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NYSERDA Technology and Market Development Program

Semiannual Report through December 31, 2015

Final Report

March 2016

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 Record of Revision

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NYSERDA Technology and Market Development Program

Semiannual Report through December 31, 2015

Final Report

Prepared by:

New York State Energy Research and Development Authority

Albany, NY

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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]

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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 electric (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 Energy Efficiency Portfolio Standard (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 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

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6 Per the September 13, 2012 Order, if the BNL proposal was not selected by US 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 US 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.

November 14, 2014[9] 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 approving the CEF is expected in early January.[12]

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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 June 30, 2015 were included in prior semiannual reports and are omitted from Table 2-1.

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

Some of the solicitations listed in this table may have split funding sources, and some solicitations may have been revised since their initial release date.

Solicitation Number	Solicitation Name	Solicitation Release Date	Solicitation Closing Date
RFP 3136	Website Development and Sitecore CMS Administration	07/07/2015	08/03/2015
RFI 2568	CHP Acceleration Program	07/20/2013	11/30/2016
RFP 3143	Staff Augmentation	07/14/2015	08/12/2015
PON 3125	Acceleration Availability of Targeted Residential Program-Category C	07/23/2015	12/31/2015
RFP 3165	Renewable Heat NY Training	10/23/2015	01/21/2015
PON 3011	Community Solar NY Round 2	12/04/2015	11/16/2016

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 for the first four years of program operation (2012 through December 31, 2015). Performance milestone tables (included for each initiative in Section 3 of this report) show progress through December 31, 2015 against the Operating Plan's expected benefits. Benefits achieved in the four years of the T&MD Program should be viewed with two important points of context:

- Most programs are competitively bid, requiring time to develop and issue solicitations, select winning bidders, and negotiate contracts. Several solicitations were issued between January 1, 2012 and December 31, 2015.
- Several T&MD programs are continuing and building on successful, long-standing programs funded with prior rounds of SBC monies or other sources. Where possible, existing programs have maximized use of other funds prior to utilizing T&MD funds.

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]

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

Electricity, fossil fuel, and demand savings/generation targets and progress refer to the cumulative annual savings that are achieved through a particular time period from all measures installed; e.g., T&MD savings for 2012 - 2015 are the energy savings achieved in 2015, as a result of energy efficiency measures installed from January 2012 through December 2015.

The progress for the 2012-2013 time period was restated[14] 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 time period has been adjusted in this report to capture changes in that period due to lags in data collection or cancellation of projects.

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.

[14] http://www.nyserda.ny.gov/About/Publications/Program-Planning-Status-and-Evaluation-Reports/SBCIV-Documents

Table 2-2. Summary of Anticipated Cumulative T&MD Benefits through December 31, 2015 (at full implementation) for Energy Efficiency, CHP, and Other Benefits[15]

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	126.2
Demand Reduction from Funded Project and Technology Installations	43.00	5.30	48.30	126.2
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 The target and progress for the System-wide CO_2 Emission Reductions, Energy Efficiency - Onsite and Central Station (Annual Tons) have been recalculated using an updated emission factor of 625 lbs. CO_2e/MWh for the electricity grid (from 826 lbs. CO_2e/MWh). An average emission factor of 625 pounds of CO_2e/MWh is used to estimate emission reductions associated with electricity use reductions for all sectors. This value includes emissions from in-state electricity generation as well as emissions associated with net imports of electricity. The emission factor for electricity is based on data from Patterns & Trends - New York State Energy Profiles: 1997 – 2011 (NYSERDA 2013) and methodology from the GHG Inventory and Forecast prepared for the 2014 Draft New York State Energy Plan (April 2014).

Table 2-2 continued

CHP Projects[16]

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	59.24
MWs Installed from Funded Project and Technology Installations	18.00	19.50	37.50	59.24
MWs 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	481.7
GWhs Generated from Funded CHP Project and Technology Installations	121.00	155.25	276.25	481.7
GWhs 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	626,263
MMBtu Consumed from Funded Project and Technology Installations	157,300	201,825	359,125	626,263
MMBtu Consumed from Anticipated Replications not Directly Funded by Program		79,300	79,300	0

Other T&MD Benefits[17]

Benefit Description	2012-2016	Out Years	Total	Thru Selected Period
System-wide CO2 Emission Reductions, Energy Efficiency - On-site and Central Station (Annual Tons)	363,890	366,555	730,444	47,877
Advanced Technologies Reaching Commercial Availability	46	42	88	14
Improved Technologies Deployment Programs Adopted by the Market or Further Supported by Deployment Programs	10	9	19	0
Commercial Sales of New and Improved Supported Technologies (millions)	$26.5	$157.7	$184.2	3.6
Funding Leveraged (co-funding and outside investment) by Investment (millions)	$747.5	$103.0	$850.5	408.9
Clean Energy Businesses Graduating from Incubators	90	72	162	46
Clean Energy Companies Receiving Support	525	200	725	343
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	19,860
Supply Chain Training to Facilitate Adoption of Energy Efficient Products (Partner Employees)	1,525		1,525	2,376

16 CHP totals were overstated in the previous reporting period due to a technical issue. The numbers should have been for On-site Electricity Generated from CHP Projects, Technologies, and Replications (Cumulative Annual MW), 58.8 MW; GWh Generated from Funded CHP Project and Technology Installations 471.01 GWh, MMBtu Consumed from Funded Project and Technology Installs 612,320 MMBtu.

17 System-wide CO_2 Emission Reductions increased significantly this reporting period due to exclusion of energy savings in pervious report.

2.1.3 Budget and Spending Status

Table 2-3 shows the T&MD program budget and financial status through December 31, 2015. Committed and spent funds are also shown as a percent of the total 2012-2016 budget. As of December 31, 2015, four years of T&MD activity has been completed of the five-year program. NYSERDA's funding commitment level is mostly on target at a portfolio level.

Table 2-3. Budget and Financial Status for T&MD Programs through December 31, 2015

Totals may not sum exactly due to rounding.

	2012-2016 Budget	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds[a,b]	Percent of Budget 2012-2016 Committed
Power Supply and Delivery					
Smart Grid/Electric Vehicle	$61,281,382	$10,421,436	17%	$34,048,462	56%
Advanced Clean Power	$51,771,962	$11,840,380	23%	$34,856,241	67%
Combined Heat and Power[c]	$75,000,000	$5,019,391	7%	$42,068,200	56%
Total Power Supply & Delivery	*$188,053,344*	*$27,281,207*	*15%*	*$110,972,903*	*59%*
Building Systems					
Advanced Buildings	$75,336,161	$10,362,149	14%	$55,697,787	74%
Advanced Energy Codes & Standards	$16,679,794	$2,169,922	13%	$9,761,691	59%
Total Building Systems	*$92,015,955*	*$12,532,071*	*14%*	*$65,459,478*	*71%*
Clean Energy Infrastructure					
Market Development	$70,380,281	$35,688,624	51%	$42,835,007	61%
Clean Energy Business Development	$41,761,046	$12,645,238	30%	$23,948,505	57%
Environmental Monitoring, Evaluation and Protection (EMEP)	$18,550,048	$5,033,998	27%	$15,967,770	86%
Workforce Development[c]	$39,000,000	$9,324,106	24%	$15,423,755	40%
Total Clean Energy Infrastructure	*$169,691,375*	*$62,691,966*	*37%*	*$98,175,037*	*58%*
Total of All Program Areas	***$449,760,674***	***$102,505,244***	***23%***	***$274,607,418***	***61%***
Administration (8%)	$39,765,533	$29,194,059	73%	$29,210,678	73%
NYS Cost Recovery Fee (1.7%)	$7,585,944	$2,953,437	39%	$2,953,437	39%
Evaluation (5%)	$26,363,458	$3,932,284	15%	$22,537,529	85%
Grand Total - Portfolio	***$523,475,609***	***$138,585,024***	***26%***	***$329,309,062***	***63%***

[a] 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.

[b] 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.

[c] Funding was increased in PSC's December 17, 2012 Order.

3 T&MD Initiatives

This section provides a status update on each of the nine T&MD initiatives, including budget status and highlights of early achievements during the first three and a half years of the five-year funding period. As noted in Section 2, benefits achieved in the first three and a half years of the T&MD program should be viewed with two important points of context:

- Most programs are competitively bid, requiring time to develop and issue solicitations, select winning bidders and negotiate contracts. Several solicitations were issued between January 1, 2012 and December 31, 2015.
- Several T&MD programs are continuing and building on successful, long-standing programs funded with prior rounds of SBC monies or other sources. Where possible, existing programs have maximized use of other funds prior to utilizing T&MD funds.

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 December 31, 2015

Totals may not sum exactly due to rounding.

	2012-2016 Budget	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds[a,b]	Percent of Budget 2012-2016 Committed
Smart Grid/Electric Vehicle					
Smart Grid	$47,284,415	$8,103,268	17%	$25,709,650	54%
Electric Vehicle	$13,996,967	$2,318,168	17%	$8,338,812	60%
Total Smart Grid/Electric Vehicle	*$61,281,382*	*$10,421,436*	*17%*	*$34,048,462*	*56%*
Advanced Clean Power					
Technology Innovation	$27,826,749	$8,704,186	31%	$27,826,749	100%
Resource Development	$13,945,213	$479,974	3%	$1,253,566	9%
Solar Cost Reduction	$10,000,000	$2,656,220	27%	$5,775,926	58%
Total Advanced Clean Power	*$51,771,962*	*$11,840,380*	*23%*	*$34,856,241*	*67%*
Combined Heat & Power[c]					
CHP Aggregation & Acceleration	$25,000,000	$2,743,663	11%	$5,273,730	21%
CHP Performance	$50,000,000	$2,275,728	5%	$36,794,470	74%
Total Combined Heat & Power	*$75,000,000*	*$5,019,391*	*7%*	*$42,068,200*	*56%*
Grand Total - Power, Supply, & Delivery Initiatives	***$188,053,344***	***$27,281,207***	***15%***	***$110,972,903***	***59%***

[a] 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

[b] 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.

