

# New York State's Regional Greenhouse Gas Initiative Investment Plan

2019 Operating Plan

Final Report | October 2019

## **NYSERDA's Promise to New Yorkers:**

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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**

*2019 Operating Plan*

Prepared by:

**New York State Energy Research and Development Authority**

Albany, NY

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## Acronyms and Abbreviations

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BNL	Brookhaven National Laboratory
CBETA	Cornell-Brookhaven Energy Recovery Line Test Accelerator
CEF	Clean Energy Fund
CGC	Cleaner Greener Communities
CH <sub>4</sub>	methane
CIGS	copper indium gallium selenide
CO <sub>2</sub>	carbon dioxide
CO <sub>2e</sub>	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 <sub>2</sub> 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 presents programs that reduce and avoid GHG and other air pollutant emissions as well as demonstrate New York State’s commitment to its environmental goals. Specifically, program investments listed in this update of the operating plan are anticipated to result in significant carbon dioxide equivalent (CO<sub>2</sub>e) 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 <sup>a</sup> (Tons CO <sub>2</sub> e <sup>b</sup> )		Cost Benefit Ratio (\$/Ton CO <sub>2</sub> e)	
	Total Incentives <sup>c</sup>	Total Associated Costs <sup>d</sup>	Annual Savings <sup>e</sup>	Lifetime Savings <sup>f</sup>	Annual Savings <sup>e</sup>	Lifetime Savings <sup>f</sup>	Annual Savings <sup>e</sup>	Lifetime Savings <sup>f</sup>	\$/Ton Annual CO <sub>2</sub> e Savings <sup>g</sup>	\$/CO <sub>2</sub> e EXPECTED LIFETIME Savings <sup>h</sup>
<b>Green Jobs - Green New York</b>										
One-to Four-Family Residential Buildings Program Financing	\$27.0	\$4.1	203,381	4,677,759	25,892	491,943	29,776	624,778	50	44
<b>Energy Efficiency</b>										
LIPA Energy Efficiency and Renewable Energy Initiative	\$50.0	-	6,029	-	119,802	2,156,436	69,946	1,261,803	40	40
EmPower New York	\$0.6	\$0.04	3,491	83,784	-	-	256	6,154	102	72
Home Performance with ENERGY STAR <sup>®</sup>	\$0.9	\$0.11	13,492	323,808	74	1,332	1,123	26,686	37	37
Solar Hot Water (Thermal) Program	\$0.1	\$0.003	345	6,900	1	20	26	519	198	107
<b>Renewable Energy</b>										
Renewable Heat New York	\$0.3	\$0.05	202	4,040	37	740	104	2,087	191	125
NY-Sun Initiative <sup>i</sup>	\$15.0	\$0.3	-	-	60,963	1,524,063	35,358	883,956	17	12
<b>Innovative GHG Abatement Strategies</b>										
Charge NY <sup>j</sup>	\$14.2	\$6.6	26,879	268,790	-	-	1,804	268,790	77	637
<b>Clean Energy Fund</b>										
Clean Energy Fund <sup>k</sup>	\$79.0	\$21.0	17,228	273,341	1,608	26,768	1,842	273,341	366	150
<b>TOTAL Anticipated Benefits<sup>l</sup></b>	<b>\$187.1</b>	<b>\$32.2</b>	<b>271,047</b>	<b>5,638,422</b>	<b>208,376</b>	<b>4,201,302</b>	<b>140,236</b>	<b>3,348,116</b>	<b>1,077</b>	<b>1,223</b>

- <sup>a</sup> 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.
- <sup>b</sup> CO<sub>2</sub>e stands for carbon dioxide equivalent and describes the amount of CO<sub>2</sub> 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.
- <sup>c</sup> Inclusive of incentive dollars for expenditures, encumbrances, and contract pre-encumbrances.
- <sup>d</sup> Inclusive of all non-incentive expenditures.
- <sup>e</sup> Inclusive of savings from all currently operational projects installed since program inception.
- <sup>f</sup> Annual Savings multiplied by the lifetime of the measure installed.
- <sup>g</sup> The sum of Total Incentives and Total Associated Costs divided by Annual Savings.
- <sup>h</sup> The sum of Total Incentives and Total Associated Costs divided by Lifetime Savings.
- <sup>i</sup> 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 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 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, 2019. Anticipated benefits over the timeline of the budget proposal have been calculated.

