



NYSERDA

NYSERDA Technology and Market Development Program

Semiannual Report through

June 30, 2016

Final Report

NYSERDA's Promise to New Yorkers:

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

Mission Statement:

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

Vision Statement:

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

**NYSERDA Technology and
Market Development Program**
Semiannual Report through June 30, 2016

Final Report

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

August 31, 2016

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1 Introduction

1.1 Public Policy Context

The System Benefits Charge (SBC) was established by Order of the New York State Public Service Commission (PSC) in 1998. The PSC established the ratepayer-supported SBC and designated the New York State Energy Research and Development Authority (NYSERDA) as the Administrator of the program. The program was re-authorized in 2001 and 2006 for five-year terms. For the period 2006 through 2011, program funding was \$154 million per year, of which approximately half focused on energy efficiency resource acquisition/deployment activities and half on technology and market development activities.

In its September 20, 2010 petition to the PSC to continue the SBC, NYSERDA proposed some modifications to the program, including consolidating and transferring the resource acquisition and deployment activities within the Energy Efficiency Portfolio Standard (EEPS) Program and requesting to extend the current SBC by six months to coincide with the December 31, 2011 conclusion of the current EEPS Program. The petition also summarized the history and accomplishments of the SBC and described a proposed Technology and Market Development (T&MD) portfolio to serve as the next iteration of the SBC.

The PSC issued a Notice of Proposed Rulemaking on October 6, 2010 (Case 10-M-0457) and asked for comments on NYSERDA's proposal to be submitted by November 22, 2010. NYSERDA and the Department of Public Service (DPS) also conducted a Technical Conference on November 4, 2010, to provide stakeholders and interested parties with more information on the potential uses of SBC funds for the T&MD Program. The PSC issued an Order on December 30, 2010, which "reaffirmed its high level commitment to the continuation of SBC programs and to the important State policy goals they support."¹ The December 30, 2010 Order continued SBC through the end of 2011, but deferred a decision on the proposed T&MD Program, pending a more robust stakeholder input process and submission of an Operating Plan.

¹ PSC. Case 10-M-0457 and Case 05-M-0090. *Order Continuing System Benefits Charge Funded Programs*. Issued and effective December 30, 2010.

NYSERDA submitted the T&MD Operating Plan on May 16, 2011. On June 8, 2011, PSC issued a Notice of Proposed Rulemaking requesting public comment on the Operating Plan by July 25, 2011, with reply comments due August 15, 2011. The Operating Plan requested average annual program funding of \$70 million for seven initiatives, plus \$15 million for an incremental Combined Heat and Power (CHP) initiative.

In a PSC Order issued on October 24, 2011, NYSERDA's T&MD Operating Plan was approved, including a CHP initiative for five years (January 1, 2012 through December 31, 2016). The average annual funding rate of \$93.8 million represented \$80 million in program costs and \$13.8 million for administration, evaluation, and New York State Cost Recovery Fees.² This plan included \$65 million in program costs (\$76.2 million total) for NYSERDA's "base" T&MD initiatives and \$15 million in program costs (\$17.6 million total) for a CHP Initiative. Of the \$15 million for CHP, \$5 million in SBC funds was approved in the Order to be used for the CHP Aggregation and Acceleration Program, and, at NYSERDA's option, for feasibility studies. The remaining \$10 million for the CHP Performance Program was to be derived from a source or sources other than the SBC funds approved in the October 24, 2011 Order. NYSERDA was directed to submit a plan for funding the balance of the CHP Initiative by March 31, 2012. By March 31, 2012, NYSERDA was also directed by the Order to submit an accounting of SBC III funds that were uncommitted as of December 31, 2011 with the option to submit a proposal for use of those funds, as well as SBC III funds that may become uncommitted in the future.

A revised T&MD Operating Plan was filed with PSC on December 22, 2011, updating NYSERDA's May 16, 2011 submittal to comport with the October 24, 2011 Order.³

² PSC. Case 10-M-0457 – In the Matter of the System Benefits Charge IV. Issued and effective October 24, 2011.

³ NYSERDA, 2011. Technology and Market Development Program Operating Plan for 2012-2016, System Benefits Charge, December 22 and revised November 13, 2012 and February 15, 2013 nyserda.ny.gov/-/media/Files/About/System-Benefits-Charge/SBC-Five-Year-Operating-Plan.pdf

On March 9, 2012, NYSERDA submitted a full accounting of uncommitted SBC III funds as directed in the October 24, 2011 Order. On March 30, 2012, NYSERDA submitted a petition proposing ways to allocate those uncommitted SBC III funds among three primary activities:

- Develop and implement programs to reduce solar (also known as solar photovoltaic or PV) balance-of-system (BOS) costs and support priority solar electric technology development (\$10 million).

Provide cost-sharing support as part of a Brookhaven National Laboratory (BNL) proposal to the U.S. Department of Energy (DOE) solicitation for a New York State Energy Storage Innovation Hub (\$10 million, with \$2.5 million allocated to the New York Battery and Energy Storage Technology Consortium [NY-BEST]).

- Expand NYSERDA's Advanced Buildings Program (\$5.76 million, including \$3 million for an Advanced Buildings Consortium [ABC] and \$3.76 million for a deep energy savings initiative in commercial buildings).

NYSERDA requested to apply \$1.75 million in uncommitted SBC III funds to New York State Cost Recovery Fee assessments applicable to SBC III. In addition, NYSERDA requested approval to allocate uncommitted SBC III funds to projects committed as of December 31, 2011. A notice inviting comments was issued on May 11, 2012, and requested comments by August 3, 2012.

In addition, on March 30, 2012, NYSERDA submitted petitions to provide funding for the CHP Program and to provide continued funding and expansion of NYSERDA's workforce development initiatives as directed in the October 24, 2011 Order.⁴ PSC issued a Notice of Proposed Rulemaking on May 9, 2012, and requested comments by August 3, 2012.

On September 13, 2012, the PSC issued an Order and approved, with modifications, NYSERDA's requests in its petition regarding uncommitted SBC III funds.⁵ The PSC approved the reallocation of SBC III funds into the T&MD portfolio to support T&MD solar electric activities (\$10 million) and Advanced Buildings activities (\$5.76 million) as well as NYSERDA's support of the BNL proposal and NY-BEST

⁴ Petitions related to adjusting the goals and funding for EEPS programs were also submitted on this date.

⁵ PSC. Case 10-M-0457 – *In the Matter of the System Benefits Charge IV*. Issued and effective September 13, 2012.

(\$10 million, with \$2.5 million allocated to NY-BEST).⁶ Also approved was NYSERDA's allocation of SBC III funds to New York State Cost Recovery fee assessments. The PSC did not approve NYSERDA's request to reallocate uncommitted SBC III funds to projects committed as of December 31, 2011 in advance, but directed NYSERDA to submit for review and approval any proposals separately. The Order directed NYSERDA to submit, within 60 days, a supplemental revision to its T&MD Operating Plan to account for the approved initiatives. A revised T&MD Operating Plan was filed with PSC on November 13, 2012 to comport with the September 13, 2012 Order. This plan included \$75.15 million in average annual program funding plus \$12.06 million in average annual funding for administration, evaluation, and cost recovery.

The PSC issued an Order on December 17, 2012 and approved, with modifications, the requests described in the balance of NYSERDA's March 30, 2012 petitions.⁷ In this Order, the PSC approved NYSERDA to reallocate \$35.9 million from the Benchmarking and Operations Efficiency and the Electric Reduction in Master-Metered Buildings (EEPS) programs and \$22.7 million in uncommitted EEPS-1 funds to support the T&MD CHP Initiative. In addition, the Order approved NYSERDA reallocating \$24 million in EEPS-1 funds (\$12 million in electric funding and \$12 million in natural gas funding) to support T&MD workforce development initiatives. PSC also directed NYSERDA to submit by February 15, 2013, a supplemental revision to its T&MD Operating Plan to comport with the December 17, 2012 Order.⁸ NYSERDA submitted a revised T&MD Operating Plan on February 15, 2013, aligning the report with

⁶ Per the September 13, 2012 Order, if the BNL proposal was not selected by U.S. DOE, NYSERDA had seven days to notify the DPS Office of Energy Efficiency and the Environment (OEEE) of this decision and 60 days to submit a proposal on how those funds should be reallocated. On December 5, 2012, NYSERDA notified DPS OEEE of the proposal denial and designated February 5, 2013 as the date for NYSERDA to submit an alternative proposal to use the funds. The due date for this submission was subsequently extended three times and on September 5, 2013, NYSERDA submitted a petition to transfer \$7.5 million in uncommitted SBC III funds to a Power Electronics Manufacturing Consortium proposal in response to a U.S. DOE solicitation. In an Order issued December 20, 2013, the PSC approved use of these funds with the same requirements regarding proposal acceptance and denial as described above.

⁷ 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.

⁸ NYSERDA was also directed to submit a supplemental revision to its EEPS Operating Plan by February 15, 2013 and did so on that date.

the December 17, 2012 Order. On June 16, 2014, NYSERDA submitted a petition to the PSC to add \$7.5 million to the CHP initiative. This petition was withdrawn on November 14, 2014⁹ with the recommendation that the uncommitted funds be considered within the overall context of the Clean Energy Fund (CEF).

The CEF proceeding was initiated by the PSC in a May 8, 2014 Order Commencing Proceeding.¹⁰ PSC noted in the Order that NYSERDA's CEF proposal "should refocus on market and technology transformative strategies designed to provide temporary intervention and support to overcome specific barriers and produce self-sustaining results." In response, NYSERDA filed its CEF Proposal on September 23, 2014 (Proposal).¹¹ In its Proposal, NYSERDA provided information regarding the four portfolios of activity that would constitute the CEF: market development; technology and business innovation (subsequently recast as innovation and research in the CEF Information Supplement); NY Green Bank; and the NY-Sun initiative. Also, in that filing, NYSERDA advanced both budget and benefit information regarding the proposed market development and business and technology innovation portfolios, among other issues. On June 25, 2015, NYSERDA filed a CEF Information Supplement to supplement and replace the original proposal to assist the stakeholder comment process and to provide more detailed information for PSC deliberation.

In these filings, NYSERDA proposed the CEF comprise both market development and innovation and research activities and was intended to supersede the final year (calendar 2016) of the current T&MD portfolio. A PSC Order approved the CEF in January 2016, subsuming the final year of T&MD.¹²

⁹ Case 10-M-0457, *In the Matter of the System Benefits Charge IV*, Withdrawal of Petition for Allocation of Uncommitted T&MD Funds, November 14, 2014.

¹⁰ Case 14-M-0094 – *Proceeding on Motion of the Commission to Consider a Clean Energy Fund*, Order Commencing Proceeding. Issued and effective May 8, 2014.

¹¹ Case 14-M-0094 – *Proceeding on Motion of the Commission to Consider a Clean Energy Fund*, Clean Energy Fund Proposal, September 23, 2014.

¹² Case 14-M-0094 – *Proceeding on Motion of the Commission to Consider a Clean Energy Fund*, Ordering Authorizing the Clean Energy Fund Framework. Issued and effective January 21, 2016.

1.2 T&MD Program Mission and Objectives

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

Specifically, objectives designed to support this mission include:

- Moving new/under-used technologies and services into the marketplace to serve as a feeder to help achieve 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 New York 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) will be assessed based on their ability to support these objectives. Future evaluation reports will present these findings as programs are assessed.

Achievement of T&MD portfolio goals is dependent on long-term or multi-phase 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 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 intends to count outputs and outcomes supported at least in part by T&MD funds toward T&MD performance milestones and results. Where prior SBC or other funded activities are foundational to the success of the T&MD program and illustrative of potential future expectations for the T&MD portfolio, they are highlighted to help convey a more complete picture of possible program benefits, but these achievements will not be tallied toward the T&MD goals unless they have received T&MD funds.

The majority of T&MD activities undertaken to date have been dedicated to issuing solicitations, selecting and launching projects, meeting with stakeholders, and scoping programs. Results from foundational SBC III programs (e.g., Smart Grid; Advanced Clean Power; Clean Energy Business Development; and Environmental Monitoring, Evaluation, and Protection) continue to accrue and are reported in more detail in the SBC III annual report. Commercialization benefits from projects started in 2012 will take a few years to materialize and will be reflected accordingly in future reports.

1.3 Organization of the Report

This semiannual 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 Program Advisory Committee Members
- Appendix B: T&MD Program Logic Models
- Appendix C: Evaluation Report Summaries
- Appendix D: Target Ranges

As all the T&MD programs become fully operational and mature, the content of these semiannual reports will expand and evolve to reflect the activities undertaken within each of the initiatives and how accomplishments to date relate to the T&MD portfolio's mission and the output and outcome metrics established in the Operating Plan.

2 Portfolio-Level Reporting

2.1 Portfolio Level Progress

To establish and implement the T&MD portfolio, NYSERDA has engaged in an intensive outreach process with stakeholders, developed and released competitive solicitations to implement the initiatives within the portfolio, and conducted other activities to put the T&MD initiatives into operation. These activities are outlined in the following sections.

2.1.1 Solicitations Released

In the past six months of the T&MD Program, NYSERDA staff has been actively engaged in developing competitive solicitations to acquire implementation contractors, trade allies, and customers to support each T&MD initiative. Table 2-1 presents solicitations released, release date, and proposal due date or open enrollment end date. Note that solicitations released prior to December 31, 2015 were included in prior semiannual reports and are omitted from Table 2-1.

