New York State's Regional Greenhouse Gas Initiative Investment Plan

2020 Operating Plan | December 2020

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

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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.

New York State's Regional Greenhouse Gas Initiative Investment Plan

2020 Operating Plan

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

December 2020

Table of Contents

Acronyms and Abbreviations

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

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

Summary of Benefits

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

Table S-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_2e[b])		Cost Benefit Ratio ($/Ton CO_2e)	
	Total Incentives[c]	Total Associated Costs[d]	Annual Savings[e]	Lifetime Savings[f]	Annual Savings[e]	Lifetime Savings[f]	Annual Savings[e]	Lifetime Savings[f]	$/Ton Annual CO2e Savings[g]	$/CO2e EXPECTED LIFETIME Savings[h]
Green Jobs - Green New York										
One-to Four-Family Residential Buildings Program Financing	$25.0	$3.8	188,010	4,324,238	23,935	454,764	27,526	577,561	50	44
Energy Efficiency										
LIPA Energy Efficiency and Renewable Energy Initiative	$25.0	-	3,015	-	59,901	1,078,219	34,973	630,903	40	40
Multifamily Performance Program	$0.10	$0.02	3,384	52,170	151	1,957	328	4,877	24	1
EmPower New York	$0.7	$0.04	3,908	93,790	-	-	287	6,888	102	74
Home Performance with ENERGY STAR®	$0.9	$0.12	14,344	344,260	79	1,422	1,194	28,375	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	$0.6	$0.08	337	6,737	62	1,233	174	3,482	191	145
NY-Sun Initiative[j]	$18.7	$0.4	-	-	75,852	1,896,294	43,994	1,099,851	17	13
Innovative GHG Abatement Strategies										
Charge NY[j]	$30.2	$14.0	843,595	8,435,954	-	-	1,804	8,435,954	5	1,360
Clean Energy Fund										
Clean Energy Fund[k]	$84.9	$22.6	89,290	1,416,693	8,336	138,773	9,547	1,416,693	76	136
TOTAL Anticipated Benefits[l]	**$186.2**	**$41.0**	**1,146,274**	**14,681,627**	**168,316**	**3,572,675**	**119,856**	**12,205,163**	**741**	**1,961**

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

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

[d] Inclusive of all non-incentive expenditures.

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

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

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

[h] The sum of columns 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.

Table notes continued on the next page

Table S-1 notes continued

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

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

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

The Summary of Benefits provides a quantitative estimate of the benefits associated with deployment programs. Green Jobs - Green New York, Long Island Power Authority (LIPA), Efficiency and Renewable Energy, 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 time frame.

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 emission 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, 2020. Anticipated benefits over the timeline of the budget proposal have been calculated.

Benefit achievements are updated on a quarterly basis and can be found in New York State's RGGI-Funded Programs Status Report.[1]

1 Introduction

1.1 Background

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

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

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

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

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

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

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

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 were approved by NYSERDA's Board of Directors in January 2020. Overall, the plan covers program investments comprised of the following RGGI funds:

- Anticipated proceeds from auctions to be held during fiscal years 2020–2023
- 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 capped CO_2 emissions from power plants through 2015 and then lowered the cap by 10% in 2018.

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

Each state is implementing this initiative through individual CO_2 Budget Trading Programs linked through the regional cap-and-trade program.[4]

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

The CO_2 Allowance Auction Program established the rules through which New York State will sell most of its CO_2 allowances. The CO_2 Allowance Auction Program 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" [21 NYCRR Part 507.4(d)]. 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 CO_2 emission reduction goals, which reduce global climate change and pollution through energy efficiency, renewable energy, and carbon abatement technology. Investments will be focused on a complementary mix of electricity related GHG reduction opportunities and technologies as well as strategies for reductions related to the use of petroleum and natural gas.

