,402,764	90,433,090	79,726,658	89,804,135	1,445,366,647
	Surplus/(Shortfall) of Revenues over Funding Allocations	(72,242,128)	16,343,951	29,037,331	26,860,846	0
	Cumulative Surplus (Shortfall)	(72,242,128)	(55,898,177)	(26,860,846)	0	0

2.2.1 Program Funding Expansion Plan and Additional Funds

The RGGI Operating Plan Amendment addresses the potential for auction revenues to exceed the estimates being used to develop the operating plan for each year. Allowance auction proceeds may exceed the revenue estimates presented in this multi-year operating plan. Absent unforeseen circumstances, if additional revenue should become available, proceeds could be used to reduce deficits or expand funding for the existing portfolio of RGGI programs to the extent consistent with Part 242, the CO₂ Budget Trading Program regulation. Changes in actual program funding as a result of fluctuating auction revenues are accounted for in the RGGI Quarterly Program Status Reports, available on NYSERDA's website: nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports

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

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

2.2.2 Other Fees and Expenses

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

2.2.3 Repayment of SBC Funds

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

2.2.4 Ongoing New York Share of RGGI, Inc. Costs

RGGI, Inc. is a nonprofit corporation created to support development and implementation of CO₂ Budget Trading Programs in New York State and other participating states. NYSERDA entered into an agreement for RGGI, Inc. to provide technical and support services for key elements of New York State's CO₂ Budget Trading program, that include the following:

- Developing and maintaining a system to report data from emissions sources subject to RGGI and to track allowances
- Implementing a platform to auction CO₂ allowances
- Monitoring the market related to the auction and trading of CO₂ allowances
- Providing technical assistance to the participating states in reviewing applications for emissions offset projects
- Creating and implementing a market monitoring program
- Providing technical assistance to the participating states to evaluate proposed changes to the states' RGGI programs

New York State's share of RGGI, Inc. costs was estimated to be approximately \$1,000,000 per year during the planning period. This estimate is approximately consistent with the budget approved by the RGGI, Inc. Board of Directors in their 2017 and 2018 RGGI, Inc. budgets.

2.2.5 State Cost Recovery Fee

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

2.2.6 Other Budget Components

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

2.2.7 Program Evaluation and Administration

Program evaluation and administration costs have been budgeted for fiscal years 2018–2021 at \$3.25 million annually. These figures are consistent with the rates necessary to evaluate and administer the energy efficiency and technology and market development programs funded through RGGI.

3 RGGI Programs and Benefits

3.1 NY-Sun and NYSERDA Solar Electric

3.1.1 Program Description and Benefits

The NY-Sun and NYSERDA Solar Electric initiatives are driving the growth of the solar industry and making solar more affordable for all New Yorkers. The program provides declining incentives for the installation of systems and works to reduce solar project costs. Community Solar NY, a component of the NY-Sun initiative, empowers community projects through aggregation, group purchasing, incentives for low- to moderate-income (LMI) solar development, and other strategies to make solar more accessible. RGGI funding enables customers of the Long Island Power Authority (LIPA), NYPA, and municipal power companies to participate in NY-Sun.

3.2 Renewable Heat NY

3.2.1 Program Description and Benefits

Renewable Heat NY was announced by Governor Andrew M. Cuomo in his 2014 State of the State address as a long-term commitment to support the installation of high-efficiency, low-emission wood heating technology for residential, municipal, and commercial buildings. To date, 43 pellet boilers and 494 residential pellet stoves have been installed. biomass heating industry reach scale. The Renewable Heat NY program was revised and updated in 2018 to streamline the offering of incentives, workforce development, training, and marketing to help the development of New York-based advanced technology heating products.

3.3 LIPA Efficiency and Renewable Energy

3.3.1 Program Description and Benefits

The RGGI funds provided to the Long Island Power Authority (LIPA) ensure 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. These funds enhance the portfolio of clean energy activities for energy consumers on Long Island, as approved by the Long Island Power Authority (LIPA) and administered by PSEG-Long Island. Funding and reporting requirements are established

through a Memorandum of Understanding between NYSERDA and LIPA, which ensure RGGI funds meet the requirements on the RGGI regulations that funds are used to support energy efficiency and clean energy activities. For the purpose of developing this proposed Operating Plan Amendment, NYSERDA assumes funding support of \$25 million in 2019 and 2020 for LIPA's clean energy activities.