[c] Funding was increased in PSC's December 17, 2012 Order.

3.1.1 Smart Grid and Electric Vehicle Infrastructure

3.1.1.1 Smart Grid

The Smart Grid Program promotes product development and demonstrations targeted at ensuring high levels of security, quality, reliability and availability of electric power; improving economic productivity; and minimizing environmental impacts while maximizing safety and sustainability. A smarter grid will be characterized by the widespread application of advanced sensing, communication and control devices, and other uniform diagnostic systems to support real-time visualization of electric grid operating conditions. This smarter grid is expected to reduce energy losses, extend equipment life, reduce operating costs, increase system resiliency to disruptions, support quicker restoration after disruptions, support the integration of distributed energy resources, and increase the throughput or transfer of electric energy 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 December 31, 2015. 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 December 31, 2015[18]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
Technology, development, demonstration or pilot projects	Signed Contracts - Target	7	10	12		29
	Signed Contracts - Progress	9	6			15
	Completed Projects - Target		5	9	15	29
	Completed Projects - Progress	0	4			4
Research Studies	Signed Contracts - Target	2	3	3		8
	Signed Contracts - Progress	12	15			27
	Completed Projects - Target		2	3	3	8
	Completed Projects - Progress	0	13			13
All Projects	Supported Companies - Target	8	12	14		34
	Supported Companies - Progress	21	15			36

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$18.0	$42.0	$52.0		$112.0
	Leveraged Funds Amount (millions) - Progress	$13.2	$14.8			$28.0
	Products and Technologies Commercialized - Target			1	2	3
	Products and Technologies Commercialized - Progress	0	1			1
	Product Revenue Amount (millions) - Target				$6.0	$6.0
	Product Revenue Amount (millions) - Progress	$0.0	$0.1			$0.1
	Market Adoption - Target			2	4	6
	Market Adoption - Progress	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 December 2015, more than 640 electric vehicle-charging stations were installed through NYSERDA programs.
- NYSERDA's contractor, Energetics Inc., released 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.

18 2012-13 Technology, development, demonstration or pilot projects Signed Contracts went from 12 to 11 due to a contract being removed. 2012-13 Leveraged Funds Amount went from $13.4 million to $13.2 million due to a contract being removed

- NYSERDA continued to add valuable resources to its Charge NY website, which has information for a variety of audiences about EVs and their benefits. Resources include an EV Calculator to estimate the benefits of switching to an EV and best practice guides for installing charging stations at workplaces and commercial buildings.
- Projects focused on detailing the grid impacts of EVs and identifying policy- and technology-based solutions met with stakeholders including utilities, the New York Independent System Operator (NYISO), DPS, EV charging station suppliers, and electric grid experts. Final reports are expected in early 2016.
- NYSERDA published final reports on ways to shift EV charging to off-peak hours through actions other than time-of-use rates and the feasibility of implementing an "EV tourism" program in the Hudson Valley.
- 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.
- HEVO Inc. completed the prototype development and demonstration on their new 3.3-kW wireless electric vehicle charging unit. The units were successfully demonstrated in multiple vehicle applications in New York and Europe leading to strategic partnerships with manufacturing and sales companies. HEVO is now working on the development of a higher power 11-kW charging unit.

Table 3-3 shows performance milestones and results for Electric Vehicle Infrastructure Program through December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
Technology, development, demonstration or pilot projects	Signed Contracts - Target	4	9	12		25
	Signed Contracts - Progress	1	15			16
	Completed Projects - Target		3	6	16	25
	Completed Projects - Progress	0	3			3
Research Studies	Signed Contracts - Target	4	2	2		8
	Signed Contracts - Progress	1	12			13
	Completed Projects - Target		4	2	2	8
	Completed Projects - Progress	0	2			2
All Projects	Supported Companies - Target	5	10	15		30
	Supported Companies - Progress	3	21			24

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$4.0	$14.0	$24.0		$42.0
	Leveraged Funds Amount (millions) - Progress	$7.9	$4.6			$12.6
	Products and Technologies Commercialized - Target		1	1	2	4
	Products and Technologies Commercialized - Progress	0	0			0
	Product Revenue Amount (millions) - Target				$9.0	$9.0
	Product Revenue Amount (millions) - Progress	$0.0	$0.0			$0.0
	Market Adoption - Target			1	2	3
	Market Adoption - Progress	0	0			0

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 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:

- Eos Energy Storage LLC conducted all activities required to manufacture and test a 24-kWh, AC-integrated zinc hybrid cathode prototype battery system. Eos, with support of NY-based manufacturer Incodema, identified and addressed performance issues associated with pilot-scale manufacturing of battery sub-modules and their constituent parts and sub-assemblies, which has led to optimized designs and improved prototype production runs. Currently, Eos is nearing finalization of an agreement to establish their manufacturing operations at a facility based in the New York's Capital Region and is progressing to the production of a 500-kWh system. Outside of New York, Eos has recently received orders for approximately 52 MWh for their Aurora 1000|4000 battery system.
- Poseidon Systems LLC manufactures, installs, and monitors oil debris monitoring systems on the gearboxes (the most common failure point) of large wind turbines. When a gearbox failure occurs without prior warning, the time to replace the wind turbine gearbox can significantly impact power production because the wind turbine may be unavailable for up to a month. The Poseidon Systems oil debris monitoring system looks for changes in particles within the oil to provide the wind turbine owner with advance warning, resulting in significantly shorter downtime of the wind turbine. Poseidon Systems LLC installed 40 systems as demonstration project on a New York State wind farm in collaboration with the site owner.
- Three proposals were contracted for Advanced Clean Power (PON 2942). Four more 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 December 31, 2015. 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) and Energy Storage Commercialization Center (bottom) Performance Milestones and Results through December 31, 2015 [19]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Signed Contracts - Target	15	26	10		51
	Signed Contracts - Progress	12	20			32
	Completed Projects - Target		10	15	26	51
	Completed Projects - Progress	1	7			8
	Supported Companies - Target	19	32	13		64
	Supported Companies - Progress	12	20			32

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$20.0	$32.0	$13.0		$65.0
	Leveraged Funds Amount (millions) - Progress	$19.5	$29.2			$48.8
	Products and Technologies Commercialized - Target		1	2	5	8
	Products and Technologies Commercialized - Progress	2	1			3
	Product Revenue Amount (millions) - Target	$1.0	$1.0	$3.0	$50.0	$55.0
	Product Revenue Amount (millions) - Progress	$0.6	$0.2			$0.8

Table 3-4 continued

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$2.0	$2.0	$1.0	$2.0	$7.0
	Leveraged Funds Amount (millions) - Progress	$0.5	$0.7			$1.2
	Products and Technologies Commercialized - Target	1	4	4	16	25
	Products and Technologies Commercialized - Progress	0	0			0
	Revenue Amount (millions) - Target	$0.2	$2.2	$1.4	$6.3	$10.1
	Revenue Amount (millions) - Progress	$0.0	$1.0			$1.0
	Product Development Tests - Target	2	8	6	25	41
	Product Development Tests - Progress	0	19			19

19 2012-13 Completed Projects went from 0 to 1 due to lag in the data. 2012-13 Leveraged Funds Amount went from $20.16 million to $19.5 based on data quality review.

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.

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

- Offshore Wind Values – NYSERDA 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.
- Bureau of Ocean Energy Management (BOEM) NYS Offshore Wind Task Force – NYSERDA is a member of this task force led by the New York Department of State (DOS). BOEM organizes this task force to provide guidance and advice on New York State interests and impacts of siting offshore energy projects in federal waters off New York State. NYSERDA has been an active participant and presenter at these meetings and has met with BOEM several times during this reporting period as BOEM plans to proceed with identifying New York's first Wind Energy Area at the site of the Long Island-NYC Offshore Wind Collaborative in 2016. This process will result in the scheduling of a task force meeting in 2016.
- During this reporting period, NYSERDA arranged additional in-person meetings between New York State agencies and BOEM. The objectives were to identify existing and new opportunities to enhance New York's role in project development, strengthen relationships between key federal and state partners, discuss issues related to project review, including issues specific to New York, and specifically discuss the Long Island-NYC Offshore Wind Collaborative proposal review schedule as described in the previous bullet.
- Northeast Wind Resource Center – NYSERDA 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 December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

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

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target		$1.0	$1.5		$2.5
	Leveraged Funds Amount (millions) - Progress	$0.0	$0.0			$0.0
	Site Development Potential (MW) - Target				1,000.00	1,000.00
	Site Development Potential (MW) - Progress	0.00	0.00			0.00

3.1.2.3 Solar Cost Reduction[20]

This program will help achieve the goals of the NY-Sun initiative[21] 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.

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20 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.