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

The Climate Leadership and Community Protection Act (CLCPA), signed into law in July 2019, charts a course for New York State to reduce 85% greenhouse gas emissions by 2050, a pathway to a carbon neutral economy, and a goal that 40% of the benefits from investments in clean energy and energy efficiency will be realized by disadvantaged communities. NYSERDA has proposed the incorporation of language regarding benefits for disadvantaged communities in the regulations that authorize its investments of RGGI proceeds.

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.[5]

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.

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

2 Overview of Program Funding

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

- Estimated future proceeds from fiscal years 2020–2023
- Remaining program funds

2.1 Assumptions about Auction Proceeds for Operating Plan

Estimated auction proceeds for fiscal years 2020–2023 are collectively anticipated to exceed $326 million. For planning purposes, it was assumed that the average allowance price would be $5.20 across the planning horizon. The planning horizon for this operating plan is three fiscal years with each fiscal year balancing commitments in line with projected future revenue.

2.2 Summary of Proceeds Investment by Program

Table 1 provides a summary of proceeds investment by program and shows how the approximately $1,645 million of program funds made available through RGGI auctions have been, or will be, allocated among programs and other costs through fiscal year 2023.

The table shows cumulative allocations through March 2020 and reflects the planned and actual allocations for fiscal years 2020–2023. The table also summarizes the allocation of all current and planned proceeds through March 31, 2023.

Table 1. RGGI Revenue and Funding Allocation Plan

Category	Program	Cumulative Allocations through March 31, 2020	FY20-21 Plan	FY21-22 Plan	FY22-23 Plan	Cumulative Allocations through March 31, 2023
Proceeds	Number of allowances	392,188,425	20,087,261	20,988,398	20,107,348	453,371,431
	Allowance price	$3.33	$5.20	$5.20	$5.20	$3.58
	RGGI Auction Proceeds	1,306,349,512	104,453,755	109,139,668	104,558,210	1,624,501,144
	Interest Earnings	17,921,697	2,228,000	1,462,000	1,050,000	22,495,803
	Total Revenues	**1,324,271,208**	**106,681,755**	**110,601,668**	**105,608,210**	**1,646,996,947**
Renewable Energy	NY SUN NYPA Customer Incentives	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	2,837,698	-	-	-	2,837,698
	NYS Generation Attributes Tracking System	789,933	-	-	-	789,933
	NYSERDA PV incentives	5,319,821	-	-	-	5,319,821
Energy Efficiency	Clean Energy Workforce Opportunity Program	15,000,000	-	-	-	15,000,000
	LIPA Efficiency and RE	204,600,000	25,000,000	-	-	229,600,000
	Energy Storage	52,926,434	-	-	-	52,926,434
	EmPower NY	27,955,148	200,000	200,000	200,000	28,555,148
	Assisted Home Performance with Energy Star®	25,520,757	300,000	300,000	300,000	26,420,757
	Multifamily Performance Program	15,162,316	-	-	-	15,162,316
	Multifamily Carbon Emissions Reduction	5,833,019	-	-	-	5,833,019
	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	Southern Tier Competition (76 West)	11,000,000	-	-	-	11,000,000
	Brookhaven National Lab- ION Collidor	25,000,000	-	-	-	25,000,000
	Electric Vehicle/Charge NY	23,500,000	-	21,500,000	11,300,000	56,300,000
	Advanced Buildings & Industrial Innovations	14,616,037	-	-	-	14,616,037
	Climate Research & Analysis	8,729,380	-	-	-	8,729,380
	Competitive GHG Reduction Pilot	1,013,533	-	-	-	1,013,533
	Clean Energy Business Development	5,809,987	-	-	-	5,809,987
	Transportation Research	3,819,311	-	-	-	3,819,311
	PV Manufacturing consortium	8,500,000	-	-	-	8,500,000
	Carbon Sequestration	1,000,000	-	-	-	1,000,000

