LIPA EFFICIENCY LONG ISLAND AND RENEWABLES PORTFOLIO 2012 ANNUAL EVALUATION REPORT

Final

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LONG ISLAND POWER AUTHORITY

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1. INTRODUCTION TO ANNUAL REPORT

1.1 STRUCTURE OF THE EVALUATION REPORT

This report presents the results of the evaluation of the 2012 Efficiency Long Island (ELI) and Renewable Energy programs for Long Island Power Authority (LIPA), conducted by the Opinion Dynamics evaluation team. The evaluation team produced two reports. This document provides an overview of evaluation findings, including impact and process results for 2012. The Program Guidance Document provides detailed program-by-program impact analysis results, process evaluation findings, and a discussion of data collection and analytic methods.

Key Definitions

Below we provide definitions for key terms used throughout the report:

- **Gross Impacts:** The change in energy consumption and/or demand at the generator that results directly from program-related actions taken by participants, regardless of why they participated. These impacts include line losses, coincident factors for demand, and waste heat factors and installation rate for lighting. Gross impacts are the demand and energy that LIPA's power plants do not generate due to program-related actions taken by participants.

- **Net Impacts:** The change in energy consumption and/or demand at the generator that results directly from program-related actions taken by participants, and would not have occurred absent the program. The only difference between the gross and net impacts is the application of the net-to-gross ratio (NTGR).

- **Net-to-Gross Ratio (NTGR) (Free Ridership and Spillover):** The factor that, when multiplied by the gross impact, provides the net impacts for a program. Free ridership reduces the ratio to account for those customers who would have installed an energy-efficient measure without the program. The free ridership component of the NTGR can be viewed as a measure of naturally occurring energy efficiency, which may include efficiency gains associated with market transformation resulting from ongoing program efforts. Spillover increases the NTGR to account for those customers who install energy-efficient measures outside of the program (i.e., without an incentive), but due to the actions of the program.

- **Evaluated Net Savings:** The net savings by the program for purposes of comparison to program savings goals. Evaluated net savings are determined by applying program planning NTGR to the gross impact estimates determined by the evaluation team.

- **kW (Demand or Capacity):** The average level of power used over an hour. System coincident demand is the level of demand at the hour of the day when there is the maximum demand on the system grid. Peak power is the average power used across a four-hour period when there is high demand. For LIPA, peak demand takes place from 2:00 to 6:00 p.m. Monday through Friday (non-holiday) in the summer months from June to August.

- **kWh (Energy Consumption):** The power consumed over a period of time. Impacts are based on annual usage.

- **Program Administrator Cost Test:** A test that measures the net costs of an energy efficiency program as a resource option based on the costs incurred by the Program Administrator (including incentive costs) and excluding any net costs incurred by the participant.

- **Total Resource Cost Test:** A test that measures the net costs of an energy efficiency program as a resource option based on the total costs of the program, including both the participants' and the utility's costs.

- **Levelized Cost of Capacity:** The equivalent cost of capacity (kW) to be incurred each year over the life of the equipment that would yield the same present value of total costs, using a nominal discount rate of 5.643% to be consistent with the LIPA supply alternatives. The levelized cost is a measure of the costs of the program to the administrator in a form that can be compared to the cost of supply additions.

- **Levelized Cost of Energy:** The equivalent cost of energy (kWh) over the life of the equipment that would yield the same present value of costs, using a nominal discount rate of 5.643%. The levelized cost is a measure of the costs of the program to the administrator in a form that can be compared to the cost of supply additions.

2. EXECUTIVE SUMMARY

In 2012, LIPA continued efforts to expand the Efficiency Long Island (ELI) initiative through improved program delivery and expanded program reach. The 2012 ELI savings goals increased substantially as compared to 2011 and portfolio performance followed suit, with evaluated demand and energy savings increasing by 50% and 43% percent, respectively, over 2011 evaluated results. Key drivers to this success include:

Increased Contributions of the Solution Provider: In 2010, LIPA integrated a new Solution Provider contractor to facilitate program participation and program delivery to work with commercial key account customers. The contractor began operations in Q4 of 2010, and became a key component of the program in 2011. The role of the Solution Provider expanded significantly in 2012, exceeding its annual savings goal for demand and energy by 22% and 19% percent, respectively, while accounting for 30% of the total demand and 27% of the total energy savings realized by the portfolio of ELI programs. The cost effectiveness of the Solution Provider is slightly better than the overall portfolio, with a B/C ration of 3.0.