3.4 EmPower New York

3.4.1 Program Description and Benefits

EmPower New York provides energy efficiency services for low-income New Yorkers statewide. RGGI funds are targeted to households where CEF funds are not available, such as municipal electric territories. Customers on Long Island may be eligible for programs through National Grid and PSEG LI. Eligible energy efficiency measures such as insulation and air sealing focus on carbon reducing carbon emissions, and LED lighting and appliance replacements addresses electric reduction needs in the home. Participating customers receive an energy audit and energy education at no cost. NYSERDA coordinates services with the Weatherization Assistance Program (WAP) whenever possible to ensure effective use of both funding sources. The amounts proposed for FY 2018–2021 are based on current annual incentives offered for municipal utility customers. Across the State, a total of 7,027 households have been served with RGGI funding through June 2018.

EmPower New York, like similar residential energy service programs, supports the following:

- The cost-effective reduction of GHGs
- Energy savings for New York households
- Opportunities to reduce the disproportionate cost burden and environmental impacts on low-income families and environmental justice communities

3.5 Home Performance with ENERGY STAR®

3.5.1 Program Description and Benefits

Home Performance with ENERGY STAR® (HPwES) is a comprehensive energy efficiency services program for existing one- to four-family homes. RGGI funding will allow HPwES to target customers using oil and propane for space and domestic water heating purposes. The funds will offset part of the cost for consumers to replace inefficient oil and propane heating equipment and other measures that have

a direct impact on reducing oil and propane consumption (e.g., insulation, air sealing). Income-eligible customers receive additional incentives, up to 50% of the cost of eligible measures, through Assisted HPwES. HPwES and Assisted HPwES are delivered in coordination with Green Jobs - Green New York, described later in this plan.

Consistent with the program selection criteria and similar to other residential energy service programs, Home Performance with ENERGY STAR[®], supports the following:

- The cost-effective reduction of GHGs.
- Other benefits to New York State by leveraging RGGI funds with existing electric reduction programs funded through SBC and other sources; participants will realize more annual energy bill savings than when only electric measures are installed.
- Opportunities to reduce the disproportionate cost burden and environmental impacts on low-income families and environmental justice communities.

3.6 Multifamily Performance Program

3.6.1 Program Description and Benefits

The Multifamily Performance Program (MPP) serves buildings with five or more units. RGGI funding will be used to reduce non-firm gas, oil, and propane in multifamily buildings by providing incentives to repair and replace space and domestic water heating systems as well as installing insulation, air sealing, and other building shell energy efficiency measures. Electric customers of LIPA, NYPA, and municipal electric providers will receive services for oil efficiency, including heating and shell measures, if not provided by their utility.

Consistent with the program selection criteria and similar to other residential energy service programs, the Multifamily Performance Program supports the following:

- The cost-effective reduction of GHGs.
- Other benefits to New York State by leveraging RGGI funds with existing electric reduction programs funded through SBC and other sources; participants will realize more annual energy bill savings than when only electric measures are installed.
- Opportunities to reduce the disproportionate cost burden and environmental impacts on low-income families and environmental justice communities.

3.7 Charge NY

3.7.1 Program Description and Benefits

With RGGI funding for Charge NY initiative, NYSERDA is pursuing three main strategies to promote plug-in electric vehicle (PEV) adoption. First, NYSERDA implemented a rebate program for PEVs in March 2017, accelerating purchases of PEVs by reducing higher upfront costs.

Second, NYSERDA will continue to 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 include other market development activities, such as policy and business model development activities 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 drivers 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 ensure 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. The Charge NY Program will provide significant environmental benefits including the reduction of GHG emissions through the displacement of petroleum use. The anticipated portfolio will have an array of projects dealing mainly with on-road transportation concentrating on PEVs and their associated charging infrastructure. The increase in the installation of charging infrastructure across the State will help reduce the “range anxiety” for potential PEV owners thus spurring an increase in PEV acquisitions.