Table 1 continued

Category	Program	Cumulative Allocations through March 31, 2020	FY20-21 Plan	FY21-22 Plan	FY22-23 Plan	Cumulative Allocations through March 31, 2023
Community Clean Energy	Cleaner Greener Communities	94,261,895	-	-	-	94,192,235
	Clean Energy Communities	4,273,120	-	-	-	4,273,120
	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 Phase3 (Placeholder/Long Island Projects)	-	-	-	-	-
	Renewable/Net-Zero Energy Demonstrations	6,000,000	1,000,000	1,000,000	1,000,000	9,000,000
	Regional Economic Development & GHG Reduction	10,289,945	-	-	-	10,289,945
Clean Energy Fund	Transfer to(from) Clean Energy Fund	73,790,932	11,688,162	44,517,751	51,284,389	181,250,000
	Transfer to NY Green Bank	-	-	-	-	-
Directed	NYS Environmental Tax Credits	133,000,000	23,000,000	23,000,000	23,000,000	202,000,000
	NYS Environmental Protection Fund	-	5,000,000	-	-	5,000,000
	Electric Generation Facility Cessation Mitigation	30,000,000	20,000,000	-	-	50,000,000
	Green Jobs-Green NY- Original Legislation	112,000,000	-	-	-	112,000,000
	Green Jobs-Green NY- Additional Funding	105,025,275	12,000,000	12,000,000	12,019,903	141,045,178
	Transfer to Clean Energy Standard	719,424	-	-	-	719,424
	NYS Budget Transfer	90,000,000	-	-	-	90,000,000
	NYS Temporary Budget Transfer	-	-	-	-	-
Administration and Other Non-Program Costs	Program Administration	33,096,359	6,500,000	6,500,000	6,500,000	52,531,359
	Program Evaluation	9,155,429	-	-	-	9,155,429
	Commensurate Benefit/Litigation reserve	21,900,366	-	-	-	21,900,366
	RGGI Inc Startup Costs	1,598,204	-	-	-	1,598,204
	RGGI Inc pro-rata costs	8,358,667	825,000	825,000	825,000	10,833,667
	State Cost Recovery	12,817,568	1,168,593	758,917	1,022,912	15,767,990
	Total Funding Allocations	**1,324,271,208**	**106,681,755**	**110,601,668**	**107,452,203**	**1,648,840,941**
	Surplus/(Shortfall)	-	-	-	(1,843,993)	(1,843,993)
	Cumulative Surplus (Shortfall)	**-**	**-**	**-**	**(1,843,993)**	**(1,843,993)**

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 used to develop the operating plan for each year. Allowance auction proceeds may exceed the revenue estimates presented in this multiyear operating plan. Absent unforeseen circumstances, if additional revenue should become available, proceeds could be used to reduce deficits or expand funding for the existing portfolio of RGGI programs to the extent consistent with Part 242, the CO_2 Budget Trading Program regulation. Changes in actual program funding as a result of fluctuating auction revenues are accounted for in the RGGI Quarterly Program Status Reports.[6]

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

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

2.2.2 Other Fees and Expenses

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

2.2.3 Repayment of System Benefits Charge Funds

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

2.2.4 Ongoing New York Share of RGGI, Inc. Costs

RGGI, Inc. is a nonprofit corporation created to support development and implementation of CO_2 Budget Trading Programs in New York and other participating states. NYSERDA entered into an agreement for RGGI, Inc. to provide technical and support services for key elements of New York State's CO_2 Budget Trading program that include the following:

- Develop and maintain a system to report data from emission sources subject to RGGI and to track allowances
- Implement a platform to auction CO_2 allowances

- Monitor the market related to the auction and trading of CO_2 allowances
- Provide technical assistance to the participating states in reviewing applications for emission offset projects
- Create and implement a market monitoring program
- Provide technical assistance to the participating states to evaluate proposed changes to the states' RGGI programs

New York State's share of RGGI, Inc. costs was estimated to be approximately $1,000,000 per year during the planning period. This estimate is consistent with the budget approved by the RGGI, Inc. Board of Directors in their 2018 and 2019 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 2020–2023 at approximately $6.5 million. This amount represents an increase in program administration funding from prior years and reflects the projected increased need to support additional anticipated activities due to restoration of CEF funding, the continued management of projects from past initiatives, and new program activity.