Full-Scale Implementation of the Small Business Direct Install Program: Late in 2011, LIPA added a new contractor to conduct targeted marketing and outreach to facilitate the installation of energy-efficient lighting among small business customers. While the Small Business Direct Install (SBDI) program did not achieve its annual demand and energy goals for 2012, LIPA program staff collaborated with the implementation contractor to achieve full-scale implementation of the program, which accounted for approximately 20% of evaluated demand and energy savings from the commercial customer segment. It should be noted that LIPA reserves the SBDI program for certain targeted circuits that have a high loading and, therefore, can benefit more from installation of efficient measures.

Increased Sales of Efficient Lighting Products and Market Adoption of LED Lighting: In 2012, LIPA's Energy Efficient Products (EEP) program exceeded its demand and energy savings goals by more than 20%, driven by a significant increase in sales of efficient lighting products. Lighting products account for the vast majority of program sales and savings, and traditionally, compact fluorescent lamps (CFLs) have been the dominant source of lighting product sales and savings through the program. While CFLs still accounted for the large majority of bulbs sold in 2012, sales of LED light bulbs grew significantly. Program sales of LED bulbs have increased from less than 1% of all bulbs sold through the program in 2010, to 4% in 2011, to 11% in 2012. In total volume, the program sold 3,438 LED bulbs in 2010, 68,121 in 2011, and 247,255 in 2012. Market acceptance of LED lighting in the commercial market has also increased with LED fixtures accounting for 33% of all prescriptive lighting savings through the CEP program in 2012.

Adoption of Evaluation Results into Annual Planning: Evaluation findings for each program year cannot be finalized much earlier than five months after the close of the year. As such, LIPA experiences a one-year lag before it can incorporate evaluation findings into program planning assumptions and tracking systems. The 2012 program plans were the first to be informed by evaluation results, having been developed using updated savings assumptions derived from the 2010 evaluation effort, which was completed in May 2011. Similarly, LIPA completed efforts to embed evaluated savings estimates into the Siebel system, allowing for closer alignment between planned and evaluated program savings estimates. This represents a significant milestone in LIPA's efforts to better integrate the program evaluation process into its program planning and implementation efforts. Having accomplished this level of integration, LIPA has directed the evaluation team to direct a larger share of its resources toward strategic research that will allow LIPA to increase the reach and savings delivered by the ELI portfolio.

The following sections review the ELI and Renewable Energy portfolio's program impacts for 2012, as well as the key process findings for the ELI and Renewable Energy programs.

2.1 SUMMARY OF PORTFOLIO PERFORMANCE

LIPA established 2012 annual demand and energy savings goals of 60.8 MW and 263,650 MWh for the combined ELI and Renewable Energy portfolios. Combined evaluated net savings achieved 93% of goal for demand and 99% of goal for energy, as shown in Table 1. Program spending was consistent with this level of savings.

In 2012, LIPA spent just over $96 million implementing the ELI and Renewable Energy programs—86% of the programs' available budgets. Based on our analysis of portfolio impacts and costs, the savings generated by the portfolios are cost-effective. The overall benefit/cost ratio, based on the Program Administrator (PA) test[1], is 2.6 for the combined portfolio savings. (A PA value greater than 1 indicates that portfolio benefits outweigh costs.) In addition, the levelized costs of the combined portfolio savings are $0.053 per kWh, or $215.85 per kW-yr. A levelized cost analysis is a way to quickly compare the cost of energy efficiency programs with energy or demand savings from the programs. Because levelized costs are expressed as $/kW-yr or $/kWh, they can be readily compared to the cost of alternative supply additions or the cost of generating electricity. The levelized costs of the ELI and Renewable Energy portfolios combined are less than the comparable costs of generating the displaced energy.

The avoided cost of displaced energy was updated this year based on a more recent, and lower, forecast for long term natural gas prices. The overall reduction in long term energy prices is now about 40% below what was used in the 2010 and 2011 evaluation reports. The avoided cost of capacity was updated to be consistent with bids received by LIPA in a recent generation and transmission (G&T) auction. The overall reduction in long term capacity prices is now about 15% below what was used in the 2010 and 2011 evaluation reports.