21 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 U.S. Photovoltaic Manufacturing Consortium's (PVMC) Roof-Integrated Lightweight PV project completed the first prototype installation of a lightweight commercial and industrial solar electric test array using high performance thin film Solar Frontier CIGS solar electric modules and Johns Manville ENRGYCurb support mold at PVMC's Prototype Demonstration Facility (PDF) in Halfmoon, NY. Evaluation of the prototype installation demonstrates the ability to meet initial cost analysis projections of greater than $0.30/Watt cost reductions. The test array was completed alongside a comparison c-Si array, with time and motion study methodologies completed. The installation and performance data for each will be used to generate further cost reduction opportunities through support mold design enhancements targeting cost and performance advances.
- 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 NY-Sun 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 December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
Technology, development, demonstration or pilot projects	Signed Contracts - Target	7	3			10
	Signed Contracts - Progress	0	4			4
	Completed Projects - Target		2	5	3	10
	Completed Projects - Progress	0	0			0
Develop tools, practices, studies, surveys, engagements	Signed Contracts - Target	7	2	1		10
	Signed Contracts - Progress	0	8			8
	Completed Projects - Target		5	3	2	10
	Completed Projects - Progress	0	1			1
All Projects	Supported Companies - Target	6	2	1		9
	Supported Companies - Progress	0	12			12
	Solar (PV) Trainees - Target	1,800	200			2,000
	Solar (PV) Trainees - Progress	0	3,725			3,725
	Training Sessions - Target	180	20			200
	Training Sessions - Progress	0	120			120
	Meetings, Workshops, Conferences - Target	1	4	3	2	10
	Meetings, Workshops, Conferences - Progress	0	0			0

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$5.5	$5.0	$2.6		$13.1
	Leveraged Funds Amount (millions) - Progress	$2.0	$2.9			$4.9
	Products and Technologies Commercialized - Target				1	1
	Products and Technologies Commercialized - Progress	0	0			0
	Product Revenue Amount (millions) - Target				$7.2	$7.2
	Product Revenue Amount (millions) - Progress	$0.0	$0.0			$0.0
	Market Adoption - Target		3	2	2	7
	Market Adoption - Progress	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 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 one CHP Expo 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 one webinar.
- Participated in three stakeholder meetings.
- Held a CHP training for architects and engineers.

Table 3-7 shows performance milestones and results for the CHP Aggregation and Acceleration Program through December 31, 2015. Energy savings reported in Table 3-7 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 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 December 31, 2015

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-20
All Projects	Projects - Target	3	21	30	37
	Applications Accepted but not yet Contracted - Progress	0	2		
	Projects Under Contract but not yet Installed - Progress	4	33		
	Projects Installed - Progress	0	16		
	Total Progress	4	51		
All Projects	Peak Load Electric Generation (MW) - Target	1.00	7.00	10.00	12.50
	Peak Load Electric Generation Applications Accepted but not yet Contracted (MW) - Progress	0.00	0.13		
	Peak Load Electric Generation Under Contract but not yet Installed (MW) - Progress	0.02	0.60		
	Peak Load Electric Generation Installed (MW) - Progress	0.00	1.26		
	Total Progress	0.02	1.99		
All Projects	Electric Generation (GWh) - Target	6.10	42.70	61.00	76.25
	Electric Generation Applications Accepted but not yet Contracted (GWh) - Progress	0.00	0.81		
	Electric Generation Under Contract but not yet Installed (GWh) - Progress	0.09	3.65		
	Electric Generation Installed (GWh) - Progress	0.00	7.69		
	Total Progress	0.09	12.15		
All Projects	Primary Energy Savings (MMBtu) - Target	7,930	55,510	79,300	99,125
	Primary Energy Savings Applications Accepted but not yet Contracted (MMBtu) - Progress	0	1,051		
	Primary Energy Savings Under Contract but not yet Installed (MMBtu) - Progress	119	4,742		
	Primary Energy Savings Installed (MMBtu) - Progress	0	9,996		
	Total Progress	119	15,789		

		2012-13	2014-15	2016	2017-20	Total
All Projects	Pre-Packaged Systems - Target	10	8	2		20
	Pre-Packaged Systems - Progress	64	108			172
	Knowledge/Technology Transfer Activities - Target	4	4	2		10
	Knowledge/Technology Transfer Activities - Progress	19	82			101

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$20.0	$20.0	$10.0		$50.0
	Leveraged Funds Amount (millions) - Progress	$3.4	$20.6			$24.1
	Leveraged Funds Replicated (millions) - Target				$40.0	$40.0
	Leveraged Funds Replicated (millions) - Progress	$0.0	$0.0			$0.0
	Peak Load Electric Generation Replicated (MW) - Target				10.00	10.00
	Peak Load Electric Generation Replicated (MW) - Progress	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
	Primary Energy Savings Replicated (MMBtu) - Target				79,300	79,300
	Primary Energy Savings Replicated (MMBtu) - Progress	0	0			0

3.1.3.2 CHP Performance Program

The CHP Performance Program funds installations of CHP systems using energy, summer peak demand, efficiency, and environmental performance-based payments. The program funds clean, efficient, cost effective, gas-fired systems using site-specific designs. In accordance with the PSC Order, systems are required to meet a minimum fuel conversion efficiency of 60% and a maximum of 1.6 pounds/MWh of NO_x emissions.[22] 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, three have prime movers (engines, turbines) on-site. They represent a hospital, college, and 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 project has allowed the applicant to generate their own power - improving reliability, lowering costs, and reducing greenhouse gas emissions by over 10,000 tons/year and keeping to their commitment of sustainable development and energy conservation.
- Prime movers associated with three projects have been placed and site construction activities have been initiated, representing six large capital project commitments in 2015.

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22 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 December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13	2012-15	2012-16	2012-20
All Projects	Projects - Target		1	5	16
	Applications Accepted but not yet Contracted - Progress	4	5		
	Projects Under Contract but not yet Installed - Progress	0	8		
	Projects Installed - Progress	0	1		
	Total Progress	4	14		
All Projects	Peak Load Electric Generation (MW) - Target		2.00	8.00	25.00
	Peak Load Electric Generation Applications Accepted but not yet Contracted (MW) - Progress	24.27	24.86		
	Peak Load Electric Generation Under Contract but not yet Installed (MW) - Progress	0.00	29.59		
	Peak Load Electric Generation Installed (MW) - Progress	0.00	2.80		
	Total Progress	24.27	57.25		
All Projects	Electric Generation (GWh) - Target		10.00	60.00	200.00
	Electric Generation Applications Accepted but not yet Contracted (GWh) - Progress	187.22	172.51		
	Electric Generation Under Contract but not yet Installed (GWh) - Progress	0.00	272.08		
	Electric Generation Installed (GWh) - Progress	0.00	25.00		
	Total Progress	187.22	469.60		
All Projects	Primary Energy Savings (MMBtu) - Target		13,000	78,000	260,000
	Primary Energy Savings Applications Accepted but not yet Contracted (MMBtu) - Progress	243,389	224,265		
	Primary Energy Savings Under Contract but not yet Installed (MMBtu) - Progress	0	353,709		
	Primary Energy Savings Installed (MMBtu) - Progress	0	32,500		
	Total Progress	243,389	610,475		

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$30.0	$110.0	$110.0		$250.0
	Leveraged Funds Amount (millions) - Progress	$11.5	$120.2			$131.6

3.2 Building Systems Initiative

Table 3-9 shows the Building Systems budget and financial status through December 31, 2015. 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 December 31, 2015

Totals may not sum exactly due to rounding.

	2012-2016 Budget	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds[a,b]	Percent of Budget 2012-2016 Committed
Advanced Buildings					
Emerging Technology/Accelerated Commercialization	$32,446,215	$1,716,522	5%	$14,807,839	46%
Technology Development	$33,613,215	$5,879,857	17%	$33,613,215	100%
Demand Response	$9,276,731	$2,765,770	30%	$7,276,733	78%
Total Advanced Buildings	*$75,336,161*	*$10,362,149*	*14%*	*$55,697,787*	*74%*
Advanced Energy Codes & Standards	$16,679,794	$2,169,922	13%	$9,761,691	59%
Grand Total - Building Systems Initiatives	***$92,015,955***	***$12,532,071***	***14%***	***$65,459,478***	***71%***

a 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.

b 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:

- Four proposals submitted to round two of the large-scale demonstration solicitation have been selected and are in contract negotiations.
- Several focused demonstration applications have been received and are 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.
- Two contractors have submitted, and had approved, the M&V plan for their ETAC projects.
- One contractor has submitted the Task 5 "Plan to Identify Market Barriers." That plan has been reviewed and sent back to the contractor for some revision.
- 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 14 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 has been approved and will be issued in January 2016. Eligible technologies under this solicitation include air-source and ground-source heat pumps, and low-capacity natural gas furnaces.

Table 3-10 shows performance milestones and results for the ETAC Program through December 31, 2015. 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 December 15, 2015

Outputs/Leading Indicators

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

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

Outcomes/Impacts

		2012-13	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$1.0	$3.5	$2.0		$6.5
	Leveraged Funds Amount (millions) - Progress	$0.1	$4.4			$4.5
	Leveraged Funds Replicated (millions) - Target				$21.0	$21.0
	Leveraged Funds Replicated (millions) - Progress	$0.0	$0.0			$0.0
	Peak Load Reduction Replicated (MW) - Target				7	7
	Peak Load Reduction Replicated (MW) - Progress	0	0			0
	Energy Savings Replicated (GWh) - Target				30	30
	Energy Savings Replicated (GWh) - Progress	0	0			0
	Primary Energy Savings Replicated (MMBtu) - Target				231,800	231,800
	Primary Energy Savings Replicated (MMBtu) - Progress	0	0			0
	Market Adoption - Target			4	3	7
	Market Adoption - Progress	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:

- Completed Round 6 project selection of PON 2606. Eleven projects were recommended for funding totaling nearly $2.2 million and leveraged more than $2.1 million in external funding.
- To date, PON 2606 has received 342 proposals requesting $59.7 million in NYSERDA funds. Through Round 6, approximately $21 million has been committed of the $25 million PON 2606 Budget.
- 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.

