NYSERDA Technology and Market Development Program Annual Report through December 31, 2022

Final Report | August 2023

NEW YORK STATE | NYSERDA

NYSERDA's Promise to New Yorkers:

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

Our Vision:

New York is a global climate leader building a healthier future with thriving communities; homes and businesses powered by clean energy; and economic opportunities accessible to all New Yorkers.

Our Mission:

Advance clean energy innovation and investments to combat climate change, improving the health, resiliency, and prosperity of New Yorkers and delivering benefits equitably to all.

NYSERDA Record of Revision

Document Title
NYSERDA Technology and Market Development Program Annual Report through December 31, 2022

Revision Date	Description of Changes	Revision on Page(s)
8/15/2023	Original Issue	Original Issue

NYSERDA Technology and Market Development Program

Annual Report through December 31, 2022

Final Report

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

August 2023

Table of Contents

List of Tables

1 Introduction

1.1 Technology and Market Development Program Timeline, Mission, and Objectives

The Technology and Market Development (T&MD) program was authorized by the Public Service Commission (PSC) to run from January 1, 2012 through December 31, 2016. The program closed approximately one year early, with the final year subsumed into the New York State Energy Research and Development Authority's (NYSERDA) current Clean Energy Fund portfolio. For more of the procedural history, see Appendix A: Public Policy Context.

The mission of the T&MD program was to test, develop, and introduce new technologies, strategies, and practices to build a statewide market infrastructure to reliably deliver clean energy to New Yorkers.

Specifically, objectives designed to support this mission are as follows:

- Moving new/underused technologies and services into the marketplace to serve as a feeder to help achieve Energy Efficiency Portfolio Standard (EEPS) and Renewable Portfolio Standard (RPS) goals.
- Validating emerging energy efficiency, renewable, and smart grid technologies/strategies and accelerate market readiness in New York State.
- Stimulating technology and business innovation to provide more clean energy options and lower cost solutions, while growing the State's clean energy economy.
- Spurring actions and investments to achieve results distinct from incentive-based programs.

The nine initiatives that comprise the T&MD portfolio (detailed in section 3) are assessed based on their ability to support these objectives. Evaluation reports present these findings and are summarized in section 4.

Achievement of T&MD portfolio goals is dependent on long-term or multiphase investments, and for this reason, several of the T&MD initiatives build on the experience and success of programs funded by previous rounds of the System Benefits Charge (SBC) program or other funding sources. Although this desired and necessary continuity of effort makes it difficult to attribute performance results and outcomes to a specific phase of funding, NYSERDA recognizes the importance of attempting to clearly delineate progress made in the T&MD portfolio from earlier or alternate funding sources. Toward this

end, NYSERDA includes outputs and outcomes supported at least in part by T&MD funds toward program performance milestones and results. Prior SBC or other funded activities are highlighted to help convey a more complete picture of possible program benefits, but these achievements are not tallied toward the T&MD goals unless they were supported by program funds. Commercialization benefits from projects started in 2012 under T&MD will continue to materialize and will be reflected as they do.

1.2 Organization of the Report

This report, filed pursuant to the October 24, 2011 PSC Order, describes how the T&MD Portfolio is progressing toward its mission and objectives. The report is divided into the following sections:

- Section 1: Introduction
- Section 2: Portfolio-Level Reporting
- Section 3: T&MD Initiatives
- Section 4: T&MD Program Evaluation Activities
- Appendix A: T&MD Targets

The T&MD programs have been closed to new applicants for some time. With all final spending and benefits now completed, this issuance represents the final report to close out the T&MD portfolio.

2 Portfolio-Level Reporting

Table 1 provides a summary of anticipated T&MD portfolio benefits for the five-year funding period (2012–2016) and out years (2017–2022), and the sum of all expected benefits as well as achievements to date for applicable metrics. A column labeled "Thru Selected Period" provides achievements to date, through December 31, 2022, for each metric. This report closes out both spending and benefits that are associated with the portfolio.

The T&MD portfolio progressed as expected toward attainment of long-term goals:

- Energy efficiency benefits (on-site electricity, fossil fuel, and demand reductions) include savings from both directly funded projects and technology installations. The portfolio fell short on many energy efficiency goals however demand savings goals for directly funded projects have been met and most CHP project goals were exceeded.
- The portfolio has met or exceeded many of its non-energy goals ("Other T&MD Benefits") in this area, including the number of advanced technologies reaching commercial availability, leveraged funds, number of clean energy businesses graduating from incubators, number of clean energy companies receiving support, businesses partnering with NYSERDA, and training related goals.

A substantial amount of 2016 T&MD funding was repurposed into the Clean Energy Fund (CEF). Given the corresponding early end to the T&MD portfolio, the 2016 T&MD goals presented in this report are the goals that were established in the second revision of the operating plan (2012–2016) dated February 15, 2013, adjusted in proportion to the reduction of funds that occurred in 2016.[1] Adjusted targets should still be viewed with caution since the approach to prorate targets may not align with how each individual program would have accrued benefits. For example, in some cases the later programmatic investments and activities that were foregone might have achieved higher benefits per dollar due to momentum and diffusion into the market. Other noteworthy program implementation and progress milestones are detailed in section 3, with updates applied to areas that expended funds during the reporting period.

Table 1. Summary of Anticipated Cumulative T&MD Benefits

Through December 31, 2022 (at full implementation) for Energy Efficiency, Combined Heat and Power (CHP) and Other Benefits

See endnotes for more information [2,3,4,5]

Energy Efficiency

Benefit Description	2012-2016	Out Years	Total	Thru Selected Period
On-site Electricity Savings from Energy Efficiency Projects, Technologies, Replications, and Codes & Standards (Cumulative Annual GWh)	470.20	225.44	695.64	470.3
GWh Savings from Funded Project and Technology Installations	100.20	0.00	100.20	96.3
GWh Savings from Anticipated Replications not Directly Funded by Program		13.11	13.11	0.0
GWh Savings from Codes & Standards Activities supported by the Program	370.00	212.33	582.33	374.0
On-site Fossil Fuel Savings from Energy Efficiency Projects, Technologies, Replications, and Codes & Standards (Cumulative Annual MMBtu)	2,920,370	647,382	3,567,752	451,587
MMBtu Savings from Funded Project and Technology Installations	562,370	0	562,370	297
MMBtu Savings from Anticipated Replications not Directly Funded by Program		101,992	101,992	0
MMBtu Savings from Codes & Standards Activities supported by the Program	2,358,000	545,390	2,903,390	451,290
On-site Demand Reduction from Energy Efficiency Projects, Technologies, Replications, and Codes & Standards (Cumulative Annual MW)	132.01	114.28	246.30	237.7
Demand Reduction from Funded Project and Technology Installations	42.01	3.62	45.63	130.7
Demand Reduction from Anticipated Replications not Directly Funded by Program		25.43	25.43	0.0
Demand Reduction from Codes & Standards Activities supported by the Program	90.00	85.23	175.23	107.0

CHP Projects

Benefit Description	2012-2016	Out Years	Total	Thru Selected Period
On-site Electricity Generated from CHP Projects, Technologies, and Replications (Cumulative Annual MW)	11.00	14.40	25.40	26.49
MWs Installed from Funded Project and Technology Installations	11.00	12.00	23.00	26.49
MWs Installed from Anticipated Replications not Directly Funded by the Program		2.40	2.40	0.00
On-site Electricity Generated from CHP Projects, Technologies, and Replications (Cumulative Annual GWh)	78.30	114.64	192.94	210.5
GWhs Generated from Funded CHP Project and Technology Installations	78.30	100.00	178.30	210.5
GWhs Generated from Anticipated Replications not Directly Program Funded by Program		14.64	14.64	0.0
Primary Energy Savings from CHP Installations (Cumulative Annual MMBtus)	101,790	149,032	250,822	274,140
MMBtu Consumed from Funded Project and Technology Installations	101,790	130,000	231,790	274,140
MMBtu Consumed from Anticipated Replications not Directly Funded by Program		19,032	19,032	0

Table 1 continued

Other T&MD Benefits

Benefit Description	2012-2016	Out Years	Total	Thru Selected Period
System-wide CO2 Emission Reductions, Energy Efficiency - On-site and Central Station (Annual Tons)	443,762	168,674	612,436	299,244
Advanced Technologies Reaching Commercial Availability	42	19	61	103
Improved Technologies Deployment Programs Adopted by the Market or Further Supported by Deployment Programs	8	2	10	34
Commercial Sales of New and Improved Supported Technologies (millions)	$24.60	$109.07	$133.67	$163.79
Funding Leveraged (co-funding and outside investment) by Investment (millions)	$481.43	$19.93	$501.36	$1,925.03
Clean Energy Businesses Graduating from Incubators	90	4	94	116
Clean Energy Companies Receiving Support	466	30	496	495
Retail and Supply Chain Businesses Partnering with NYSERDA to increase Market Share of Energy Efficient Products	1,033		1,033	1,327
Clean Energy Training for Practitioners (Trainees)	19,219	8	19,227	54,074
Supply Chain Training to Facilitate Adoption of Energy Efficient Products (Partner Employees)	900		900	2,376

2.1.1 Budget and Spending Status

Table 2 shows the T&MD program budget and financial status through March 31, 2023. Committed and spent funds are also shown as a percent of the total 2012–2016 budget. During 2022, approximately $4.9 million of prior project commitments have been expended and all remaining commitments have been closed out.

Table 2. Budget and Financial Status for T&MD Programs through March 31, 2023

	2012-2016 Budget [a]	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds [b]	Percent of Budget 2012-2016 Committed
Power Supply and Delivery					
Smart Grid/Electric Vehicle	$27,195,123	$27,195,123	100%	$27,195,123	100%
Advanced Clean Power	$26,592,937	$26,592,937	100%	$26,592,937	100%
Combined Heat and Power	$25,195,003	$25,195,003	100%	$25,195,003	100%
Total Power Supply & Delivery	*$78,983,063*	*$78,983,063*	*100%*	*$78,983,063*	*100%*
Building Systems					
Advanced Buildings	$26,835,607	$26,835,607	100%	$26,835,607	100%
Advanced Energy Codes & Standards	$8,767,558	$8,767,558	100%	$8,767,558	100%
Total Building Systems	*$35,603,165*	*$35,603,165*	*100%*	*$35,603,165*	*100%*
Clean Energy Infrastructure					
Market Development	$40,881,118	$40,881,118	100%	$40,881,118	100%
Clean Energy Business Development	$24,901,196	$24,901,196	100%	$24,901,196	100%
Environmental Monitoring, Evaluation and Protection (EMEP)	$15,544,384	$15,544,384	100%	$15,544,384	100%
Workforce Development	$13,446,673	$13,446,673	100%	$13,446,673	100%
Total Clean Energy Infrastructure	*$94,773,371*	*$94,773,371*	*100%*	*$94,773,371*	*100%*
EV Fast Chargers Order[c]	*$21,616,000*	*$21,616,000*	100%	*$21,616,000*	100%
Electric Generating Facility Cessation Mitigation Program [d]	*$15,734,980*	*$15,734,980*	100%	*$15,734,980*	100%
Total of All Program Areas	***$246,710,579***	***$246,710,579***	***100%***	***$246,710,579***	***100%***
Administration (8%)	$39,765,533	$39,601,827	100%	$39,601,827	100%
NYS Cost Recovery Fee (1.7%)	$4,955,283	$4,930,798	100%	$4,930,798	100%
Evaluation (5%)	$9,321,791	$9,321,791	100%	$9,321,791	100%
Grand Total - Portfolio [e]	***$300,753,186***	***$300,564,995***	***100%***	***$300,564,995***	***100%***

Table notes are on the next page.

* Totals may not sum exactly due to rounding.

[a] Pursuant to the January 21, 2016 CEF Order, the budget figures include reclasses to the CEF of $182.7 million of uncommitted funds as of February 29, 2016.

[b] Committed funds include amounts spent plus remaining funding obligated under a contract, purchase order, or incentive award. In addition, committed funds include planned funding for contracts awarded and under negotiation and planned funding under active development through solicitations with specific due dates.

[c] Pursuant to the 2/7/2019 Order (Case 18-E-0138, Establishing Framework for Direct Current Fast Charging Infrastructure Program), $21,616,000 of uncommitted funds was used for the EV Fast Chargers program.

[d] Pursuant to the 2/11/2021 Order (Case 20-E-047, Developing a Funding Mechanism for the Electric Generation Facility Cessation Mitigation Program), $15,734,979 of uncommitted funds was used for the Electric Generating Facility Cessation Mitigation program.

[e] The September 9, 2021 CEF Modification Order (14-M-0094) required all incremental uncommitted funds to be utilized to fully fund the $343M authorized for NY Sun 6GW goal. As of March 31, 2023, all remaining uncommitted TMD funds have been reallocated and the budgets reflected in this report are post-reallocation.

3 T&MD Initiatives

This section provides a status update on each of the nine T&MD initiatives, including budget status and highlight achievements.

An Output/Leading Indicator describes the anticipated immediate results associated with initiative activities. An Outcome/Impact describes expected achievements in the near, intermediate, and longer term.

3.1 Power Supply and Delivery Initiatives

Table 3 shows committed and spent funds for this initiative as a percentage of the total 2012–2016 budgets. Later sections describe progress for each area of this initiative.