An important catalyst in LIPA's decision to invest in the ELI and Renewable Energy portfolios was the desire to offset the need to develop approximately 520 MW of new generating capacity on Long Island required to satisfy forecasted energy demand. As such, performance relative to the annual capacity savings goals is the primary performance metric for LIPA's programs. LIPA derived its annual savings goals from planning assumptions regarding key inputs to the estimation of expected gross and net savings attributable to program-incented energy efficiency measures. To allow for consistency and direct comparison between evaluated program performance and established savings goals, the evaluation team developed evaluated net savings estimates for each ELI and Renewable Energy program, as shown in Table 1 and presented throughout this report, for purposes of assessing goal attainment. We calculated evaluated net savings by applying LIPA's planning assumptions for the net-to-gross factor to the gross demand and energy savings estimates determined through our evaluation.

[1] The PA test measures the net costs of an energy efficiency program as a resource option based on the costs incurred by the Program Administrator, including all program costs and any rebate and incentive costs, but excluding costs incurred by the participant. To allow for direct comparison with LIPA's assessment of all supply-side options, we applied the PA test as the primary method of determining cost-effectiveness, and used assumptions similar to those used by LIPA's resource planning team.

Among other inputs, the benefit/cost assessment requires an estimate of net program savings. The best-practice approach to this assessment dictates that the net savings used to develop the benefit/cost ratio reflect current levels of naturally occurring energy efficiency, free ridership, and spillover to provide an estimate of the benefits associated with the current year's investment in the programs. As such, the evaluation team used evaluated net-to-gross factors to develop the net energy savings estimates included in the benefit/cost ratio calculation, and for lifetime levelized cost.

Table 1. Net Impacts: ELI & Renewable Energy Portfolio Evaluated Impacts Versus Goals

Program	Budget	Actual Cost	Coincident Demand Savings (MW)		Energy Savings (MWh)		Benefit/ Cost Ratio (PA)	PA Levelized Costs	
			Goal	Evaluated	Goal	Evaluated		$/kW-yr	$/kWh
CEP Mid Market	$14,973,658	$14,724,508	8.24	7.30	34,754	27,939	2.2	249.95	0.066
Solution Provider	$17,935,493	$23,436,123	12.64	15.43	55,553	66,168	3.0	182.97	0.044
SBDI	$15,767,716	$6,513,140	10.12	5.24	43,195	21,939	5.2	137.99	0.033
Commercial Efficiency Program	**$48,676,867**	**$44,673,772**	**31.00**	**27.96**	**133,502**	**116,046**	**3.1**	**190.76**	**0.047**
EEP	$13,818,313	$13,621,284	13.40	16.25	94,432	117,297	4.2	162.65	0.023
Cool Homes	$6,023,784	$5,044,860	7.32	4.42	8,425	3,922	3.1	128.10	0.160
REAP	$3,133,688	$3,211,694	0.73	0.32	4,700	2,345	0.4	1,593.50	0.217
HPwES	$4,657,957	$4,422,998	0.72	0.45	669	735	0.3	1,329.70	0.830
HPD	$3,598,146	$1,975,005	1.12	0. 84	3,487	2,300	1.0	427.58	0.242
Existing Homes Subtotal	*$17,413,576*	*$14,654,556*	*9.89*	*60.3*	*17,281*	*9,301*	*1.4*	*312.51*	*0.220*
ES New Homes	$2,501,847	$1,872,265	0.70	1.05	896	1,513	2.3	179.66	0.124
Subtotal Residential	**$33,733,736**	**$30,148,105**	**23.99**	**23.33**	**112,609**	**128,110**	**2.7**	**213.73**	**0.044**
Subtotal ELI	**$82,410,603**	**$74,821,877**	**54.99**	**51.30**	**246,111**	**244,157**	**2.9**	**199.39**	**0.046**
Solar PV	$27,420,437	$20,855,832	5.52	5.31	15,665	12,733	1.6	296.76	0.124
Backyard Wind	$1,404,112	$394,715	0.04	0.02	490	113	0.4	1,795.81	0.263
Solar Hot Water	$866,700	$157,476	0.24	0.01	1,384	9	0.2	2,244.28	1.536
Subtotal Renewables	**$29,691,249**	**$21,408,024**	**5.80**	**5.34**	**17,539**	**12,855**	**1.6**	**303.37**	**0.126**
Total	**$112,101,852**	**$96,229,901**	**60.79**	**56.63**	**263,650**	**257,012**	**2.6**	**215.85**	**0.053**