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

# 1 Introduction

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## 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<sub>2</sub>) 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<sub>2</sub>) 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<sub>2</sub> allowances that are used to supplement existing policies and programs. The plan is structured to result in immediate emission reductions, while building capacity for carbon emission mitigation action in the long-term. In accordance with State regulations, this plan implements activities to reduce carbon emissions and pollution through energy efficiency, renewable energy, and support for innovative carbon abatement strategies.

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

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

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

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

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

Building from the 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 2019.<sup>1</sup> Overall, the plan covers program investments comprised of the following RGGI funds:

- Anticipated proceeds from auctions to be held during fiscal years 2019–22
- 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.<sup>2</sup> Under RGGI, the participating states initially designed cap-and-trade programs that cap CO<sub>2</sub> 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 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.<sup>3</sup>

Each state is implementing this initiative through individual CO<sub>2</sub> Budget Trading Programs linked through the regional cap-and-trade program. Visit <http://www.rggi.org> for additional background on the initiative.

In New York State, the RGGI Program has been implemented through two complementary programs: The New York State Department of Environmental Conservation (DEC) established New York State's CO<sub>2</sub> Budget Trading Program (6 NYCRR Part 242, 6 NYCRR Part 200, General Provisions) and NYSERDA established the CO<sub>2</sub> Allowance Auction Program (21 NYCRR Part 507).

The CO<sub>2</sub> Allowance Auction Program established the rules through which New York State will sell most of its CO<sub>2</sub> allowances. The CO<sub>2</sub> Allowance Auction Program [21 NYCRR Part 507.4(d)] also creates the parameters for use of the proceeds from the sale of allowances that will be used to “promote and implement programs for energy efficiency, renewable or non-carbon emitting technologies, and innovative carbon emissions abatement technologies with significant carbon reduction potential.” The plan is designed to be consistent with these regulatory requirements.

### **1.3 Program Goals**

New York State invests RGGI proceeds to support comprehensive strategies that best achieve the RGGI CO<sub>2</sub> 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.

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.<sup>4</sup>

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<sub>2</sub> Emissions Offset credits under the CO<sub>2</sub> 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

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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 2019–22
- Remaining program funds

### 2.1 Assumptions about Auction Proceeds for Operating Plan

Estimated auction proceeds for fiscal years 2019–22 are collectively anticipated to exceed \$340 million. For planning purposes, it was assumed that the average allowance price would be \$5.35 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 \$1,552 million of program funds made available through RGGI auctions have been, or will be, allocated among programs and other costs through fiscal year 2022.

The table shows cumulative allocations through March 2019 and reflects the planned and actual allocations for fiscal years 2019–2022. The table also summarizes the allocation of all current and planned proceeds through March 31, 2022.