Table 3. Power, Supply, and Delivery Budget/Financial Status through December 31, 2022

	2012-2016 Budget [a]	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds [b,c]	Percent of Budget 2012-2016 Committed
Smart Grid/Electric Vehicle					
Smart Grid	$22,110,203	$22,110,203	100%	$22,110,203	100%
Electric Vehicle	$5,084,920	$5,084,920	100%	$5,084,920	100%
Total Smart Grid/Electric Vehicle	*$27,195,123*	*$27,195,123*	*100%*	*$27,195,123*	*100%*
Advanced Clean Power					
Technology Innovation	$19,941,284	$19,941,284	100%	$19,941,284	100%
Resource Development	$1,221,151	$1,221,151	100%	$1,221,151	100%
Solar Cost Reduction	$5,430,502	$5,430,502	100%	$5,430,502	100%
Total Advanced Clean Power	*$26,592,937*	*$26,592,937*	*100%*	*$26,592,937*	*100%*
Combined Heat & Power[c]					
CHP Aggregation & Acceleration	$5,170,587	$5,170,587	100%	$5,170,587	100%
CHP Performance	$20,024,416	$20,024,416	100%	$20,024,416	100%
Total Combined Heat & Power	*$25,195,003*	*$25,195,003*	*100%*	*$25,195,003*	*100%*
Grand Total - Power, Supply, & Delivery Initiatives	***$78,983,063***	***$78,983,063***	***100%***	***$78,983,063***	***100%***

* Totals may not sum exactly due to rounding.

[a] Pursuant to the January 21, 2016 CEF Order, the budget figures presented herein include reclasses to the CEF of $182.7 million of uncommitted funds as of February 29, 2016.

[b] Committed funds include amounts spent plus remaining funding obligated under a contract, purchase order, or incentive award. In addition, committed funds include planned funding for contracts awarded and under negotiation and planned funding under active development through solicitations with specific due dates.

[c] Committed funds may decrease from period to period as a result of the disencumbrance/cancellation of contracts, or due to the actual award amount(s) resulting from a due date solicitation being less than the planned award. The Commission's January 21, 2016 Order Authorizing the Clean Energy Fund Framework directed that any

uncommitted program funds after February 29, 2016 would be retained for future ratepayer benefits. Those amounts are included in this table and will be retained for future ratepayer benefits in accordance with the January order.

3.1.1 Smart Grid and Electric Vehicle Infrastructure

3.1.1.1 Smart Grid

The Smart Grid Program promotes product development and demonstrations targeted at ensuring high levels of security, quality, reliability, and availability of electric power; improving economic productivity; and minimizing environmental impacts while maximizing safety and sustainability. A smarter grid will be characterized by the widespread application of advanced sensing, communication and control devices, and other uniform diagnostic systems to support real-time visualization of electric grid operating conditions. This smarter grid is expected to reduce energy losses, extend equipment life, reduce operating costs, increase system resiliency to disruptions, support quicker restoration after disruptions, support the integration of distributed energy resources, and increase the throughput or transfer of electric energy among regions in the State. A smarter grid will also be essential to accelerating adoption of grid powered electric vehicles (GPV) and associated infrastructure. Projects funded through program activity must demonstrate significant statewide public benefit and quantify all energy, environmental, and economic impacts. Technology demonstrations, product development, research studies, and engineering studies are all eligible for funding support through periodic program solicitations.

The following key program activities and accomplishments have occurred during this reporting period:

- None. Activities were completed in prior reporting period and final invoices were paid during this reporting period.

Table 4 shows performance milestones and results for the Smart Grid Program through December 31, 2022. Outputs/Leading Indicators measure immediate results; outcomes/impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Signed contracts and completed projects are for technology development, demonstration, and pilot projects, including several large flagship projects. Signed contracts and completed projects for research studies include studies on technologies, market barriers, and policies related to increased smart grid implementation in New York State. The program performed as expected, exceeding most targets.

Table 4. Smart Grid Performance Milestones and Results through December 31, 2022

See endnotes for more information[6,7]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
Technology, development, demonstration or pilot projects	Projects Contracted - Target	7	9			16
	Projects Contracted - Progress	8	6	4	1	19
	Projects Completed - Target		5	9	2	16
	Projects Completed - Progress	0	4	1	14	19
Research Studies	Projects Contracted - Target	2	2			4
	Projects Contracted - Progress	13	15	4	0	32
	Projects Completed - Target		2	2		4
	Projects Completed - Progress	0	13	6	13	32
All Projects	Supported Companies - Target	8	10			18
	Supported Companies - Progress	21	15	6	1	43

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$18.00	$42.00	$0.50		$60.50
	Leveraged Funds Amount (millions) - Progress	$13.82	$58.37	$10.10	$85.89	$168.18
	Products and Technologies Commercialized - Target			1	1	2
	Products and Technologies Commercialized - Progress	0	2	0	1	3
	Product Revenue Amount (millions) - Target				$3.24	$3.24
	Product Revenue Amount (millions) - Progress	$0.00	$1.25	$0.50	$1.94	$3.70
	Market Adoption - Target			2	1	3
	Market Adoption - Progress	0	0	5	1	6

3.1.1.2 Electric Vehicle Infrastructure

The electric vehicle (EV) infrastructure efforts include engineering studies, product development, demonstration projects, and pilot programs to validate technology that minimizes negative grid impacts from grid-powered vehicle (GPV) charging, develops GPV-to-grid communication technologies and control processes, and promotes new business models that enable the benefits of vehicle storage for the distribution system.

The following key program activities and accomplishments were performed during this reporting period:

- None. Activities were completed in prior reporting period and final invoices were paid during this reporting period.

Table 5 shows performance milestones and results for Electric Vehicle Infrastructure Program through December 31, 2022. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Research studies focus on technologies, market barriers, and policies related to increased grid-powered vehicle implementation in New York State. Leveraged funds include co-funding and outside investments for EV infrastructure. Every output/outcome metric has been met or exceeded, except the product revenue metric.

Table 5. Electric Vehicle Infrastructure Performance Milestones and Results through December 31, 2022

See endnotes for more information[8]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
Technology, development, demonstration or pilot projects	Projects Contracted - Target	4	9	2		15
	Projects Contracted - Progress	1	15	2	2	20
	Projects Completed - Target		3	6	6	15
	Projects Completed - Progress	0	3	5	12	20
Research Studies	Projects Contracted - Target	4	1			5
	Projects Contracted - Progress	1	12	2	3	18
	Projects Completed - Target		4	1		5
	Projects Completed - Progress	0	2	7	9	18
All Projects	Supported Companies - Target	5	10	3		18
	Supported Companies - Progress	3	21	6	2	32

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$4.00	$14.00	$6.80		$24.80
	Leveraged Funds Amount (millions) - Progress	$7.86	$21.64	$5.03	$88.08	$122.62
	Products and Technologies Commercialized - Target		1	1		2
	Products and Technologies Commercialized - Progress	0	0	2	1	3
	Product Revenue Amount (millions) - Target				$5.31	$5.31
	Product Revenue Amount (millions) - Progress	$0.00	$0.00	$1.75	$2.34	$4.09
	Market Adoption - Target			1	1	2
	Market Adoption - Progress	0	1	0	27	28

3.1.2 Advanced Clean Power

3.1.2.1 Clean Power Technology Innovation Program

The Clean Power Technology Innovation Program works to advance smart grid technology, assist New York State innovators in product development, and overcome barriers and institutional impediments to the widespread use of renewable and clean power and storage technologies. Technologies eligible under this program include innovative renewable-electric and other advanced clean power technologies for grid-connected applications, storage technologies for sub-utility-scale stationary applications, or technologies that improve grid-power quality and reliability. Subsystems and components, as well as improved innovative manufacturing methods for these technologies, are included. Examples of technologies include fuel cells, batteries, solar electric power, wind power, hydropower, power conditioning equipment, waste heat to electricity, biomass to electricity, and innovative control or monitoring technologies.

The following key program activities and accomplishments were performed during this reporting period:

- Helix power has finished long lead part procurement and has identified a manufacturing partner.

Table 6 shows performance milestones and results for the Technology Innovation and Energy Storage programs through December 31, 2022. Commercialization metrics for projects that only received SBC III funding are not reported here. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Leveraged funds include co-funding and outside investments for clean power technology projects. Progress toward output and outcome metrics was mixed, with some targets such as leveraged funds and products/technologies commercialized exceeding targets while other metrics fell short.

Table 6. Clean Power Technology Innovation (Top Two Sections) and Energy Storage Commercialization Center (Bottom Section) Performance Milestones and Results through December 31, 2022

See endnotes for more information[9,10]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	15	26	3		44
	Projects Contracted - Progress	12	20	3	0	35
	Projects Completed - Target		10	15	19	44
	Projects Completed - Progress	1	7	9	18	35
	Supported Companies - Target	19	32	5		56
	Supported Companies - Progress	12	20	3	0	35

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$20.00	$32.00	$4.60		$56.60
	Leveraged Funds Amount (millions) - Progress	$19.53	$94.60	$36.47	$321.37	$471.97
	Products and Technologies Commercialized - Target		1	2	4	7
	Products and Technologies Commercialized - Progress	3	2	1	4	10
	Product Revenue Amount (millions) - Target	$1.00	$1.00	$3.00	$42.85	$47.85
	Product Revenue Amount (millions) - Progress	$0.53	$24.72	$0.93	$2.49	$28.66

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$2.00	$2.00	$1.00	$1.10	$6.10
	Leveraged Funds Amount (millions) - Progress	$0.50	$0.98	$0.51	$0.98	$2.97
	Products and Technologies Commercialized - Target	1	4	4	13	22
	Products and Technologies Commercialized - Progress	0	0	0	0	0
	Revenue Amount (millions) - Target	$0.15	$2.20	$1.40	$4.99	$8.74
	Revenue Amount (millions) - Progress	$0.00	$1.03	$0.44	$5.25	$6.72
	Product Development Tests - Target	2	8	6	20	36
	Product Development Tests - Progress	0	19	11	125	155

3.1.2.2 Resource Development Program

The Resource Development Program is focusing on activities to stimulate the development of new renewable energy supplies, technologies, and businesses in the renewable energy industry with the greatest potential to meet near- to intermediate-term energy and environmental goals. Similar to previous efforts to address market barriers that helped develop land-based wind energy in Upstate New York, this program concentrates on the gap in understanding offshore wind energy. Marine resource and site assessment activities will increase knowledge of coastal marine energy assets and their suitability for power development and improve understanding of the capacity in New York State to manufacture, construct, and service new marine-based electrical generation projects and components.

NYSERDA is the lead agency coordinating offshore wind opportunities in New York State, which will support the ambitious Climate Leadership and Community Protection Act (Climate Act) goals to meet 70 percent renewable energy by 2030 and a zero-carbon emission electric sector by 2040. On January 29, 2018, the New York Offshore Wind Master Plan was released, representing a comprehensive roadmap that encourages the development of offshore wind in a manner that is sensitive to environmental, maritime, economic, and social issues, while addressing market barriers and aiming to lower costs. Two CEF Investment Plans now support NYSERDA's continuing work, originally initiated under the T&MD program, to advance offshore wind. With work in this area now progressing under CEF, the previous 90-megawatt (MW) site development potential target set for this program, noted in Tables 3 to 5, has been superseded by the current State offshore wind goal of 9 GW by 2030. Remaining committed funding for the Resource Development program has been used to contract with Cornell University to support the development of renewable energy through the application of anaerobic digestion, which concluded in 2022. Cornell provided support for NYSERDA in reviewing proposed plans for farms that were selected to participate in the former NYSERDA program for refurbishment of existing farm based anaerobic digesters. Cornell also developed and shared information about impacts of anaerobic digester system alternatives with farms and other interested parties. Analysis and information developed during the course of the ADAI can be found on the Cornell Environmental Systems website.[11]

The following key program activities and accomplishments were performed during this reporting period:

- None. All spending and activities were completed in prior reporting periods.

Table 7 shows performance milestones and results for the Resource Development program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Signed contracts and completed projects include studies, surveys, and plans. Stakeholder engagements include engagements with stakeholder organizations and consortia in support of developing a research/program agenda. Leveraged funds include co-funding and outside investment. All output metric targets have been exceeded. Progress on outcome metrics will not be achieved as these activities were undertaken in the Clean Energy Fund.

Table 7. Resource Development Performance Milestones and Results through December 31, 2022

See endnotes for more information[12]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	1				1
	Projects Contracted - Progress	3	0	0	0	3
	Projects Completed - Target	1				1
	Projects Completed - Progress	0	2	0	1	3
	Stakeholder Engagements - Target					
	Stakeholder Engagements - Progress	2	1	0	0	3

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target		$0.20			$0.20
	Leveraged Funds Amount (millions) - Progress	$0.00	$0.00	$0.00	$0.00	$0.00
	Site Development Potential (MW) - Target				90.00	90.00
	Site Development Potential (MW) - Progress	0.00	0.00	0.00	0.00	0.00

3.1.2.3 Solar Cost Reduction

The Solar Cost Reduction program[13] helped achieve the goals of the NY-Sun initiative[14] through activities that reduced the balance-of-system (BOS) costs of solar electric installations and supported priority solar electric technology development in New York State. BOS costs included non-module hardware, labor, design, permitting, and interconnection, and can amount to approximately one-half of the installed cost of a solar electric system. A dialogue with representatives of the industry, permitting authorities, and various stakeholders was conducted through workshops and other means to develop a thorough understanding of the solar electric project development process and the elements that constitute BOS cost components.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Major Project Accomplishments:

- **The Photovoltaic Trainers Network (PVTN)** contract concluded in March 2018. A total of 12,988 individuals participated in courses offered through the PV Trainers Network. Courses included solar electric training for code officials, first responders, municipal personnel, architects, and engineers.
- **Train-the-Trainer** designed and implemented the train-the-trainer program to teach instructors at five academic institutions across New York State to independently deliver trainings. All academic instructors were independently teaching safety and fire considerations for Solar PV and seven out of 10 were independently teaching Solar PV Permitting and Inspection Methods by program conclusion.
- **Technical Assistance** provided highly responsive, free, on-call technical assistance to local government officials on various solar PV topics via the "Ask the Expert" portal and the PVTN email account. Through this portal and direct email communication, PVTN provided a concierge service that helped government officials better understand solar PV technology and more effectively manage the solar PV development and approval process. In all, PVTN answered over 170 technical assistance requests ranging from procuring solar for municipal facilities, reviewing zoning laws, and interpreting code language.
- **Resource Development** created 11 complementary resources to provide deeper guidance to local government officials on best practices for solar PV planning, zoning, procurement, taxation, inspection, safety, and other topics in the form of factsheets, guidance documents, and frequently asked questions. Many of these resources are now included in NY-Sun's Solar Guidebook for Local Governments.
- **Online Portal** developed an online portal that served as a one-stop shop for local government officials on solar PV. Officials could view the trainings offered, search and register for upcoming trainings, browse the relevant resources and FAQs for answers and further guidance on specific topics, view webinars and podcasts, and request technical assistance or a training. Over the course of the program the portal had 45,188 sessions, 129,230 page views, and a total of 28,688 users.
- **Lasting Impact** can be seen in the academic partner instructors who have continued to teach training courses despite the ending of some PVTN programs. For instance, a PVTN partner from Bronx Community College is teaching a safety and fire course to the area's country fire department chiefs. In addition, academic partner Erie Community College received grant funding from State University of New York (SUNY) to turn the Solar PV for Engineering course into an online module for SUNY Erie Community College students.