Notes:

1. B/C Ratio from Program Administrator perspective using comparison to baseload marginal supply costs. If B/C is greater than 1.0, program is cost-effective.
2. All levelized cost calculations use a discount rate of 5.643% to be consistent with supply-side alternatives.
3. Results do not include R&D or LIPA Edge.
4. Actual costs are the expenditures necessary to obtain the energy and demand savings as reported in Siebel, and do not reflect LIPA accrual accounting.

In 2012 LIPA spent slightly more than $96 million on the ELI and Renewable portfolios, a 43% increase in combined spending as compared to 2011. Figure 1 presents a summary of LIPA's $75 million spending related to implementation, management and evaluation of ELI programs by type of expenditure. Figure 2 provides the detail for LIPA's $21 million investment in the 2012 Renewable Energy portfolio.

Figure 1. 2012 LIPA Expenditures for the ELI Portfolio

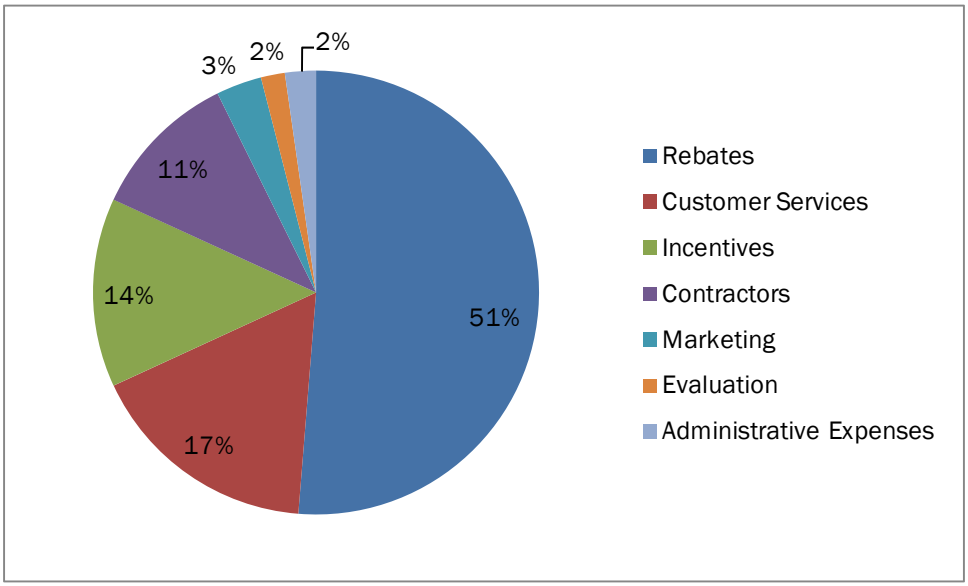
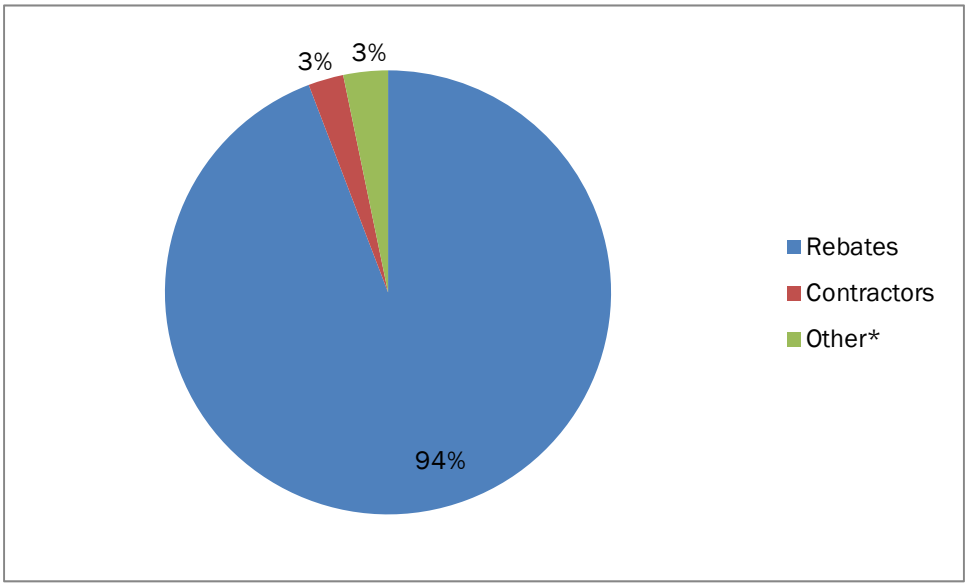