Table 2-1. Solicitations Released from December 31, 2015 through June 30, 2016

Solicitation Number	Solicitation Name	Solicitation Release Date	Solicitation Closing Date
PON 3127	Emerging Technology Demonstration Projects-Residential HVAC	January 2016	April 2016

2.1.2 Implementation of T&MD Initiatives

Table 2-2 provides a summary of anticipated T&MD portfolio benefits for the five-year funding period (2012-2016) and out years (2017-2020), as well as achievements to date for applicable metrics. Performance milestone tables (included for each initiative in Section 3 of this report) show progress through June 30, 2016 against the Operating Plan's expected benefits

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. Consistent with the Operating Plan for Technology and Market Development Programs (2012-2016), where a target is a range, the range's minimum value is shown in Table 2-2. Refer to Appendix D for the details on the target ranges.

With regard to on-site energy savings, the level of achieved savings to date should be viewed in the context of the expected ramp up of savings over time. Specifically, two of the expected contributors to the overall savings goals in NYSERDA's T&MD Operating Plan, the Advanced Codes and Standards and Advanced Buildings programs, anticipated most of their savings to be achieved in late 2014 through 2016 or later. The energy savings reported in Table 2-2 for all programs except Market Pathways Products Partners are program-reported; market impact evaluation activities have not yet been conducted on these other programs. Future reports will present findings from those studies once they are finalized. The energy savings for the Market Pathways Products Partners Program are adjusted for the evaluation findings from a market/impact evaluation that was completed in 2014.¹³

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; e.g., T&MD savings for 2012 - 2016 are the energy savings achieved in 2016, as a result of energy efficiency measures installed from January 2012 through June 2016.

The progress for the 2012-2013 time period was previously restated¹⁴ after the underlying data that is now in a centralized data warehouse went through a quality and reconciliation process resulting in corrections across the program. By restating the results for the previous reporting period, NYSERDA is following financial reporting practices and meeting the validation and verification criteria for all reporting.

In certain programs, the progress for the 2012-2013 and 2014-2015 time periods have been adjusted in this report to capture changes in that period due to lags in data collection or cancellation of projects.

To allow certain underlying data on progress to be reported with an appropriate number of significant digits, targets are shown with more precision (significant digits) than actually exist in most of the target estimates. None of the targets have been changed by showing additional significant digits.

¹³ <http://www.nysesda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf>

¹⁴ <http://www.nysesda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/SBCIV-Documents>

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.

The CEF proposal recommended repurposing a substantial amount of 2016 T&MD funding for CEF work. 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, and do not reflect any adjustment associated with the requested reallocation of 2016 funds. Other noteworthy program implementation and progress milestones are each described in greater detail in Section 3.

Table 2-2. Summary of Anticipated Cumulative T&MD Benefits through June 30, 2016 (at full implementation) for Energy Efficiency, CHP, and Other Benefits¹⁵

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)	541.60	647.70	1,189.30	94
GWh Savings from Funded Project and Technology Installations	171.60	0.90	172.50	94
GWh Savings from Anticipated Replications not Directly Funded by Program		29.80	29.80	0
GWh Savings from Codes & Standards Activities supported by the Program	370.00	617.00	987.00	0
On-site Fossil Fuel Savings from Energy Efficiency Projects, Technologies, Replications, and Codes & Standards (Cumulative Annual MMBtu)	3,323,200	2,802,600	6,125,800	314,039
MMBtu Savings from Funded Project and Technology Installations	965,200	7,800	973,000	314,039
MMBtu Savings from Anticipated Replications not Directly Funded by Program		231,800	231,800	0
MMBtu Savings from Codes & Standards Activities supported by the Program	2,358,000	2,563,000	4,921,000	0
On-site Demand Reduction from Energy Efficiency Projects, Technologies, Replications, and Codes & Standards (Cumulative Annual MW)	133.00	242.40	375.40	129.2
Demand Reduction from Funded Project and Technology Installations	43.00	5.30	48.30	129.2
Demand Reduction from Anticipated Replications not Directly Funded by Program		30.10	30.10	0.0
Demand Reduction from Codes & Standards Activities supported by the Program	90.00	207.00	297.00	0.0

¹⁵ 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

Table 2-2 continued

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)	18.00	29.50	47.50	59.48
MW's Installed from Funded Project and Technology Installations	18.00	19.50	37.50	59.48
MW's Installed from Anticipated Replications not Directly Funded by the Program		10.00	10.00	0.00
On-site Electricity Generated from CHP Projects, Technologies, and Replications (Cumulative Annual GWh)	121.00	216.25	337.25	495.8
GWh's Generated from Funded CHP Project and Technology Installations	121.00	155.25	276.25	495.8
GWh's Generated from Anticipated Replications not Directly Program Funded by Program		61.00	61.00	0.0
Primary Energy Savings from CHP Installations (Cumulative Annual MMBtus)	157,300	281,125	438,425	644,490
MMBtu Consumed from Funded Project and Technology Installations	157,300	201,825	359,125	644,490
MMBtu Consumed from Anticipated Replications not Directly Funded by Program		79,300	79,300	0

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)	508,768	539,814	1,048,582	73,115
Advanced Technologies Reaching Commercial Availability	46	42	88	23
Improved Technologies Deployment Programs Adopted by the Market or Further Supported by Deployment Programs	10	9	19	1
Commercial Sales of New and Improved Supported Technologies (millions)	\$26.50	\$157.70	\$184.20	\$49.93
Funding Leveraged (co-funding and outside investment) by Investment (millions)	\$696.45	\$103.00	\$799.45	\$772.00
Clean Energy Businesses Graduating from Incubators	90	72	162	48
Clean Energy Companies Receiving Support	525	200	725	372
Retail and Supply Chain Businesses Partnering with NYSERDA to increase Market Share of Energy Efficient Products	1,750		1,750	1,327
Clean Energy Training for Practitioners (Trainees)	39,056	9	39,065	29,326
Supply Chain Training to Facilitate Adoption of Energy Efficient Products (Partner Employees)	1,525		1,525	2,376

2.1.3 Budget and Spending Status

Table 2-3 shows the T&MD program budget and financial status through June 30, 2016. Committed and spent funds are also shown as a percent of the total 2012-2016 budget.

Table 2-3. Budget and Financial Status for T&MD Programs through June 30, 2016

	2012-2016 Budget a	Spent Funds	Percent of 2012- 2016 Budget Spent	Committed Funds b,c	Percent of Budget 2012-2016 Committed
Power Supply and Delivery					
Smart Grid/Electric Vehicle	\$33,890,565	\$12,765,307	38%	\$33,697,583	99%
Advanced Clean Power	\$31,396,343	\$14,291,357	46%	\$31,107,363	99%
Combined Heat and Power ^c	\$46,055,354	\$7,125,141	15%	\$45,452,929	99%
Total Power Supply & Delivery	\$111,342,262	\$34,181,805	31%	\$110,257,875	99%
Building Systems					
Advanced Buildings	\$48,393,575	\$12,963,530	27%	\$42,635,708	88%
Advanced Energy Codes & Standards	\$9,785,964	\$3,071,235	31%	\$9,185,964	94%
Total Building Systems	\$58,179,539	\$16,034,765	28%	\$51,821,672	89%
Clean Energy Infrastructure					
Market Development	\$44,255,742	\$36,934,070	83%	\$44,382,218	100%
Clean Energy Business Development	\$25,287,254	\$15,331,230	61%	\$25,535,254	101%
Environmental Monitoring, Evaluation and Protection (EMEP)	\$16,428,580	\$5,975,617	36%	\$16,429,031	100%
Workforce Development ^c	\$15,945,695	\$10,908,673	68%	\$15,880,267	100%
Total Clean Energy Infrastructure	\$101,917,271	\$69,149,590	68%	\$102,226,770	100%
Total of All Program Areas	\$271,439,072	\$119,366,160	44%	\$264,306,317	97%
Administration (8%)	\$39,765,533	\$33,017,596	83%	\$33,034,197	83%
NYS Cost Recovery Fee (1.7%)	\$7,175,495	\$3,378,275	47%	\$3,378,275	47%
Evaluation (5%)	\$22,363,458	\$4,881,758	22%	\$22,878,398	102%
Grand Total - Portfolio	\$340,743,558	\$160,643,789	47%	\$323,597,187	95%

* 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.

3 T&MD Initiatives

This section provides a status update on each of the nine T&MD initiatives, including budget status and highlights of 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 3-1 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.

The level of committed funding in two program areas appears to be lower than might be expected at this point in time. Reasons are as follows:

- NYSERDA's program activities for Resource Development are not constant over time but instead vary with changes in state policy and energy priorities, which lead to differences in expenditures from year to year.
- Interest in the CHP market has increased as a result of the program's new catalog sales approach (predefined units make selection easier and cheaper for customer) and aggressive marketing program (regular CHP Expos event). Industry participants have reported customer sales cycles on occasion have been reduced to almost three months (as opposed to 12-15 months) and are attributing this reduction to the change in practices.

Table 3-1. Power, Supply, and Delivery Budget and Financial Status through June 30, 2016

	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	\$25,629,750	\$9,746,919	38%	\$26,874,662	105%
Electric Vehicle	\$8,260,815	\$3,018,388	37%	\$6,822,921	83%
Total Smart Grid/Electric Vehicle	\$33,890,565	\$12,765,307	38%	\$33,697,583	99%
Advanced Clean Power					
Technology Innovation	\$24,228,401	\$10,521,963	43%	\$23,939,421	99%
Resource Development	\$1,256,016	\$482,519	38%	\$1,256,016	100%
Solar Cost Reduction	\$5,911,926	\$3,286,875	56%	\$5,911,926	100%
Total Advanced Clean Power	\$31,396,343	\$14,291,357	46%	\$31,107,363	99%
Combined Heat & Power^c					
CHP Aggregation & Acceleration	\$5,974,523	\$3,411,781	57%	\$5,976,023	100%
CHP Performance	\$40,080,831	\$3,713,360	9%	\$39,476,906	98%
Total Combined Heat & Power	\$46,055,354	\$7,125,141	15%	\$45,452,929	99%
Grand Total - Power, Supply, & Delivery Initiatives	\$111,342,262	\$34,181,805	31%	\$110,257,875	99%

* 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.

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 between regions of 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:

- The Electric Power Transmission and Distribution (EPTD) Smart Grid Program solicitation (PON 3026) was released December 12, 2014. This third solicitation under the T&MD plan made \$10 million available over two rounds with due dates of February 18, 2015 and August 5, 2015. Of 19 proposals received under Round 2 of PON 3026, awards for five projects, requesting total funding of just over \$4.2 million have been made in support of research (1), engineering analysis (2), and product demonstration (2) projects.
- A superconducting fault current limiter (SCFCL) was successfully field tested at Central Hudson Gas & Electric's Knapps Corners substation near Poughkeepsie. The device is designed to protect critical electrical equipment against power surges, extend equipment life, improve service reliability, and reduce customer costs. The SCFCL, designed and installed by Applied Materials Inc. with \$1.2 million in funding support from NYSERDA, successfully defended the substation from 22 instances of power surges or fault currents caused by lightning, or downed or crossed power lines.
- Lockheed Martin, in partnership with Iberdrola USA and with support from NYSERDA successfully completed a proof-of-concept project designing algorithms that would be capable of analyzing data optically gathered by overflights of the utility network to improve the speed and accuracy of conducting damage assessments and response actions associated with overall recovery from a weather events. Success of the proof-of-concept has led to a second phase of product development/testing of the Integrated Aerial Weather Damage Assessment System (IAWDAS) where light detection range sensors will be used to identify the condition of utility assets and guide restoration planning.
- Table 3-2 shows performance milestones and results for the Smart Grid Program through June 30, 2016. 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.

Table 3-2. Smart Grid Performance Milestones and Results through June 30, 2016¹⁶

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Technology, development, demonstration or pilot projects	Projects Contracted - Target	7	10	12		29
	Projects Contracted - Progress	9	6	3		18
	Projects Completed - Target		5	9	15	29
	Projects Completed - Progress	0	4	0		4
Research Studies	Projects Contracted - Target	2	3	3		8
	Projects Contracted - Progress	12	15	1		28
	Projects Completed - Target		2	3	3	8
	Projects Completed - Progress	0	13	3		16
All Projects	Supported Companies - Target	8	12	14		34
	Supported Companies - Progress	21	15	4		40

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$18.00	\$42.00	\$52.00		\$112.00
	Leveraged Funds Amount (millions) - Progress	\$13.15	\$67.96	\$1.74		\$82.86
	Products and Technologies Commercialized - Target			1	2	3
	Products and Technologies Commercialized - Progress	0	2	0		2
	Product Revenue Amount (millions) - Target				\$6.00	\$6.00
	Product Revenue Amount (millions) - Progress	\$0.00	\$1.25	\$0.00		\$1.25
	Market Adoption - Target			2	4	6
	Market Adoption - Progress	0	0	0		0

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 have been performed during this reporting period:

- As of June 30, 2016, more than 680 electric vehicle-charging stations were installed through NYSERDA programs.
- NYSERDA’s contractor, Energetics Inc., compiled updated reports on the use of NYSERDA-supported EV charging stations installed through the EV Charging Station Demonstration Program. The reports show quarterly use of the stations broken down by geographic region, type of location, and business model.