<u>Market Insights Team (formerly Behavior Research Program)</u>

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 December 31, 2015. 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 December 31, 2015[23]

Advanced Buildings Technology Development
Performance Milestones and Results

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Signed Contracts - Target	23	18	5		46
	Signed Contracts - Progress	25	48			73
	Completed Projects - Target		23	18	5	46
	Completed Projects - Progress	0	14			14
	Supported Companies - Target	12	9	2		23
	Supported Companies - Progress	19	42			61

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$7.0	$5.0	$2.0		$14.0
	Leveraged Funds Amount (millions) - Progress	$34.1	$21.7			$55.9
	Products and Technologies Commercialized - Target		1	4	1	6
	Products and Technologies Commercialized - Progress	2	2			4
	Product Revenue Amount (millions) - Target			$8.0	$75.0	$83.0
	Product Revenue Amount (millions) - Progress	$0.8	$2.0			$2.8

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. Enhanced incentives are currently offered in Con Edison territory via the Demand Management Program.

[23] 2012-13 Signed Contracts went from 29 to 25 due to four contracts being removed. 2012-13 Supported Companies went from 25 to 19 due to six companies being removed. 2012-13 Product Revenue Amount went from $7 million to $8 million due to lag in data being received.

NYSERDA has historically funded DR projects with SBC III resources. Benefits from this SBC III DR investment continue to accrue and were reported in the 2014 SBC III annual report finalized in March 2015. (Prior historical accomplishments are in the SBC III annual report through December 2012).

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

- One project implementation of demand response enablement measures has been completed, representing approximately $12,000 in private capital investment.
- Sixteen prequalified interval meter projects have been completed that will enable a peak load reduction of approximately 2.3 MW.

Table 3-12 shows performance milestones and results for the Demand Response Program through December 31, 2015. 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 December 31, 2015[24]

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 Accepted but not yet Contracted (MW) - Progress	2.05	1.44		
	MW Registered Under Contract but not yet Installed (MW) - Progress	5.44	7.84		
	MW Registered Installed (MW) - Progress	40.22	115.59		
	Total Progress	47.71	124.87		

Outcomes/Impacts

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

[24] 2012-13 MW Registered Installed Progress increased from 47.06 to 47.71 due to a lag in reported data.

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 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 and corresponding New York State Supplement. We expect these markets to prepare for adoption in the second quarter of 2016.
- Newport Ventures finalized and began delivering three training courses to its target audiences; code enforcement officials and construction professionals during this reporting period and is expected to finalize an additional seven courses during the next reporting period. Newport Ventures delivered six total training sessions during this reporting period.
- Urban Green Council finalized and began delivering two training courses to its target audience; architects and engineers during this reporting period. Urban Green Council delivered 17 total training sessions during this reporting period.
- The Institute for Building Technology and Safety piloted two courses intended to educate target markets on the role of third-party energy professionals with respect to enforcing and complying with the Energy Code. Feedback gathered through pilot delivery will inform further curriculum development planned for the next reporting period. The Institute for Building Technology and Safety delivered six total training sessions this reporting period.
- NYSERDA began the planning phase of a two-day Energy Code Conference and Tradeshow, which will be held at the Empire State Convention Center in Albany on November 30 through December 1, 2016. An advisory committee comprised of public and private stakeholders was formed to help steer planning. It met for the first time in December 2015.

3.2.1.7 Technical Support, Studies, and Resources

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 conducted the majority of its market research and the preliminary gap analysis results are expected first quarter 2016.

3.2.1.8 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. Initial marketing and outreach efforts to promote these services began during fourth quarter of 2015. NYSERDA expects these efforts to continue and escalate through first quarter 2016.

Table 3-13 shows performance milestones and results for the Advanced Energy Codes and Standards Program through December 31, 2015. 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 December 31, 2015[25]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
Code compliance efforts	Annual Code Compliance Assessments - Target	2	2	1		5
	Annual Code Compliance Assessments - Progress	1	1			2
	Training Sessions - Target	6	6			12
	Training Sessions - Progress	0	7			7
	Code Requirement Trainees - Target	7,000	6,000	2,000		15,000
	Code Requirement Trainees - Progress	0	2,411			2,411
Equipment and appliance standards efforts	State/Federal Standards Conformance Assessments - Target	1	1	1		3
	State/Federal Standards Conformance Assessments - Progress	0	0			0
All Projects	Program Support Solicitations - Target	1	1			2
	Program Support Solicitations - Progress	0	0			0
	Implementation Support Solicitations - Target	1	1			2
	Implementation Support Solicitations - Progress	1	2			3

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
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
	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
	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
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
	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

25 2014-15 Training Sessions decreased due to clarification in methodology. Session refers to a course, not to the number of times the course is delivered in a given reporting period.

3.3 Clean Energy Infrastructure Initiatives

Table 3-14 shows the Clean Energy Infrastructure budget and financial status through December 31, 2015. 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 December 31, 2015

Totals may not sum exactly due to rounding.

	2012-2016 Budget	Spent Funds	Percent of 2012-2016 Budget Spent	Committed Funds[a,b]	Percent of 2012-2016 Budget Committed
Market Development					
Market Research	$4,640,141	$3,512,232	76%	$4,435,370	96%
Market Pathways	$55,710,000	$27,568,806	49%	$31,399,433	56%
Education/Behavior	$10,030,140	$4,607,586	46%	$7,000,204	70%
Total Market Development	*$70,380,281*	*$35,688,624*	*51%*	*$42,835,007*	*61%*
Clean Energy Business Development					
Innovation Entrepreneurial Capacity	$36,761,046	$10,080,754	27%	$20,047,748	55%
Market Intelligence	$1,688,584	$809,843	48%	$963,978	57%
Direct Support for Business	$2,400,000	$1,180,328	49%	$2,350,975	98%
Marketing	$911,416	$574,313	63%	$585,804	64%
Total Clean Energy Business Development	*$41,761,046*	*$12,645,238*	*30%*	*$23,948,505*	*57%*
EMEP	$18,550,048	$5,033,998	27%	15,967,770	86%
Workforce Development					
Renewable Energy/Advanced Technologies	$15,000,000	$3,621,672	24%	$5,833,430	39%
Energy Efficiency	$24,000,000	$5,702,434	24%	$9,590,325	40%
Total Workforce Development	*$39,000,000*	*$9,324,106*	*24%*	*$15,423,755*	*40%*
Grand Total - Clean Energy Infrastructure	***$169,691,375***	***$62,691,966***	***37%***	***$98,175,037***	***58%***

[a] 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.

[b] 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 electric 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 New York State of ongoing Clean Energy Fund and REV activities, including an analysis of net metering.

Table 3-15 shows performance milestones and results for the Market Research Program through December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Completed Projects - Target	2	1	1		4
	Completed Projects - Progress	3	13			16

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 Program

The Products Program, formerly known as the Energy $mart^{SM} Products Program, seeks to increase awareness of and demand for energy-efficient products.

During the second half of 2015, the Products team continued to focus on new initiatives that align with the principles of the Clean Energy Fund and address specific market barriers impacting the adoption of high efficiency residential products and integrated systems. One of the initiatives was PON 3125, which targets retailers, manufacturers, distributors/vendors, and other stakeholders to provide them with an opportunity to propose market-driven solutions to increase the availability of and demand for targeted high-efficiency products. Round 1 of PON 3125 was released on July 24, 2015.

For Round 1, the following high-efficiency residential products were targeted: high-efficiency clothes washers; refrigerators; home energy management systems (HEMS), heating, ventilation and air condition (HVAC) systems, heat pump water heaters (HPWH), and advanced lighting fixtures. Support was offered in three categories:

- Category A (*Market Support)* - to increase the supply of and demand for targeted products through upstream interventions.
- Category B (*Pilots or Demonstration Project*s) - to educate builders, architects, designers, contractors, and consumers about HEMS.
- Category C (*Educational Retail Events)* - to educate consumers and contractors on the benefits of targeted and other high-efficiency residential products.

Categories A and B were promoted as a competitive due date solicitation with proposals due September 24, 2015 whereas Category C was open-ended with applications accepted on a first come, first served basis. NYSERDA is currently in negotiations with each of the awarded proposers for Category A and B and expects to commence projects for each in the first quarter of 2016.

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, 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. 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).

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

- Commercial Lighting and HVAC Program Business Partners programs were closed effective December 31, 2015.

Innovative Strategies

Innovative Strategies is designed to support 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. Opportunities to standardize efforts will be identified where appropriate, and credibility will be provided to approaches that reduce the barriers to financing energy efficiency projects that are not addressed by EEPS programs. The goals of the Emerging Technologies and Advanced Commercialization - Commercial/Industrial (ETAC-CI) initiative are to identify, demonstrate, and accelerate adoption of newer, under-used energy-saving technologies and strategies in the State.