3 RGGI Programs and Benefits

3.1 NY-Sun

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), New York Power Authority (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, 52 pellet boilers, 35 advanced cordwood boilers, and 2600 residential pellet stoves have been installed. 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 State-based advanced technology heating products.

3.3 LIPA Efficiency and Renewable Energy

3.3.1 Program Description and Benefits

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 Public Service Enterprise Group (PSEG)-Long Island. Funding and reporting requirements are established through a Memorandum of Understanding between NYSERDA and LIPA, which ensure that RGGI funds meet the requirements of the RGGI regulations that funds are used to support energy efficiency and clean energy activities. In calendar years 2019 and 2020, $25 million has been provided to support LIPA's clean energy activities.

3.4 EmPower New York

3.4.1 Program Description and Benefits

Similar to Assisted Home Performance with ENERGY STAR®, funds to support EmPower New York, providing energy efficiency services for low-income New Yorkers, are targeted to customers of municipal utilities heating with oil, propane, kerosene, wood, or coal. Funds may also be applied to municipal utility customer heating homes with natural gas. Measures supported by EmPower include insulation, air sealing, and heating system upgrades. The $200,000 annual contribution proposed for FY20-21 through FY22-23 is based on current annual incentives offered for municipal utility customers.

Similar to other residential energy service programs, EmPower New York supports the following:

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

3.5 Assisted Home Performance with ENERGY STAR®

3.5.1 Program Description and Benefits

To maintain statewide access to fuel neutral, whole building, energy efficiency opportunities, these funds will maintain support for moderate-income customers of municipal utilities (which cannot be funded through the CEF) to access Assisted Home Performance with ENERGY STAR® as a comprehensive energy efficiency services program for existing one- to four-family homes. RGGI funding will allow the program 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). The $300,000 annual contribution proposed for FY20-21 through FY22-23 is based on current annual incentives offered for municipal utility customers.

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

ChargeNY will pursue three main strategies to promote plug-in electric vehicle (PEV) adoption by consumers across New York State. First, NYSERDA implemented the Drive Clean rebate program for PEVs in March 2017, accelerating purchases of PEVs by reducing higher upfront costs. Additional funding of $4 million will be provided in FY20-21 and $22.5 million in FY21-22 to support the continuation of the rebate program in future years. Second, NYSERDA will continue to invest in

marketing and awareness-building activities to build public interest in PEVs. 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 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 inspiration for PEV adoption based on usage data reported from previous installations. Regions of the State that have seen faster PEV adoption will be identified for additional charging station support, which ensures investments in infrastructure support areas with the greatest potential for additional PEV drivers. ChargeNY will also initiate the deployment of a network of direct current (DC) fast charging stations across the State.

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 three years, the 18 awardees, awarded $7.5 million in total, have raised more than $29 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 fourth and final round of the competition is under way.

3.9 Community Clean Energy

3.9.1 Program Descriptions

3.9.1.1 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.[7] 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.

3.9.1.2 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, Public Service Commission, Department of Transportation, and Department of Health.

3.9.1.3 Community Energy Engagement Program

The Community Energy Engagement program, 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.

3.9.2 Program Benefits

Because these Community Clean Energy programs are co-funded with the 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.

3.9.2.1 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)

3.9.2.2 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)

3.10 Energy to Lead

3.10.1 Program Description and Benefits

Part of the Reforming the Energy Vision (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. To date, four colleges have been awarded funding:

- Bard College's Micro Hydro for Macro Impact project will use local dams to develop micro hydropower. The project will include the launch of a public, interactive website dedicated to micro-hydropower.
- The University at Buffalo will implement the Localizing Buffalo's Renewable Energy Future project, which will install 100 megawatts (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.
- 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.

3.11 Clean Energy Fund

3.11.1 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 Commission, 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, increase 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. In designing the CEF, NYSERDA originally planned to dedicate $250 million in RGGI funds to the CEF portfolio over 10 years, supporting the $3.42 billion Market Development and Innovation and Research activities.