¹⁶ 2014-15 Leveraged Funds Amount went from \$15 million to \$68 million. Product Revenue Amount also increased from 0 to \$1 million. Products and Technologies Commercialized increased from 1 to 2. This is all due to lag in data.

- NYSERDA made awards to eight new projects for product demonstrations and policy studies in April. Contracts are currently being negotiated. Projects will explore EVs' benefits to the electric grid and ratepayers, controllable charging in public settings, and ways to get car dealers, employers, and local government planning boards more engaged in EV market expansion.
- NYSERDA continued to add valuable resources to its Charge NY website, which has information for a variety of audiences about EVs and their benefits. New resources EValueNY, a database of information about EVs and EV charging in NYS that researchers and market participants can use to learn about NYS's progress on EVs and opportunities to invest further in the EV market.
- NYSERDA published final reports on alternatives to demand charges for DC fast charging stations, EV charging station financing, policies and technologies to enable grid-interactive vehicles, and smart charging options for utilities.
- NYSERDA met periodically with stakeholders, including auto manufacturers, environmental groups, EV infrastructure providers, site owners, and installers to solicit input for the design of new EV-related programs.
- NOHMs Technologies, Inc. continues to develop electrolytes for lithium ion batteries for motorsport applications. Recent overcharge testing of novel electrolyte samples further narrowed the field of possible electrolyte formulations. Candidate formulations have shown promising abuse testing results and are anticipated to undergo independent validation in Q3 2016.

Table 3-3 shows performance milestones and results for Electric Vehicle Infrastructure Program through June 30, 2016. 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 electric vehicle infrastructure.

Table 3-3. Electric Vehicle Infrastructure Performance Milestones and Results through June 30, 2016¹⁷

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Technology, development, demonstration or pilot projects	Projects Contracted - Target	4	9	12		25
	Projects Contracted - Progress	1	15	1		17
	Projects Completed - Target		3	6	16	25
	Projects Completed - Progress	0	3	1		4
Research Studies	Projects Contracted - Target	4	2	2		8
	Projects Contracted - Progress	1	12	1		14
	Projects Completed - Target		4	2	2	8
	Projects Completed - Progress	0	2	4		6
All Projects	Supported Companies - Target	5	10	15		30
	Supported Companies - Progress	3	21	1		25

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$4.00	\$14.00	\$24.00		\$42.00
	Leveraged Funds Amount (millions) - Progress	\$7.86	\$21.64	\$0.31		\$29.81
	Products and Technologies Commercialized - Target		1	1	2	4
	Products and Technologies Commercialized - Progress	0	0	0		0
	Product Revenue Amount (millions) - Target				\$9.00	\$9.00
	Product Revenue Amount (millions) - Progress	\$0.00	\$0.00	\$0.00		\$0.00
	Market Adoption - Target			1	2	3
	Market Adoption - Progress	0	1	0		1

3.1.2 Advanced Clean Power

3.1.2.1 Clean Power Technology Innovation Program

The Clean Power Technology Innovation Program works to advance clean power 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 of these

¹⁷ 2014-15 Leveraged Funds Amount went from \$5 million to \$22 million. Market Adoption increased from 0 to 1. This is all due to lag in data.

technologies, 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 have been performed during this reporting period:

- Cadenza Innovation, a pioneering provider of energy storage solutions based on disruptive architectures for lithium-ion battery packs, announced more than \$5 million in growth capital. The company will use the new funds to expand product development, secure additional certifications, extend initial deployments, make key new hires and fuel revenue growth.
- Lionano Inc., an innovator in battery components has been recently awarded an Army SBIR Phase II with \$1 million award, obtained an exclusive worldwide technology license from Cornell University for the commercialization of an advanced anode material, and has its own research and prototyping labs located in the McGovern Center incubator at Cornell University, to produce cathode material at a rate of over 30 tons/yr.
- Four proposals were contracted for Advanced Clean Power (PON 2942). The remaining three proposals are in the process of being contracted.

Table 3-4 shows performance milestones and results for the Technology Innovation and Energy Storage programs through June 30, 2016. Commercialization metrics for projects that only received SBC III funding are not reported here; those metrics are reported in the SBC III annual report. Outputs/Leading Indicators measure immediate results; 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.

Table 3-4. Clean Power Technology Innovation (top two sections) and Energy Storage Commercialization Center (bottom section) Performance Milestones and Results through June 30, 2016¹⁸

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	15	26	10		51
	Projects Contracted - Progress	12	20	3		35
	Projects Completed - Target		10	15	26	51
	Projects Completed - Progress	1	7	5		13
	Supported Companies - Target	19	32	13		64
	Supported Companies - Progress	12	20	3		35

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$20.00	\$32.00	\$13.00		\$65.00
	Leveraged Funds Amount (millions) - Progress	\$19.53	\$70.37	\$0.51		\$90.41
	Products and Technologies Commercialized - Target		1	2	5	8
	Products and Technologies Commercialized - Progress	3	2	0		5
	Product Revenue Amount (millions) - Target	\$1.00	\$1.00	\$3.00	\$50.00	\$55.00
	Product Revenue Amount (millions) - Progress	\$0.53	\$24.72	\$0.00		\$25.25

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$2.00	\$2.00	\$1.00	\$2.00	\$7.00
	Leveraged Funds Amount (millions) - Progress	\$0.50	\$0.77	\$0.00		\$1.27
	Products and Technologies Commercialized - Target	1	4	4	16	25
	Products and Technologies Commercialized - Progress	0	0	0		0
	Revenue Amount (millions) - Target	\$0.15	\$2.20	\$1.40	\$6.30	\$10.05
	Revenue Amount (millions) - Progress	\$0.00	\$1.03	\$0.00		\$1.03
	Product Development Tests - Target	2	8	6	25	41
	Product Development Tests - Progress	0	19	0		19

3.1.2.2 Resource Development Program

The Resource Development Program is focusing on activities that will 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.

¹⁸ 2012-13 Products and Technologies Commercialized increased from 2 to 3. 2014-15 Leveraged Funds Amount increase from \$29 million to \$70. Product Revenue Amount increased from \$0 to \$25 million. This is all due to a lag in data. Data for this program is on a three month lag. Data through June 2016 will be updated in the next report.

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

- Offshore Wind Values – NYSEERDA is collaborating with the Long Island Power Authority (LIPA) and PSEG-Long Island, in consultation with the DPS, to assess methodologies to adequately understand and quantify all the location-specific value components offshore wind will add to New York beyond project and grid-specific costs and benefits.
- Northeast Wind Resource Center – NYSEERDA continued to be an active supporter of the National Renewable Energy Laboratory-funded Northeast Wind Resource Center (NWRC) led by the Clean Energy States Alliance. The NWRC’s purpose is to provide credible information, targeted outreach, and direct engagement with stakeholders and decision makers about offshore wind energy. The NWRC plans to support the development of a viable offshore wind industry by:
 - Collecting and disseminating Web-based information by creating an NWRC-specific website and by maintaining websites for the U.S. Offshore Wind Hub, the Offshore Wind Accelerator Project, and the Maine Ocean and Wind Industry Initiative.
 - Developing strategies to increase opportunities for multistate collaboration.
 - Sponsoring regular webinars, workshops, and meetings.
 - Coordinating with other regions (e.g., Southeast Coastal Wind Coalition).

Table 3-5 shows performance milestones and results for the Resource Development Program through June 30, 2016. 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 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.

Table 3-5. Resource Development Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	3	2	1		6
	Projects Contracted - Progress	3	0	0		3
	Projects Completed - Target	1	1	2	2	6
	Projects Completed - Progress	0	2	0		2
	Stakeholder Engagements - Target	2	1			3
	Stakeholder Engagements - Progress	2	1	0		3

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target		\$1.00	\$1.50		\$2.50
	Leveraged Funds Amount (millions) - Progress	\$0.00	\$0.00	\$0.00		\$0.00
	Site Development Potential (MW) - Target				1,000.00	1,000.00
	Site Development Potential (MW) - Progress	0.00	0.00	0.00		0.00

3.1.2.3 Solar Cost Reduction¹⁹

This program will help achieve the goals of the NY-Sun initiative²⁰ through activities that reduce the balance-of-system (BOS) costs of solar electric installations and support priority solar electric technology development in New York State. BOS costs include 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 will be 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 have been performed during this reporting period:

- Under Solar One's solar electric group purchase program called Here Comes Solar (HCS), a system was installed using the first canopy-racking system deployed among HCS members, a product that HCS staff was centrally involved in the development of. In addition to elevating the array to eliminate shading from the neighboring building, the canopy design also elevates the system above the 9-foot threshold that the New York City Fire Department requires for the suspension of clear path and obstruction setbacks stipulated by the NYC fire code. Without such elevation, the install would not have been possible due to fire code imposed space restrictions. This very common barrier disqualifies many solar installations on flat roof row houses in the outer boroughs of New York City. SITU Studio and Brooklyn SolarWorks created a canopy that utilizes a very efficient use of materials and standardized components, thus dramatically reducing material and labor inputs, resulting in a low installed cost adder (approximately \$1/watt) relative to other canopy designs appearing in the New York City market.
- Sunvestment Group (SVG) is developing a platform that brings together prospective investors in solar electric projects with proposed projects. Specifically, SVG focuses on community-based investments—making the attractive returns of solar projects available to members of the local community through establishing third-party investment entities that enter into a Community Power Purchase Agreement (CPPA) with the local site host. In fall 2015, Sunvestment Energy Group (SEG) successfully released the alpha version of its web platform (www.sunvestmentgroup.com) at the Solar Power International Conference (Anaheim, CA) in September, where they demonstrated the platform and interacted with several potential customers.

¹⁹ 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 balance-of-system costs for solar electric installations and the development of priority solar electric technology.

²⁰ 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.

- The PV Trainers Network (PVTN) continued to provide a wide breadth of trainings across the State including, but not limited to, the following courses: Solar Procurement for Local Governments; Land Use Planning for Solar Energy; Intro to Solar Policy; and Solar PV Permitting and Inspection Methods. The PV Trainers Network assembled a Municipal PV Procurement Toolkit, which was approved for release by NYSERDA in December 2015. The toolkit was developed in response to requests for assistance for government procurement of solar electric from communities across the state. The toolkit provides resources to localities to guide them through the process. The toolkit includes:
 - Step-by-step guidance to the procurement process.
 - A model Request for Proposals (RFP).
 - A model Power Purchase Agreement (PPA).
 - An Excel-based Bid Evaluation Form.
 - A database of PPA Prices and Terms.
 - One-on-One Technical Assistance for municipalities interested in solar procurement.

Table 3-6 shows performance milestones and results for the Solar Cost Reduction program through June 30, 2016. 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 for develop 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 balance-of-system (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. Leverage funds include co-funding and outside investment for balance-of-system projects.

Table 3-6. Solar Cost Reduction Performance Milestones and Results through June 30, 2016²¹

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Technology, development, demonstration or pilot projects	Projects Contracted - Target	7	3			10
	Projects Contracted - Progress	0	4	0		4
	Projects Completed - Target		2	5	3	10
	Projects Completed - Progress	0	0	0		0
Develop tools, practices, studies, surveys, engagements	Projects Contracted - Target	7	2	1		10
	Projects Contracted - Progress	0	8	1		9
	Projects Completed - Target		5	3	2	10
	Projects Completed - Progress	0	1	0		1
All Projects	Supported Companies - Target	6	2	1		9
	Supported Companies - Progress	0	12	1		13
	Solar (PV) Trainees - Target	1,800	200			2,000
	Solar (PV) Trainees - Progress	0	4,404	3,017		7,421
	Training Sessions - Target	180	20			200
	Training Sessions - Progress	0	152	83		235
	Meetings, Workshops, Conferences - Target	1	4	3	2	10
	Meetings, Workshops, Conferences - Progress	0	27	0		27

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$5.50	\$5.00	\$2.60		\$13.10
	Leveraged Funds Amount (millions) - Progress	\$2.00	\$16.31	\$0.00		\$18.31
	Products and Technologies Commercialized - Target				1	1
	Products and Technologies Commercialized - Progress	0	1	0		1
	Product Revenue Amount (millions) - Target				\$7.20	\$7.20
	Product Revenue Amount (millions) - Progress	\$0.00	\$0.04	\$0.00		\$0.04
	Market Adoption - Target		3	2	2	7
	Market Adoption - Progress	0	0	0		0

3.1.3 Combined Heat and Power (CHP)

3.1.3.1 CHP Aggregation and Acceleration Program

The CHP Aggregation and Acceleration Program is developing and transforming the marketplace for CHP systems from 50 kW to 1.3 MW, the nameplate capacity range of a majority of NYSERDA’s previous CHP projects. The program will accomplish this transformation by (1) compiling a vetted catalog of prequalified equipment, and (2) creating and validating rules-of-thumb for simplifying the analysis used to determine the capacity needs of a given site. This focus on prepackaged CHP modules

²¹ 2014-15 Solar (PV) Trainees increased from 3,725 to 4,404. Training Sessions increased from 120 to 152. Leveraged Funds Amount increased from \$3 million to \$16 million. Meetings, Workshops, Conferences increased from 0 to 27. Products and Technologies Commercialized increased from 0 to 1. This is all due to lag in data.

that include all major components will reduce the need for (and thus reduce the costs of and opportunities for errors during) equipment-integration engineering and assembly; 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 have been performed during this reporting period:

- Conducted two CHP Expos in Manhattan, which provided opportunities for prospective customers to meet the approved CHP vendors.
- Conducted four CHP Power Breakfast/Lunch and Learn events, which combine a presentation of CHP technology and the CHP Acceleration Program with a tour of a CHP system.
- Made presentations at two webinars.
- Participated in six stakeholder meetings.
- Held two CHP trainings for architects and engineers.