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

- Energize NY reached a closed financing amount totaling approximately $820,000. Table 3-16 shows performance milestones and results for the Market Pathways Program through December 31, 2015. 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 $mart 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 December 31, 2015

Outputs/Leading Indicators

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

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
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			10.21
	Energy Savings Installed (MMBtu) - Target	254,000	419,000	222,000		895,000
	Energy Savings Installed (MMBtu) - Progress	142,610	94,132			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			67.38
	Market Adoption - Target	1	1	1		3
	Market Adoption - Progress	0	0			0
Market Pathways - C/I	Completed Projects - Target	5	10	3	2	20
	Completed Projects - Progress	0	7			7

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 $mart 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 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 (Solar) 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 absent 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 is currently in the process of contracting with the four organizations selected for funding by the Technical Evaluation Panel, including three contracts for implementation projects and one contract for an Oversight/Evaluation Contractor.

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:

- During the current reporting period, LIFE began the planning process for the LIFE 2016 Statewide Conference to be held on May 25-26, 2016 in Albany, NY.
- LIFE produced and distributed three 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 six webinars on various topics including program updates, best practices, and consumer protections. On average, the webinars were attended by 47 individuals representing 26 organizations.
- The LIFE Steering Committee met three times (July 2, October 1, and December 17) to plan for LIFE initiatives, share program information, and discuss opportunities for collaboration.
- LIFE increased its number of followers on Twitter by 6 percent.

Table 3-17 shows performance milestones and results for the Education/Behavior Program through December 31, 2015. 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 are the sponsorship on 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Signed Contracts - Target	5	3			8
	Signed Contracts - Progress	0	0			0
	Meetings, Workshops, Conferences - Target	2	2	1		5
	Meetings, Workshops, Conferences - Progress	1	1			2
	Community Partnership Participants - Target	250	250	75		575
	Community Partnership Participants - Progress	465	560			1,025

Outcomes/Impacts

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

- Cycle 1 teams have completed initial prototypes and have started to conduct field-testing.
- Cycle 2 teams are completing the development of minimally viable prototypes.
- Over 100 applications were submitted across all three POCCs and 24 new teams were ultimately selected in Cycle 3.
- The PowerBridge NY program partnered with the New York City Regional Innovation Node (NYCRIN) to run an I-Corps cleantech course for the Downstate region. The course is an intensive Lean launchpad approach to customer discovery and market validation.
- Each POCC will present a sustainability plan to the POCC Advisory Board on January 28, 2016. The plans will outline their strategy to attract adequate financial support to operate the programs at the conclusion of NYSERDA funding.

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 New York State's most promising clean energy ventures. 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, development partners, mentors, and service providers.

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

- New York University's ACRE incubator graduate United Wind, a Brooklyn-based clean energy company, received $4 million in funding from the NY Green Bank and secured an additional $200 million in project equity capital to expand its small wind lease program for distributed wind projects throughout the United States.
- One of graduates from The Tech Garden's Clean Tech Center is Ephesus Technologies, a Syracuse-based clean energy company that markets and installs LED lighting systems at music and sports venues. It was acquired by Eaton Corp., a multinational power management company, and it continues to operate in Syracuse.

- Stony Brook University's Clean Energy Business Incubator Program client ThermoLift, a Long Island-based clean energy company that is developing a high efficiency heat pump and air conditioner, was selected to join the prestigious Wells Fargo Innovation Incubator, where they will receive up to $250,000 in cash and in-kind, expert technical consultation from the National Renewable Energy Laboratory.

Table 3-18 shows performance milestones and results for the Innovation/Entrepreneurial Program through December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Incubators or POCCS Participants - Target	65	90	50	200	405
	Incubators or POCCS Participants - Progress	29	75			104

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$40.0	$45.0	$25.0	$40.0	$150.0
	Leveraged Funds Amount (millions) - Progress	$40.2	$40.2			$80.3
	Products and Technologies Commercialized - Target	5	10	10	15	40
	Products and Technologies Commercialized - Progress	1	6			7
	Product Revenue Amount (millions) - Target	$2.5	$5.0	$5.0	$7.5	$20.0
	Product Revenue Amount (millions) - Progress	$0.0	$0.0			$0.0
	Businesses Graduated from Incubators - Target	36	36	18	72	162
	Businesses Graduated from Incubators - Progress	9	37			46
	FTEs Associated with Incubator Graduates - Target	108	108	54	216	486
	FTEs Associated with Incubator Graduates - Progress	185	90			275

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 to present, focus groups were held involving nearly 100 individuals including entrepreneurs affiliated with cleantech startup companies, cleantech investors, executives, and other representatives of larger, more established technology companies, directors of cleantech incubators, representatives from cleantech industry consortia, universities conducting cleantech research, and other cleantech organizations.

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

- In second half of 2015, SRI prepared a draft of the second edition of the NYS Clean Energy Technologies Innovation Metrics report. A user survey was completed to understand user usage and additional reporting needs. The 2015 report will have vignettes of NYS clean energy success stories. NYSERDA's Marketing team laid out the report based on data and text from SRI. The draft report is currently under review and is expected to be released in the first quarter of 2016.

Table 3-19 shows performance milestones and results for the Market Intelligence Program through December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

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

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 of the startup companies mentored by an EIR have shown the following cumulative benefits 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 the New York City Accelerator for a Clean Resilient Economy (NYC-ACRE) and New York University 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) started its second cohort in August 2015 with 20 students, which is twice as many as the first class. The course includes visits to NYISO and NYSERDA 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.
- NYC-ACRE in collaboration with New York University is hosting the NY Clean Start Program 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 start in February 2016 and will complete in July 2016.

- The Commercialization Toolkit program 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 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 expected to be released by March 2016.

Table 3-20 shows performance milestones and results for the Direct Support for Business Acceleration Program through December 31, 2015. 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 December 31, 2015

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Companies Supported - Target	59	59	32		150
	Companies Supported - Progress	41	33			74

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Business Executives Transitioned - Target		18	18	9	45
	Business Executives Transitioned - Progress	0	23			23

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 July through December 2015, NYSERDA's training partners delivered courses to 1,695 New Yorkers. Courses ranged from introductory through advanced and included the following: solar electric training for code officials, first responders, municipal personnel, architects, and engineers; passive house training for design professionals and tradespeople; energy efficiency training for plumbers, electricians, and building operators; and entry-level technical training coupled with paid internships for New Yorkers with barriers to employment. Under NYSERDA's Clean Energy On-the-Job Training (OJT) program, four businesses hired a total of six individuals during the reporting period. These individuals included three solar thermal installers and three geothermal installers.

Table 3-21 and Table 3-22 show performance milestones and results for the Workforce Development Program through December 31, 2015. 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 December 31, 2015[26]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Renewable Energy Technical Trainees - Target	500	1,000	500		2,000
	Renewable Energy Technical Trainees - Progress	0	2,738			2,738
	Entry Level Trainees - Target	90	200	190		480
	Entry Level Trainees - Progress	0	460			460
	OJT, Hands-On Training - Target	150	380	150		680
	OJT, Hands-On Training - Progress	39	90			129
	Training Organizations - Target	2	3	1		6
	Training Organizations - Progress	2	2			4
	Certifications Developed - Target		2	1		3
	Certifications Developed - Progress	0	0			0
	Course Development - Target	2	4	2		8
	Course Development - Progress	0	16			16

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$0.8	$2.3	$1.3		$4.4
	Leveraged Funds Amount (millions) - Progress	$1.1	$1.5			$2.7

26 2012-13 Training Organizations went from 0 to 2 based on data quality review.

Table 3-22. Workforce Development – Energy Efficiency Performance Milestones and Results through December 31, 2015[27]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Energy Efficiency Technical Trainees - Target	3,448	5,517	4,828		13,793
	Energy Efficiency Technical Trainees - Progress	96	9,414			9,510
	Entry Level Trainees - Target	800	1,280	1,120		3,200
	Entry Level Trainees - Progress	0	721			721
	OJT, Hands-On Training - Target	467	747	653		1,867
	OJT, Hands-On Training - Progress	48	95			143
	Training Organizations - Target	2	3	1		6
	Training Organizations - Progress	4	2			6
	Certifications Developed - Target		2	1		3
	Certifications Developed - Progress	0	0			0

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$1.3	$3.8	$2.0		$7.1
	Leveraged Funds Amount (millions) - Progress	$0.4	$6.2			$6.6

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:

- New projects have been selected and contracted as a result of two new solicitations issued during the previous reporting period: Acid Deposition and Mercury Research in New York State (PON 2912), which resulted in eight new projects; Energy-Related Air Quality and Health Research in New York State (PON 2981), which resulted in seven new research projects and two new fellowship projects.
- Outreach activities included participation and support for the Adirondack Research Consortium annual conference, the Northeast Ecosystem Research Cooperative conference, and NYSERDA's Partnership for Environmental Improvement meeting.

27 2012-13 Training Organizations went from 10 to 4 based on data quality review.

- RFP 3062 was issued to select new outreach contractors to assist with the dissemination of program products and research findings.

Table 3-23 shows performance milestones and results for the EMEP Program through December 31, 2015. 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 December 31, 2015[28]

Outputs/Leading Indicators

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Signed Contracts - Target	23	28	9		60
	Signed Contracts - Progress	21	37			58
	Completed Projects - Target	5	23	23	9	60
	Completed Projects - Progress	0	13			13
	Program Advisory Group Meetings - Target	2	2	1		5
	Program Advisory Group Meetings - Progress	3	0			3
	Science Advisory Committee Meetings - Target	2	2	1		5
	Science Advisory Committee Meetings - Progress	3	0			3
	Meetings, Workshops, Conferences - Target	5	6	3		14
	Meetings, Workshops, Conferences - Progress	7	13			20
	Briefings - Target	12	12	6		30
	Briefings - Progress	5	5			10

Outcomes/Impacts

		2012-13 with Adjustments	2014-15	2016	2017-20	Total
All Projects	Leveraged Funds Amount (millions) - Target	$3.5	$4.5	$3.0		$11.0
	Leveraged Funds Amount (millions) - Progress	$2.5	$5.3			$7.8
	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	13			28

28 2012-13 Signed Contracts went from 20 to 21 due to a lag in data.