3.8 76West Southern Tier Clean Energy Competition

3.8.1 Program Description and Benefits

As outlined in the 2015 State of the State address, 76West is a \$20 million clean energy business competition and business development program in the Southern Tier to catalyze a clean energy business cluster that builds on the region's technology, manufacturing, and natural resource assets. During the program's first two years, the 12 awardees, which have been awarded \$5 million in total, have raised more than \$20 million in private capital, established manufacturing operations in the Southern Tier, and contributed to the energy economy by purchasing key components and manufacturing services from local suppliers and contractors. The third-year awardees, who will receive \$2.5 million in awards including a \$1 million top prize, will be announced in the fall of 2018.

3.9 Brookhaven National Laboratory – Ion Collider

3.9.1 Program Description and Benefits

Cornell University (CU) and the Brookhaven National Laboratory (BNL) are designing, building and commissioning the Cornell-BNL Energy Recovery Linac Test Accelerator (CBETA), a 4-pass, 150 MeV electron ERL that is a prototype for advanced technology to be used in the future BNL eRHIC accelerator. This pilot-scale facility is located at CU where all field testing/validation will occur, with BNL serving as the project contractor and managing all aspects of the initiative. The work is being conducted at CU to fully leverage an existing \$32 million facility located on Cornell's campus, resulting in significant overall cost savings for the ERL project.

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 eRHIC accelerator. The ERL will recover the energy that is typically lost during particle collisions. This recovered energy reduces the overall electric energy demand of the facility, obviates the need for electric utility infrastructure upgrades to accommodate the EIC, allows for higher electron beam intensities, and higher resolution of the sub-atomic particles created by the collisions.

The ERL has the potential to reduce the energy demand of the EIC facility by 35 MWe compared with more conventional technology and significantly enhance overall performance. Annual energy savings are approximately 140,000 megawatt-hours (MWh), translating into a lifetime CO₂ savings of 1,400,000 metric tons, over the facility's intended 20-year life. This peak demand reduction allows BNL to utilize PSEG-LI's existing electric power infrastructure and reduce the capital cost of the overall EIC. This cost savings will further increase the competitiveness of BNL's proposal.

3.10 Community Clean Energy

3.10.1 Program Descriptions

3.10.1.1 Clean Energy Communities

Local governments are critical partners in achieving a new energy vision for New York State. The Clean Energy Communities Program encourages localities to pursue a list of ten High-Impact Actions.⁵ Communities that successfully complete at least four of these actions receive the Clean Energy Community designation and are eligible for a grant of up to \$250,000 for a clean energy project.

3.10.1.2 Climate Smart Communities

Established in 2009, the Climate Smart Communities Program is comprised of a network of local governments across the State. In 2014, Governor Cuomo introduced a Climate Smart Communities certification program to guide climate actions and provide recognition to those communities demonstrating leadership. Managed by the Department of Environmental Conservation, this State program works in partnership with five other State agencies: NYSERDA, the Department of State, the Public Service Commission, the Department of Transportation, and the Department of Health.

⁵ List of Clean Energy Community High-Impact Actions may be found here: <https://www.nyscrda.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Action-Items>

3.10.1.3 Community Energy Engagement Program

The Community Energy Engagement program, which is co-funded through the Clean Energy Fund, deploys trusted, local organizations within each of the 10 Regional Economic Development Councils to build awareness and increase uptake of local renewable and energy efficiency solutions. Additionally, the initiative will focus on improving energy affordability and increasing deployment of distributed energy resources for community members of all income levels, with a focus on LMI households and communities.

3.10.2 Program Benefits

Because these Community Clean Energy programs are being co-funded with Clean Energy Fund (CEF) and RGGI funding, all metrics associated with implementation of the program will be split proportionately per the level of funding coming from each source. These benefits will be quantified and reported on a quarterly basis.