Figure 2. 2012 LIPA Expenditures for the Renewable Energy Portfolio



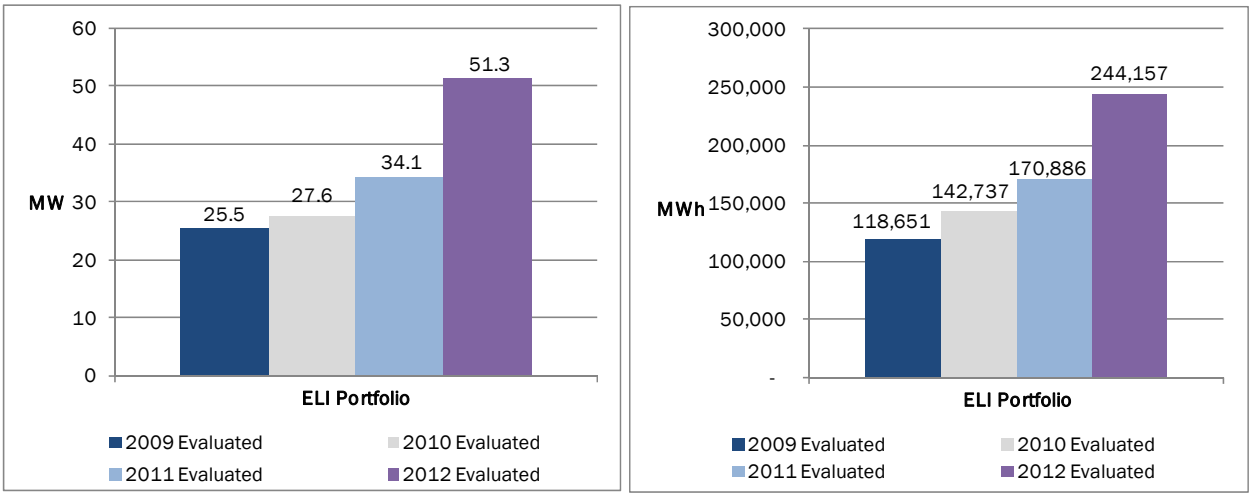
*Other includes marketing and administrative expenses.

2.2 ELI PORTFOLIO EVALUATED IMPACTS

In 2012, LIPA spent approximately $75 million on the ELI portfolio. Overall, evaluated net savings from the ELI portfolio included 51 MW of demand and more than 244,000 MWh of energy. The ELI portfolio resulted in the annual displacement of roughly 154,500 tons of CO_2, 536 tons of SO_2, and 166 tons of NOx. These environmental savings represent the equivalent of removing approximately 26,000 cars from the road, and a fuel savings of roughly 326,000 barrels of oil[2].

The ELI portfolio performed exceptionally well in 2012, achieving a 50% increase in demand savings and a 43% increase in energy savings as compared to 2011. Further, the ELI portfolio ended the year at 93% of the overall net demand (MW) savings goal, and fell just short (99%) of the overall net energy (MWh) savings goal. Figure 3 presents the consistent increase in evaluated savings across the four years since ELI's inception, and marked increase in savings realized in 2012.

Figure 3. 2012 ELI Portfolio Evaluated Net MW and MWh Savings



There were variances between evaluated results and the established savings goals across programs. The largest shortfall was in the Small Business Direct Install (SBDI) program component. It is important to note that due to significant delays in the procurement process in 2011, implementation of SBDI was delayed until November of 2011. The 2012 goals were thus increased substantially to include the unrealized portion of the 2011 goal. Notably, this shortfall was offset by the Solutions Provider and Energy Efficient Products program components surpassing their goals.