Table 3-7 shows performance milestones and results for the CHP Aggregation and Acceleration Program through June 30, 2016. Energy savings reported in Table 3-7 are program-reported; evaluation activities have not been conducted on these programs yet. 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 or project count, peak load demand, electric generation, and primary energy savings refers to the cumulative savings that are installed, contracted or accepted through a particular time period; e.g., 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; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period.

Table 3-7. CHP Aggregation and Acceleration Performance Milestones and Results through June 30, 2016²²

Outputs/Leading Indicators

	2012-13	2012-15	2012-16	2012-20
All Projects Projects - Target	3	21	30	37
Applications Approved but not yet Contracted - Progress	0	2	2	
Projects Contracted but not yet Completed - Progress	4	33	32	
Projects Completed - Progress	0	16	25	
Total Progress	4	51	59	
All Projects Peak Load Electric Generation (MW) - Target	1.00	7.00	10.00	12.50
Peak Load Electric Generation Applications Approved but not yet Contracted (MW) - Progress	0.00	0.13	0.15	
Peak Load Electric Generation Projects Contracted but not yet Completed (MW) - Progress	0.02	0.60	0.66	
Peak Load Electric Generation Projects Completed (MW) - Progress	0.00	1.26	1.41	
Total Progress	0.02	1.99	2.22	
All Projects Electric Generation (GWh) - Target	6.10	42.70	61.00	76.25
Electric Generation Applications Approved but not yet Contracted (GWh) - Progress	0.00	0.81	0.92	
Electric Generation Projects Contracted but not yet Completed (GWh) - Progress	0.09	3.65	4.03	
Electric Generation Projects Completed (GWh) - Progress	0.00	7.69	8.57	
Total Progress	0.09	12.15	13.52	
All Projects Primary Energy Savings (MMBtu) - Target	7,930	55,510	79,300	99,125
Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	0	1,051	1,190	
Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	119	4,742	5,238	
Primary Energy Savings Projects Completed (MMBtu) - Progress	0	9,996	11,146	
Total Progress	119	15,789	17,573	

	2012-13 with A djustments	2014-15 with A djustments	2016	2017-20	Total
All Projects Pre-Packaged Systems - Target	10	8	2		20
Pre-Packaged Systems - Progress	64	111	78		253
Knowledge/Technology Transfer Activities - Target	4	4	2		10
Knowledge/Technology Transfer Activities - Progress	19	82	19		120

Outcomes/Impacts

	2012-13 with A djustments	2014-15 with A djustments	2016	2017-20	Total
All Projects Leveraged Funds Amount (millions) - Target	\$20.00	\$20.00	\$10.00		\$50.00
Leveraged Funds Amount (millions) - Progress	\$3.43	\$20.64	\$4.98		\$29.05
Leveraged Funds Replicated (millions) - Target				\$40.00	\$40.00
Leveraged Funds Replicated (millions) - Progress	\$0.00	\$0.00	\$0.00		\$0.00
Peak Load Electric Generation Replicated (MW) - Target				10.00	10.00
Peak Load Electric Generation Replicated (MW) - Progress	0.00	0.00	0.00		0.00
Electric Generation Replicated (GWh) - Target				61.00	61.00
Electric Generation Replicated (GWh) - Progress	0.00	0.00	0.00		0.00
Primary Energy Savings Replicated (MMBtu) - Target				79,300	79,300
Primary Energy Savings Replicated (MMBtu) - Progress	0	0	0		0

²² 2014-15 Pre-Packed Systems increased from 108 to 111. This change is due to a lag in data collection.

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% and a maximum of 1.6 pounds/MWh of NO_x emissions.²³ To quantify the performance-based payments, the program applies rigorous, multi-year 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 will initially be limited to the Con Edison service territory.

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

- Of the contracted projects, six have prime movers (engines, turbines) on-site. They represent hospitals, colleges, and a manufacturing business that are dedicated to providing energy and demand savings and resiliency for buildings of shelter, laboratories with sensitive equipment, and other needs.
- The noted installed projects completed its first year of measured performance. Exceeding commitments, the system produced 80% of the site's annual electricity consumed and 95% of the annual steam consumed while increasing reliability and redundancy and decreasing the site's carbon footprint.
- The CHP Performance Program offering closed during this reporting period. Larger systems can be entertained under reissued PON 2568 until December 31, 2016 or funds are exhausted, whichever comes first.

²³ 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.

Table 3-8 shows performance milestones and results for the CHP Performance Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Energy savings reported in Table 3-8 are program-reported; evaluation activities have not yet been conducted on these programs. 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 for project count, peak load demand, electric generation, and primary energy savings refers to the cumulative savings that are installed, contracted or accepted through a particular time period; e.g., 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; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period.

Table 3-8. CHP Performance Program Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

	2012-13	2012-15	2012-16	2012-20
All Projects Projects - Target		1	5	16
Applications Approved but not yet Contracted - Progress	4	5	4	
Projects Contracted but not yet Completed - Progress	0	8	10	
Projects Completed - Progress	0	1	1	
Total Progress	4	14	15	
All Projects Peak Load Electric Generation (MW) - Target		2.00	8.00	25.00
Peak Load Electric Generation Applications Approved but not yet Contracted (MW) - Progress	24.27	24.86	14.60	
Peak Load Electric Generation Projects Contracted but not yet Completed (MW) - Progress	0.00	29.59	39.89	
Peak Load Electric Generation Projects Completed (MW) - Progress	0.00	2.80	2.80	
Total Progress	24.27	57.25	57.29	
All Projects Electric Generation (GWh) - Target		10.00	60.00	200.00
Electric Generation Applications Approved but not yet Contracted (GWh) - Progress	187.22	172.51	98.33	
Electric Generation Projects Contracted but not yet Completed (GWh) - Progress	0.00	272.08	359.10	
Electric Generation Projects Completed (GWh) - Progress	0.00	25.00	25.00	
Total Progress	187.22	469.60	482.43	
All Projects Primary Energy Savings (MMBtu) - Target		13,000	78,000	260,000
Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	243,389	224,265	127,827	
Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	0	353,709	466,828	
Primary Energy Savings Projects Completed (MMBtu) - Progress	0	32,500	32,500	
Total Progress	243,389	610,475	627,155	

Outcomes/Impacts

	2012-13	2014-15	2016	2017-20	Total
	with Adjustments	with Adjustments			
All Projects Leveraged Funds Amount (millions) - Target	\$30.00	\$110.00	\$110.00		\$250.00
Leveraged Funds Amount (millions) - Progress	\$11.47	\$119.95	\$82.40		\$213.82

3.2 Building Systems Initiative

Table 3-9 shows the Building Systems budget and financial status through June 30, 2016. 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 3-9. Building Systems Budget and Financial Status through June 30, 2016

	2012-2016 Budget a	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds b,c	Percent of Budget 2012-2016 Committed
<u>Advanced Buildings</u>					
Emerging Technology/Accelerated Commercialization	\$14,366,925	\$2,281,748	16%	\$16,518,811	115%
Technology Development	\$25,007,131	\$7,253,928	29%	\$17,091,656	68%
Demand Response	\$9,019,519	\$3,427,854	38%	\$9,025,241	100%
Total Advanced Buildings	\$48,393,575	\$12,963,530	27%	\$42,635,708	88%
Advanced Energy Codes & Standards	\$9,785,964	\$3,071,235	31%	\$9,185,964	94%
Grand Total - Building Systems Initiatives	\$58,179,539	\$16,034,765	28%	\$51,821,672	89%

* 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

3.2.1 Advanced Building Technologies

3.2.1.1 Emerging Technology/Accelerated Commercialization (ETAC) – Buildings

The ETAC Buildings component is a new, deliberate approach to accelerating commercial introduction of emerging or underused building technologies and strategies. ETAC will serve both as a feeder effort to support New York State clean energy programs and to 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-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 accelerate 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 must fall within one of NYSERDA's identified priority categories of technologies or approaches, and must also provide prior independently verified performance data.

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

- NYSERDA's ETAC-C/I program offering closed effective December 31, 2015,
- Several focused demonstration applications have been received and are still under review.

ETAC-Multifamily

The goal of this program is to identify commercially available energy efficiency methodologies, technologies, or strategies that are commercially available, but under-used in the multifamily (MF) market and to address the market barriers preventing their broader adoption. This goal will be accomplished through selected projects that will demonstrate the technologies or strategies, identify barriers to their implementation, and develop strategies that will address the barriers identified. Project contractors will transfer technology via a combination of published papers and presentations.

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

- All three contractors have secured demonstration sites for their ETAC projects. Projected energy savings for all three projects have been submitted.
- All three contractors have submitted, and had approved, the M&V plan for their ETAC projects.
- All projects are in the installation process of their projects:
 - LED Lighting and Controls – in the process of selecting an installation contractor.
 - Centralized Domestic Hot Water Controls – approximately 50% installed with completion scheduled by summer's end.
 - Supply Side Steam Orifice Plates – Installation began at the end of the heating season with completion scheduled for fall 2016.
- All contractors have submitted drafts for "Plan to Identify Market Barriers" and are now working on revisions.
- As noted in the December 2015 report, NYSERDA has decided not offer a second round solicitation for Multifamily ETAC.

ETAC-Residential

ETAC-Residential targets the low-rise residential market, typically buildings of three stories in height or fewer above-grade. 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 three current projects are focused on LED lighting. Subsequent solicitations under ETAC-RES will focus on high-efficiency HVAC equipment.

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

- Lighting systems and monitoring equipment are installed at 17 of the 18 demonstration sites under PON 2752.
- Some of the homes have completed the M&V phase and data acquisition equipment has been removed and final energy usage and savings data is being compiled.
- PON 3127 Emerging Technology Demonstration Projects – Residential HVAC was issued in January 2016. Eligible technologies under this solicitation include air-source and ground-source heat pumps, and low-capacity natural gas furnaces. Eight proposals were received on April 21, 2016 and are under review.

Table 3-10 shows performance milestones and results for the ETAC Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Energy savings reported in Table 3-10 are program-reported; evaluation activities have not yet been conducted on these programs. 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 for project count, peak load demand, electric generation, and primary energy savings refers to the cumulative savings that are installed, contracted, or accepted through a particular time period; e.g., 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.

Table 3-10. Emerging Technology/Accelerated Commercialization Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

	2012-13	2012-15	2012-16	2012-20
All Projects Projects - Target	1	6	12	17
Applications Approved but not yet Contracted - Progress	0	1	1	
Projects Contracted but not yet Completed - Progress	0	13	13	
Projects Completed - Progress	1	4	4	
Total Progress	1	18	18	
All Projects Peak Load Reduction (MW) - Target	0.55	1.25	2.00	2.30
Peak Load Reduction Applications Approved but not yet Contracted (MW) - Progress	0.00	0.02	0.02	
Peak Load Reduction Projects Contracted but not yet Completed (MW) - Progress	0.00	1.10	1.10	
Peak Load Reduction Projects Completed (MW) - Progress	0.00	0.25	0.25	
Total Progress	0.00	1.36	1.36	
All Projects Energy Savings (GWh) - Target	2.00	6.20	9.60	10.50
Electric Savings Applications Approved but not yet Contracted (GWh) - Progress	0.00	0.07	0.07	
Electric Savings Projects Contracted but not yet Completed (GWh) - Progress	0.00	15.94	15.94	
Electric Savings Projects Completed (GWh) - Progress	0.00	0.75	0.75	
Total Progress	0.00	16.76	16.76	
All Projects Primary Energy Savings (MMBtu) - Target	5,000	36,200	70,200	78,000
Primary Energy Savings Applications Approved but not yet Contracted (MMBtu) - Progress	0	0	0	
Primary Energy Savings Projects Contracted but not yet Completed (MMBtu) - Progress	0	75,684	75,684	
Primary Energy Savings Projects Completed (MMBtu) - Progress	1,053	1,614	1,614	
Total Progress	1,053	77,297	77,297	

	2012-13 with Adjustments	2014-15 with Adjustments	2016	2017-20	Total
All Projects Stakeholder Engagements - Target	7	5	1		13
Stakeholder Engagements - Progress	20	5	0		25
Knowledge/Technology Transfer Activities - Target	8	17	10	3	38
Knowledge/Technology Transfer Activities - Progress	0	7	0		7

Outcomes/Impacts

	2012-13 with Adjustments	2014-15 with Adjustments	2016	2017-20	Total
All Projects Leveraged Funds Amount (millions) - Target	\$1.00	\$3.50	\$2.00		\$6.50
Leveraged Funds Amount (millions) - Progress	\$0.08	\$4.45	\$0.00		\$4.53
Leveraged Funds Replicated (millions) - Target				\$21.00	\$21.00
Leveraged Funds Replicated (millions) - Progress	\$0.00	\$0.00	\$0.00		\$0.00
Peak Load Reduction Replicated (MW) - Target				7	7
Peak Load Reduction Replicated (MW) - Progress	0	0	0		0
Energy Savings Replicated (GWh) - Target				30	30
Energy Savings Replicated (GWh) - Progress	0	0	0		0
Primary Energy Savings Replicated (MMBtu) - Target				231,800	231,800
Primary Energy Savings Replicated (MMBtu) - Progress	0	0	0		0
Market Adoption - Target			4	3	7
Market Adoption - Progress	0	0	0		0

3.2.1.2 Technology Development

Under the Technology Development area, NYSERDA will undertake targeted building technology development activities that address the technical and economic 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 to help accelerate the introduction of emerging technologies to New York State markets.