Table 8 shows performance milestones and results for the Solar Cost Reduction program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Signed contracts and completed projects for development tools, practices, studies, surveys, and engagements are projects that reduce solar electricity costs. Signed contracts and completed projects for technology, development, demonstration, or pilot projects are for BOS projects. The meetings, workshops, and

conferences are a result of BOS projects. The training sessions focus on aspects of solar electricity for authorities having jurisdiction, local officials, and trainers. Leveraged funds include co-funding and outside investment for BOS projects. Most output/outcome metrics were met or exceeded, except the technology, development, and demonstration projects contracted and completed and product revenue and market adoption.

Table 8. Solar Cost Reduction Performance Milestones and Results through December 31, 2022

See endnotes for more information[15,16]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
Technology, development, demonstration or pilot projects	Projects Contracted - Target	6				6
	Projects Contracted - Progress	0	4	0	0	4
	Projects Completed - Target		2	4		6
	Projects Completed - Progress	0	0	0	4	4
Develop tools, practices, studies, surveys, engagements	Projects Contracted - Target	6				6
	Projects Contracted - Progress	0	8	1	0	9
	Projects Completed - Target		5	1		6
	Projects Completed - Progress	0	1	2	6	9
All Projects	Supported Companies - Target	5				5
	Supported Companies - Progress	0	12	1	0	13
	Solar (PV) Trainees - Target	1,180				1,180
	Solar (PV) Trainees - Progress	0	4,521	4,666	3,801	12,988
	Training Sessions - Target	118				118
	Training Sessions - Progress	0	155	142	88	385
	Meetings, Workshops, Conferences - Target	1	4	1		6
	Meetings, Workshops, Conferences - Progress	0	27	26	15	68

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$5.50	$2.30			$7.80
	Leveraged Funds Amount (millions) - Progress	$2.00	$16.45	$1.69	$7.72	$27.85
	Products and Technologies Commercialized - Target				1	1
	Products and Technologies Commercialized - Progress	0	1	0	0	1
	Product Revenue Amount (millions) - Target				$4.25	$4.25
	Product Revenue Amount (millions) - Progress	$0.00	$0.04	$0.12	$0.05	$0.21
	Market Adoption - Target		3	1		4
	Market Adoption - Progress	0	0	1	1	2

3.1.3 Combined Heat and Power

3.1.3.1 CHP Aggregation and Acceleration Program

The CHP Aggregation and Acceleration Program began with T&MD funds by developing and transforming the marketplace for CHP systems from 50 kilowatts (kW) to 1.3 MW, the nameplate capacity range of a majority of NYSERDA's previous CHP projects. It also serves as the foundation for transition to the CEF-funded program in 2016, which expanded to support CHP systems of 3 MW and smaller with no minimum size. The program's goal was to accomplish this transformation by a vetted catalog of prequalified equipment and creating and validating rules of thumb for simplifying

compiling the analysis used to determine the capacity needs of a given site. This focus on prepackaged CHP modules that include all major components will reduce the need for equipment-integration engineering and assembly (and thus reduce the costs of and opportunities for errors); nevertheless, site-specific engineering regarding placement of equipment at the site and tie-ins to the site's infrastructure will still be necessary.

The following key program activities and accomplishments were performed during this reporting period:

- All projects are now complete and final expenditures have been made.

Table 9 shows performance milestones and results for the CHP Aggregation and Acceleration Program, through December 31, 2022. Energy savings reported in Table 9 are the evaluated program savings project count, peak load demand, electric generation—and primary energy savings targets are established for projects installed through a particular time period. Progress refers to the cumulative savings that are installed, contracted, or accepted through a particular time period. For example, T&MD savings for 2012–2013 are the energy and demand savings/generation achieved or expected as of December 31, 2013 as a result of activity from January 2012 through December 2013. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Achievement of output and outcome metrics was mixed, with some targets, such as leveraged funds and projects already completed, exceeding their target, while other metrics fell short. Based on surveys of CHP professionals, the market assessment portion of a 2020 evaluation found that there were very few or no projects completed without involvement from NYSERDA. As a result, there are no evaluated savings for the replication projects.

Table 9. CHP Aggregation and Acceleration Performance Milestones and Results through December 31, 2022

See endnotes for more information[17]

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-present
All Projects	Projects - Target	3	9	9	9
	Applications Approved but not yet Contracted - Progress	0	2	0	0
	Projects Contracted but not yet Completed - Progress	4	33	30	0
	Projects Completed - Progress	0	16	28	52
	Total Progress	4	51	58	52
All Projects	Peak Load Electric Generation (MW) - Target	1.00	3.00	3.00	3.00
	Peak Load Electric Generation Applications Approved but not yet Contracted (MW) - Progress	0.00	0.13	0.00	0.00
	Peak Load Electric Generation Projects Contracted but not yet Completed (MW) - Progress	0.02	0.60	0.76	0.00
	Peak Load Electric Generation Projects Completed (MW) - Progress	0.00	1.26	1.43	2.00
	Total Progress	0.02	1.99	2.19	2.00
All Projects	Electric Generation (GWh) - Target	6.10	18.30	18.30	18.30
	Electric Generation Applications Approved but not yet Contracted (GWh) - Progress	0.00	0.81	0.00	0.00
	Electric Generation Projects Contracted but not yet Completed (GWh) - Progress	0.09	3.65	4.62	0.00
	Electric Generation Projects Completed (GWh) - Progress	0.00	7.69	8.71	12.00
	Total Progress	0.09	12.15	13.33	12.00
All Projects	Primary Energy Savings (MMBtu) - Target	7,930	23,790	23,790	23,790
	Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	0	1,051	0	0
	Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	119	4,742	6,011	0
	Primary Energy Savings Projects Completed (MMBtu) - Progress	0	9,996	11,324	16,140
	Total Progress	119	15,789	17,335	16,140

		2012-13	2014-15	2016	2017-present	Total
All Projects	Pre-Packaged Systems - Target	5				5
	Pre-Packaged Systems - Progress	64	111	90	0	265
	Knowledge/Technology Transfer Activities - Target	2				2
	Knowledge/Technology Transfer Activities - Progress	19	82	27	0	128

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$12.00				$12.00
	Leveraged Funds Amount (millions) - Progress	$3.43	$18.55	$10.46		$32.44
	Leveraged Funds Replicated (millions) - Target				$9.60	$9.60
	Leveraged Funds Replicated (millions) - Progress	$0.00	$0.00	$0.00	$0.00	$0.00
	Peak Load Electric Generation Replicated (MW) - Target				2.40	2.40
	Peak Load Electric Generation Replicated (MW) - Progress	0.00	0.00	0.00	0.00	0.00
	Electric Generation Replicated (GWh) - Target				14.64	14.64
	Electric Generation Replicated (GWh) - Progress	0.00	0.00	0.00	0.00	0.00
	Primary Energy Savings Replicated (MMBtu) - Target				19,032	19,032
	Primary Energy Savings Replicated (MMBtu) - Progress	0	0	0	0	0

3.1.3.2 CHP Performance Program

The CHP Performance Program funds installations of CHP systems using energy, summer peak demand, efficiency, and environmental performance-based payments. The program funds clean, efficient, cost effective, gas-fired systems using site-specific designs. In accordance with the PSC Order, systems are required to meet a minimum fuel conversion efficiency of 60 percent and a maximum of 1.6 pounds/megawatt-hour (MWh) of NO_x emissions.[18] To quantify the performance-based payments, the program applies rigorous, multiyear system performance measurements, which is a groundbreaking approach for energy efficiency program administrators.

Additional incentives are geared toward projects that:

- Offer greater potential value to the distribution system.
- Operate at higher overall efficiency levels.
- Are located at critical infrastructure, including facilities of refuge.

Additional incentives for projects that offer greater potential value to the distribution system were limited to the Con Edison service territory.

The following key program activities and accomplishments were performed during this reporting period:

All projects are now complete and final expenditures have been made. Table 10 shows performance milestones and results for the CHP Performance Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Energy savings reported are evaluated program savings. Project count, peak load demand, electric generation, and primary energy savings targets are established for projects installed through a particular time period. Progress refers to the cumulative savings that are installed, contracted, or accepted through a particular time period. For example, T&MD savings for 2012–2013 are the energy and demand savings/generation achieved or expected as of December 31, 2013 as a result of activity from January 2012 through December 2013. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Every output/outcome metric has been exceeded except for the number of projects completed. Although the number of projects completed will not meet the target, the projects yielded greater results that expected.

Table 10. CHP Performance Program Performance Milestones and Results through December 31, 2022

See endnotes for more information[19]

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-present
All Projects	Projects - Target		1	5	13
	Applications Approved but not yet Contracted - Progress	4	5	2	0
	Projects Contracted but not yet Completed - Progress	0	8	10	0
	Projects Completed - Progress	0	1	1	8
	Total Progress	4	14	13	8
All Projects	Peak Load Electric Generation (MW) - Target		2.00	8.00	20.00
	Peak Load Electric Generation Applications Approved but not yet Contracted (MW) - Progress	24.27	24.86	8.34	0.00
	Peak Load Electric Generation Projects Contracted but not yet Completed (MW) - Progress	0.00	29.59	39.89	0.00
	Peak Load Electric Generation Projects Completed (MW) - Progress	0.00	2.80	2.80	24.49
	Total Progress	24.27	57.25	51.03	24.49
All Projects	Electric Generation (GWh) - Target		10.00	60.00	160.00
	Electric Generation Applications Approved but not yet Contracted (GWh) - Progress	187.22	172.51	49.12	0.00
	Electric Generation Projects Contracted but not yet Completed (GWh) - Progress	0.00	272.08	359.10	0.00
	Electric Generation Projects Completed (GWh) - Progress	0.00	25.00	25.00	198.46
	Total Progress	187.22	469.60	433.22	198.46
All Projects	Primary Energy Savings (MMBtu) - Target		13,000	78,000	208,000
	Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	243,389	224,265	63,854	0
	Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	0	353,709	466,828	0
	Primary Energy Savings Projects Completed (MMBtu) - Progress	0	32,500	32,500	258,000
	Total Progress	243,389	610,475	563,182	258,000

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$30.00	$110.00	$60.00		$200.00
	Leveraged Funds Amount (millions) - Progress	$11.47	$106.95	$82.40	$116.42	$317.24

3.2 Building Systems Initiative

Table 11 shows the Building Systems budget and financial status through December 31, 2022. Committed and spent funds are also shown as a percentage of the total 2012–2016 budget. The following sections describe progress for each area of this initiative.

Table 11. Building Systems Budget and Financial Status through December 31, 2022

	2012-2016 Budget [a]	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds [b,c]	Percent of Budget 2012-2016 Committed
Advanced Buildings					
Emerging Technology/Accelerated Commercialization	$8,191,542	$8,191,542	100%	$8,191,542	100%
Technology Development	$13,029,142	$13,029,142	100%	$13,029,142	100%
Demand Response	$5,614,923	$5,614,923	100%	$5,614,923	100%
Total Advanced Buildings	*$26,835,607*	*$26,835,607*	*100%*	*$26,835,607*	*100%*
Advanced Energy Codes & Standards	$8,767,558	$8,767,558	100%	$8,767,558	100%
Grand Total - Building Systems Initiatives	***$35,603,165***	***$35,603,165***	***100%***	***$35,603,165***	***100%***

* Totals may not sum exactly due to rounding.

[a] Pursuant to the January 21, 2016 CEF Order, the budget figures presented herein include reclasses to the CEF of $182.7 million of uncommitted funds as of February 29, 2016.

[b] Committed funds include amounts spent plus remaining funding obligated under a contract, purchase order, or incentive award. In addition, committed funds include planned funding for contracts awarded and under negotiation and planned funding under active development through solicitations with specific due dates.

[C] Committed funds may decrease from period to period as a result of the disencumbrance/cancellation of contracts, or due to the actual award amount(s) resulting from a due date solicitation being less than the planned award. The Commission's January 21, 2016 Order Authorizing the Clean Energy Fund Framework directed that any uncommitted program funds after February 29, 2016 would be retained for future ratepayer benefits. Those amounts are included in this table and will be retained for future ratepayer benefits in accordance with the January order.