**Table 1. RGGI Revenue and Funding Allocation Plan**

	<b>Program</b>	<b>Cumulative Allocations through March 31, 2019</b>	<b>FY19-20 Plan</b>	<b>FY20-21 Plan</b>	<b>FY21-22 Plan</b>	<b>Cumulative Allocations through March 31, 2022</b>
<b>Proceeds</b>	Number of allowances	371,889,660	20,298,765	20,535,096	23,000,000	435,723,521
	Allowance price	\$3.21	\$5.62	\$5.62	\$5.62	\$3.56
	RGGI Auction Proceeds	1,194,325,692	114,079,059	115,407,240	129,260,000	1,547,591,325
	Interest Earnings	15,164,803	2,279,000	2,279,000	1,688,000	21,910,803
	<b>Total Revenues</b>	<b>1,209,490,495</b>	<b>116,858,059</b>	<b>117,686,240</b>	<b>130,948,000</b>	<b>1,574,982,794</b>
<b>Renewable Energy</b>	NY SUN NYPA Customer Incentives	20,000,000	-	-	-	20,000,000
	NY SUN Community 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
<b>Energy Efficiency</b>	Clean Energy Workforce Opportunity Program	15,000,000	-	-	-	15,000,000
	LIPA Efficiency and RE	179,600,000	25,000,000	25,000,000	-	229,600,000
	Energy Storage	-	52,926,434	-	-	52,926,434
	EmPower NY	27,755,148	200,000	200,000	200,000	28,355,148
	Home Performance with Energy Star	25,220,757	300,000	300,000	300,000	26,120,757
	Multifamily Performance Program	15,213,490	(51,174)	-	-	15,162,316
	Multifamily Carbon Emissions Reduction	5,833,021	(2)	-	-	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
<b>Innovative GHG Abatement Strategies</b>	Southern Tier Competition (76 West)	11,000,000	-	-	-	11,000,000
	Brookhaven National Lab- ION Collider	25,000,000	-	-	-	25,000,000
	Electric Vehicle/Charge NY	23,500,000	5,000,000	-	-	28,500,000
	Advanced Buildings & Industrial Innovations	14,616,235	(198)	-	-	14,616,037
	Climate Research & Analysis	8,735,913	(6,533)	-	-	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	3,834,361	(15,050)	-	-	3,819,311
	PV Manufacturing consortium	8,500,000	-	-	-	8,500,000
	Carbon Sequestration	1,000,000	-	-	-	1,000,000

Table 1 continued

	Program	Cumulative Allocations through March 31, 2019	FY19-20 Plan	FY20-21 Plan	FY21-22 Plan	Cumulative Allocations through March 31, 2022
Community Clean Energy	Cleaner Greener Communities	98,612,277	(1,132,660)	-	-	97,479,617
	Clean Energy Communities	2,573,120	-	-	-	2,573,120
	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)	8,000,000	-	-	-	8,000,000
	Renewable/Net-Zero Energy Demonstrations	-	4,000,000	-	-	4,000,000
	Regional Economic Development & GHG Reduction	10,289,945	-	-	-	10,289,945
Clean Energy Fund	Transfer to(from) Clean Energy Fund	56,250,000	(5,262,144)	33,012,678	62,533,312	146,533,846
	Transfer to NY Green Bank	52,926,434	(52,926,434)	-	-	-
Directed	Transfer to State - Env. Tax Credits	110,000,000	23,000,000	23,000,000	23,000,000	179,000,000
	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	94,625,275	12,400,000	15,900,000	15,884,661	138,809,936
	Transfer to Clean Energy Standard	719,424	-	-	-	719,424
	NYS Budget Transfer	90,000,000	-	-	-	90,000,000
	NYS Temporary Budget Transfer	-	-	-	-	-
	Program Administration	30,798,923	2,232,436	3,250,000	3,250,000	39,531,359
Administration and Other Non-Program Costs	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	7,916,791	1,000,000	1,000,000	1,000,000	10,916,791
	State Cost Recovery	12,106,362	1,345,935	1,023,562	1,124,291	15,600,150
	<b>Total Funding Allocations</b>	<b>1,249,103,097</b>	<b>77,245,458</b>	<b>117,686,240</b>	<b>107,292,264</b>	<b>1,551,327,059</b>
	Surplus/(Shortfall) of Revenues over Funding Allocations	(39,612,602)	39,612,602	-	23,655,736	23,655,735
	<b>Cumulative Surplus (Shortfall)</b>	<b>(39,612,602)</b>	<b>-</b>	<b>-</b>	<b>23,655,736</b>	<b>23,655,735</b>

### **2.2.1 Program Funding Expansion Plan and Additional Funds**

The RGGI Operating Plan Amendment addresses the potential for auction revenues to exceed the estimates being used to develop the operating plan for each year. Allowance auction proceeds may exceed the revenue estimates presented in this multiyear operating plan. Absent unforeseen circumstances, if additional revenue should become available, proceeds could be used to reduce deficits or expand funding for the existing portfolio of RGGI programs to the extent consistent with Part 242, the CO<sub>2</sub> Budget Trading Program regulation. Changes in actual program funding as a result of fluctuating auction revenues are accounted for in the RGGI Quarterly Program Status Reports. Visit [nyserdera.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports](http://nyserdera.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/RGGI-Reports) on the NYSERDA's website for details.