3.10.2.1 Clean Energy Communities Program

The benefits associated with the Clean Energy Communities Program will be positively reflected in the following:

- Number of designated clean energy communities
- Number of communities that have completed one or more High-Impact Actions
- Number of total High-Impact Actions completed
- Number of High-Impact Actions completed after program launch
- Energy Savings Metrics associated with High-Impact Actions and completed grant projects (MW, MWh, MMBtu)

3.10.2.2 Community Energy Engagement

The benefits associated with the Community Energy Engagement Program will be positively reflected in the following:

- Number of residents, small businesses, and multifamily building owners assisted with clean energy applications (audit, grant, and finance applications)
- Number of new partnerships developed with other locally based organizations as well as activities completed with these local partners
- Number of completed (closed) loans
- Number of projects completed with NYSERDA, NYSERDA plus other, or other funding
- Amount of funding received by customers (NYSERDA, NYSERDA plus other, or other funding)

3.11 Energy to Lead

3.11.1 Program Description and Benefits

Part of the REV Campus Challenge program, Governor Cuomo’s Energy to Lead Competition challenges colleges and student-led coalitions across the State to develop and implement plans to advance clean energy on their campuses and in their local communities. The three groups that proposed the best solutions for an innovative clean energy project in energy efficiency, renewables, or GHG emissions reduction were awarded \$1 million each to help implement their plans. The three winning institutions were 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 University 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.

Collectively the three winning college projects are expected to reduce greenhouse gas emissions by the equivalent of taking 17,000 cars off the road each year. The University at Buffalo’s project is expected to result in the avoidance of 82,000 metric tons of greenhouse gas emissions annually. SUNY Broome Community College’s project is expected to result in the avoidance of 135 metric tons of greenhouse gas emissions annually.

3.12 Clean Energy Fund

3.12.1 Program Description and Benefits

Reforming the Energy Vision (REV) is the State’s comprehensive energy strategy aimed at building a next generation energy system that is clean, more resilient, and affordable for all New Yorkers. As approved by the Public Service Commission (PSC), the Clean Energy Fund (CEF) serves as one of the essential pillars of REV. To deliver on its primary goals to reduce greenhouse gas emissions, increase

renewable energy generation and energy efficiency, and attract greater private investment in clean energy, the CEF investment portfolios are designed to achieve scale in clean energy markets. These key CEF objectives dovetail with the RGGI investment parameters, creating a unique opportunity to leverage CEF and RGGI funds to help achieve overall REV objectives.

Historically, RGGI funds have been implemented alongside certain existing energy efficiency programs (e.g., Home Performance with Energy Star[®], Empower NY, and Multifamily Performance Program), to allow customers in those sectors to address energy efficiency opportunities as they exist in their homes or buildings, capturing opportunities for on-site electric, natural gas or petroleum fuel efficiency. By integrating RGGI funds with ratepayer-supported programs, the energy efficiency industry has been able to develop business models and service packages that offer consumers ‘whole building’ services, often capturing the highest-value energy savings and greenhouse gas emission reduction opportunities and allows the CEF to be administered on a “fuel neutral” basis.

NYSERDA originally anticipated contributing \$250 million in RGGI funds to CEF programs over 10 years. This contribution was anticipated to partially fund the \$3.42 billion, 10-year Market Development and Innovation and Research activities. Both recent reductions in RGGI revenues and the effort to present a three-year balanced budget Operating Plan on a commitment basis result in the proposal to reduce the RGGI funds transfer to the CEF over the three-year period from \$75 million to \$6.7 million. This will result in a reduction of \$68.3 million (about 2%) in the \$3.42 billion in funding for CEF Market Development and Innovation and Research. NYSERDA anticipates this reduction will not negatively impact NYSERDA’s ability to achieve the 10-year goals established by the PSC in the CEF Order. If additional RGGI revenues or other funds materialize during the three-year Plan period, or subsequently, NYSERDA may restore some, or all, of this reduction.

By directing a level of RGGI funds to the CEF, RGGI will continue to leverage ratepayer supported activities, including clean energy market development under the CEF on a ‘fuel neutral’ basis.