3.2.4 Advanced Building Technologies

3.2.4.1 Emerging Technology/Accelerated Commercialization—Buildings

The Emerging Technology/Accelerated Commercialization (ETAC)—Buildings component employs a deliberate approach to accelerating commercial introduction of emerging or underused building technologies and strategies. ETAC will serve both as a feeder effort to support State clean energy programs and encourage market adoption without additional ratepayer support. This effort focuses on three market sectors: commercial/institutional, multifamily, and residential.

ETAC-Commercial/Institutional

NYSERDA's ETAC-Commercial/Institutional (CI) program is targeted to technology developers and owners of multiple buildings wishing to gain independent validation of performance for a product, technology, or approach that is commercially available, yet not in widespread use, and accelerates market acceptance. Projects receive a NYSERDA-funded performance measurement and verification (M&V) study tailored to each project. Performance validation considers factors such as energy savings and other benefits and pathways to overcome market challenges. Project results and validated performance information is shared through targeted, deliberate outreach to the market, other New York Program Administrators, and Department of Public Service staff. Support is offered through both competitive

and open-enrollment solicitations. The ETAC-CI open enrollment program, launched in May 2013, consists of two program tracks: Energy Performance Validation and Focused Demonstrations. Projects in the Focused Demonstration track receive NYSERDA funding to support installation and project costs, but they must fall within one of NYSERDA's identified priority categories of technologies or approaches and provide prior independently verified performance data.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.
- All related M&V work is now complete.

ETAC-Multifamily

The goal of this program was to identify energy efficiency methodologies, technologies, or strategies that are commercially available, but underused in the multifamily market and to address the market barriers preventing broader adoption. This goal was accomplished through selected projects that demonstrated the technologies and strategies, identified barriers to their implementation, and developed strategies to address identified barriers. Project contractors have provided transfer technology via a combination of published papers and presentations.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

ETAC-Residential

ETAC-Residential targets the low-rise residential market, typically buildings with three stories or less. ETAC-RES demonstration projects are intended to validate improved energy efficiency performance under real-world conditions, overcome current market barriers, and accelerate market uptake of proven, but underutilized, energy-saving technologies. The current projects are focused on high-efficiency HVAC equipment.

The following key program activities and accomplishments were performed during this reporting period:

- Contracts for all demonstrations and M&V have been fully executed and 100% of the installations and M&V work have been completed. The goals of these project demonstrations include determining what information the market needs regarding technical and economic performance; collecting performance information/data that can be communicated accurately and confidently; disseminating the information to the market and making data available to create change. The air source heat pump (ASHP) demonstrations include 20 residential replacements and 20 residential displacements, five residential air-to-water systems, five residential low-capacity gas furnace/ASHP hybrids, and a variable refrigerant flow system. Approximately 24 ground source heat pump systems are also being evaluated. Final reports for the 20 AHP replacements and 20 ASHP displacements have been published on NYSERDA's website along with a learning summary. The report for the GSHP demonstration has been completed and will published in 2023. The applicable savings have been reported.

Table 12 shows performance milestones and results for the ETAC program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Energy savings reported are program-reported; evaluation activities focusing on electricity savings are in development and future reports will present findings from those studies as they are finalized. Project count, peak load demand, electric generation, and primary energy savings targets are established for projects installed through a particular time period. Progress refers to the cumulative savings that are installed, contracted, or accepted through a particular time period. For example, T&MD savings for 2012–2013 are the energy and demand savings/generation achieved or expected as of December 31, 2013 as a result of activity from January 2012 through December 2013. Blank cells indicate the lack of a target in a particular time period. All output metric targets have been exceeded, while a few outcome metrics will fall short of the targets.

Table 12. Emerging Technology/Accelerated Commercialization Performance Milestones and Results through December 31, 2022

See endnotes for more information[20]

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-present
All Projects	Projects - Target	1	6	7	7
	Applications Approved but not yet Contracted - Progress	0	1	8	0
	Projects Contracted but not yet Completed - Progress	0	13	17	16
	Projects Completed - Progress	1	4	5	14
	Total Progress	1	18	30	30
All Projects	Peak Load Reduction (MW) - Target	0.55	1.01	1.01	1.01
	Peak Load Reduction Applications Approved but not yet Contracted (MW) - Progress	0.00	0.02	0.953	0.00
	Peak Load Reduction Projects Contracted but not yet Completed (MW) - Progress	0.00	1.10	1.604	2.03
	Peak Load Reduction Projects Completed (MW) - Progress	0.00	0.25	0.245	0.67
	Total Progress	0.00	1.36	2.803	2.70
All Projects	Energy Savings (GWh) - Target	2.00	4.62	4.62	4.62
	Electric Savings Applications Approved but not yet Contracted (GWh) - Progress	0.00	0.07	1.82	0.00
	Electric Savings Projects Contracted but not yet Completed (GWh) - Progress	0.00	15.94	17.83	13.27
	Electric Savings Projects Completed (GWh) - Progress	0.00	0.75	0.75	5.48
	Total Progress	0.00	16.76	20.41	18.75
All Projects	Primary Energy Savings (MMBtu) - Target	5,000	34,320	34,320	34,320
	Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	0	0	10,952	0
	Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	0	75,684	73,479	41,857
	Primary Energy Savings Projects Completed (MMBtu) - Progress	1,053	1,614	16,821	18,889
	Total Progress	1,053	77,297	101,252	60,746

		2012-13	2014-15	2016	2017-present	Total
All Projects	Stakeholder Engagements - Target	6				6
	Stakeholder Engagements - Progress	20	5	0	0	25
	Knowledge/Technology Transfer Activities - Target	8	9			17
	Knowledge/Technology Transfer Activities - Progress	0	7	0	0	7

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$1.00	$1.86			$2.86
	Leveraged Funds Amount (millions) - Progress	$0.09	$4.44	$2.88	$2.91	$10.32
	Leveraged Funds Replicated (millions) - Target				$9.24	$9.24
	Leveraged Funds Replicated (millions) - Progress	$0.00	$0.00	$0.00	$0.00	$0.00
	Peak Load Reduction Replicated (MW) - Target				3	3
	Peak Load Reduction Replicated (MW) - Progress	0	0	0	0	0
	Energy Savings Replicated (GWh) - Target				13	13
	Energy Savings Replicated (GWh) - Progress	0	0	0	0	0
	Primary Energy Savings Replicated (MMBtu) - Target				101,992	101,992
	Primary Energy Savings Replicated (MMBtu) - Progress	0	0	0	0	0
	Market Adoption - Target			3		3
	Market Adoption - Progress	0	0	0	0	0

3.2.4.2 Technology Development

Under the Technology Development area, NYSERDA will undertake targeted building technology development activities that address the barriers and opportunities for new or emerging products. As a complement to Technology Development, NYSERDA plans to establish an Advanced Building Consortium to guide and conduct targeted high-priority technology development and demonstration projects and help accelerate the introduction of emerging technologies to New York State markets.

From 2013 to 2015, six solicitation rounds were issued to support the development and commercialization of solutions in the following technology areas: construction materials, strategies, and practices: heating and cooling; lighting; demand response, smart buildings and demand-side resources; and other technologies or opportunities.

Activities supported included: applied research aimed at early-stage development of a new product or technology, policy, business and/or regulatory model; development and commercialization of products/services for improving the energy performance of either new or existing buildings in New York State; and demonstrations of new or underutilized technologies or practices that advance the energy performance of either new or existing buildings in New York State.

The output from these activities resulted in the commercialization of Organic LED (OLED) lighting, light disinfection technology, advanced construction and framing techniques, higher efficiency heating and cooling appliances, demand management and response solutions as well as informative information on improving steam distribution systems, minimizing energy losses associated with elevator shafts, best practices guides on oil-fired tankless coil boilers, and integrated control of heat pumps and fossil-fuel fired system.

Companies receiving NYSERDA support have leveraged other investments (both public and private) and increased staffing/employment.

A solicitation for an Advanced Building Consortium was issued and proposals received. After review of the proposals and other considerations, a decision was made not to pursue the establishment of an Advanced Building Consortium at this time.

Behavior Research Program

NYSERDA works with Action Research, Inc. (Action Research), Behavioral Ideas Lab (ideas42), Research into Action (RIA), and clean energy programs in New York State to design, implement, and evaluate clean energy pilots that integrate behavioral strategies to improve clean energy program outcomes. The behavior research pilots are documented and shared in public presentations, case study reports, and published articles. Funding to demonstrate successful pilot interventions at a larger demonstration scale was allocated to three demonstration projects through NYSERDA's Behavior Demonstration Program (PON 2646). These projects are reported under the section "Education to Change Behavior and Influence Choices" of this report.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 13 shows performance milestones and results for the Technology Development Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Anticipated achievements and results are estimates based on savings per program dollar invested in projects. Blank cells indicate the lack of a target in a particular time period. Signed contracts and completed projects are for clean power technology projects. Supported companies are clean energy companies. Products and technologies commercialized are clean power technologies that have reached commercial availability. Product revenue includes commercial sales of supported clean power technologies. Leveraged funds include both co-funding and outside investment for clean power technology projects. Every output/outcome metric has been met or exceeded, except the product revenue metric.

Table 13. Advanced Buildings Technology Development Performance Milestones and Results through December 31, 2022

See endnotes for more information[21,22]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	23	11			34
	Projects Contracted - Progress	25	48	8	5	86
	Projects Completed - Target		23	11		34
	Projects Completed - Progress	0	14	12	60	86
	Supported Companies - Target	12	5			17
	Supported Companies - Progress	19	42	8	2	71

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$7.00	$3.40			$10.40
	Leveraged Funds Amount (millions) - Progress	$36.24	$82.15	$24.96	$293.68	$437.03
	Products and Technologies Commercialized - Target		1	3		4
	Products and Technologies Commercialized - Progress	2	4	3	5	14
	Product Revenue Amount (millions) - Target			$8.00	$53.42	$61.42
	Product Revenue Amount (millions) - Progress	$0.44	$14.28	$6.70	$24.31	$45.73

3.2.4.3 Enabling Demand Response and Load Management

Under the Enabling Demand Response (DR) Load Management Program, NYSERDA helped increase participation and reliability of performance in utility and New York State Independent System Operator programs. These outcomes suppress wholesale energy costs, reduce congestion costs, increase reliability, and provide other benefits. The development of enabling DR technologies and new demand management models through this program increased the technical potential of DR in the State.

The Existing Facilities Program (PON 1219) is no longer offering open-enrollment incentives for DR projects across New York State as of September 1, 2015.

SBC IV and Indian Point Energy Center Reliability Contingency Plan funding is no longer available for new DR projects, but existing projects are still in the process of implementation and benefits from these projects continue to accrue.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 14 shows performance milestones and results for the DR Program through December 31, 2022. Energy savings reported in Table 14 are program-reported; evaluation activities are in development and future reports will present findings as the studies finalized. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. The sole output metric has been exceeded while the outcome metric, megawatt Registered Evaluated, was not met.

Table 14. Demand Response Performance Milestones and Results through December 31, 2022

See endnotes for more information[23]

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-present
All Projects	MW Registered - Target	9.00	23.00	41.00	44.62
	MW Registered Applications Approved but not yet Contracted (MW) - Progress	2.05	1.44	0.0	0.00
	MW Registered Projects Contracted but not yet Completed (MW) - Progress	5.44	7.84	3.2	0.00
	MW Registered Projects Completed (MW) - Progress	40.22	115.59	126.2	127.98
	Total Progress	47.71	124.87	129.3	127.98

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	MW Registered Evaluated - Target				22.31	22.31
	MW Registered Evaluated - Progress	0.00	0.00	0.00		0.00

3.2.4.4 Advanced Energy Codes and Standards

The Advanced Codes and Standards Initiative consists of two components: (1) a set of code activities targeted at State commercial and residential building sectors and (2) a set of standards activities directed at influencing State and national appliance and equipment standards, in addition to specification setting processes for various equipment types. Activities in these areas are described in the following sections.

3.2.4.5 Annual Statewide Compliance Assessments

Statewide compliance assessment studies provide a means to track compliance trends associated with changing codes and standards. These assessment studies help identify where program intervention may be needed. Compliance assessments will occur as a phased effort.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Training to support new and advanced codes and standards is critical, particularly at points of adoption. Training efforts will build on those developed using American Recovery and Reinvestment Act of 2009 (ARRA) funds, with new or enhanced approaches and topics that address areas of low compliance or code change.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

3.2.4.6 Technical Support, Studies, and Resources

Technical consulting and other research firms were competitively selected to provide technical and administrative support for Advanced Codes and Standards program efforts, including new strategies to improve compliance and enforcement. In June 2019, NYSERDA published the Energy Code Enforcement Manual for Code Enforcement Officers.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

3.2.4.7 Pilots and Expanded Implementation Assistance

Pilot testing strategies for improved code compliance and enforcement strategies as well as green planning efforts developed for competitive selection. NYSERDA also will support the construction and code enforcement communities by strategically providing implementation assistance to increase compliance with new and advanced codes and standards.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 15 shows performance milestones and results for the Advanced Energy Codes and Standards program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Energy savings reported in Table 15 are both program-reported and evaluation activities. Blank cells indicate the lack of a target in a particular time period. The training sessions are for new or expanded code training modules. The program support solicitations

will competitively hire consulting and market research firms to provide program support. The support solicitations are for pilots and program implementation assistance. Progress toward output and outcome was mixed, with some targets such as code requirement trainees, training sessions, GWh and GW installed exceeding goals, while others fell short.