The 2019 Operating Plan advanced a plan to restore funds supporting the CEF portfolio, while also realizing annual balanced budgets. In keeping with this strategy, while accounting for new revenue and commitment projections, NYSERDA will allocate to the CEF $17.65 million in FY20-21, $40.51 million in FY21-22, and $60.57 million in FY22-23, bringing the aggregate amount committed to the CEF in line with the original schedule to dedicate $25 million annually. Should revenues continue according to current projections, continued contributions to the CEF in future years (through 2025) will be maintained at $25 million per year.

3.12 NY Prize

3.12.1 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. Expected to launch during the first part of 2018, 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.

3.13 Green Jobs - Green New York

3.13.1 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 NYSERDA's 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 that RGGI funds are directed towards providing GJGNY loans to low- to moderate-income consumers and consumers who may lack access to traditional financing sources. Approximately $1 million will be transferred to the revolving loan fund each year of this three-year Operating Plan based on current annual loan origination levels and the amount that is expected to not be replenished from bond proceeds.[8]

3.14 Energy Storage

3.14.1 Program Description and Benefits

New York State has established statewide advanced energy storage targets of 1.5 gigawatts by 2025 and 3 gigawatts by 2030. This RGGI-funded initiative will allow NYSERDA to provide energy storage project incentives on Long Island for retail energy storage projects (including customer-sited storage and value of distributed energy resources (VDER) value stack compensated projects) and for bulk storage projects connected into the transmission, sub-transmission, and distribution system. This will enable geographic deployment of the NYSERDA energy storage retail and bulk incentive offerings in all areas of the State, with the rest of State supported by PSC authorized funds. These incentives will be delivered according to the Energy Storage Market Acceleration Incentives Implementation Plan filed on March 11, 2019 with Department of Public Service.

3.15 Renewable/Net Zero Energy Demonstrations

3.15.1 Program Description and Benefits

In 2019, the statewide Net Zero Energy for Economic Development initiative was launched. The initiative is supporting new construction or renovation work on existing buildings that is designed to achieve net zero energy or net zero carbon performance. Eligible building types include commercial, industrial, institutional and mixed-use facilities, and project awards are also based on the ability of the project to advance the goals of the local Regional Economic Development Council Strategic Plan or State Priority Issue Area. The RGGI funds are designed to support at least one project in Long Island and is offered alongside a maximum of up to $15 million of support from the Clean Energy Fund, available for projects located in the rest of the State. This Operating Plan assumes a continued $1 million contribution in each of the three years of the 2020 Operating Plan.

3.16 Energy and Nature Education Center

3.16.1 Program Description and Benefits

RGGI funds are made available to support the design and construction of a new Energy and Nature Education Center at Jones Beach State Park. The NYS Office of Parks, Recreation and Historic Preservation will construct the facility as a net zero energy building, utilizing both on-site renewable energy technologies—solar photovoltaic (PV) panels and a geothermal heat pump—as well as high-energy efficiency equipment and sustainable building materials. The center will also be designed as a public-private partnership to serve as an education resource for the park's visitors, which in 2018 numbered over 8.5 million people.

3.17 Electric Generation Facility Cessation Mitigation

3.17.1 Program Description and Benefits

The Electric Generation Facility Cessation Mitigation Program was enacted at the end of the 2015 New York State Legislative Session and is designed to support the economic transition of communities reliant on power plants as a source of financial support. The program is administered by the New York Empire State Development Corporation (ESDC) and received an initial funding level of $30 million provided by NYSERDA as directed in the FY16-17 State Budget. Pursuant to the FY17-18 State Budget, up to $15 million in additional funding will be made available to the program beginning in FY20-21.

In his 2020 State of the State, Governor Cuomo introduced a proposal to spur redevelopment in communities impacted during the transition to a clean energy economy. As part of that proposal, NYSERDA will make $5 million in consulting assistance available to support community planning for infrastructure and site reuse.