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

- NYSERDA's Building Innovation Team is in the process of contracting the 11 projects recommended for funding under Round 6 of PON 2606.
- To date, NYSERDA's building technology efforts have led to four commercialized products. The commercialized products cover energy efficient lighting, building controls, and new construction materials.
- NYSERDA is evaluating the potential impacts for supporting a consortium to advance technologies that operate building systems with a holistic approach that optimizes the whole building efficiency instead of discrete system efficiencies, and that facilitate and maximize the benefits from on-site energy resources. Establishment of such a consortium is contemplated under the Clean Energy Fund.

Market Insights Team (formerly Behavior Research Program)

NYSERDA's Market Insights Team 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 with the public in public presentations, case study reports, and published articles. Funding to demonstrate successful pilot interventions at larger demonstration scale was allocated to three demonstration projects through NYSERDA's Behavior Demonstration Program (PON 2646). These projects are under contract development.

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

- Under RFP 3072 funding, Ideas42 completed its review of NYSERDA CEF strategies and identified 10 strategies with potential for behavior integration. During the next reporting period, Ideas42 will prioritize 1 to 3 of the 10 identified strategies to receive integrated behavioral design services and pilot testing. Separate contracts under this RFP were completed with KEMA (for independent evaluation services) and Action Research (for behavior design services).
- Deployment and initial evaluation of behavioral pilots focused on customized programmable thermostat set points to promote winter heat savings for submetered apartment dwellers. Also to influence student residents of dorm suites to conserve water, electricity, and heat in response to receiving electronic real-time energy and resource feedback. Another pilot will focus on conserving summer window air-conditioning (AC) usage in a nonsubmetered Downstate multifamily building equipped with wireless energy meters.
- Initiated field deployment of behavior pilots funded under PON 2621 to increase uptake and follow through of Green Jobs - Green New York (GJGNY) home energy assessment recommendations, and use of a LogCheck software for building operators to track and optimize their building's energy operations.

Table 3-11 shows performance milestones and results for the Technology Development Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; 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.

Table 3-11. Advanced Buildings Technology Development Performance Milestones and Results through June 30, 2016²⁴

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	23	18	5		46
	Projects Contracted - Progress	25	48	4		77
	Projects Completed - Target		23	18	5	46
	Projects Completed - Progress	0	14	8		22
	Supported Companies - Target	12	9	2		23
	Supported Companies - Progress	19	42	4		65

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$7.00	\$5.00	\$2.00		\$14.00
	Leveraged Funds Amount (millions) - Progress	\$36.24	\$82.02	\$4.33		\$122.58
	Products and Technologies Commercialized - Target		1	4	1	6
	Products and Technologies Commercialized - Progress	2	4	0		6
	Product Revenue Amount (millions) - Target			\$8.00	\$75.00	\$83.00
	Product Revenue Amount (millions) - Progress	\$0.44	\$22.94	\$0.00		\$23.39

3.2.1.3 Enabling Demand Response and Load Management

Under the Enabling Demand Response (DR) Load Management Program, NYSERDA has helped increase participation and reliability of performance in utility and New York State Independent System Operator (NYISO) 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 has increased the technical potential of DR in New York 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.

²⁴ 2012-13 Leveraged Funds Amount increased from \$34 million to \$36 million. 2014-15 Leveraged Funds Amount increased from \$22 million to \$82 million. Product Revenue Amount also increased from \$2 million to \$23 million. Products and Technologies Commercialized increased from 1 to 4. This change is all due to a lag in data collection.

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

- Two demand response enablement projects have been implemented that save 465.4 kW, representing approximately \$573,000 in private investment.

Table 3-12 shows performance milestones and results for the Demand Response Program through June 30, 2016. Energy savings reported in Table 3-12 are program-reported; evaluation activities have not yet been conducted on these programs. Future reports will present findings from those studies as they are finalized. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period.

Table 3-12. Demand Response Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

	2012-13	2012-15	2012-16	2012-20
All Projects MW Registered - Target	9.00	23.00	41.00	46.00
MW Registered Applications Approved but not yet Contracted (MW) - Progress	2.05	1.44	0.85	
MW Registered Projects Contracted but not yet Completed (MW) - Progress	5.44	7.84	2.60	
MW Registered Projects Completed (MW) - Progress	40.22	115.59	124.35	
Total Progress	47.71	124.87	127.80	

Outcomes/Impacts

		2012-13 with Adjustments	2014-15 with Adjustments	2016	2017-20	Total
All Projects	MW Registered Evaluated - Target				23.00	23.00
	MW Registered Evaluated - Progress	0.00	0.00	0.00		0.00

3.2.1.4 Advanced Energy Codes and Standards

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

3.2.1.5 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 have been performed during this reporting period:

- NYSERDA began in earnest the data collection phase of a Delphi Panel to establish a baseline Energy Code compliance level as of December 2014. Unlike traditional compliance assessment approaches which are comparatively costly and time consuming, and produce varying degrees of reliability, the Delphi Panel approach assembles a group of stakeholders and industry professionals representing building design, construction, and enforcement markets to draw from their experience with commercial and residential building construction to reach an agreed upon, qualitative compliance estimate. The Delphi Panel went through three rounds of interviews designed to elicit feedback on compliance in New York State. Results are expected in the first quarter of 2016. The Delphi Panel process will be repeated in 2017 or 2018 to determine how compliance levels have changed.

3.2.1.6 Development and Delivery of Advanced Training and Tools

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 have been performed during this reporting period:

- Progress was made by NYSERDA's Energy Code training partners to develop and deliver a suite of training courses and deliver them as classroom sessions to educate design, construction, and enforcement markets on the 2015 International Energy Conservation Code (IECC) and corresponding New York State Supplement. The State Fire Prevention and Building Code Council voted on March 9, 2016 to adopt the 2015 IECC, ASHRAE 90.1-2013 and State Supplement. This newly adopted energy code takes effect October 3, 2016.
- Technical consulting and other research firms will be competitively selected to provide technical and administrative support Advanced Codes and Standards program efforts, including new strategies to improve compliance and enforcement.

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

- NYSERDA contracted with the Trust for Conservation Innovation/Building Codes Assistance Project to perform a gap analysis and produce an action plan to better understand how building design, construction, and enforcement markets perceive and value the energy code, and provide NYSERDA with recommendations for improving compliance, including exploring third-party enforcement support. During this period, the Building Codes Assistance Project submitted draft gap analysis and action plans. Both will be finalized and published as a final report in the next reporting period.

3.2.1.7 Pilots and Expanded Implementation Assistance

Pilots testing strategies for improved code compliance and enforcement strategies, and stretch and green planning efforts were 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 have been performed during this reporting period:

- NYSERDA Contracted with TY Lin International to deliver Energy Code enforcement support and education to municipalities statewide. Primary services offered to municipalities are building plan review and on-site inspection consultation aimed at providing code enforcement officials with knowledge, tools and best practices to improve Energy Code enforcement. Since project launch, 85 plan reviews and three onsite inspections have been performed.

Table 3-13 shows performance milestones and results for the Advanced Energy Codes and Standards Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Energy savings reported in Table 3-13 are program-reported; evaluation activities have not yet been conducted on these programs. Although NYSERDA anticipates making progress toward increased energy savings through the activities completed to date, the results have not yet been studied and quantified. 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. 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.

Table 3-13. Advanced Energy Codes and Standards Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Code compliance efforts	Annual Code Compliance Assessments - Target	2	2	1		5
	Annual Code Compliance Assessments - Progress	1	1	0		2
	Training Sessions - Target	6	6			12
	Training Sessions - Progress	0	7	0		7
	Code Requirement Trainees - Target	7,000	6,000	2,000		15,000
	Code Requirement Trainees - Progress	0	2,411	2,189		4,600
Equipment and appliance standards efforts	State/Federal Standards Conformance Assessments - Target	1	1	1		3
	State/Federal Standards Conformance Assessments - Progress	0	0	0		0
All Projects	Program Support Solicitations - Target	1	1			2
	Program Support Solicitations - Progress	0	0	0		0
	Implementation Support Solicitations - Target	1	1			2
	Implementation Support Solicitations - Progress	1	2	0		3
Outcomes/Impacts						
		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Code compliance efforts	Energy Savings Installed (GWh) - Target	84.00	140.00	90.00	317.00	631.00
	Energy Savings Installed (GWh) - Progress	0.00	0.00	0.00		0.00
	Energy Savings Installed (MMBtu) - Target	575,000	1,057,000	726,000	2,563,000	4,921,000
	Energy Savings Installed (MMBtu) - Progress	0	0	0		0
	Peak Load Reduction Installed (MW) - Target	18.00	28.00	19.00	64.00	129.00
	Peak Load Reduction Installed (MW) - Progress	0.00	0.00	0.00		0.00
Equipment and appliance standards efforts	Energy Savings Installed (GWh) - Target		5.00	51.00	300.00	356.00
	Energy Savings Installed (GWh) - Progress	0.00	0.00	0.00		0.00
	Peak Load Reduction Installed (MW) - Target		2.00	23.00	143.00	168.00
	Peak Load Reduction Installed (MW) - Progress	0.00	0.00	0.00		0.00

3.3 Clean Energy Infrastructure Initiatives

Table 3-14 shows the Clean Energy Infrastructure budget and financial status through June 30, 2016. 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 3-14. Clean Energy Infrastructure Budget and Financial Status through June 30, 2016

	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	\$4,435,370	\$3,663,007	83%	\$4,435,370	100%
Market Pathways	\$32,694,001	\$28,240,969	86%	\$32,857,952	101%
Education/Behavior	\$7,126,371	\$5,030,094	71%	\$7,088,896	99%
Total Market Development	\$44,255,742	\$36,934,070	83%	\$44,382,218	100%
Clean Energy Business Development					
Innovation Entrepreneurial Capacity	\$21,356,497	\$12,428,354	58%	\$21,604,497	101%
Market Intelligence	\$988,978	\$864,293	87%	\$988,978	100%
Direct Support for Business	\$2,350,975	\$1,452,940	62%	\$2,350,975	100%
Marketing	\$590,804	\$585,643	99%	\$590,804	100%
Total Clean Energy Business Development	\$25,287,254	\$15,331,230	61%	\$25,535,254	101%
EMEP	\$16,428,580	\$5,975,617	36%	\$16,429,031	100%
Workforce Development					
Renewable Energy/Advanced Technologies	\$5,843,483	\$4,223,255	72%	\$5,803,936	99%
Energy Efficiency	\$10,102,212	\$6,685,418	66%	\$10,076,331	100%
Total Workforce Development	\$15,945,695	\$10,908,673	68%	\$15,880,267	100%
Grand Total - Clean Energy Infrastructure	\$101,917,271	\$69,149,590	68%	\$102,226,770	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.

3.3.1 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.

3.3.1.1 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, 16 projects have been completed, covering a variety of technologies and topics including lighting, data centers, solar, and NYSERDA-wide corporate strategy. These various studies have 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 have been performed during this reporting period:

- NYSERDA completed additional studies to inform ongoing CEF and REV activities, including a screening tool to assess and compare different clean energy options and research on clean transportation.

Table 3-15 shows performance milestones and results for the Market Research Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period.

Table 3-15. Market Research Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

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

3.3.1.2 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, support for channel and customer awareness, and support for capacity development in key service networks (e.g., installation and maintenance).

During this reporting period, the products team continued to investigate and develop its strategies around three particular emerging and underutilized technologies: air source heat pumps (ASHPs), home energy management systems (HEMS) and advanced rooftop units (ARUs). Strategies in the promotion of ASHPs made the greatest advancements. Given a new generation of ASHPs with increased heating functionality in colder climates, an opportunity now exists in NYS to achieve considerable carbon reductions. The Products team continued to research the ASHP technology opportunities in NYS as well as communicating extensively with stakeholders on the key stall points and barriers that have prevented those stakeholders from moving the ASHP market in NYS.

The also team successfully negotiated NYSERDA Agreement 86073 with Vermont Energy Investment Corporation (VEIC). This project was awarded under NYSERDA's PON 3125 "Accelerating Availability of Targeted Residential Products" and allows for VEIC to implement a residential upstream ASHP pilot in the Con Edison (Con Ed) utility service territory. This pilot seeks to influence ASHP manufacturers and distributors with various approaches while complimenting downstream ASHP rebates offered by Con Ed. The launch of the pilot is planned for October 2016 with a final evaluation report anticipated for October 2017.

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 made available so that Business Partners can use 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 have 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 [ESCOs]) 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 ASHRAE/ACCA Quality Maintenance Standard 180. Partners learn to evaluate and upgrade commercial roof top units (RTU) beyond what is typically offered as standard practice. There are no updates for this program due to the Commercial Lighting and HVAC Program Business Partners programs closing effective December 31, 2015.