Table 15. Advanced Energy Codes and Standards Performance Milestones and Results through December 31, 2022

See endnotes for more information [24]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
Code compliance efforts	Annual Code Compliance Assessments - Target	2	1			3
	Annual Code Compliance Assessments - Progress	1	1	1	0	3
	Training Sessions - Target	6	1			7
	Training Sessions - Progress	0	7	7	2	16
	Code Requirement Trainees - Target	7,000	1,850			8,850
	Code Requirement Trainees - Progress	0	2,411	3,863	14,518	20,792
Equipment and appliance standards efforts	State/Federal Standards Conformance Assessments - Target	1	1			2
	State/Federal Standards Conformance Assessments - Progress	0	0	0	0	0
All Projects	Program Support Solicitations - Target	1				1
	Program Support Solicitations - Progress	0	0	0	0	0
	Implementation Support Solicitations - Target	1				1
	Implementation Support Solicitations - Progress	1	2	0	0	3

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
Code compliance efforts	Energy Savings Installed (GWh) - Target	84.00	140.00	90.00	58.29	372.29
	Energy Savings Installed (GWh) - Progress	0.00	117.00	79.00	178.00	374.00
	Energy Savings Installed (MMBtu) - Target	575,000	1,057,000	726,000	545,390	2,903,390
	Energy Savings Installed (MMBtu) - Progress	0	135,400	106,560	209,330	451,290
	Peak Load Reduction Installed (MW) - Target	18.00	28.00	19.00	11.11	76.11
	Peak Load Reduction Installed (MW) - Progress	0.00	33.00	23.00	51.00	107.00
Equipment and appliance standards efforts	Energy Savings Installed (GWh) - Target		5.00	51.00	154.04	210.04
	Energy Savings Installed (GWh) - Progress	0.00	0.00	0.00	0.00	0.00
	Peak Load Reduction Installed (MW) - Target		2.00	23.00	74.12	99.12
	Peak Load Reduction Installed (MW) - Progress	0.00	0.00	0.00	0.00	0.00

3.3 Clean Energy Infrastructure Initiatives

Table 16 shows the Clean Energy Infrastructure budget and financial status through December 31, 2022. Committed and spent funds are also shown as a percent of the total 2012–2016 budget. Progress for each area of this initiative is described in following sections.

Table 16. Clean Energy Infrastructure Budget and Financial Status through December 31, 2022

	2012-2016 Budget [a]	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds [b,c]	Percent of 2012-2016 Budget Committed
Market Development					
Market Research	$4,312,136	$4,312,136	100%	$4,312,136	100%
Market Pathways	$29,929,316	$29,929,316	100%	$29,929,316	100%
Education/Behavior	$6,639,666	$6,639,666	100%	$6,639,666	100%
Total Market Development	*$40,881,118*	*$40,881,118*	*100%*	*$40,881,118*	*100%*
Clean Energy Business Development					
Innovation Entrepreneurial Capacity	$21,000,045	$21,000,045	100%	$21,000,045	100%
Market Intelligence	$902,293	$902,293	100%	$902,293	100%
Direct Support for Business	$2,411,475	$2,411,475	100%	$2,411,475	100%
Marketing	$587,383	$587,383	100%	$587,383	100%
Total Clean Energy Business Development	*$24,901,196*	*$24,901,196*	*100%*	*$24,901,196*	*100%*
EMEP	$15,544,384	$15,544,384	100%	$15,544,384	100%
Workforce Development					
Renewable Energy/Advanced Technologies	$5,105,277	$5,105,277	100%	$5,105,277	100%
Energy Efficiency	$8,341,396	$8,341,396	100%	$8,341,396	100%
Total Workforce Development	*$13,446,673*	*$13,446,673*	*100%*	*$13,446,673*	*100%*
Grand Total - Clean Energy Infrastructure	***$94,773,371***	***$94,773,371***	***100%***	***$94,773,371***	***100%***

* Totals may not sum exactly due to rounding.

[a] Pursuant to the January 21, 2016 CEF Order, the budget figures presented herein include reclasses to the CEF of $182.7 million of uncommitted funds as of February 29, 2016.

[b] Committed funds include amounts spent plus remaining funding obligated under a contract, purchase order, or incentive award. In addition, committed funds include planned funding for contracts awarded and under negotiation and planned funding under active development through solicitations with specific due dates.

[c] Committed funds may decrease from period to period as a result of the disencumbrance/cancellation of contracts, or due to the actual award amount(s) resulting from a due date solicitation being less than the planned award. The Commission's January 21, 2016 Order Authorizing the Clean Energy Fund Framework directed that any uncommitted program funds after February 29, 2016 would be retained for future ratepayer benefits. Those amounts are included in this table and will be retained for future ratepayer benefits in accordance with the January order.

3.3.5 Market Development

The Market Development initiatives help to create the foundation for long-term changes in the market for the delivery of products and services that address energy efficiency and the adoption of renewable energy technologies. Strategies address the supply chain, consumer behavior, market barriers, and education.

Market Development activities identify new market opportunities and keep the supply chain informed about technological innovations. They also provide the technical tools, resources, and training necessary to promote energy efficiency and renewable options to consumers.

3.3.5.1 Market Research

The Market Research component identifies market and institutional barriers to technology and product adoption, obtains critical early-stage information and insights to guide investment decisions, and further advances the reach of T&MD and EEPS programs and other public policy goals. Its goal is to amass specific market intelligence and identify program opportunities to increase implementation efficiency and effectiveness. Since the start of the program in 2012, 20 projects have been completed, covering a variety of technologies and topics, including lighting, data centers, solar, and NYSERDA-wide corporate strategy. These various studies offered insights on how NYSERDA can best position its programs and overall organizational structure to advance key energy efficiency and renewable energy technologies.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 17 shows performance milestones and results for the Market Research program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. The sole output metric was exceeded.

Table 17. Market Research Performance Milestones and Results through December 31, 2022

See endnotes for more information[25]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Completed - Target	2	1	1		4
	Projects Completed - Progress	3	13	4	0	20

3.3.5.2 Market Pathways

The Market Pathways component works across the supply chain and sectors to promote the stocking, specification, sales, installation, maintenance, and use of energy-efficient products and strategies. NYSERDA provides tools, business strategies, and business and marketing materials to manufacturers, suppliers, distributors, retailers, service providers, designers, specifiers, contractors, and builders. The following sections describe progress in key areas.

Products Team

The Products Team conceptualizes, drives, and implements strategies and interventions that accelerate the adoption of emerging or underutilized energy-relevant products by working to develop supply chains and service networks. Interventions include support for product availability in relevant channels, channel and customer awareness, and capacity development in key service networks (e.g., installation and maintenance).

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Business Partners Programs

The Business Partners programs were designed to accelerate the adoption of energy efficiency products and services within the commercial sector. Activities help service providers (contractors, vendors, installers, distributors, and designers) in the commercial midmarket supply chain develop business models to address the primary factors affecting their customers' operations and energy decisions. New market opportunities are identified, and the supply chain is informed of technological innovations and provided the technical tools, resources, and training necessary to promote profitable energy efficiency options to their customers.

Technical and sales training is provided for the network of service providers (Business Partners) focusing on quality and efficient design practices and maintenance, repair, and replacement services for energy products in commercial and industrial buildings. Tools and resources are available for Business Partners to design projects, demonstrate cost-benefit information, and help customers develop and implement energy efficiency plans. These tools and resources enable Business Partners to differentiate their business models within the marketplace, make it easier to demonstrate the value of clean energy solutions, increase customer confidence in project benefits, improve project performance, streamline the procurement of energy services, and help integrate energy efficiency information into the decision-making processes for buyers and sellers. Incentives are provided to help Business Partners overcome risk, understand new technologies, and encourage the expansion of new clean energy solutions for their customers.

Business Partner programs focused on commercial lighting design, rooftop HVAC service and maintenance, and motor inventories. ICF Resources is the implementation contractor for the Commercial Lighting Business Partners program. The core elements of the lighting program provide educational and technical support and resources to Lighting Business Partners (lighting contractors, distributors, manufacturer representatives, architects, engineers, and energy service companies) that incorporate lighting quality elements into their interior energy-efficient lighting projects. DNV GL is the implementation contractor for the HVAC Business Partners program that provides HVAC Business Partners (primarily commercial HVAC firms and refrigeration firms) with quality maintenance strategies and tools in accordance with the American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE) and Air Conditioning Contractors of America (ACCA) Quality Maintenance Standard 180. Partners learn to evaluate and upgrade commercial roof top units beyond what is typically offered as standard practice. There are no updates for this program due to the closing of the Commercial Lighting and HVAC Program Business Partners programs effective December 31, 2015.

The Motors program was intended to focus on providing educational and technical support to NYSERDA's Partners (motor suppliers, repair shops, electrical companies, manufacturers, and distributors). However, the program was discontinued prior to market launch.

Innovative Strategies

Innovative Strategies supported the identification and demonstration of sector-specific approaches, tools, and strategies for demonstrating and verifying energy savings and to broadcast the energy efficiency message to building owners, operators, and the financial sector. Efforts were standardized where appropriate, and credibility was provided to approaches that reduced barriers to financing energy efficiency projects not addressed by EEPS programs.

High-Performance Tenant Demonstration Projects

The High-Performance Tenant Demonstration Projects (HPDP) were launched as part of a partnership effort with Natural Resource Defense Council (NRDC). NYSERDA committed to identifying five pilot tenant projects by May of 2015 to test methods of influencing the design process for incorporating energy efficiency in tenant spaces. NYSERDA targeted tenant projects in Class A buildings in the early stages of the lease negotiation process. Using the lessons drawn from the initiative, NYSERDA sought to target the unrealized energy savings potential of commercial tenants while assessing the potential for developing Energy Efficiency Packages through energy modeling, as tools for influencing commercial tenant space design. The initiative also involved measurement and verification of the savings resulting from installed Energy Efficiency Packages, along with the development of case studies for each of the tenant space fit-out projects.

The five customers that received support through this initiative are Gensler, MetLife, Paul Hastings LLP, White & Case LLP, and Rudin Management. All customers received energy modeling and energy efficiency package development technical assistance, implementation incentives, measurement and verification (M&V). Four projects have resulted in the publishing of a case study, highlighting lessons learned, and the benefits associated with designing and building out highly efficient workspaces.

A technical review firm (EME Consulting Engineers) was retained to perform the M&V and produce an M&V report for each customer, comparing projected energy savings from the Energy Efficiency Packages, and actual realized savings. All M&V reports were completed in Q1 2021. Results from the M&V activities are included in the Table 18, which shows performance milestones and results for the Market Pathways Program through December 31, 2022. Energy savings reported for the Business Partners program in Tables 3 to 16 are program reported. Evaluation activities have not been conducted on these programs. Energy savings for the Product Partners program in 2012–2013 are evaluated savings. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. While most output and outcome metric targets were exceeded, a few metrics fell short of the targets.

Table 18. Market Pathways Performance Milestones and Results through December 31, 2022

See endnotes for more information[26]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
Market Pathways - RES	Energy Smart Product Partner Participants - Target	732.0				732.0
	Energy Smart Product Partner Participants - Progress	610.0	281.0	0.0	0.0	891.0
	Product Partner Trainees - Target	200.0	95.0			295.0
	Product Partner Trainees - Progress	130.0	353.0	0.0	0.0	483.0
Market Pathways - Midstream Support	Midstream Partner Participants - Target	301				301
	Midstream Partner Participants - Progress	95	341	0	0	436
	Midstream Partner Trainees - Target	375	230			605
	Midstream Partner Trainees - Progress	1,103	790	0	0	1,893
	Factsheets - Target	4	1			5
	Factsheets - Progress	0	0	0	0	0
	Seminars/Webinars - Target	4	1			5
	Seminars/Webinars - Progress	12	12	0	0	24
Market Pathways - C/I	Innovative Energy Efficiency Investment Strategy Participants - Target	18				18
	Innovative Energy Efficiency Investment Strategy Participants - Progress	12	12	0	0	24
	EAL Evaluations - Target	4	2			6
	EAL Evaluations - Progress	0	0	0	0	0
	EAL Seminars/Webinars - Target	4	2			6
	EAL Seminars/Webinars - Progress	48	0	0	0	48
	Factsheets - Target	3	1			4
	Factsheets - Progress	0	0	0	0	0
	Seminars/Webinars - Target	4	2			6
	Seminars/Webinars - Progress	0	0	0	0	0

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
Market Pathways - RES	Energy Savings Installed (GWh) - Target	50.00	23.75			73.75
	Energy Savings Installed (GWh) - Progress	5.91	4.30	0.00	0.00	10.21
	Energy Savings Installed (MMBtu) - Target	254,000	274,050			528,050
	Energy Savings Installed (MMBtu) - Progress	142,610	94,132	0	0	236,742
Market Pathways - Midstream Support	Energy Savings Installed (GWh) - Target	15.00	6.83			21.83
	Energy Savings Installed (GWh) - Progress	4.64	62.74	0.00	0.00	67.38
	Market Adoption - Target	1	1			2
	Market Adoption - Progress	0	0	0	0	0
Market Pathways - C/I	Projects Completed - Target	5	7			12
	Projects Completed - Progress	0	7	1	5	13

3.3.6 Education to Change Behavior and Influence Choices

Economic Development Growth Extension Program

The Economic Development Growth Extension (EDGE) Program is facilitated by Regional Outreach Contractors who perform outreach, education, and promotion of NYSERDA program opportunities to residents, businesses, institutions, and local governments across the State. Formerly known as the Energy $mart Communities Program, EDGE educates New Yorkers about the role energy efficiency and renewable power can play in reducing energy costs and providing clean, reliable energy for homes, schools, and workplaces. The EDGE Program was designed to include support for the

Governor's Regional Economic Development Council initiative by aligning the program territories geographically and providing direct support to advance the strategic priorities and regionally significant projects identified in each region. Through this alignment with the Regional Councils, NYSERDA provides a greater level of education and adoption of energy efficiency practices at the community level. NYSERDA contracted with the New York State Economic Development Council and Solar One, a team that includes regionally based economic development organizations to provide on-the-ground outreach support.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Behavioral Demonstrations

Projects selected under the Behavioral Demonstrations program will test the efficacy, persistence, and cost-effectiveness of behavioral interventions designed to encourage consumers to use less energy and invest in energy efficiency services. Implementation contractors are partnered with utilities who will specify metrics and cost-effectiveness criteria that, if met, will compel them to invest in further expansion of these interventions without NYSERDA funding.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Low-Income Forum on Energy

The Low-Income Forum on Energy (LIFE) is the longest running statewide low-income energy dialogue in the United States. LIFE brings together a diverse range of parties committed to addressing the challenges and opportunities facing low-income New Yorkers as they seek safe, affordable, and reliable energy. Guided by a steering committee composed of State agencies, utilities, contractors, and community-based organizations, the forum undertakes several initiatives to increase awareness of low-income energy issues. On August 18, 2016, NYSERDA launched the LIFE initiative in the Clean Energy Fund. All program activities will continue under this initiative.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 19 shows performance milestones and results for the Education/Behavior Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Signed contracts represent the sponsorship of behavioral pilots. The meetings, workshops, and conferences are the sponsorship of annual LIFE conferences. Completed projects include completing and evaluating behavioral pilots. Progress toward output and outcome metrics has been mixed; however, certain activities associated with this program were moved and reported in the Clean Energy Fund.