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

- Smart Grid[29]
- Advanced Codes and Standards[30]
- Economic Development Growth Extension[31]
- New York Products[32]
- Clean Energy Business Development[33]
- Workforce Development[34]

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

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

[31] http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2013ContractorReports/2013-PLM-EDGE-Program.pdf

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

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

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

- CHP Aggregation and Acceleration[35]
- Advanced Buildings: ETAC[36]
- Advanced Buildings: Technology Development[37]
- Solar Cost Reduction[38]
- Clean Power Technology Innovation[39]

During this reporting period, PTLM activities were completed and reports posted to NYSERDA's website for the following programs/area:

- Transportation[40]

Following the development of a PTLM, NYSERDA typically engages in an Evaluation Readiness Review[41] 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 implementation and repeated periodically to examine program efficiency and effectiveness in light of the

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35 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-CHP-Acceleration.pdf

36 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-PLM-Advanced-Buildings.pdf

37 Ibid

38 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-SCR-logic-model.pdf

39 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-CPTI-Logic-Model-Report.pdf

40 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-Transportation-LM-Report.pdf

41 Formerly known as Evaluability Assessment.

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 July 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 Grid[42]
- Workforce Development[43]
- EMEP[44]
- Solar Cost Reduction[45]

During this reporting period, process evaluations have been completed, reports posted on NYSERDA's website, and summaries included in Appendix C for the following programs/areas:

- Economic Development Growth Extension (EDGE) [46]

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 (Q1 2016)
- Advanced Codes and Standards (Q3 2016)[47]

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

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

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

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

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

47 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 July 2015, focused market evaluations were completed for the following T&MD programs:

- NY Products Program[48]
- NYSERDA and National Customer Awareness of ENERGY STAR® for 2014 (Analysis of Consortium for Energy Efficiency Household Survey)[49]

During this reporting period, no market evaluations were completed.

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 (Q1 2016)
- Smart Grid Market Assessment (Q1 2016)
- Advanced Codes and Standards Impact Evaluation (two phases: Q1 2016 and Q4 2018)
- Market Pathways: Business Partners Impact Evaluation (Q2 2016)
- Transportation Market Characterization Assessment (Q2 2016)
- Transportation: 6 Impact/Market Impact Case Studies (Q2-Q3 2016)
- Combined Heat and Power Market Assessment (TBD)
- Clean Energy Business Development Market Assessment (TBD)

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:

- **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?
- **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?

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48 http://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2014ContractorReports/2014-New-York-Products-Program-Evaluation.pdf

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

- **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?
- **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?

The other studies described above are underway as well.

Appendix A: T&MD Program Advisory Committee Members

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 Vice President for Programs
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
Manager, State Regulatory Affairs
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
Managing Principal
Analysis Group, Inc.

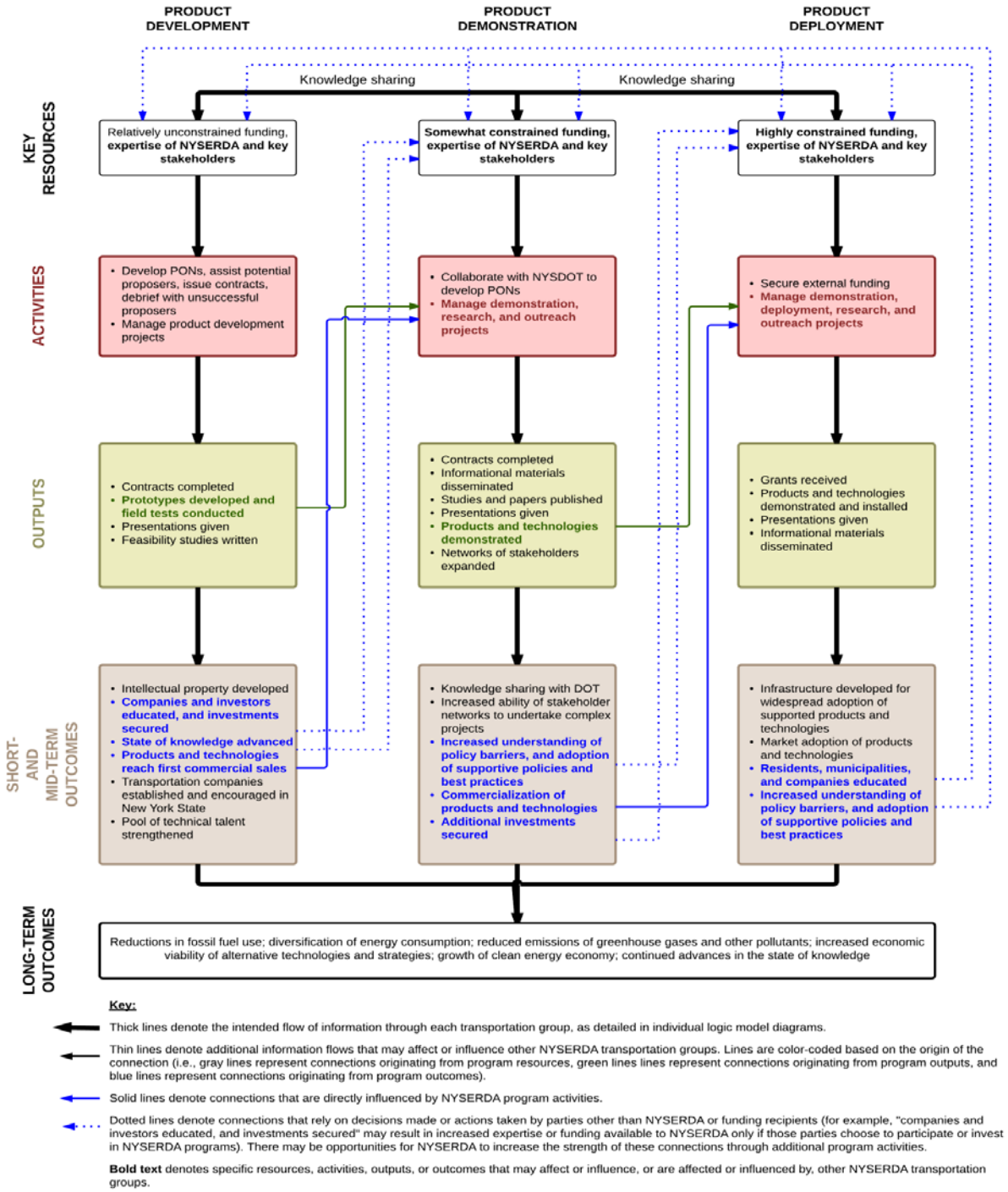
Cheri Warren
Vice President, Asset Management
National Grid

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

Ed Wisniewski
Executive Director
Consortium for Energy Efficiency (CEE)