3.13 NY Prize

3.13.1 Program Description and Benefits

NY Prize is a part of a statewide endeavor to modernize New York State's electric grid, spurring innovation and community partnerships with utilities, local governments, and private sector. NY Prize competitively offered support for feasibility studies in Stage 1 and audit-grade engineering design and business planning in Stage 2. Stage 3 will provide funds to support project build-out and post-operational monitoring. CEF funding of \$20 million is available to support Stage 3 awards, and the \$8 million in RGGI funds is planned for potential Stage 3 awards to Long Island-based projects that cannot be funded through CEF funds.

3.14 Green Jobs - Green New York

3.14.1 Program Description and Benefits

The Green Jobs - Green New York (GJGNY) Program, created under the Green Jobs - Green New York Act of 2009, provides New Yorkers with access to energy assessments, installation services, low interest financing, and pathways to training for various green-collar careers. The GJGNY program was originally funded with \$112 million of RGGI funds, of which \$26 million was allocated to a residential revolving loan fund to provide low interest financing for residential energy efficiency improvements, residential solar photovoltaic (PV) systems (effective April 2014), solar thermal systems, and high-efficiency pellet stove heating systems (through the Renewable Heat NY program). Interest rate changes reviewed with the GJGNY Advisory Council and effectuated in September 2016 are resulting in a reduced level of RGGI funds required to support the financing and refinancing of GJGNY loans and ensuring RGGI funds are directed towards providing GJGNY loans to low- to moderate-income consumers and consumers who may lack access to traditional financing sources. For FY 2018–19 through FY 2020–21, NYSERDA proposes to transfer an additional \$63 million to the revolving loan fund based on current annual loan origination levels.

The revolving loan funds are used to fund program loans until they are financed with the proceeds of bonds and notes. Energy efficiency “Tier 1” loans (using traditional loan underwriting standards) are financed through financing assistance through the New York State Environmental Facilities Corporation (EFC) Clean Water State Revolving Fund program. Tier 1 PV loans are financed through bonds issued under a current credit facility provided through M&T Bank. However, due to the program loan interest rates currently offered, in order to meet bond debt service coverage requirements, the bond proceeds are less than the principal amount of loans issued, requiring additional funds to be added to fund the depletion of the revolving loan fund. Other “Tier 2” energy efficiency and PV loans issued (using slightly more flexible loan underwriting criteria serving consumers not likely eligible to access traditional financing) are funded from the revolving loan fund and must be held for a period of time until their performance allows them to be financed. NYSERDA had preliminary discussions with the EFC about the inclusion of loans, which meet agreed upon criteria, in bonds to be issued in 2018.

The GJGNY Program often serves as a point of entry into existing energy efficiency programs for prospective projects through the audit and financing offerings. It is anticipated that a portion of these projects will proceed through a GJGNY-funded audit or loan and without additional incentives from NYSERDA or another program administrator. It is extremely difficult to predict how much implementation of audit recommended measures will go through incentive programs previously identified and to quantitatively identify attribution to each source of funding or support provided. Therefore, reporting on each respective portfolio of coordinating programs such as RGGI/GJGNY and EEPS will show the full benefits contributed to by each funding source, and NYSERDA-wide reporting will ensure there is no double counting. Therefore, the plan does not attempt to disaggregate savings by funding source.

See the monthly and annual GJGNY reports for additional program metrics (nyserda.ny.gov/About/Publications/GJGNY-Advisory-Council-Reports).

4 Program Evaluation and Reporting

The overarching goals of the RGGI program evaluation effort are to provide objective and credible information that supports optimum program operation and outcomes and provides program accountability. The evaluation effort will assess progress toward meeting stated program and public policy goals, as well as progress in moving markets toward behaviors that result in emissions reductions and increased energy efficiency and use of renewable energy.

The evaluation and reporting activities outlined herein will be applied to the portfolio of RGGI programs described in this plan, including GJGNY. RGGI program evaluation and status reports will address the portfolio of programs, funding, and benefits included in this plan.