Table 19. Education/Behavior Performance Milestones and Results through December 31, 2022

See endnotes for more information[27]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	5	1			6
	Projects Contracted - Progress	0	0	4	0	4
	Meetings, Workshops, Conferences - Target	2	2			4
	Meetings, Workshops, Conferences - Progress	1	1	1	0	3
	Community Partnership Participants - Target	250	158			408
	Community Partnership Participants - Progress	465	560	21	0	1,046

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Completed - Target		4	5		9
	Projects Completed - Progress	0	0	0	0	0

3.3.7 Clean Energy Business Development

3.3.7.1 Innovation/Entrepreneurial Capacity Building

There are three proof-of-concept centers (POCC): (1) New York University, in partnership with the City University of New York, (2) Columbia University, in partnership with Stony Brook University, and (3) Cornell Tech in New York City and Brookhaven National Laboratory are co-branding the two programs as PowerBridgeNY. Another POCC is run through NextCorps (formerly High-Tech Rochester) as NEXUS-NY. The mission of the POCCs is to accelerate the translation of clean energy research into marketable products and services. This translation is primarily accomplished by fostering successful prestart-up companies. Generally, the next step for these companies is to participate in a business mentoring or incubation program. NYSERDA is investing approximately $5 million in seed money at each center over a five-year period. NextCorps successfully completed the contract for NEXUS-NY at the end of 2018 after running five annual cohorts. New York University and Columbia University planned to continue operating PowerBridgeNY in 2019 with the addition of a sixth cohort.

The objectives of the POCC initiative are as follows:

- Accelerate the commercialization of innovations out of research institutions and into the marketplace, particularly through startups.
- Early in the research and development phase, match emerging clean energy technologies with scalable commercialization potential, based on real market need, with the investment community.
- Establish sustainable regional innovation ecosystems and solidify linkages to potential investors and entrepreneurs in clean energy technologies to the POCC initiative.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Given the nature of the POCC program, the new businesses formed during the first cohort have raised the most funding and generated the most revenue. It can be expected that the new businesses from subsequent cohorts will demonstrate similar accomplishments over the next few years.

Emerging Clean Energy Business Development

The Clean Energy Business Incubator program was established in 2009 with funding from SBC III. The purpose of these incubators is to foster the viability and growth of the State's most promising cleantech start-up companies. Most of these companies are still in the process of commercializing technologies and have yet to earn revenue from commercial operation and product sales. The six incubators are strategically located across the State from Buffalo to Long Island and assist companies by providing ready access to investors, mentors, development partners, and commercialization resources.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 20 shows performance milestones and results for the Innovation/Entrepreneurial Program through December 31, 2022. The metrics only reflect results from the incubators that received T&MD funding. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Leverage funds include co-funding and outside investments to help businesses in clean energy. Product revenue includes commercial sales of new and improved supported technologies. The following key program metrics and accomplishments have been tracked and achieved by companies working with the NYSERDA-sponsored incubators during this reporting period: private capital raised, non-NYSERDA grants awarded, new commercial products

developed, revenue generated, jobs created and retained, strategic partnerships formed, and mergers and acquisitions completed. Every output/outcome metric has been met or exceeded, except the Incubator/POCC participant metric, which fell slightly short of the target.

Table 20. Innovation/Entrepreneurial Milestones and Results through December 31, 2022

See endnotes for more information[28,29,30]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Incubators or POCCS Participants - Target	65	90	50	30	235
	Incubators or POCCS Participants - Progress	29	76	17	93	215

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$40.00	$45.00	$2.00		$87.00
	Leveraged Funds Amount (millions) - Progress	$40.15	$83.35	$24.72	$133.20	$281.42
	Products and Technologies Commercialized - Target	5	10	8		23
	Products and Technologies Commercialized - Progress	1	6	10	55	72
	Product Revenue Amount (millions) - Target	$2.50	$5.00	$4.10		$11.60
	Product Revenue Amount (millions) - Progress	$0.00	$0.00	$0.00	$81.40	$81.40
	Businesses Graduated from Incubators - Target	36	36	18	4	94
	Businesses Graduated from Incubators - Progress	12	49	9	46	116
	FTEs Associated with Incubator Graduates - Target	108	108	54	12	282
	FTEs Associated with Incubator Graduates - Progress	185	124	14	240	563

3.3.7.2 Market Intelligence

New York State Clean Energy Technology Innovation Metrics: NYSERDA has completed reports every three years and concluded in 2018 when NYSERDA worked with SRI International to research and prepare the 2018 report update on clean energy technology metrics.[31] To determine the metrics for the first report, focus groups involved nearly 100 individuals including entrepreneurs affiliated with cleantech start-up companies, cleantech investors, executives, and other representatives of larger, more established technology companies, directors of cleantech incubators, representatives from cleantech industry consortia, universities conducting cleantech research, and other cleantech organizations. The third and final report tracks those same metrics three years later, but it was not published for external distribution. Six factsheets for 2018 are presented on the website.[32]

Table 21 shows performance milestones and results for the Market Intelligence Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Signed contracts include creating annual benchmark reports on clean energy business and financial indicators for the State. Website downloads support the dissemination of clean energy benchmark information. Progress toward the website downloads target was excellent even though the number of projects contracted was one less than expected.

Table 21. Market Intelligence Performance Milestones and Results through December 31, 2022

See endnotes for more information[33]

Outputs/Leading Indicators		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	2	1			3
	Projects Contracted - Progress	0	2	0	0	2
	Website Downloads - Target	100	195			295
	Website Downloads - Progress	0	109	167	204	480

3.3.7.3 Direct Support for Business Acceleration Program

NYSERDA's Entrepreneurs-In-Residence (EIR) program offers experienced entrepreneurial mentoring to NYSERDA contractors, incubator clients, startups in other NYSERDA programs, and startups not yet in NYSERDA programs, where those startups are expected to help New York State achieve its Climate Act goals. Observations from the program show companies struggle with customer delivery and engagement, the development of an overall business strategy, and development and execution of a strategy to secure private investments. Most of these companies are founded by technical entrepreneurs who initially lack the business skills required to successfully bring a clean energy product to market.

NY Clean Start, part of New York University's Advanced Diploma program, targets experienced businesspeople with a concentrated course about the markets, financing models, permitting requirements, technology solutions, and other unique aspects of the cleantech industry necessary to start a successful clean energy business. NY Clean Start is expected to increase the number of clean energy entrepreneurs, create well-paying jobs in communities, and provide solutions for addressing the long-term challenge of energy independence.

The StartupGPS Commercialization Toolkit addresses a very common need of new startups: the struggle to understand the big picture as a new company and its development in the journey from product ideation to commercial deployment. The toolkit is designed to provide (1) a framework for guiding company business development, (2) an easy way to assess overall business readiness, and (3) a curated suite of resources tailored to the specific needs of clean economy entrepreneurs as they pursue successful commercialization of their offerings.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 22 shows performance milestones and results for the Direct Support for Business Acceleration Program through December 31, 2021. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Companies supported include companies with new and improved products serving State markets. Business executives transitioned include the transition of business executives to the clean energy technology industry. Progress toward output metrics was mixed, while the program supported less companies than expected, it exceeded expectations in terms of the business executives' transitioned outcome.

Table 22. Direct Support for Business Acceleration Performance Milestones and Results through December 31, 2022

See endnotes for more information[34]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Companies Supported - Target	59	59	29		147
	Companies Supported - Progress	41	33	10	0	84

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Business Executives Transitioned - Target		18	18	8	44
	Business Executives Transitioned - Progress	0	23	28	0	51

3.3.8 Workforce Development Initiative

New York State's ambitious energy and environmental goals require trained workers with applied skills in energy efficiency, renewable energy, and advanced technologies. The Workforce Development Initiative is designed to address the ongoing need for workers with skills that will result in quality installations, services, and maintenance for clean energy technologies.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Tables 23 and 24 show performance milestones and results for the Workforce Development Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Community colleges may offer renewable energy, advanced technology, and energy efficiency courses. While most output and outcome metric targets were exceeded, a few did not meet their targets.

Table 23. Workforce Development—Renewable Energy Performance Milestones and Results through December 31, 2022

See endnotes for more information[35]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Renewable Energy Technical Trainees - Target	500	280			780
	Renewable Energy Technical Trainees - Progress	0	2,738	1,220	0	3,958
	Entry Level Trainees - Target	90	97			187
	Entry Level Trainees - Progress	0	460	122	0	582
	OJT, Hands-On Training - Target	150	115			265
	OJT, Hands-On Training - Progress	39	90	2	0	131
	Training Organizations - Target	2				2
	Training Organizations - Progress	2	2	1	0	5
	Certifications Developed - Target		1			1
	Certifications Developed - Progress	0	0	0	0	0
	Course Development - Target	2	1			3
	Course Development - Progress	0	16	1	0	17

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$0.80	$0.90			$1.70
	Leveraged Funds Amount (millions) - Progress	$1.11	$1.55	$0.02	$0.00	$2.67

Table 24. Workforce Development—Energy Efficiency Performance Milestones and Results through December 31, 2022

See endnotes for more information[36]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Energy Efficiency Technical Trainees - Target	3,448	2,345			5,793
	Energy Efficiency Technical Trainees - Progress	96	9,414	4,975	71	14,556
	Entry Level Trainees - Target	800	544			1,344
	Entry Level Trainees - Progress	0	721	152	0	873
	OJT, Hands-On Training - Target	467	317			784
	OJT, Hands-On Training - Progress	48	95	0	0	143
	Training Organizations - Target	2	1			3
	Training Organizations - Progress	4	2	0	0	6
	Certifications Developed - Target		1			1
	Certifications Developed - Progress	0	0	0	0	0

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$1.30	$1.70			$3.00
	Leveraged Funds Amount (millions) - Progress	$0.40	$6.24	$1.40	$0.00	$8.04

3.3.9 Environmental Monitoring, Evaluation, and Protection

Environmental Monitoring, Evaluation, and Protection (EMEP) provides knowledge to reduce the adverse impacts associated with electricity generation—such as damaging the State's ecosystems and residents' health—and assists planning efforts for cleaner alternative options. Additionally, informing the clean energy technology industry about life-cycle environmental impacts early in the development stage can minimize unanticipated negative effects and document the energy and environmental attributes of products. EMEP also provides critical energy-related environmental research to help support the regulatory responsibilities of a range of other agencies in the State, including the Department of Environmental Conservation, Department of Health, Department of State, and the Office of the Attorney General.

The following key program activities and accomplishments were performed during this reporting period:

- None. All activities and spending were completed in prior reporting periods.

Table 25 shows performance milestones and results for the EMEP Program through December 31, 2022. Outputs/Leading Indicators measure immediate results and Outcomes/Impacts measure achievements; evaluation activities are in development and future reports will present findings from those studies as they are finalized. Blank cells indicate the lack of a target in a particular time period. Signed contracts include

several large flagship projects. The meetings, workshops, and conferences are sponsored by NYSERDA. Briefings are on research projects convening with policymakers or other stakeholders. Leveraged funds include co-funding and outside investment to support projects and sponsored research. Progress toward output and outcome metrics was mixed, while most output and outcome metric targets have been exceeded, a few did not meet their targets.

Table 25. Environmental Monitoring Performance Milestones and Results through December 31, 2022

See endnotes for more information[37,38]

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-present	Total
All Projects	Projects Contracted - Target	23	28	2		53
	Projects Contracted - Progress	21	36	3	2	62
	Projects Completed - Target	5	23	23	2	53
	Projects Completed - Progress	0	14	5	50	69
	Program Advisory Group Meetings - Target	2	2			4
	Program Advisory Group Meetings - Progress	3	0	0	0	3
	Science Advisory Committee Meetings - Target	2	2			4
	Science Advisory Committee Meetings - Progress	3	0	0	0	3
	Meetings, Workshops, Conferences - Target	5	6	1		12
	Meetings, Workshops, Conferences - Progress	7	13	6	11	37
	Briefings - Target	12	12	3		27
	Briefings - Progress	5	5	2	3	15

Outcomes/Impacts

		2012-13	2014-15	2016	2017-present	Total
All Projects	Leveraged Funds Amount (millions) - Target	$3.50	$4.50	$1.80		$9.80
	Leveraged Funds Amount (millions) - Progress	$2.53	$31.18	$7.10	$1.46	$42.27
	EMEP Research Citations - Target			2,670		2,670
	EMEP Research Citations - Progress	47	38	18	41	144
	Peer-reviewed Scientific Journal Articles - Target	10	35	45	16	106
	Peer-reviewed Scientific Journal Articles - Progress	15	40	48	67	170

4 T&MD Program Evaluation Activities

This section summarizes evaluation work completed, underway, and planned for the T&MD programs. Some evaluations are program-specific, while others are done at a higher level to inform and optimize the portfolio-level results. As noted earlier, evaluation spending in 2022 represents a small amount of ongoing support for internal NYSERDA staffing.