Total evaluated net savings for 2012 indicate that the Energy Efficient Products (EEP) program and Commercial Efficiency Program (CEP) are key drivers to portfolio performance – combined, accounting for 86% of evaluated net demand savings and 96% of evaluated net energy savings. In total the combined evaluated net savings for CEP and SBDI fell short of the annual savings goal, realizing 90% of the 2012 demand savings goal and 87% of the energy savings goal. The deficit in savings was driven by the shortfall in evaluated savings from the SBDI program, which achieved 52%

[2] Displacement and equivalent savings values based on NYS PSC calculator provided by LIPA.

and 51% of the annual demand and energy goals, respectively. However, as noted above, the SBDI goal for 2012 was increased significantly to include the portion of the 2011 goal that was not realized due to the delay in program implementation. In contrast, CEP, comprising the integrated efforts of the Solution Provider and CEP Mid-Market implementation components, exceeded its demand and energy goals by 9% and 4%, respectively. Overall, the commercial portfolio performed extremely well, increasing evaluated net demand and energy savings by 70% and 64% respectively as compared to 2011.

The EEP program accounts for the largest share of demand and energy savings among the residential programs and dictates the performance of the residential portfolio, particularly with respect to energy savings. EEP surpassed the annual demand and energy savings goal, realizing evaluated net demand savings equal to 121% of the goal and evaluated net energy savings equal to 124% of goal. This increase in EEP savings is in contrast to shortfalls in 2011. The savings in excess of goals from the EEP program was offset by a shortfall in both demand and energy goals for the Cool Homes program. The Cool Homes program realized net evaluated demand savings equal to 60% of goal and evaluated net energy savings equal to 47% of goal. The majority of the difference between evaluated net savings and goal for the Cool Homes program can be attributed to differences between program planning assumptions regarding the number of measures incented through the program and the actual numbers delivered by the program.

Based on an analysis of portfolio impacts and costs, the savings generated by the ELI portfolio are cost-effective. As shown in Table 2, the benefit/cost is 2.9. (A benefit/cost value greater than 1 indicates that portfolio benefits outweigh costs.) In addition, the levelized costs for ELI portfolio savings is $199.39 per kW-yr or $0.046 per kWh—less than the comparable marginal costs of supply-side alternatives.

Table 2. Summary of 2012 ELI Program Administrator (PA) Cost Test and Levelized Costs

2012 Portfolio	Benefit/Cost Ratio (PA)	Levelized Cost ($/KW-yr)	Levelized Cost ($/KWh)
Efficiency Long Island (ELI)	2.9	199.39	0.046

2.3 ECONOMIC IMPACTS OF ELI

Beginning with the 2011 evaluation effort, LIPA has requested that the evaluation team conduct an assessment of the economic impact of its investment in the ELI and Renewable Energy portfolios on the economy of Long Island. In 2011, the evaluation team developed an Input-Output (I-O) model of the Long Island regional economy using IMPLAN modeling software to estimate these impacts. Central to the I-O model approach is the development of a static model for the effects of program spending based on a matrix of relationships among economic sectors, including industries, households, government, and foreign trade. The model requires inputs on spending, avoided cost, electric rates, and other parameters from LIPA, and draws on the net savings information included in the benefit/cost assessment. The evaluation team updated this model and its inputs for this 2012 evaluation.

In our PY2011 evaluation, we estimated one-year and 10-year economic impacts associated with LIPA's 2011 investment, where the 10-year economic impacts accrue from measures installed in 2011 over their remaining measure life. We then extrapolated these impacts to the prior two years of ELI implementation (assuming similar multipliers of economic impact) to arrive at a portfolio-to-date

estimate. In our PY2012 evaluation, we estimated one-year and 10-year economic impacts associated with LIPA's 2012 investment, using updated model data and inputs. We added these impacts to our 2011 portfolio-to-date estimate (adjusted to 2012 dollars) to arrive at our 2012 portfolio-to-date estimate.

As shown in Table 3, our analysis of economic benefits found that LIPA's $75 million investment in the ELI portfolio in 2012 returned $82 million in total economic benefits to the Long Island regional economy in 2012, including an additional 609 full-time equivalent (FTE) employees.[3] Over 10 years, these 2012 investments are expected to return $142 million in total economic benefits to the regional economy (in 2012 dollars[4]), with an employment benefit of 1,086 new FTEs over the time period.