4.1 Evaluation Budget

The budget for RGGI program evaluation is based on need and continues to be consistent with the level of funding provided for evaluation of NYSERDA's ratepayer-funded programs, historically at a rate of 5% of program funding or less. The evaluation budget will support overall evaluation design and planning, implementation of plans by third-party contractors, and NYSERDA's management of the evaluation activities. Implementation of the evaluation plans will involve collection and analysis of primary and secondary data by independent contractors. Primary data collection activities that may be undertaken by evaluation contractors include on-site verification; metering and monitoring of installed measures; and conducting in-person, telephone, email, and other types of surveys and interviews. NYSERDA will use its best efforts to leverage existing evaluation experience and staffing to maximize economies of scale.

4.2 Evaluation Approach

NYSERDA customizes evaluation to the specific types of RGGI programs and their approach to achieving CO₂e reductions. Individual programs will receive varying levels of evaluation depending on need. The focus of the evaluation work will be on assessing program impacts, namely CO₂e reductions. Process and market evaluations are also planned, particularly in coordination with other funding sources such as CEF, EEPS, and Technology and Market Development. Each of these three main areas of program evaluation—impact, market, and process—is described briefly in this section.

The types of programs presented in this plan are expansive in terms of the sectors and fuels covered and the ways in which they reduce CO₂e. NYSERDA has divided programs into two broad categories for purposes of evaluation:

- Market Development Programs that provide direct emission reductions through on-site electric or fossil-fuel efficiency measures, or on-site generation that displaces grid electricity.
- Innovation Programs that provide less direct, longer-term benefits in advancing information, technologies and markets.

These two categories of programs present different evaluation needs, especially in the area of impact evaluation, as described in the following section.

4.2.1 Impact Evaluation

Impact evaluation measures the outcomes and co-benefits attributable to a program, calculates the cost-effectiveness of a program, and compares the outcomes to the goals set forth for the program. Key metrics for evaluating impacts of the RGGI programs include, but may not be limited to, the following direct outcomes and co-benefits: CO₂e reductions, electricity and fuel savings, customer bill savings, program cost per ton of CO₂e reduced, and job creation.

For Market Development Programs that provide direct emission reductions through on-site electric and fossil-fuel efficiency projects, NYSERDA plans to measure and verify the electric and fossil-fuel savings attributable to the programs, and then apply emission factors to determine CO₂e reductions. Measurement, verification and attribution analysis will be conducted on a sample of completed projects according to industry best practices and will build on NYSERDA's experience in program evaluation. Similar approaches may be appropriate as well for on-site generation projects that are displacing electricity otherwise purchased from the grid. Once the evaluation of electric and fossil-fuel savings is complete, NYSERDA plans to apply default emission factors available from secondary sources. Default factors are commonly used in lieu of source testing due to the time and cost of such testing.⁶ Evaluations will ensure that appropriate emission factors, taking into consideration the technology, timing, and location of projects, are applied to fossil-fuel savings.

⁶ U.S. Environmental Protection Agency. 2007. National Action Plan for Energy Efficiency. Model Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc. (www.epa.gov/andeeactionplan), Chapter 6

Evaluation strategies for Innovation Programs (i.e., those programs that do not provide emission reductions through on-site energy efficiency and generation projects) will be explored in detail by NYSERDA and contractors procured to aid in this area. Specific evaluation plans will take into consideration the level of rigor necessary for the program-reported, emission-reduction estimates to apply an appropriate level of rigor in the evaluations. For example, programs involving detailed and project specific technical studies of expected emission reductions may require less emphasis by evaluation than other programs.

NYSERDA recognizes the importance of providing information on the geographic distribution of program funding and benefits and will examine how best to present this information within available technical capabilities. Impacts for specific populations, such as low-income and environmental justice communities, will be examined for programs expected to address such populations. Additionally, some co-benefits such as job creation will be addressed at the portfolio level in the evaluation.

Several impact evaluations have been completed and those evaluations underway (or planned for the current cycle) include, but are not limited to, the following. As the RGGI portfolio evolves, evaluation plans will as well.

- Home Performance with ENERGY STAR® Program: NYSERDA is reviewing the cost effectiveness and overall added value of conducting a second assessment of measure adoption among Green Jobs - Green NY “audit only” participants (i.e., those who may have installed measures on their own in the absence of incentives) with possible assessment of energy and emission impacts from those measures. In addition, a billing analysis of Home Performance GJGNY On-Bill Recovery projects is in the planning phase; results will be made available as appropriate.