4.1 Program Theory and Logic Models

Program Theory and Logic Model (PTLM) reports are typically developed early in the program timeline and updated as changes are made. PTLM reports inform evaluation work by documenting the relationships between program activities, outputs, and short, medium, or long-term outcomes the program intends to induce.

Prior to December 2021, PTLM activities were completed and reports were posted to NYSERDA's website for the following programs or areas:

- Smart Grid[39]
- Advanced Codes and Standards[40]
- EDGE[41]
- New York Products[42]
- Clean Energy Business Development[43]
- Workforce Development[44]
- CHP Aggregation and Acceleration[45]
- Advanced Buildings: ETAC[46]
- Advanced Buildings: Technology Development[47]
- Solar Cost Reduction[48]
- Clean Power Technology Innovation[49]
- Transportation[50]

All activities in this area are now complete.

4.2 Process Evaluation

Process Evaluation reviews oversight and operations, gauges customer satisfaction, and recommends process and efficiency improvements. The goal of Process Evaluation is to inform real-time adjustments and maximize program efficiency and effectiveness through actionable recommendations. The T&MD Operating Plan identified that formative process evaluations would be conducted on most programs

during the early stages of implementation and repeated periodically to examine program efficiency and effectiveness considering the program's stated outcomes and impacts. Process evaluations are typically conducted through in-depth interviews resulting in a qualitative assessment and will be supported by secondary research, such as review of program documents, as appropriate. Evaluations of NYSERDA's organizational processes (e.g., competitive solicitation) may also be conducted.

Prior to December 2021, focused process evaluations were completed for the following T&MD programs. Each of the following process evaluation reports is available on the NYSERDA website:

- Smart Grid[51]
- Workforce Development[52]
- EMEP[53]
- Solar Cost Reduction[54]
- EDGE[55]
- Advanced Codes and Standards[56]
- Advanced Buildings Technology Development[57]
- Advanced Codes and Standards Behavioral Study[58]

All activities in this area are now complete.

4.3 Market and Impact Evaluation

T&MD near- and long-term impacts are assessed through full-scale impact and market evaluations. Early evaluation activities have included collecting baseline information to identify the program effects on the number and knowledge base of market participants, and whether barriers to more widespread technology adoption are being effectively addressed. Later evaluation activities have examined longer-term impacts, such as technology commercialization and replication. Some methods used in assessing program impacts include surveys and interviews with program participants and nonparticipants, Delphi panels, case studies, on-site measurement and verification of energy savings for certain technologies, technology commercialization tracking, technology transfer, bibliometric tracking, and citation analysis.

This evaluation includes the following three primary activities, which are briefly described as intended to apply to the T&MD programs:

- **Market characterization** will describe a specific market or market segments, including size of the market, key market actors, distribution channels, market actor awareness and knowledge, key market drivers and opportunities, and market barriers. The market characterization assesses the market before or early in the commencement of a specific intervention or program, for the purpose of guiding the intervention and/or facilitating future evaluation of effectiveness.
- **Market impact assessment** is used to analyze the extent to which a market has been transformed by specific program interventions or programs. Market impact assessment describes changes in market actor awareness and knowledge, key market drivers and opportunities, and market barriers, as well as the value of the program perceived by key market actors. Market assessment also collects and tracks information on key indicators the program is expecting to influence (i.e., the adoption of clean energy and energy-efficient products, services, or practices). Market impact assessments may require a previous market characterization study.
- **Energy impact evaluation** will address program-specific, directly induced quantitative changes (e.g., kilowatt-hours, kW, and British thermal units) attributable to the T&MD programs. This evaluation is distinguished from market impact assessments, which assess other program outcomes distinct from energy and demand savings.

Prior to December 2021, focused market evaluations were completed for the following T&MD programs:

- NY Products Program[59]
- NYSERDA and National Customer Awareness of ENERGY STAR® for 2014 (Analysis of Consortium for Energy Efficiency Household Survey)[60]
- Smart Grid Market characterization[61]
- Transportation Market characterization assessment[62]
- Transportation: six impact/market evaluation case studies[63,64,65,66,67,68]
- Clean Energy Business Development market assessment[69]
- Combined Heat and Power market assessment[70]
- ETAC/Advanced Buildings Technology Development Solid State Lighting and Controls market characterization and assessment[71]
- Environmental Monitoring, Evaluation, and Protection (EMEP)

Prior to December 2021, impact evaluations were completed for the following programs/areas:

- Advanced Codes and Standards Impact Evaluation, Phase 1[72]
- Market Pathways: Business Partners[73]
- Combined Heat and Power impact evaluation
- CHP Impact and Market evaluations
- Smart Grid case studies
- T&MD demonstration project impact evaluation
- Advanced Codes and Standards

All activities in this area are now complete.

Appendix A. T&MD Targets

Pursuant to the January 21, 2016 CEF Order, the CEF received a transfer of $182.7 million of uncommitted funds from T&MD as of February 29, 2016. The T&MD program also ended nearly a year early. In the uncommitted funds transfer, individual programs lost between 2 and 91 percent of their budgets, and considering the early sunset of this portfolio, the T&MD targets for each program have been adjusted in the report proportional to the budget reductions each program received. Original targets from the February 15, 2013 Operating Plan are included in the appendix for reference.

Table A-1. Original Targets from the February 15, 2013 Operating Plan

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Advanced Buildings Technology Development	Outputs/Leading Indicators	All Projects	Projects Completed	46	34	26%
Advanced Buildings Technology Development	Outputs/Leading Indicators	All Projects	Projects Contracted	46	34	26%
Advanced Buildings Technology Development	Outputs/Leading Indicators	All Projects	Supported Companies	23	17	26%
Advanced Buildings Technology Development	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	14	10	26%
Advanced Buildings Technology Development	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	83	61	26%
Advanced Buildings Technology Development	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	6	4	26%
Advanced Energy Codes and Standards	Outputs/Leading Indicators	All Projects	Implementation Support Solicitations	2	1	41%
Advanced Energy Codes and Standards	Outputs/Leading Indicators	All Projects	Program Support Solicitations	2	1	41%
Advanced Energy Codes and Standards	Outputs/Leading Indicators	Code compliance efforts	Annual Code Compliance Assessments	5	3	41%
Advanced Energy Codes and Standards	Outputs/Leading Indicators	Code compliance efforts	Code Requirement Trainees	15,000	8,850	41%
Advanced Energy Codes and Standards	Outputs/Leading Indicators	Code compliance efforts	Training Sessions	12	7	41%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Advanced Energy Codes and Standards	Outputs/Leading Indicators	Equipment and appliance standards efforts	State/Federal Standards Conformance Assessments	3	2	41%
Advanced Energy Codes and Standards	Outcomes/Impacts	Code compliance efforts	Energy Savings Installed (GWh)	631	372	41%
Advanced Energy Codes and Standards	Outcomes/Impacts	Code compliance efforts	Energy Savings Installed (MMBtu)	4,921,000	2,903,390	41%
Advanced Energy Codes and Standards	Outcomes/Impacts	Code compliance efforts	Peak Load Reduction Installed (MW)	129	76	41%
Advanced Energy Codes and Standards	Outcomes/Impacts	Equipment and appliance standards efforts	Energy Savings Installed (GWh)	356	210	41%
Advanced Energy Codes and Standards	Outcomes/Impacts	Equipment and appliance standards efforts	Peak Load Reduction Installed (MW)	168	99	41%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Knowledge/Technology Transfer Activities	10	2	76%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Pre-Packaged Systems	20	5	76%
CHP Aggregation and Acceleration	Outcomes/Impacts	All Projects	Electric Generation Replicated (GWh)	61	15	76%
CHP Aggregation and Acceleration	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	50	12	76%
CHP Aggregation and Acceleration	Outcomes/Impacts	All Projects	Leveraged Funds Replicated (millions)	40	10	76%
CHP Aggregation and Acceleration	Outcomes/Impacts	All Projects	Peak Load Electric Generation Replicated (MW)	10	2	76%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
CHP Aggregation and Acceleration	Outcomes/Impacts	All Projects	Primary Energy Savings Replicated (MMBtu)	79,300	19,032	76%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Electric Generation (GWh)	76	18	76%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Peak Load Electric Generation (MW)	13	3	76%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Primary Energy Savings (MMBtu)	89,125	21,390	76%
CHP Aggregation and Acceleration	Outputs/Leading Indicators	All Projects	Projects	37	9	76%
CHP Performance	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	250	200	20%
CHP Performance	Outputs/Leading Indicators	All Projects	Electric Generation (GWh)	200	160	20%
CHP Performance	Outputs/Leading Indicators	All Projects	Peak Load Electric Generation (MW)	25	20	20%
CHP Performance	Outputs/Leading Indicators	All Projects	Primary Energy Savings (MMBtu)	260,000	208,000	20%
CHP Performance	Outputs/Leading Indicators	All Projects	Projects	16	13	20%
Clean Power Technology Innovation	Outputs/Leading Indicators	All Projects	Projects Completed	51	44	13%
Clean Power Technology Innovation	Outputs/Leading Indicators	All Projects	Projects Contracted	51	44	13%
Clean Power Technology Innovation	Outputs/Leading Indicators	All Projects	Supported Companies	64	56	13%
Clean Power Technology Innovation	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	65	57	13%
Clean Power Technology Innovation	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	55	48	13%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Clean Power Technology Innovation	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	8	7	13%
Demand Response	Outcomes/Impacts	All Projects	MW Registered Evaluated	23	22	3%
Demand Response	Outputs/Leading Indicators	All Projects	MW Registered (MW)	46	45	3%
Direct Support for Business	Outputs/Leading Indicators	All Projects	Companies Supported	150	147	2%
Direct Support for Business	Outcomes/Impacts	All Projects	Business Executives Transitioned	45	44	2%
Education/Behavior	Outputs/Leading Indicators	All Projects	Community Partnership Participants	575	408	29%
Education/Behavior	Outputs/Leading Indicators	All Projects	Meetings, Workshops, Conferences	5	4	29%
Education/Behavior	Outputs/Leading Indicators	All Projects	Projects Contracted	8	6	29%
Education/Behavior	Outcomes/Impacts	All Projects	Projects Completed	12	9	29%
Electric Vehicle	Outputs/Leading Indicators	All Projects	Supported Companies	30	18	41%
Electric Vehicle	Outputs/Leading Indicators	Research Studies	Projects Completed	8	5	41%
Electric Vehicle	Outputs/Leading Indicators	Research Studies	Projects Contracted	8	5	41%
Electric Vehicle	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Completed	25	15	41%
Electric Vehicle	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Contracted	25	15	41%
Electric Vehicle	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	42	25	41%
Electric Vehicle	Outcomes/Impacts	All Projects	Market Adoption	3	2	41%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Electric Vehicle	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	9	5	41%
Electric Vehicle	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	4	2	41%
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Knowledge/ Technology Transfer Activities	38	17	56%
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Stakeholder Engagements	13	6	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Energy Savings Replicated (GWh)	30	13	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	7	3	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Leveraged Funds Replicated (millions)	21	9	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Market Adoption	7	3	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Peak Load Reduction Replicated (MW)	7	3	56%
Emerging Technology/Accelerated Commercialization	Outcomes/Impacts	All Projects	Primary Energy Savings Replicated (MMBtu)	231,800	101,992	56%
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Primary Energy Savings (MMBtu)	78,000	34,320	56%
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Projects	17	7	56%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Energy Savings (GWh)	11	5	56%
Emerging Technology/Accelerated Commercialization	Outputs/Leading Indicators	All Projects	Energy Savings (MW)	2	1	56%
Energy Efficiency	Outputs/Leading Indicators	All Projects	Certifications Developed	3	1	58%
Energy Efficiency	Outputs/Leading Indicators	All Projects	Energy Efficiency Technical Trainees	13,793	5,793	58%
Energy Efficiency	Outputs/Leading Indicators	All Projects	Entry Level Trainees	3,200	1,344	58%
Energy Efficiency	Outputs/Leading Indicators	All Projects	OJT, Hands-On Training	1,867	784	58%
Energy Efficiency	Outputs/Leading Indicators	All Projects	Training Organizations	6	3	58%
Energy Efficiency	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	7	3	58%
Energy Storage Commercialization Center	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	7	6	13%
Energy Storage Commercialization Center	Outcomes/Impacts	All Projects	Product Development Tests	41	36	13%
Energy Storage Commercialization Center	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	25	22	13%
Energy Storage Commercialization Center	Outcomes/Impacts	All Projects	Revenue Amount (millions)	10	9	13%
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Briefings	30	27	11%
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Projects Completed	60	53	11%
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Meetings, Workshops, Conferences	14	12	11%
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Program Advisory Group Meetings	5	4	11%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Science Advisory Committee Meetings	5	4	11%
Environmental Monitoring, Evaluation, Protection	Outputs/Leading Indicators	All Projects	Projects Contracted	60	53	11%
Environmental Monitoring, Evaluation, Protection	Outcomes/Impacts	All Projects	EMEP Research Citations	3,000	2,670	11%
Environmental Monitoring, Evaluation, Protection	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	11	10	11%
Environmental Monitoring, Evaluation, Protection	Outcomes/Impacts	All Projects	Peer-Reviewed Scientific Journal Articles	119	106	11%
Innovation Entrepreneurial Capacity	Outputs/Leading Indicators	All Projects	Incubators or POCCS Participants	405	235	42%
Innovation Entrepreneurial Capacity	Outcomes/Impacts	All Projects	Businesses Graduated from Incubators	162	94	42%
Innovation Entrepreneurial Capacity	Outcomes/Impacts	All Projects	FTEs Associated with Incubator Graduates	486	282	42%
Innovation Entrepreneurial Capacity	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	150	87	42%
Innovation Entrepreneurial Capacity	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	20	12	42%
Innovation Entrepreneurial Capacity	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	40	23	42%
Market Intelligence	Outputs/Leading Indicators	All Projects	Projects Contracted	5	3	41%
Market Intelligence	Outputs/Leading Indicators	All Projects	Website Downloads	500	295	41%
Market Pathways - C/I	Outputs/Leading Indicators	All Projects	EAL Evaluations	10	6	41%
Market Pathways - C/I	Outputs/Leading Indicators	All Projects	EAL Seminars/ Webinars	10	6	41%
Market Pathways - C/I	Outputs/Leading Indicators	All Projects	Factsheets	6	4	41%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Market Pathways - C/I	Outputs/Leading Indicators	All Projects	Innovative Energy Efficiency Investment Strategy Participants	30	18	41%
Market Pathways - C/I	Outputs/Leading Indicators	All Projects	Seminars/ Webinars	10	6	41%
Market Pathways - C/I	Outcomes/Impacts	All Projects	Projects Completed	20	12	41%
Market Pathways - Midstream Support	Outputs/Leading Indicators	All Projects	Factsheets	9	5	41%
Market Pathways - Midstream Support	Outputs/Leading Indicators	All Projects	Midstream Partner Participants	510	301	41%
Market Pathways - Midstream Support	Outputs/Leading Indicators	All Projects	Midstream Partner Trainees	1,025	605	41%
Market Pathways - Midstream Support	Outputs/Leading Indicators	All Projects	Seminars/ Webinars	9	5	41%
Market Pathways - Midstream Support	Outcomes/Impacts	All Projects	Energy Savings Installed (GWh)	37	22	41%
Market Pathways - Midstream Support	Outcomes/Impacts	All Projects	Market Adoption	3	2	41%
Market Pathways - RES	Outputs/Leading Indicators	All Projects	Energy Smart Product Partner Participants	1,240	732	41%
Market Pathways - RES	Outputs/Leading Indicators	All Projects	Product Partner Trainees	500	295	41%
Market Pathways - RES	Outcomes/Impacts	All Projects	Energy Savings Installed (GWh)	125	74	41%
Market Pathways - RES	Outcomes/Impacts	All Projects	Energy Savings Installed (MMBtu)	895,000	528,050	41%
Market Research	Outputs/Leading Indicators	All Projects	Projects Completed	4	4	4%
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	Certifications Developed	3	1	61%
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	Course Development	8	3	61%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	Entry Level Trainees	480	187	61%
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	OJT, Hands-On Training	680	265	61%
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	Renewable Energy Technical Trainees	2,000	780	61%
Renewable Energy and Advanced Technologies	Outputs/Leading Indicators	All Projects	Training Organizations	6	2	61%
Renewable Energy and Advanced Technologies	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	4	2	61%
Resource Development	Outputs/Leading Indicators	All Projects	Projects Completed	6	1	91%
Resource Development	Outputs/Leading Indicators	All Projects	Projects Contracted	6	1	91%
Resource Development	Outputs/Leading Indicators	All Projects	Stakeholder Engagements	3	-	91%
Resource Development	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	3	-	91%
Resource Development	Outcomes/Impacts	All Projects	Site Development Potential (MW)	1,000	90	91%
Smart Grid	Outputs/Leading Indicators	All Projects	Supported Companies	34	18	46%
Smart Grid	Outputs/Leading Indicators	Research Studies	Projects Completed	8	4	46%
Smart Grid	Outputs/Leading Indicators	Research Studies	Projects Contracted	8	4	46%
Smart Grid	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Completed	29	16	46%
Smart Grid	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Contracted	29	16	46%
Smart Grid	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	112	60	46%
Smart Grid	Outcomes/Impacts	All Projects	Market Adoption	6	3	46%