The Motors Program focuses on providing educational and technical support to NYSERDA's Partners (motor suppliers, repair shops, electrical companies, manufacturers, and distributors) who perform motor inventories and sell and promote National Electrical Manufacturers Association (NEMA) Premium® motors and variable speed drives (VSDs).

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 the barriers to financing energy efficiency projects that are not addressed by EEPS programs.

Table 3-16 shows performance milestones and results for the Market Pathways Program through June 30, 2016. Energy savings reported for the Business Partners program in Table 3-16 are program-reported; evaluation activities have not yet been conducted on these programs. The recently completed evaluation factors for the efficiency products with Energy Smart Partners have been applied to the energy savings reported for the Product Partners program. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period.

Table 3-16. Market Pathways Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Market Pathways - RES	Energy Smart Product Partner Participants - Target	940	200	100		1,240
	Energy Smart Product Partner Participants - Progress	610	281	0		891
	Product Partner Trainees - Target	200	200	100		500
	Product Partner Trainees - Progress	130	353	0		483
Market Pathways - Midstream Support	Midstream Partner Participants - Target	430	55	25		510
	Midstream Partner Participants - Progress	95	341	0		436
	Midstream Partner Trainees - Target	375	375	275		1,025
	Midstream Partner Trainees - Progress	1,103	790	0		1,893
	Factsheets - Target	4	4	1		9
	Factsheets - Progress	0	0	0		0
	Seminars/Webinars - Target	4	4	1		9
	Seminars/Webinars - Progress	12	12	0		24
Market Pathways - C/I	Innovative Energy Efficiency Investment Strategy Participants - Target	20	5	5		30
	Innovative Energy Efficiency Investment Strategy Participants - Progress	12	12	0		24
	EAL Evaluations - Target	4	4	2		10
	EAL Evaluations - Progress	0	0	0		0
	EAL Seminars/Webinars - Target	4	4	2		10
	EAL Seminars/Webinars - Progress	48	0	0		48
	Factsheets - Target	3	2	1		6
	Factsheets - Progress	0	0	0		0
	Seminars/Webinars - Target	4	4	2		10
Seminars/Webinars - Progress	0	0	0		0	

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
Market Pathways - RES	Energy Savings Installed (GWh) - Target	50.00	50.00	25.00		125.00
	Energy Savings Installed (GWh) - Progress	5.91	4.30	0.00		10.21
	Energy Savings Installed (MMBtu) - Target	254,000	419,000	222,000		895,000
	Energy Savings Installed (MMBtu) - Progress	142,610	94,132	0		236,742
Market Pathways - Midstream Support	Energy Savings Installed (GWh) - Target	15.00	15.00	7.00		37.00
	Energy Savings Installed (GWh) - Progress	4.64	62.74	0.00		67.38
	Market Adoption - Target	1	1	1		3
	Market Adoption - Progress	0	0	0		0
Market Pathways - C/I	Projects Completed - Target	5	10	3	2	20
	Projects Completed - Progress	0	7	1		8

3.3.1.3 Education to Change Behavior and Influence Choices Component

Economic Development Growth Extension Program

The Economic Development Growth Extension (EDGE) Program is facilitated by Regional Outreach Contractors (ROCs) 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 Smart Communities Program, EDGE educates New Yorkers about the role that 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 Governor Andrew M. Cuomo’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 has 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 have been performed during this reporting period:

- EDGE's emphasis has moved away from promoting these SBC-specific programs to promoting opportunities for various new NYSERDA initiatives and other statewide opportunities. That outreach and marketing conducted by the Regional Outreach Contractors (ROCs) includes, but is not limited to, the following activities:
 - EDGE Program ROCs have established new partnerships that have led to referrals from these new relationships.
 - ROCs have also participated in public outreach events including the Consolidated Funding Application Workshops held across the State to support the efforts of the Regional Economic Development Council initiative.
 - Instrumental in identifying municipal contacts for interviews conducted for the Governor's Community Energy Deployment Working Group, now known as the NYS Community Partnership (NYSCP). Conducted interviews and provided write-ups for the Working Group.
 - Assisted in staffing the first NYSCP workshop held in White Plains, NY.
 - Instrumental in providing contacts to invite to the NY-Prize Statewide Energy Tour workshops as well as marketing the NY-Prize RFP 3044 for Round 1. Held webinars to connect potential projects with consultants.
 - Provided contacts with banks and invited them to the NY Green Bank Road Show.
 - Established relationships with Constituency-Based Organizations to assist in establishing Community Solarize Programs for the NY-Sun initiative.
- Conducted outreach to public schools in the various regions to encourage them to enlist in the K-Solar program.
- Promoted the PV Trainers Network workshops to partners and contacts in the appropriate regions.
- New York City ROCs have been instrumental in planning workshops for and tours of CHP sites events, which lead to increased attendance in the programs' CHP Expos. These events have increased the demand for CHP in the Con Ed territory as well as Central New York, which had over 100 participants in the only event held Upstate and was promoted by the Central New York ROCs.

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, and the utilities 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 have been performed during this reporting period:

- NYSERDA assessed the validity of the pilots upon which the proposed Behavioral Demonstrations projects were based and deemed that one of the pilots was invalid, which led to cancelling the related demonstration.
- NYSERDA has contracted with organizations: Nexant, the Oversight & Evaluation Contractor for the demonstrations, and the Energy Improvement Corporation (EIC), which has begun work on their demonstration project. Work plans have been completed, including a compilation of key indicators of success and how they will be measured, a data acquisition plan, an implementation plan, and an experimental design plan.
- NYSERDA is currently in the process of contracting with two other organizations (ThinkEco and Opower), both of which were selected for funding by the Technical Evaluation Panel to implement behavioral demonstrations.

Low-Income Forum on Energy (LIFE)

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.

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

- LIFE implemented its 2016 Statewide Conference on May 25-26, 2016 in Albany, NY.
- LIFE produced and distributed five electronic newsletters that include feature articles of interest to low-income energy stakeholders along with hyperlinked resources for readers to connect with further information. Each newsletter arrives in over 3,700 inboxes.
- LIFE hosted four webinars on various topics including program updates, best practices, and consumer protections. On average, the webinars were attended by 43 individuals representing 30 organizations.
- The LIFE Steering Committee met three times (February 2, April 28, and May 18) to plan for LIFE initiatives, share program information, and discuss opportunities for collaboration.

- LIFE increased its number of followers on Twitter by 20 percent.

Table 3-17 shows performance milestones and results for the Education/Behavior Program through June 30, 2016. 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 represent the sponsorship of behavioral pilots. The meetings, workshops and conferences are the sponsorship of annual LIFE conferences. The LIFE program anticipates sponsoring, planning, and supporting a total of seven LIFE conferences and regional meetings. Completed projects include completing and evaluating behavioral pilots.

Table 3-17. Education/Behavior Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	5	3			8
	Projects Contracted - Progress	0	0	0		0
	Meetings, Workshops, Conferences - Target	2	2	1		5
	Meetings, Workshops, Conferences - Progress	1	1	1		3
	Community Partnership Participants - Target	250	250	75		575
	Community Partnership Participants - Progress	465	560	21		1,046

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Completed - Target		4	6	2	12
	Projects Completed - Progress	0	0	0		0

3.3.2 Clean Energy Business Development

3.3.2.1 Innovation/Entrepreneurial Capacity Building

There are three Proof-of-Concept Centers (POCC): New York University, in partnership with the City University of New York, and Columbia University, in partnership with Stony Brook University, Cornell NYC Tech, and Brookhaven National Laboratory, are co-branding the two programs as PowerBridgeNY. Another POCC is run through 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 pre-startup 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. The centers are expected to operate independently after NYSERDA funding ends.

The objectives of the POCC initiative are to:

- 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 that have scalable commercialization potential, based on real market need, with the investment community.
- Establish sustainable regional innovation ecosystems of potential investors and entrepreneurs in clean energy technologies and solidify the POCC linkages to them.

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

- NEXUS-NY was awarded a \$150,000 grant from National Grid to support the program.
- One team from the first cohort of NEXUS-NY received a seed investment. Two additional teams are evaluating term sheets for seed stage investments.
- One team from the second cohort of NEXUS-NY was invited to submit a full ARPA-e proposal following the successful review of its concept paper.
- A second cohort team from NEXUS-NY entered into a manufacturing agreement with a firm from Ithaca, NY.
- A team from the third cohort of NEXUS-NY won an Academic Venture Fund (AVF) award from the Atkinson Center for a Sustainable Future. The AVF seeds original, multidisciplinary research that is not likely to find funding elsewhere because the projects are novel, risky, need early data to establish traction, or involve new teams working together. The projects have real potential to involve external partners in industry, government, and nongovernmental organizations.
- A company that was an early part of cohort one for NEXUS-NY and then fully participated in the first cohort of PowerBridgeNY received a SBIR Phase 2 grant from the U.S. Army and is aiming to close on a large investment deal in the next quarter. This company was also the first team in PowerBridgeNY to record sales revenue and has a major purchase order for their product provided they can meet certain quality requirements.
- Two teams from the PowerBridgeNY POCC have licensed their technology to other cleantech startups from the New York University's ACRE incubator.

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 startup 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 have been performed during this reporting period:

- New York University's ACRE incubator graduate Anellotech, a Pearl River-based clean energy company, received \$3 million in addition to a previously raised \$7 million from a multinational strategic investor and corporate partner to scale up the production of its cost-competitive renewable chemicals from nonfood biomass.
- Multiple clients at several of the incubators, including New York-based MPOWERD from SUNY Polytechnic Institute's iClean incubator and Syracuse-based EkoStinger from The Tech Garden's Clean Tech Center, have generated commercial revenue from customers and demonstration partners, which represents a significant milestone for these companies.
- New York University's ACRE incubator graduate United Wind, a Brooklyn-based clean energy company, raised an \$8 million Series B round led by Statoil Energy Ventures and Forum Equity Partners to expand its small wind lease program for distributed wind projects throughout the United States.

Table 3-18 shows performance milestones and results for the Innovation/Entrepreneurial Program through June 30, 2016. The metrics only reflect the results from the incubators that received T&MD funding. Outputs/Leading Indicators measure immediate results; 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 clean energy businesses. 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.

Table 3-18. Innovation/Entrepreneurial Milestones and Results through June 30, 2016²⁵

Outputs/Leading Indicators		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Incubators or POCCS Participants - Target	65	90	50	200	405
	Incubators or POCCS Participants - Progress	29	76	6		111
Outcomes/Impacts		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$40.00	\$45.00	\$25.00	\$40.00	\$150.00
	Leveraged Funds Amount (millions) - Progress	\$40.15	\$83.21	\$13.10		\$136.46
	Products and Technologies Commercialized - Target	5	10	10	15	40
	Products and Technologies Commercialized - Progress	1	6	2		9
	Product Revenue Amount (millions) - Target	\$2.50	\$5.00	\$5.00	\$7.50	\$20.00
	Product Revenue Amount (millions) - Progress	\$0.00	\$0.00	\$0.00		\$0.00
	Businesses Graduated from Incubators - Target	38	38	18	72	162
	Businesses Graduated from Incubators - Progress	9	37	2		48
	FTEs Associated with Incubator Graduates - Target	108	108	54	216	486
	FTEs Associated with Incubator Graduates - Progress	185	124	14		323

3.3.2.2 Market Intelligence

New York State Clean Energy Technology Innovation Metrics

NYSERDA worked with SRI International to research and prepare a 2015 report update on clean energy technology metrics. To determine the metrics for the first report, focus groups were held involving nearly 100 individuals including entrepreneurs affiliated with clean tech startup companies, clean tech investors, executives, and other representatives of larger, more established technology companies, directors of clean tech incubators, representatives from clean tech industry consortia, universities conducting clean tech research, and other clean tech organizations. This second report tracks those same metrics three years later.

²⁵ 2014-15 Incubators or POCCS Participants increased from 75 to 76. Full-time equivalents (FTEs) associated with Incubator Graduates increased from 90 to 124. Leveraged Funds Amount increased from \$40 million to \$83 million. This is all due to lag in data. Data for this program is on a three-month lag. Data through June 2016 will be updated in the next report.

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

- The second edition (2015) of the New York State Clean Energy Technologies Innovation Metrics report was posted on NYSERDA website in April 2016. A user survey was completed to understand user usage and additional reporting needs. The 2015 report added seven vignettes of New York State clean energy company success stories. See the report, infographic and factsheet at <http://www.nysesda.ny.gov/Partners-and-Investors/Clean-Energy-Startups/NYS-a-National-Leader-in-Cleantech>

Table 3-19 shows performance milestones and results for the Market Intelligence Program through June 30, 2016. 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 include creating annual benchmark reports on clean energy business and financial indicators for New York State. Website downloads support the dissemination of clean energy benchmark information.

Table 3-19. Market Intelligence Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	2	2	1		5
	Projects Contracted - Progress	0	2	0		2
	Website Downloads - Target	100	200	200		500
	Website Downloads - Progress	0	109	67		176

3.3.2.3 Direct Support for Business Acceleration Program

NYSERDA’s Entrepreneurs-in-Residence (EIR) program offers experienced entrepreneurial coaching to NYSERDA contractors and incubator clients. Some of the general outcomes and observations from the program show that companies struggle with customer delivery and engagement and the development of an overall business strategy. Most of these companies are founded by technical entrepreneurs, and prefer to focus on technology development more than commercialization. The EIR program has shown a 40:1 leverage of impact of NYSERDA funds expended for this program. Success metrics are collected annually at year-end from the startup companies mentored by an EIR.