4.2.2 Process Evaluation and Market Evaluation

Process evaluation reviews oversight and operations gauge customer satisfaction and recommends process, and efficiency improvements. Formative process evaluations conducted early in the program development, can offer actionable recommendations to help improve program efficiency and effectiveness and optimize the desired program outcomes.

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. This area of evaluation provides “market intelligence” to help target programs to best achieve their goals.

Though not every program may receive evaluation, both process and market evaluation will be performed on all types of programs within the RGGI portfolio. Several process and market evaluations have been completed with an upcoming study. As additional studies are planned, they will be described in upcoming quarterly RGGI reports. Further, as the RGGI portfolio evolves, evaluation plans will as well.

- Renewable Heat NY Market Baseline (in coordination with CEF): Baseline and longitudinal measurements of key indicators of programmatic and broader market success including, but not limited to, sales of NYSERDA-qualified biomass boilers compared to sales of all-biomass boilers statewide; percentage of installations in the market that were completed by Renewable Heat NY installers; and customer satisfaction with installers and equipment.

4.2.3 Baseline Studies

Within the evaluation, NYSERDA completed a Residential Statewide Baseline Study in 2015 and an update to the study is currently in the planning phase. A Commercial Baseline Study is underway and includes four separate market assessments on HVAC, Energy Management Systems/Building Management Systems, Energy Services, and Customer Decision Making. These baseline studies and subsequent updates are designed to assess Residential and Commercial markets across a broad range of customer segments and energy measures. The goals of these studies are 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 use this information to estimate the technical, economic, and achievable energy efficiency opportunities in New York State in the next three and five years. Though these large studies are being supported by rate-payer funding, RGGI funds are supplementing the budget to allow for robust data collection on fuel measures.

4.2.4 Use of Evaluation Results

The evaluation and program implementation activities described in this Plan will be integrated with the ultimate goal of “real time” feedback from the evaluation effort being used to help inform and improve programs. Early evaluation results will be used to help identify possible issues with program performance and provide recommendations to NYSERDA as to how those issues might be rectified. Reports will be made publicly available so interested parties can review any programmatic recommendations that are made. NYSERDA will use evaluation data and information to make programmatic changes in the annual plan updates, or as needed.

4.3 Evaluation Implementation

4.3.1 Staff and Contractor Resources

Evaluation of New York's RGGI programs will be managed by NYSERDA's Performance Management (PM) group. PM is organizationally separate from NYSERDA groups that administer programs. PM staff has been responsible for managing evaluation of NYSERDA's major energy efficiency, electric demand reduction, renewable energy, and research and development programs for more than 15 years. The staff and knowledge base within PM will be leveraged to provide effective, efficient evaluation management of the RGGI programs. Stakeholder input will be sought to inform evaluation of the RGGI programs.

NYSERDA recently qualified three separate pools of consultants to assist PM staff in conducting impact evaluation, market evaluation and survey data collection, respectively. This represented a departure from NYSERDA's previous evaluation structure where one contractor team was competitively selected for each evaluation area with a lead contractor coordinating and leading the work. Establishment of these pools of consultant resources will provide NYSERDA with ready access to consultant assistance and expertise to develop tactical and cost-effective approaches to evaluation and market research and ensure effective and timely feedback on performance and market impacts. This framework is currently in place and will apply to all aspects of NYSERDA's evaluation effort moving forward.

PM staff and NYSERDA program staff will develop evaluation plans in consultation with qualified consultant(s), and the consultant(s) will, in most cases, implement the evaluation in conjunction with PM staff.

The RGGI evaluation will be closely coordinated with NYSERDA's existing evaluation efforts for CEF and other programs. This coordination will be especially important on programs that receive CEF and RGGI funding to ensure the evaluation does not become overly burdensome for participants and issues associated with survey respondent fatigue are minimized. Such coordination will also aid in achieving greater efficiency and cost-effectiveness of the evaluation overall.