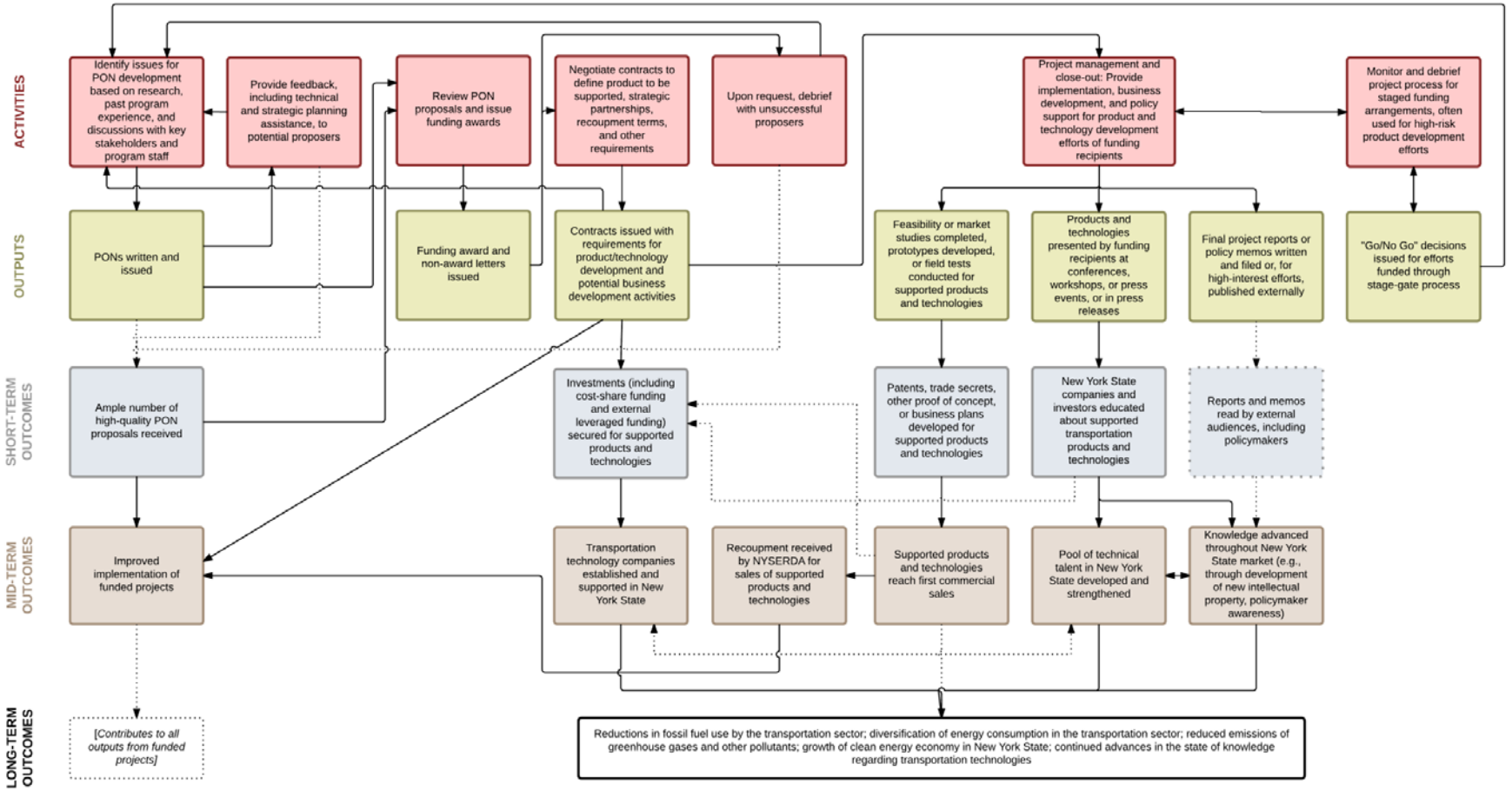
Appendix B: T&MD Program Logic Models

Figure B-1. Transportation Program Logic Model Diagram (including models for Product Development, Demonstration, and Deployment)



NYSERDA TRANSPORTATION: PRODUCT DEVELOPMENT

Resources/Inputs: Federal, state, and other funding, including statutory, T&MD, and RGGI funding; Transportation Program staff knowledge and time; expertise of the Technical Evaluation Panel; expertise of the Regional Greenhouse Gas Initiative; experience of funding recipients; relationships with key actors and stakeholders; organizational reputation of NYSERDA

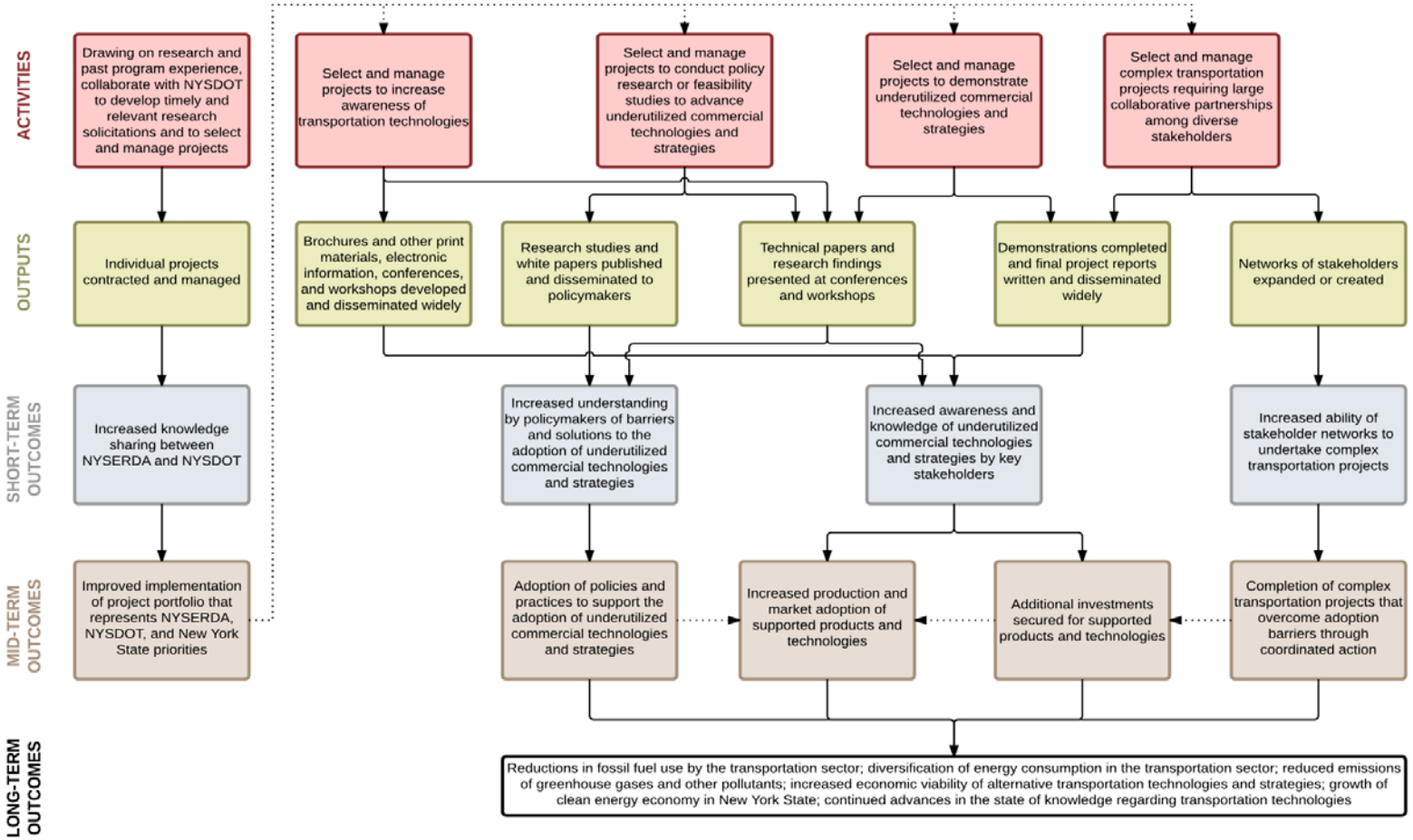


External Influences: Variability of external funding sources, fossil fuel prices, overlapping or complementary programs, private sector initiatives, federal and state energy policies

Note: Dotted lines denote connections that rely on decisions made or actions taken by parties other than NYSERDA or funding recipients.

NYSERDA TRANSPORTATION: PRODUCT DEMONSTRATION

Resources/Inputs: Federal, state, and other funding, including statutory, T&MD, and RGGI funding; Transportation Program staff knowledge and time; expertise of the Technical Evaluation Panel; expertise of NYSERDA business development staff; expertise of NYSDOT project managers; expertise of the Regional Greenhouse Gas Initiative; experience of funding recipients; relationships with key actors and stakeholders; organizational reputation of NYSERDA

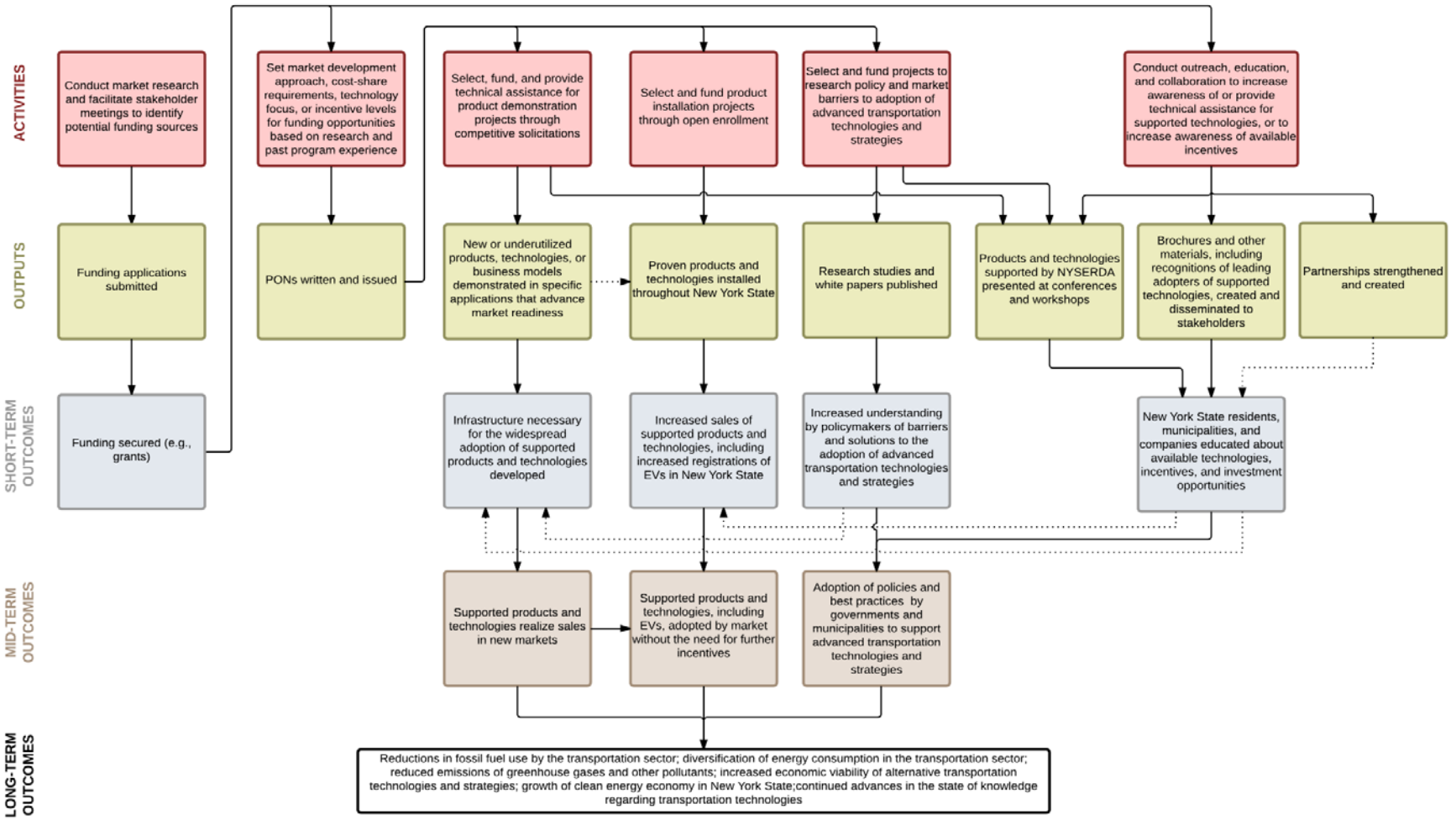


External Influences: Variability and restrictiveness of external funding sources, fossil fuel prices, overlapping or complementary programs, interests of DOT and university partners, federal and state energy policies