Sentient Science announced a significant investment from Toba Capital in the first half 2016. This investment came about as a direct result of two EIRs who worked to ready Sentient Science for the capital raise.

The program has shown the following cumulative benefits through December 31, 2015 since the program started in March 2010:

- Revenue: \$6,476,523
- Jobs (FTE): 145
- Capital Raised: \$24,215,000
- Grants won: \$18,126,712
- Strategic Partnerships: 35

The NY EXCEL (New York Executive Clean Energy Leadership) program at Skidmore College and NY Clean Start at New York University's ACRE target experienced business people 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. The ultimate goals of NY EXCEL and NY Clean Start are to increase the number of clean energy entrepreneurs in the State, create well-paying jobs in New York communities, and provide solutions for addressing the long-term challenge of energy independence.

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

- **NY EXCEL** (Skidmore College) completed its second cohort in with 14 students in January 2016. The course included visits to NYISO and a full-day visit to NYSERDA to learn about 14 energy segments and well as seminars by renewable experts, legal, and regulatory entities. The students will also travel around NYS for weekend classes and to visit companies and support centers in Syracuse, Saratoga, White Plains and New York City/Long Island, and Rochester.
- For the second cohort, a shift in branding of the **NY Clean Start** program to the New York University Advanced Diploma in Clean Energy was done to improve and simplify administration and improve program appeal to potential students.. The program is geared for professionals with five to 10 years of experience who have targeted a transition into the clean energy sector. The Clean Start curriculum combines business and technology to create a hybrid platform for professionals to team up with leaders of New York's clean energy economy—from startups to industry members and utilities. The 120-hour evening and weekend part-time curriculum is designed to attain a professional certificate from the New York University School of Professional Studies Center for Global Affairs. Classes at NYU will be held from February 2016 through July 2016. Ten graduates will receive an Advanced Diploma in Clean Energy from NYU's School of Professional Studies
<https://www.sps.nyu.edu/professional-pathways/diplomas/advanced-diploma/clean-energy.html>

- Prior to soft-launch in July 2016, the Commercialization Toolkit (www.startupGPS.org) went under extensive review, edits, and security scans by NYSERDA’s Marketing and IT teams. This toolkit addresses a very common need of new startups: their struggle to understand the big picture of their company’s development in the journey from product ideation to commercial deployment. The toolkit is designed to provide a framework for guiding company business development, an easy way to assess overall business readiness, and a curated suite of resources tailored to the specific needs of clean economy entrepreneurs as they pursue successful commercialization of their offerings. NYSERDA contracted with Northeast Clean Energy Council Institute (NECEC) to develop this online tool.

Table 3-20 shows performance milestones and results for the Direct Support for Business Acceleration Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; Outcomes/Impacts measure achievements. Blank cells indicate the lack of a target in a particular time period. Companies supported includes companies with new and improved products serving New York State markets. Business executives transitioned includes the transition of business executives to the clean energy technology industry.

Table 3-20. Direct Support for Business Acceleration Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Companies Supported - Target	59	59	32		150
	Companies Supported - Progress	41	33	9		83
Outcomes/Impacts		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Business Executives Transitioned - Target		18	18	9	45
	Business Executives Transitioned - Progress	0	23	18		41

3.3.3 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 (WFD) 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 have been performed during this reporting period:

- From January through June 2016, NYSERDA’s training partners delivered courses to 7,257 New Yorkers in energy efficiency and renewable energy courses.
- 3,696 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.
- The remaining 3,561 trainees participated in courses including: passive house training for design professionals and tradespeople; energy efficiency training for plumbers, electricians, and building operators; science, technology, mathematics, and engineering (STEM) for high school students; and entry-level technical training coupled with paid internships for New Yorkers with barriers to employment.

Table 3-21 and Table 3-22 show performance milestones and results for the Workforce Development Program through June 30, 2016. Outputs/Leading Indicators measure immediate results; 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.

Table 3-21. Workforce Development – Renewable Energy Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Renewable Energy Technical Trainees - Target	500	1,000	500		2,000
	Renewable Energy Technical Trainees - Progress	0	2,738	959		3,697
	Entry Level Trainees - Target	90	200	190		480
	Entry Level Trainees - Progress	0	460	0		460
	OJT, Hands-On Training - Target	150	380	150		680
	OJT, Hands-On Training - Progress	39	90	2		131
	Training Organizations - Target	2	3	1		6
	Training Organizations - Progress	2	2	1		5
	Certifications Developed - Target		2	1		3
	Certifications Developed - Progress	0	0	0		0
	Course Development - Target	2	4	2		8
	Course Development - Progress	0	16	1		17

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$0.80	\$2.30	\$1.30		\$4.40
	Leveraged Funds Amount (millions) - Progress	\$1.11	\$1.55	\$0.02		\$2.67

Table 3-22. Workforce Development – Energy Efficiency Performance Milestones and Results through June 30, 2016

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Energy Efficiency Technical Trainees - Target	3,448	5,517	4,828		13,793
	Energy Efficiency Technical Trainees - Progress	96	9,414	2,602		12,112
	Entry Level Trainees - Target	800	1,280	1,120		3,200
	Entry Level Trainees - Progress	0	721	0		721
	OJT, Hands-On Training - Target	467	747	653		1,867
	OJT, Hands-On Training - Progress	48	95	0		143
	Training Organizations - Target	2	3	1		6
	Training Organizations - Progress	4	2	0		6
	Certifications Developed - Target		2	1		3
Certifications Developed - Progress	0	0	0		0	

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$1.30	\$3.80	\$2.00		\$7.10
	Leveraged Funds Amount (millions) - Progress	\$0.40	\$6.24	\$0.34		\$6.98

3.3.4 Environmental Monitoring, Evaluation, and Protection (EMEP)

EMEP provides knowledge to reduce the adverse impacts associated with electricity generation that damages New York’s ecosystems and the health of its residents, and it 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 New York 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 have been performed during this reporting period:

- The solicitation was issued and a contractor selected under PON3179, Digital Aerial Baseline Survey of Marine Wildlife in Support of New York State Offshore Wind Energy. The project is the largest aerial digital survey of marine wildlife ever undertaken. The project will reduce costs and accelerate the environmentally responsible development of offshore wind energy.
- Outreach activities included participation and support for the Adirondack Research Consortium annual conference, the Adirondack Research Forum, NYSERDA’s Partnership for Environmental Improvement meeting, a multifaceted outreach effort to promote the New York State Climate Change Clearinghouse, and support for the Natural Resource Navigator toolkit.

Table 3-23 shows performance milestones and results for the EMEP Program through June 30, 2016. 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 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.

Table 3-23. Environmental Monitoring Performance Milestones and Results through June 30, 2016²⁶

Outputs/Leading Indicators

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Projects Contracted - Target	23	28	9		60
	Projects Contracted - Progress	21	35	2		58
	Projects Completed - Target	5	23	23	9	60
	Projects Completed - Progress	0	13	3		16
	Program Advisory Group Meetings - Target	2	2	1		5
	Program Advisory Group Meetings - Progress	3	0	0		3
	Science Advisory Committee Meetings - Target	2	2	1		5
	Science Advisory Committee Meetings - Progress	3	0	0		3
	Meetings, Workshops, Conferences - Target	5	6	3		14
	Meetings, Workshops, Conferences - Progress	7	13	5		25
	Briefings - Target	12	12	6		30
	Briefings - Progress	5	5	0		10

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
		with Adjustments	with Adjustments			
All Projects	Leveraged Funds Amount (millions) - Target	\$3.50	\$4.50	\$3.00		\$11.00
	Leveraged Funds Amount (millions) - Progress	\$2.53	\$31.04	\$0.00		\$33.57
	EMEP Research Citations - Target			3,000		3,000
	EMEP Research Citations - Progress	0		0		0
	Peer-reviewed Scientific Journal Articles - Target	10	35	45	29	119
	Peer-reviewed Scientific Journal Articles - Progress	15	40	5		60

²⁶ 2014-15 Projects Contracted decreased from 37 to 35 due to two projects being cancelled. Leveraged Funds Amount increased from \$5 million to \$31 million. Peer-reviewed Scientific Journal Articles increased from 13 to 40. This was due to a lag in data collection.

4 T&MD Program Evaluation Activities

NYSERDA is actively working with third-party evaluation contractor, Industrial Economics (IEc), to evaluate the T&MD programs. During the first half of 2014, a comprehensive plan was developed for evaluation of the T&MD programs over the next three and six years. This plan will be used by NYSERDA and IEc to guide the evaluation efforts and will be updated as needed. 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.

4.1 Program Theory and Logic Models

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

Prior to December 2015, PTLM activities were completed and reports posted to NYSERDA's website for the following programs/areas:

- Smart Grid²⁷
- Advanced Codes and Standards²⁸
- EDGE²⁹
- New York Products³⁰
- Clean Energy Business Development³¹
- Workforce Development³²

²⁷ <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-EPTD-Smart-Grid-Program.pdf>

²⁸ <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Advanced-Codes-Standards.pdf>

²⁹ <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-EDGE-Program.pdf>

³⁰ <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf>

³¹ <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Clean-Energy-Business-Development.pdf>

³² <http://www.nyserra.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-Workforce-Development.pdf>

- CHP Aggregation and Acceleration³³
- Advanced Buildings: ETAC³⁴
- Advanced Buildings: Technology Development³⁵
- Solar Cost Reduction³⁶
- Clean Power Technology Innovation³⁷
- Transportation³⁸

During this reporting period, no PTLMs were completed.

Following the development of a PTLM, NYSERDA typically engages in an Evaluation Readiness Review³⁹ to help identify whether a program has various factors, or when such factors will be in place, to ensure an evaluation is justified, feasible, and likely to provide useful information. For example, programs must have appropriate data tracking to support evaluation. Evaluation Readiness Reviews have been completed for several programs to date and have helped identify areas to strengthen or solidify in order to lay the groundwork for the most productive evaluations.

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

³³ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-CHP-Acceleration.pdf>

³⁴ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Advanced-Buildings.pdf>

³⁵ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Advanced-Buildings.pdf>

³⁶ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-SCR-logic-model.pdf>

³⁷ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-CPTI-Logic-Model-Report.pdf>

³⁸ <http://www.nysерda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-Transportation-LM-Report.pdf>

³⁹ Formerly known as Evaluability Assessment.

implementation and repeated periodically to examine program efficiency and effectiveness in light of 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 2015, focused process evaluations were completed for the following T&MD programs. Each of these process evaluation reports is available on the NYSERDA website:

- Smart Grid⁴⁰
- Workforce Development⁴¹
- EMEP⁴²
- Solar Cost Reduction⁴³
- EDGE⁴⁴

During this reporting period, no process evaluations have been completed.

Process evaluations which are or will be underway in the near term cover the following programs, with estimated completion date indicated in parentheses:

- Technology Development (Q3 2016)
- Advanced Codes and Standards (Q3 2016)⁴⁵

⁴⁰ <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-EPTD-Smart-Grid-Program.pdf>

⁴¹ <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-Workforce-Development.pdf>

⁴² <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-EMEP-Citation-Analysis.pdf>

⁴³ <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/Solar-Cost-Reduction-process-evaluation.pdf>

⁴⁴ <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-economic-development-growth-extension-process-evaluation.pdf>

⁴⁵ Process evaluation completion date is indicative of pre- and post-training surveys, which are ongoing throughout the life of the program.

4.3 Market and Impact Evaluation

The IEc team will also assist NYSERDA in evaluating the T&MD portfolio's near-and long-term impacts through full-scale impact and market evaluations. Early evaluation activities will include 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 will examine longer-term impacts such as technology commercialization and replication. Some methods expected to be 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, as previously defined.

- **Energy impact evaluation** will address program-specific, directly induced quantitative changes (e.g., kWh, kW, and Btu) attributable to the T&MD programs. This evaluation is distinguished from market impact assessments, previously described, which assess other program outcomes distinct from energy and demand savings.