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

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

### **2.2.2 Other Fees and Expenses**

Additional information about other fees and expenses that are netted out from total auction proceeds are also shown and described in 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<sub>2</sub> 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<sub>2</sub> Budget Trading program that include the following:

- Develop and maintain a system to report data from emissions sources subject to RGGI and to track allowances
- Implement a platform to auction CO<sub>2</sub> allowances
- Monitor the market related to the auction and trading of CO<sub>2</sub> 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 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 year 2019–2020 at approximately \$2.2 million and for fiscal years 2020–2022 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**

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### **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, 26 pellet boilers, 19 advanced cordwood boilers, and 547 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-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 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 toward 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 LIPA and administered by Public Service Enterprise Group—Long Island (PSEG-LI). Funding and reporting requirements are established through a Memorandum of

Understanding between NYSERDA and LIPA, which ensures RGGI funds meet RGGI requirements 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 2019–2022 are based on current annual incentives offered for municipal utility customers. Across the State, a total of 7,036 households have been served with RGGI funding through December 2018.

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 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. As is the case with EmPower New York, RGGI funds are targeted to households where CEF funds are not available such as municipal electric territories. RGGI funding allows 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 and air sealing). RGGI funding through HPwES will be available through

December 31, 2019. 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. The amounts proposed for FY 2019–2022 are based on current annual incentives offered for municipal utility customers. Across the State, a total of 9,464 households have been served with RGGI funding through December 2018

Consistent with the program selection criteria and similar to other residential energy service programs, Home Performance with ENERGY STAR<sup>®</sup>, 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 the 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 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 in motivating 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 will 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 that concentrate 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 three years, the 18 awardees, which have been 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.<sup>5</sup> 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, the Public Service Commission, the Department of Transportation, and the Department of Health.

#### ***3.9.1.3 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.

### **3.9.2 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.

#### **3.9.2.1 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**

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 GHG 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 comprehensive “whole building” services, often capturing the highest-value energy savings and emission reduction opportunities and allows the CEF to be administered on a fuel-neutral basis.

Due to reductions in RGGI revenues, the 2018 Operating Plan offered a proposal to reduce the RGGI funds transferred to the CEF over the three-year period in an effort to present a three-year balanced budget Operating Plan on a commitment basis. The proposal reduced the funds from \$75 million to \$6.7 million, resulting in a reduction of \$68.3 million (about 2%) in the \$3.42 billion in funding for CEF Market Development and Innovation and Research. This Operating Plan, as amended by the Board of Directors in June, proposes to both realize annual balanced budgets, as well as fully restore the originally committed funds to the CEF. Based on updates to accounting information and program implementation trends, as well as continued contributions of \$33 million in FY20–21 and \$62.5 million in FY 21–22 based on current revenue projections, the aggregate amount transferred to the CEF will resume the original schedule to dedicate \$25 million annually.

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.

## **3.12 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 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 toward providing GJGNY loans to low- to moderate-income consumers and consumers who may lack access to traditional financing sources. NYSERDA will transfer approximately \$12.4 million in FY 2019 and approximately \$15.9 million from FY 2020–FY 2022 to the revolving loan fund based on current annual loan origination levels and the amount that is expected to not be replenished from bond proceeds.

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. Visit [nyserdera.ny.gov/About/Publications/GJGNY-Advisory-Council-Reports](http://nyserdera.ny.gov/About/Publications/GJGNY-Advisory-Council-Reports) for additional program metrics in the monthly and annual GJGNY reports.