Table A-1 continued

T&MD Initiative	Milestone / Result Type	Project Type	Metric	Original Target Total	Revised Target Total	Percent Budget Reduction*
Smart Grid	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	6	3	46%
Smart Grid	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	3	2	46%
Solar Cost Reduction	Outputs/Leading Indicators	All Projects	Meetings, Workshops, Conferences	10	6	41%
Solar Cost Reduction	Outputs/Leading Indicators	All Projects	Solar (PV) Trainees	2,000	1,180	41%
Solar Cost Reduction	Outputs/Leading Indicators	All Projects	Supported Companies	9	5	41%
Solar Cost Reduction	Outputs/Leading Indicators	All Projects	Training Sessions	200	118	41%
Solar Cost Reduction	Outputs/Leading Indicators	Develop tools, practices, studies, surveys, engagements	Projects Completed	10	6	41%
Solar Cost Reduction	Outputs/Leading Indicators	Develop tools, practices, studies, surveys, engagements	Projects Contracted	10	6	41%
Solar Cost Reduction	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Completed	10	6	41%
Solar Cost Reduction	Outputs/Leading Indicators	Technology, development, demonstration or pilot projects	Projects Contracted	10	6	41%
Solar Cost Reduction	Outcomes/Impacts	All Projects	Leveraged Funds Amount (millions)	13	8	41%
Solar Cost Reduction	Outcomes/Impacts	All Projects	Market Adoption	7	4	41%
Solar Cost Reduction	Outcomes/Impacts	All Projects	Product Revenue Amount (millions)	7	4	41%
Solar Cost Reduction	Outcomes/Impacts	All Projects	Products and Technologies Commercialized	1	1	41%

* The actual percent target reduction may vary from the percent budget reduction due to rounding.

Endnotes

[1] Pursuant to the January 21, 2016 CEF Order, the CEF received a transfer of $182.7 million of uncommitted funds from T&MD as of February 29, 2016. The T&MD program ended nearly a year early. Individual programs lost between 2% and 91% of their budgets as a result of this budget transfer and, given the early end to the T&MD portfolio, the T&MD goals for each program have been adjusted in this report proportional to the budget reductions each program received. Original goals from the February 15, 2013 Operating Plan are included in appendix D for reference.

[2] To report certain underlying data on progress with an appropriate number of significant digits, targets are shown with more precision (significant digits) than exist in most of the target estimates. None of the targets changed by showing additional significant digits. Consistent with the Operating Plan for Technology and Market Development Programs (2012–2016), where a target was originally a range, minimum value of the range was used.

[3] Electricity, fossil fuel, and demand savings/generation targets and progress refer to the cumulative annual savings that have been achieved through a particular time period from all measures installed.

[4] With the submittal of its Clean Energy Fund Investment Plan Budget Accounting and Benefits Chapter on February 22, 2016, NYSERDA adopted the NYS Public Service Commission's recommendation in its January 21, 2016 Order Establishing the Benefit Cost Analysis Framework that New York's GHG emissions factor methodology shift from an average grid emission profile to a marginal grid emission profile. Due to this shift, New York's factor to calculate GHG emissions reductions has changed from 625 pounds CO2e/MWh to 1,160 pounds CO2e/MWh. The emissions reductions calculated for this report reflect the new factor of 1,160 pounds CO2e/MWh.

[5] Primary energy savings for CHP systems (expressed in MMBtu) is based on the difference between the amount of energy displaced at grid-level generators and the energy used on-site by the CHP installations, accounting for both the avoided energy losses over the transmission and distribution system and the energy saved due to replacement of the on-site boiler with more efficient equipment. The energy displaced at grid-level generators is estimated based on the electricity system simulation model used in the development of the State Energy Plan process.

[6] Adjustments made to data in previously reported periods is due to lagged data and/or QA/QC.

[7] Current reporting period is subsumed in the column 2017-21.

[8] Current reporting period is subsumed in the column 2017-21.

[9] Current reporting period is subsumed in the column 2017-21.

[10] Current reporting period is subsumed in the column 2017-21.

[11] https://cals.cornell.edu/pro-dairy/our-expertise/environmental-systems/anaerobic-digestion.

[12] Current reporting period is subsumed in the column 2017-21.

[13] The September 13, 2012, Order in Case 10-M-0457, *Order Authorizing the Reallocation of Uncommitted System Benefits Charge III Fund,* included $10 million for a new initiative within the Advanced Clean Power Program focused on reducing the BOS costs for solar electric installations and the development of priority solar electric technology.

[14] In his 2012 State of the State Address, Governor Cuomo announced the NY-Sun initiative, designed to install, in 2013, four times the customer-sited solar electric capacity installed in 2011, while protecting the ratepayer by keeping costs under control.

[15] Adjustments made to data in previously reported periods is due to lagged data and/or QA/QC.

[16] Current reporting period is subsumed in the column 2017-21.

[17] Current reporting period is subsumed in the column 2017-21.

[18] PSC. Case 07-M-0548 - Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard and Case 10-M-0457 – In the Matter of the System Benefits Charge IV. Issued and effective December 17, 2012.

[19] Current reporting period is subsumed in the column 2017-2020.

[20] Current reporting period is subsumed in the column 2017-21.

[21] Adjustments made to data in previously reported periods is due to lagged data and/or QA/QC.

[22] Current reporting period is subsumed in the column 2017-21.

[23] Current reporting period is subsumed in the column 2017-21.

[24] Current reporting period is subsumed in the column 2017-21.

[25] Current reporting period is subsumed in the column 2017-21.

[26] Current reporting period is subsumed in the column 2017-21.

[27] Current reporting period is subsumed in the column 2017-21.

[28] Adjustments made to data in previously reported periods is due to lagged data and/or QA/QC.

[29] Due to lag required to collect and compile annual data after year end from research partners, contractors and others, 2017 progress is incomplete. NYSERDA will update 2017 progress, adding lagged data, in its next report.

[30] Current reporting period is subsumed in the column 2017-21.

[31] See the 2012,2015,2018 reports, infographic and factsheet at nyserda.ny.gov/Partners-and-Investors/Clean-Energy-Startups/NYS-a-National-Leader-in-Cleantech

[32] nyserda.ny.gov/Partners-and-Investors/Clean-Energy-Startups/NYS-a-National-Leader-in-Cleantech

[33] Current reporting period is subsumed in the column 2017-21.

[34] Current reporting period is subsumed in the column 2017-21.

[35] Current reporting period is subsumed in the column 2017-21.

[36] Current reporting period is subsumed in the column 2017-21.

[37] Adjustments made to data in previously reported periods is due to lagged data and/or QA/QC.

[38] Current reporting period is subsumed in the column 2017-21.

[39] The Motors Program was intended to focus on providing educational and technical support to NYSERDA's Partners (motor suppliers, repair shops, electrical companies, manufacturers, and distributors). However, the program was discontinued prior to market launch.

[40] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Advanced-Codes-Standards.pdf

[41] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Advanced-Codes-Standards.pdf

[42] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf

[43] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Clean-Energy-Business-Development.pdf

[44] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Workforce-Development.pdf

[45] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-CHP-Acceleration.pdf

[46] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Advanced-Buildings.pdf

[47] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Advanced-Buildings.pdf

[48] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-SCR-logic-model.pdf

[49] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-CPTI-Logic-Model-Report.pdf

[50] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-Transportation-LM-Report.pdf

[51] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-EPTD-Smart-Grid-Program.pdf

[52] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-Workforce-Development.pdf

[53] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-Citation-Analysis.pdf

[54] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/Solar-Cost-Reduction-process-evaluation.pdf

[55] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-economic-development-growth-extension-process-evaluation.pdf

[56] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Codes-Process-Evaluation-Report.pdf

[57] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/Advanced-Buildings-Technology-Development-Process-Evaluation.pdf

[58] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/AEC-Phase-II-report.pdf

[59] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf

[60] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/NYSERDA%20-and-National-Awareness-of-ENERGY-STAR.pdf

[61] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Smart-Grid-MCA-Report.pdf

[62] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/Clean-Transportation-Market-Characterization-Study-Vol2.pdf

[63] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/Transportation-Case-Study-Report-Leviton.pdf

[64] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/2016-Transportation-Case-Study-Buffalo-Niagara-Medical-Campus.pdf

[65] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/2016-transportation-case-study-electric-refrigeration.pdf

[66] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Alstom-Transportation-cs.pdf

[67] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Saab-Sensis-Advanced-Airport-Departure-Manager-Transportation-cs.PDF?la=en

[68] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Adaptive-Control-Decision-Support-System-Traffic-Management-Transportation-cs.pdf

[69] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/ICBD-MCA-Final-Report.pdf

[70] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2017ContractorReports/CHP-Baseline-assessment.pdf

[71] nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/Evaluation-Contractor-Reports/2017-Reports

[72] nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/2016-advanced-energy-codes.pdf

[73] nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/Evaluation-Contractor-Reports/2017-Reports

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.

To learn more about NYSERDA's programs and funding opportunities, visit nyserda.ny.gov or follow us on Twitter, Facebook, YouTube, or Instagram.

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
nyserda.ny.gov