4.4 Reporting

NYSERDA will prepare an annual RGGI program evaluation and status report using progress tracking, findings and inputs from the independent evaluation contractors. The annual report will include for each prior year (1) an accounting of all sales of CO₂ allowances and the funds generated; (2) a summary description of program activities; (3) a quantification of benefits; and (4) an accounting of the administration costs and expenditures. The annual report will also provide information on the geographic distribution of program funding across the State.

Quarterly, NYSERDA will prepare a RGGI program status report updating progress made in each major program area. The reports will include an estimate of benefits and an accounting of the costs and expenditures.

Metrics and targets presented in this document (e.g., dollars per ton) were established for early comparison purposes to facilitate program selection. They are subject to modification in the event that changes are made to the discounting rate, discounting approach, evaluation methods, emissions factors, and budget levels. Previous RGGI Operating plans assumed each program's longest-lived measure life as an input for the expected lifetime benefit calculations. Beginning with the 2013 RGGI Operating Plan, each program's savings-weighted average end of useful-measure life was used as an input for the expected lifetime benefit calculations. Using the savings-weighted average end of useful-measure life provides a more realistic lifecycle for the persistence of energy, bill, and emission savings. Furthermore, at the time of development of this plan, the extent to which program participants will leverage complementary RGGI program support as well as other non-RGGI program support is unknown.

Quarterly status reports will quantify and report all such cross-program overlap, and the reported actual benefits and outcomes of the RGGI programs in this operating plan will be inclusive of such quantified cross-program overlap.

5 Administration

Included in program administration are direct salaries and benefits for program staff, as well as a proportionate allocation of salaries and benefits for support staff (e.g., contracts, finance, information technology, legal, and marketing and outreach), facilities and equipment costs, travel, supplies, etc.

Fixed costs are applied proportionally across all funding sources, using program staff salary costs as a percentage of total salary costs, and therefore, reflect economies of scale. These estimates are based on historical experience with the ratepayer-funded programs and considered administrative efficiencies.

Appendix A

This appendix describes the general methods and assumptions used to calculate the energy savings, emission reductions, bill savings, and cost-effectiveness metrics presented in the Operating Plan (Plan) for Investments in New York State under the CO₂ Budget Trading Program and the CO₂ Allowance Auction Program.

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 CO₂e Reductions

Emissions factors are used to translate the energy savings data into annual GHG emissions reduction values. The GHGs evaluated in the Plan include carbon dioxide, methane, and nitrous oxide. Because each of these gases has a different global warming potential,⁷ 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,⁸ 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 (IPCC) Fourth Assessment Report: Climate Change 2007.

Gas	Global Warming Potential
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	25
Nitrous oxide (N ₂ O)	298

⁷ A global warming potential is a measure that estimates how much a given mass of a GHG contributes to global warming. It is calculated over specific time intervals as gases vary in lifespan and radiative efficiency, e.g., 100 years. The IPCC also provides 20 and 500-year GWP values.

⁸ 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.

Table A-2 shows the emission factors used in the Plan to calculate emissions from on-site fuel combustion, which are derived from U.S. Environmental Protection Agency emission coefficients. The CO₂e values represent aggregate CO₂, CH₄ and N₂O emissions. If a program in the Plan covers more than one sector (e.g., the Commercial and Industrial Program), then the estimated reduction is based on a straight average emission factor.

Table A-2. Fuel Combustion Emission Factors by Sector⁹

	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

⁹ 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 (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

A marginal emissions factor of 1,160 pounds of CO₂e/MWh is used to estimate emission reductions associated with electricity use reductions for all sectors. This value includes emissions from in-State electricity generation as well as emissions associated with net-imports of electricity.¹⁰ While electricity savings may not lead to near-term emission reductions under the RGGI CO₂ cap, savings will potentially reduce imports of electricity to New York State; 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; basic service charges are excluded.

Table A-3. Fuel Prices by Sector¹¹

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

¹⁰ With the submittal of its Clean Energy Fund Investment Plan Budget Accounting and Benefits Chapter on February 22, 2016, NYSERDA 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.

¹¹ 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-2 continued

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

A.4 Program Measure Life

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

Table A-4. Program Measure Life Assumptions

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
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

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