## **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, as determined by the PSC in its December 13 Order. 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**

The 2019 New York Consolidated Funding Application includes a solicitation for Net Zero Energy for Economic Development (Program Opportunity Notice No. 3881). The solicitation provides eligible New York State commercial, industrial, institutional and mixed-use applicants with incentives on a competitive basis for building construction or renovation to existing buildings designed to achieve net zero energy or net zero carbon performance, provided the project will help achieve the goals of the Regional Economic Development Council's Strategic Plan or State Priority Issue Areas. The RGGI funds provide funding to award at least one project in Long Island, whereas up to \$14 million in Clean Energy Fund funding is available to support project awards located in the rest of the State.

## **3.16 Energy and Nature Education Center**

### **3.16.1 Program Description and Benefits**

RGGI funds are being 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.

## **4 Program Evaluation and Reporting**

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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 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<sub>2</sub>e) 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<sub>2</sub>e 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<sub>2</sub>e. 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<sub>2</sub>e reductions, electricity and fuel savings, customer bill savings, program cost per ton of CO<sub>2</sub>e 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<sub>2</sub>e 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.<sup>6</sup> 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.

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.

- 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 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 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 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<sub>2</sub> 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**

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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

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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<sub>2</sub> Budget Trading Program and the CO<sub>2</sub> 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<sub>2</sub>e 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,<sup>7</sup> emissions for gases other than carbon dioxide are converted into carbon dioxide equivalent units (CO<sub>2</sub>e) through multiplication with their appropriate Intergovernmental Panel on Climate Change (IPCC) global warming potential value,<sup>8</sup> 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 <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	25
Nitrous oxide (N <sub>2</sub> O)	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<sub>2</sub>e values represent aggregate CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O 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 <sup>9</sup>**

	<b>Transport (lb CO<sub>2</sub>e/MMBtu)</b>	<b>Residential (lb CO<sub>2</sub>e/MMBtu)</b>	<b>Commercial (lb CO<sub>2</sub>e/MMBtu)</b>	<b>Industrial (lb CO<sub>2</sub>e/MMBtu)</b>
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<sub>2</sub>e/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.<sup>10</sup> While electricity savings may not lead to near-term emission reductions under the RGGI CO<sub>2</sub> cap, savings will potentially reduce (1) imports of electricity to New York State, (2) the demand for CO<sub>2</sub> 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 <sup>11</sup>**

<b>Sector</b>	<b>Electricity (\$/kWh)</b>	<b>Natural Gas (\$/MMBtu)</b>	<b>Fuel Oil/ Distillate (\$/MMBtu)</b>	<b>Propane (\$/MMBtu)</b>
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

**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

# Endnotes

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- <sup>1</sup> The NYSERDA Board of Directors amended the Operating Plan at its June 2019 meeting in consideration of more recent accounting information and program implementation trends.
- <sup>2</sup> The RGGI participating states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. New Jersey will begin participating in RGGI on January 1, 2020.
- <sup>3</sup> Visit [https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model\\_Rule\\_2017\\_12\\_19.pdf](https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf) for more information.
- <sup>4</sup> Visit <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={FC3FBD53-FBAC-41FB-A40E-3DA0A5E0866A}> for NYSERDA's CEF supplement.
- <sup>5</sup> Visit <https://www.nyserdera.ny.gov/All-Programs/Programs/Clean-Energy-Communities/Action-Items> for a list of Clean Energy Community High-Impact Actions.
- <sup>6</sup> 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).
- <sup>7</sup> 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.
- <sup>8</sup> 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.
- <sup>9</sup> 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 [nyserdera.ny.gov/About/Publications/EA-Reports-and-Studies/Energy-Statistics](https://www.nyserdera.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.
- <sup>10</sup> 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<sub>2</sub>e/MWh to 1,160 pounds CO<sub>2</sub>e/MWh. The emissions reductions calculated for this report reflect the new factor of 1,160 pounds CO<sub>2</sub>e/MWh.
- <sup>11</sup> 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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**New York State  
Energy Research and  
Development Authority**

17 Columbia Circle  
Albany, NY 12203-6399

**toll free:** 866-NYSERDA  
**local:** 518-862-1090  
**fax:** 518-862-1091

[info@nyserda.ny.gov](mailto:info@nyserda.ny.gov)  
[nyserda.ny.gov](http://nyserda.ny.gov)



**State of New York**

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