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 emission reduction and increased energy efficiency and use of renewable energy.

The evaluation and reporting activities outlined here will be applied to the portfolio of RGGI programs described, 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 carbon dioxide equivalent (CO_2e) 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 CO_2e 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 CO_2e. 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 RGGI programs include, but may not be limited to, the following direct outcomes and co-benefits: CO_2e reductions, electricity and fuel savings, customer bill savings, program cost per ton of CO_2e 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 CO_2e 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.[9] Evaluations will ensure that appropriate emission factors are applied to fossil-fuel savings, taking into consideration the technology, timing, and location of projects.

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 in the 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 goals.

Although 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.

- 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. Although these large studies are being supported by ratepayer 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 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. NYSERDA will use evaluation data and information to make program changes in the annual plan updates, or as needed.

4.3 Evaluation Implementation

4.3.1 Staff and Contractor Resources

Evaluation of New York State'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 members have been responsible for managing the 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 these evaluations.

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 (1) provide NYSERDA with ready access to consultant assistance and expertise to develop tactical and cost-effective approaches to evaluation and market research and (2) 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 a 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, keeping issues associated with survey respondent fatigue at a minimum. Such coordination will also aid in achieving greater efficiency and cost-effectiveness of the overall evaluation.

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 CO_2 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 this plan's development, 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 for Investments in New York State under the CO_2 Budget Trading Program and the CO_2 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 CO_2e 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,[10] emissions for gases other than carbon dioxide are converted into carbon dioxide equivalent units (CO_2e) through multiplication with their appropriate Intergovernmental Panel on Climate Change (IPCC) global warming potential value,[11] 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_2O)	298

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 CO_2e values represent aggregate CO_2, CH_4 and N_2O 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 Sector [12]

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

A marginal emissions factor of 1,160 pounds of CO_2e/megawatt-hours (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.[13] While electricity savings may not lead to near-term emission reductions under the RGGI CO_2 cap, savings will potentially reduce (1) imports of electricity to New York State, (2) the demand for CO_2 allowances, leading to a possible future reduction in the cap, and (3) 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 Sector [14]

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

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

A.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

Endnotes

[1] Visit nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports on the NYSERDA website for details.

[2] The RGGI participating states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and New Jersey, which began participating in RGGI on January 1, 2020.

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

[4] Visit http://www.rggi.org for additional background on the initiative.

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

[6] Visit nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports on the NYSERDA's website for details.

[7] Visit https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Action-Items for a list of Clean Energy Community High-Impact Actions.

[8] Visit nyserda.ny.gov/About/Publications/GJGNY-Advisory-Council-Reports for additional program metrics in the monthly and annual GJGNY reports.

[9] 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. Visit https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-program-impact-evaluation-guide for more information (Chapter 6).

[10] 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.

[11] 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.

[12] 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. Visit nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/Energy-Statistics for more information. These factors are derived from EPA's February 2016 State Inventory Tool release. Visit https://www.epa.gov/statelocalclimate/state-inventory-and-projection-tool for more information. Steam emission factors have been updated to be consistent with New York City's updated Greenhouse Gas Inventory.

[13] 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 State'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, the State's factor to calculate GHG emissions reductions has changed from 625 pounds CO_2e/MWh to 1,160 pounds CO_2e/MWh. The emissions reductions calculated for this report reflect the new factor of 1,160 pounds CO_2e/MWh.

[14] 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. Visit http://www3.dps.ny.gov/W/PSCWeb.nsf/All/C56A606DB183531F852576A50069A75D?OpenDocument for more information.

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).

NYSERDA, a public benefit corporation, offers objective information and analysis, innovative programs, technical expertise, and support to help New Yorkers increase energy efficiency, save money, use renewable energy, and reduce reliance on fossil fuels. NYSERDA professionals work to protect the environment and create clean-energy jobs. NYSERDA has been developing partnerships to advance innovative energy solutions in New York State since 1975.

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