Note: Dotted lines denote connections that rely on decisions made or actions taken by parties other than NYSERDA or funding recipients. ·····►

NYSERDA TRANSPORTATION: PRODUCT DEPLOYMENT (INCLUDING ELECTRIC VEHICLE INFRASTRUCTURE)

Resources/Inputs: Federal, state, and other funding, including statutory, T&MD, and RGGI funding; Transportation Program staff knowledge and time; expertise of technical contractors; expertise of and collaboration with external partners, such as the multi-state Transportation and Climate Initiative, Regional Greenhouse Gas Initiative, and other key actors and stakeholders; organizational reputation of NYSERDA



External Influences: Variability and restrictiveness of external funding sources; energy prices; availability of tax credits for supported technologies; overlapping or complementary programs; federal, state, local, and utility energy policies

Note: Dotted lines denote connections that rely on decisions made or actions taken by parties other than NYSERDA or funding recipients. ·····►

Appendix C: Evaluation Report Summaries

C.1 Economic Development Growth Extension Process Evaluation

Conducted by: Industrial Economics, Inc. (IEc), August 2015

Program Summary

As part of NYSERDA's Education to Change Behavior and Influence Choices Initiative, the EDGE program uses targeted community outreach, and involvement in regional economic development initiatives to promote changes in attitudes and behaviors surrounding energy use. Specifically, EDGE uses partnerships with local businesses and organizations to identify potential energy and economic development projects, and matches these potential projects with available NYSERDA funding opportunities. The EDGE program seeks to address technical, economic, informational, and institutional barriers that prevent potential customers from participating in NYSERDA programs. It is designed to expand the lines of communication between NYSERDA and local businesses, organizations, and individuals, especially those conducting economic development projects that are aligned with NYSERDA's programmatic interests.

Evaluation Objectives, Approach and High Level Findings

IEc's overall findings by evaluation question can be summarized as follows:

1. **How effective were (1) the program's multi-tiered organizational structure that included partners, ROCs, contractors, and program staff, and (2) each of the community-based approaches utilized by the EDGE program and partners (e.g. cold calls, attendance at local events, etc.) in progressing toward the program's long-term goals of partnering with local organizations and reaching new potential NYSERDA customers?** The current program structure is largely efficient for day-to-day communications between regional contractors, their subcontractors, and regional EDGE staff. There are constraints, however, on contractor communication with NYSERDA staff outside the EDGE program and EDGE staff communication with subcontractors. In-person communication was identified as the most effective approach to partner with local organizations and reach new potential NYSERDA customers.

2. **Which community-based approaches utilized by the EDGE program have the highest potential to be successful if employed by future NYSERDA pilots?** Contracting with organizations with a broad geographic diversity and organizations with pre-existing relationships with potential partners are the two approaches utilized by the EDGE program with the highest potential for success in future NYSERDA community-based initiatives or pilots. The EDGE program's network of experienced contractors and established partnerships may be valuable to future NYSERDA community-based initiatives or pilots that have similar goals as the EDGE program (i.e., extending NYSERDA's outreach to residential, commercial, institutional, municipal, and/or industrial customers).

3. **How could the community-based approaches utilized by the EDGE program be modified to be more successful if utilized in future pilots?** The major issues raised by interviewees were related to time pressures and program efficiency. The two solutions to these issues identified by interviewees were (1) program-wide templates for marketing materials created by NYSERDA or another centralized entity and (2) increased collaboration between contractors to leverage materials created or partnerships forged by other contractors.

4. **What are some best practices and lessons learned from the EDGE program to capture and retain data obtained through community-based approaches?** Salesforce is an appropriate tool to capture and retain data obtained through community-based approaches. The most common EDGE data gaps identified by interviewees were application and project outcomes after projects apply to other NYSERDA programs. Furthermore, interviewees expressed frustration with the amount of data entry required and whether all requested data was used to track EDGE's progress.

Evaluation Recommendations

Recommendation 1: Future NYSERDA community-based initiatives should continue to contract, partner, or collaborate with organizations with geographic diversity across New York State and established regional relationships. Furthermore, NYSERDA should leverage EDGE's vast network of partners and experienced contractors to the extent the expertise gained and relationships formed within the EDGE program are beneficial to the goals of future NYSERDA community-based initiatives.

The evaluation results showed that face-to-face contact and leveraging existing relationships were some of the most effective approaches to identifying and recruiting new customers and partners. The EDGE program's contractors and partners are located in every region of the state, have formed existing relationships, and have over two years of relevant experience with the EDGE program.

Response to Recommendation 1: Program staff recognize the importance and effectiveness of community-based initiatives utilizing local, trusted partners to create awareness, initiate interest, and spur action for energy efficiency and clean energy projects. NYSERDA anticipates continuing use of contractors to provide regional-based support to customers that will result in added customer value and increased activity in sustainable practices.

Recommendation 2: NYSERDA should ensure all community outreach staff and/or contractors receive regular updates regarding application or project outcomes. This feedback will help outreach staff identify patterns in successful and unsuccessful project applications to inform future project recruitment. There are two information management approaches that could make this feedback-loop possible.

NYSERDA could implement this recommendation by fully integrating their outreach database(s) with the database(s) that track application and project outcomes. A database manager could then link the two data sets using a unique identifier for each individual project, and create periodic reports that contain the status and progress of applications and projects. These reports could then be distributed among outreach staff and contractors.

Alternatively, if integrating the two data sets is not feasible, an alternative solution would be to establish a regular line of communication between the outreach data manager and the application and project outcome data manager(s). Periodically (e.g. once per month or once per quarter), the outreach data manager could e-mail a spreadsheet, database, or list of unique project identifiers for which application outcomes or project outcomes are needed to the application and project outcome data manager(s). Then, the application and project outcome database manager could then use this list of unique projects to create reports that contain the status and progress of applications and projects to return to the outreach database manager. The outreach database manager could then distribute these reports to outreach staff and contractors.

Response to Recommendation 2: Program staff acknowledge that NYSERDA maintains multiple data files to track customer participation in programs. NYSERDA plans to implement a Customer Relationship Management software system in which contractors will track their clientele and have access to NYSERDA program status.

Recommendation 3: Future NYSERDA community-based initiatives should reserve a period of time at the outset to develop goals, metrics, and data requirements and approaches. This will ensure all of the data needed to track progress towards program goals are collected, and will limit burdensome requests for data that may not be used.

The EDGE program has experienced changing goals, data requirements, and reporting since its inception. Many program participants complained about the burden of entering data and questioned whether all the data entered is used to track progress. Limiting data collection and requirements to that which is required to track progress toward program goals saves resources designing and managing the database, entering data, and reporting results.

Response to Recommendation 3: As a public entity, data and metric tracking are key components that help NYSERDA demonstrate progress and shortcomings and help inform future decision making and policy development toward future offerings. Program staff will review and consider changes to current reporting data sets in an effort to reduce unnecessary and overly burdensome reporting.

Recommendation 4: Any future NYSERDA community-based initiatives with a similar design to EDGE should centralize the development of outreach materials or templates that regional staff and/or contractors could potentially leverage and reproduce. Furthermore, future community-based initiatives should require contractors and staff to disseminate any marketing materials produced by individual contractors or staff and/or approved by NYSERDA's marketing department to other contractors and staff. These steps will reduce duplicative efforts and will result in faster approval of program materials by NYSERDA's marketing department.

Time constraints across EDGE program participants and NYSERDA's marketing staff were identified in several interviews. Contractors reported that much of their time was spent developing marketing materials for various NYSERDA programs to present at upcoming events. These materials took up to two weeks to be approved by NYSERDA's marketing staff. Creating pre-approved marketing materials will reduce the time regional contractors spend developing marketing materials and will reduce NYSERDA's marketing department's review time. Similarly, any materials regional contractors or staff create should be required to be shared amongst all program participants to reduce duplicative work across regions.

Regional staff and/or contractors in future NYSERDA community-based initiatives may still need to develop original outreach materials to fully accommodate the needs of individual regions. Future NYSERDA community-based initiatives should not prohibit regional staff and/or contractors from developing unique outreach materials. Centrally-developed outreach materials should supplement and support regionally-developed outreach materials, not to replace them.

Response to Recommendation 4: While developing marketing materials has never been a primary goal of the EDGE ROCs, Program Staff recognize the importance of having "the local voice" communicated of the regions they represent and the occasional need for customized materials. NYSERDA will consider ways to reduce turn-around approval time for marketing materials.

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 - .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.

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

New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

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

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

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