Extrapolating these results over the four-year life of the portfolio, LIPA's $180 million investment to date in ELI ($191 million in 2012 dollars) produced approximately $235 million[5] in cumulative economic benefits in first of each program year, with an employment benefit of 1,612 FTE employees. Over the 10 years following each program year investment, these four-year investments are expected to return $528 million[6] to the Long Island regional economy, and result in 3,731 additional FTEs between 2009 and 2021.

Table 3. Economic Impact of PY1-PY4 ELI Program Investments

Effect	Impact of 2012 Program Investment		Impact of 2009-2012 Program Investment	
	First-Year Impact	*Impact over 10 years**	*First-Year Impact*	*Impact over 10 years**
Total Economic Output[7] (2012 $1M)	$81.6	$141.5	$235.0	$528.3
Full-Time Equivalent Employees	609	1,086	1,612	3,731

*Includes the 10-year impacts for each program year beginning in that year

[3] Full-time equivalents represent the number of total hours worked divided by the number of compensable hours in a full time schedule. This unit allows for comparison of workloads across various contexts. An FTE of 1.0 means that the workload is equivalent to a full-time employee for one year, but could be done by one person working full-time for a year, two people working part-time for the year, or two people working full-time each for six months.

[4] Using the energy supply discount rate assumption of 5.643%.

[5] 2012 dollars.

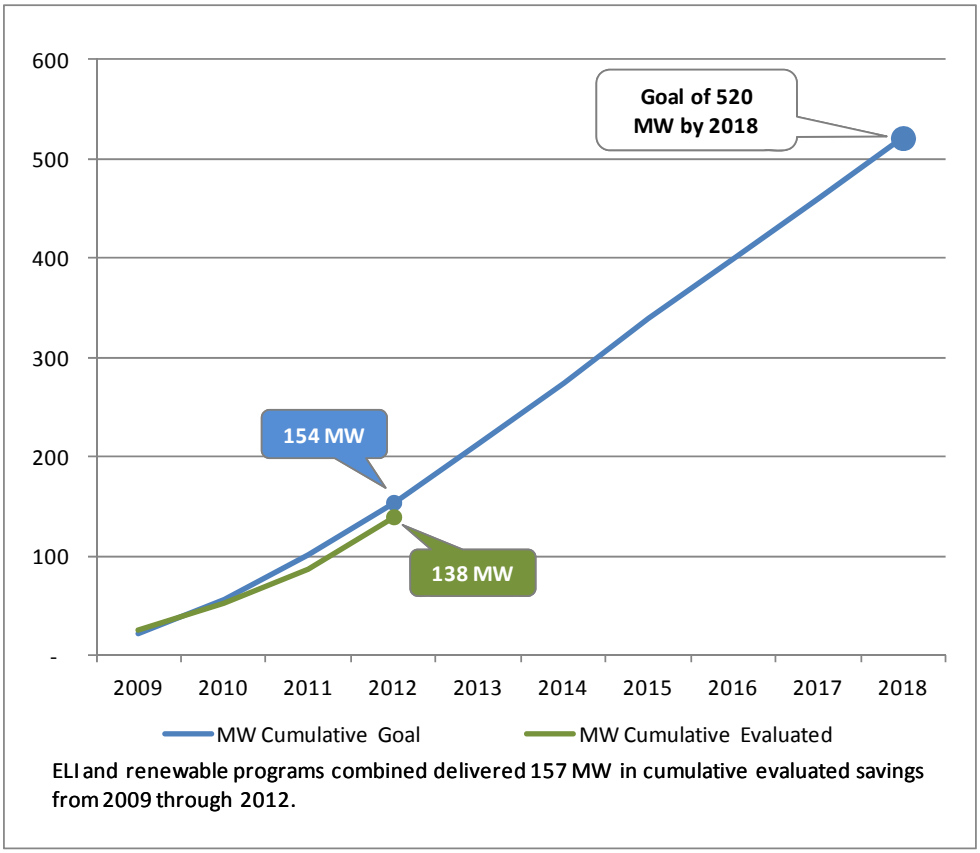
[6] 2012 dollars.

[7] Total economic output is the value of industry production. In IMPLAN these are annual production estimates in producer prices.

2.4 PROGRESS TOWARD LONG-TERM ELI GOALS

LIPA has established aggressive annual and cumulative demand savings goals for the ELI portfolio. Specifically, the goals call for a cumulative reduction of 520 MW in system coincident peak demand by 2018.