Prior to December 2015, focused market evaluations were completed for the following T&MD programs:

- NY Products Program⁴⁶
- NYSERDA and National Customer Awareness of ENERGY STAR® for 2014 (Analysis of Consortium for Energy Efficiency Household Survey)⁴⁷

During this reporting period, no market evaluations were completed. An impact evaluation was completed for the following program/area:

- Advanced Codes and Standards Impact Evaluation, Phase 1⁴⁸

Market/Impact evaluations are planned or are underway for the following programs/areas with expected completion date in parentheses:

- ETAC/Technology Development Market Assessment, Phase 1 (Q4 2016)
- Smart Grid Market Assessment (Q3 2016)
- Advanced Codes and Standards Impact Evaluation, Phase 2 (Q4 2018)
- Market Pathways: Business Partners Impact Evaluation (Q3 2016)
- Transportation Market Characterization Assessment (Q4 2016)
- Transportation: 6 Impact/Market Impact Case Studies (Q4 2016)
- Combined Heat and Power Market Assessment (Q4 2016)
- Clean Energy Business Development Market Assessment (Q4 2016)

4.4 Higher-Level Studies

In addition to evaluation activities, NYSERDA also plans to conduct studies organized around one or more high-level research questions that focus on data, impacts, and processes across programs. The studies reflect a range of evaluation activities, including evaluation readiness reviews, market characterizations, process evaluations, and market and energy impact assessments. The list of high-level studies is likely to evolve over time to meet NYSERDA's needs. Currently, this list includes but is not necessarily limited to the following activities:

⁴⁶ <http://www.nysERDA.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf>

⁴⁷ <http://www.nysERDA.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/NYSERDA%20-and-National-Awareness-of-ENERGY-STAR.pdf>

⁴⁸ <http://www.nysERDA.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/2016-advanced-energy-codes.pdf>

- **Data and resources:** How can the NYSERDA R&D Metrics Database and the existing data from prior evaluations best support evaluation efforts for the T&MD portfolio?
- **Solicitation process and markets:** How well is NYSERDA’s current solicitation process reaching intended markets and soliciting high-quality proposals?
 - During the first half of 2016, a Solicitation Process Benchmarking Assessment was completed. It provided best practices and lessons for NYSERDA based on the solicitation processes relied upon by other peer organizations.
- **NYSERDA’s reputation:** What is the effect of NYSERDA’s reputation on support for products and innovations, and how can NYSERDA best use its institutional credibility to support products and innovations?
 - During the first half of 2016, a NYSERDA Reputation Effect study was completed which provided information on how well recognized NYSERDA and its programs are among its stakeholders, how the brand is perceived, the effect of the reputation on projects, and other opportunities for NYSERDA’s reputation to help the market.
- **Portfolio performance:** What are the effects of NYSERDA’s shift from focus on technology development to its newer, broader focus on technology and business development?
- **R&D demonstration project impacts:** What are the direct and replication impacts of NYSERDA demonstration projects and how do these evolve and accumulate over time?
 - During the first half of 2014, the R&D demonstration project impact study was completed.⁴⁹ This study updated a prior similar evaluation and addressed R&D demonstration projects completed in 2008-2010. An update to this study is currently underway.
- **Informing decisions and policy:** How can NYSERDA and external organizations effectively incorporate learning from past NYSERDA projects into decisions about the design of programs and policies?

⁴⁹ <http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-RD-Demo-Survey-Report.pdf>

Appendix A: T&MD Program Advisory Committee Members

The last meeting of the T&MD Advisory Committee was in 2014. The Committee has been replaced by advisory structures under the Clean Energy Fund and/or program specific advisory groups.

Richard Adams

Manager
NREL Innovation and Entrepreneurship
Center, Center for Renewable Energy
Economic Development

Anthony Collins

President
Clarkson University

Mark Duvall

Director
Electric Transportation and Energy Storage
Electric Power Research Institute (EPRI)

Kate Fish

Executive Director
Adirondack North Country Association

Colleen Gerwitz

Director
Office of Clean Energy
NYS Department of Public Service

Maria Gotsch

President and CEO
NYC Investment Fund

Jeff Harris

Senior Policy & Tech Advisor
Alliance to Save Energy

Dave Hewitt

Consultant
ZNE and Market Transformation

Brook S. Jackson

Vice President
Policy Partnership for New York City

James Misewich, Ph.D.

Associate Laboratory Director
for Basic Energy Sciences
Brookhaven National Laboratory (BLN)
Energy Sciences and Technology Department

Steven Nadel

Executive Director
American Council for an Energy-Efficient Economy
(ACEEE)

Christopher Raup

Director, Distrusted Resource Integration
Consolidated Edison Company of New York, Inc.

Robert Simpson

President and CEO
CenterState Corporation for Economic Opportunity

Susan Stratton

Executive Director
Northwest Energy Efficiency Alliance (NEEA)

David Terry

Executive Director
National Association of State Energy Officials/ASERTTI

Sue Tierney

Senior Advisor
Analysis Group, Inc.

Cheri Warren

Vice President, Asset Management
National Grid

Jane Weissman

Former Executive Director
Interstate Renewable Energy Council, Inc. (IREC)

Ed Wisniewski

Executive Director
Consortium for Energy Efficiency (CEE)

Appendix B: T&MD Program Logic Models

No logic models were completed during this period.

Appendix C: Evaluation Report Summaries

Advanced Energy Codes Impact Evaluation Interim Report: First Delphi Process Results

Conducted by: Energy and Resource Solutions (ERS), February 2016

Program Summary

The Program aims to reduce energy use by a) increasing compliance with the Energy Code and b) contributing to the appliance and equipment standards (Standards) development. The Energy Code component includes conducting sector-based compliance assessments to measure progress toward an American Recovery and Reinvestment Act (ARRA)-mandated compliance goal and associated energy savings.

The Energy Code component provides training and technical assistance to code enforcement officials and the broader design and construction marketplace; develops technical tools to support code enforcement and compliance; conducts technical studies and research; and initiates pilots and provides implementation assistance. The results of the First Delphi set a baseline for compliance with the Energy Code. A Second Delphi Process, with expected completion in 2018, will estimate the change in Energy Code compliance and will attribute the portion of code compliance change to NYSERDA's codes activities.

This report presents the findings from the First Delphi Process completed as part of the impact evaluation of the Energy Conservation Construction Code of New York State (ECCCNYS or Energy Code) component of the New York State Research and Development Authority (NYSERDA) Advanced Energy Codes and Standards program ("the Program"). These estimates should be considered the pre-program baseline estimates and reflect estimated compliance with the 2010 Energy Code (ECCCNYS 2010); the Second Delphi Process, with targeted completion in 2018, will estimate compliance with the Energy Code in 2017. The delta between these code levels, combined with attribution information about the influence of NYSERDA's energy code activities compared to other influences such as technology advancement and normal market adoption, will estimate the impact of the energy code component of the NYSERDA Program.

Evaluation Objectives, Approach and High-Level Findings

Objective: The primary goal of the impact evaluation is to attribute energy savings to the Program’s Energy Code component. Impact evaluation activities will estimate statewide Energy Code compliance before and after implementing the Energy Code component, including, but not limited to, training and technical assistance. The difference in compliance levels will be used to estimate energy savings due to the Energy Code component.

Approach: To evaluate the Energy Code component’s effectiveness and estimate associated savings, the evaluation team conducted a Delphi process, engaging Energy Code experts to estimate compliance levels within the residential and commercial sectors. A Delphi process is a structured method to converge expert opinion from a series of interviews on a particular subject. The Delphi process consisted of three rounds of in-depth, one-on-one interviews with the Delphi participants (“experts”).

Findings: Of the 21 experts interviewed during the Delphi process, 17 have expertise in commercial building projects and fourteen have expertise in residential building projects. The overall weighted estimate of Energy Code compliance in New York State is 74% for commercial new construction and 77% for residential new construction. This result suggests that 74% of the Energy Code requirements are met by the average new commercial building and 77% of the Energy Code requirements are met by the average new residential building. The coefficients of variation (CVs) show the variability in results among the experts with experience in commercial and residential new construction.

Table C-1. Code Compliance Estimates from First Delphi Process

Energy Code	Weighted Average Compliance	Weighted CV
Commercial	74%	13%
Residential	77%	11%

Delphi Experts’ Observations and Suggestions to Improve Compliance

Overall - to improve compliance with the Energy Code:

- **Leverage third-party compliance support.** Many Delphi experts recommended leveraging third-party energy professionals to support code enforcement offices.
- **Target building operations.** Many experts recommended strategies targeting post-occupancy operations and maintenance to improve building performance.

Commercial code focus areas - focus areas for improving commercial compliance and awareness:

- **Air sealing and the building envelope** – Many experts identified a general lack of understanding of the building science behind air barriers and sealing requirements. The enforcement of the continuous air barrier was identified as an explicit opportunity for targeted training.
- **Daylighting** – Many experts observed lack of awareness among the design and construction community regarding what is required to comply with the Energy Code daylighting requirements. Targeted training on daylight zones and their applicability across a variety of building types would help improve awareness, compliance, and enforcement of this requirement.
- **Commissioning** – Many experts felt that review of commissioning activities is not adequately performed by the code enforcement community. The new 2014 Energy Code⁵⁰ requires more rigorous commercial building commissioning, and while many experts felt that these are an improvement over the 2010 Energy Code, they remain concerned that a lack of effective enforcement will result in these requirements going largely ignored.

Residential code focus areas - focus areas for improving residential compliance and awareness:

- **Documentation on plans and in electrical panels** – Many experts identified a lack of sufficient documentation on residential construction projects to verify compliance.
- **Mechanical equipment sizing** – Experts indicated that they rarely see evidence of mechanical sizing (Manual J) calculations. Although the calculations may be performed, lack of documentation makes them difficult to verify.
- **Air sealing and envelope insulation.** Air sealing and the proper insulation installation were consistently identified as one of the biggest challenges for residential construction. Delphi experts observed that in most residential building, the amount of insulation provided meets the Energy Code, but installation.

Considerations for Second Delphi Process

The evaluators have identified the considerations below for the Second Delphi process currently scheduled to be completed in 2018. These considerations are informed by the evaluators' understanding of upcoming Energy Code changes and the analysis of the process and the results from the First Delphi interviews.

⁵⁰ In November 2014, the New York State Building Code Council voted to adopt an update to the commercial Energy Code, replacing the 2010 Energy Code effective January 1, 2015. The updated code is based on the 2012 International Energy Conservation Code (IECC-2012) and includes a supplement specific to New York State.

- **Capture code changes.** It is likely that new versions of both the commercial and residential energy codes will be implemented by the beginning of the Second Delphi process. It will be important to understand how building practices changed in light of the new code versions and how training and other NYSERDA influences affected these practices. Generally, when new energy code versions are adopted, compliance initially dips as design, building, and enforcement communities need to adjust to the new and more stringent requirements. As these communities become more familiar with the new and enhanced code provisions, compliance tends to increase throughout the implementation period; this pattern often repeats with each new code version adopted. Thus, it may be necessary for Delphi participants to explicitly reflect on the time periods immediately before and after code changes to provide their opinions on NYSERDA's role in increasing awareness and compliance with new or more stringent requirements.
- **Incorporate process evaluation findings.** A process evaluation is currently underway for NYSERDA's energy code training activities. The findings from this process evaluation should be reviewed and integrated into the interview guide for the Second Delphi process. This guide will be especially useful in drafting and analyzing attribution questions to assess the influence of NYSERDA programs on Energy Code compliance.
- **Expand Delphi second-round conversation.** The evaluators found great value in the iterative nature of the Delphi process, specifically in providing each expert with the results of the previous round, both numerically and qualitatively with comments. The team captured many insights through this process and recommends lengthening the second round interviews to present more of the experts' first round results and rationales and to gather additional details regarding the justifications the experts provide in response to these first round results. This process would further improve the quality of data collected. The third round did result in some convergence of opinion and some targeted recommendations for improving compliance, but the primary convergence occurred between the first and second rounds of the Delphi process.

Appendix D: Target Ranges

Program	Reportable Item	2012-2013	2014-2015	2016	2017-2020	Total
Advanced Energy Codes	Code Training Modules	6-8	6-8			12-16
Education Behavior	Behavioral Pilots	5-8	3-4			8-12
ETAC	Knowledge/Tech Transfer Activities	8-18	17-26	10-18	3-8	38-70
ETAC	Projects Installed	1-2	5-14	6-12	5-8	17-36
ETAC	Stakeholder Meetings	7-10	5-9	1-3		13-22
Market Pathways	Completed Projects	5-8	10-15	3-7	2-5	20-35
Market Pathways	EAL Agreements	4-6	4-6	2-3		10-15
Market Pathways	Fact Sheets	3-4	2-3	1-2		6-9
Market Pathways	Fact Sheets	4-5	4-5	1-2		9-12
Market Pathways	Market Adoption	1-3	1-3	1		3-6
Market Pathways	Projects	20-25	5-10	5-10		30-45
Market Pathways	Seminars, Webinars	4-5	4-5	1-2		9-12
Market Research	Research Studies	2-3	1-2	1		4-6
Resource Development	Leveraged Funds	0 - 0.5M	1-1.5M	1.5-3.0M		2.5-5.0M
Technology Development	Projects Contracted		23-36	18-29	5-9	46-74
Technology Development	Commercial Sales			8-20M	75-100M	83-120M
Technology Development	Commercially Available Technologies		1-3	4-6	1-2	6-11
Technology Development	Leveraged Funds	7-10M	5-10M	2-3M		14-23M
Technology Development	Projects Installed		23-36	18-29	5-9	46-74
Technology Development	Stakeholder Meetings	2-5	8-20	6-10		16-35
Technology Development	Supported Companies	12-18	9-14	2-4		23-37
Technology Development ABC	Commercial Sales			1-2M	3-4M	4-6M
Technology Development ABC	Leveraged Funds		2-3M	2-3M		4-6M
Technology Development ABC	Products Demo'd ABC		1-2	1-2	1	3-5
Technology Development ABC	Projects Installed ABC		1-2	1-2	1	3-5
Technology Development ABC	Publications, Policy Research, etc.		5-9	6-10		11-19
Technology Development ABC	Stakeholders Engaged in ABC	5-10	10-15	0-5		15-30
Technology Development ABC	Supported Companies ABC	3-5	6-8	1-2		10-15

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

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

17 Columbia Circle
Albany, NY 12203-6399

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

info@nyserda.ny.gov
nyserda.ny.gov



State of New York

Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority

Richard L. Kauffman, Chair | John B. Rhodes, President and CEO