Figure 4. Progress Towards Demand Goal (MW)



LIPA continues to make progress toward the long-range goal having achieved 113%, 93%, and 86% of the cumulative goal in 2009, 2010, and 2011, respectively. Based on our analysis of cumulative evaluated net capacity savings attributable to ELI programs since 2009, the portfolio is slightly ahead its pace from last year, but still behind the long-range capacity goals. Evaluated performance of the ELI portfolio indicates that, at the portfolio level, cumulative evaluated net demand savings through 2012 are 10% below goal compared to 14% through 2011. It should be noted that LIPA's Electric Resource Plan uses an expected value of 79% achievement for the overall ELI program in its capacity planning models to account for the probability of meeting goals.

Notably, during the same four-year period, the ELI portfolio has also under spent the cumulative ELI budget by approximately 21% while each year evaluated MW savings has increased, suggesting LIPA has been prudent in its expenditures. Also, when the cumulative demand savings associated with renewable programs since 2009 are added to ELI savings, the total cumulative evaluated demand savings increases to 157 MW. It is important to note that delays in the procurement process for two commercial program implementation contractors in prior years accounts for a large share of the budget not spent. While these delays are not uncommon after substantial expansions in programmatic efforts or changes in program design, with all contractors now online, LIPA expects to

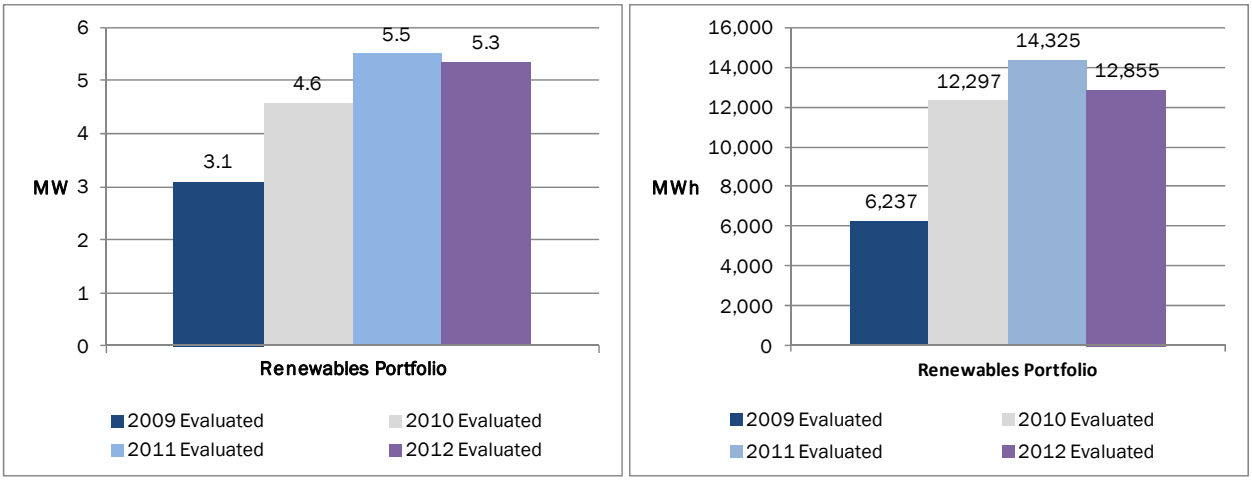
fully utilize the allocated budgets going forward. As program spending increases to planned levels, we anticipate that customer participation will increase to targeted levels, and the gap between evaluated MW and the cumulative MW goal will close. LIPA and the ELI planning contractor are working closely to assess options for building on the portfolio's strong performance with respect to delivering capacity savings to increase savings as necessary to close the current gap between evaluated savings and the established goal.

2.5 RENEWABLE PORTFOLIO IMPACTS

In 2012, LIPA spent approximately $21 million in ratepayer funds on the Renewable Energy portfolio. Overall, the portfolio resulted in roughly 5.3 MW of coincident demand savings and nearly 13,000 MWh of reduced energy consumption. The Renewable Energy portfolio resulted in an annual displacement of more than 7,500 tons of CO_2, nearly 13 tons of SO_2, and 8 tons of NOx. These environmental savings represent the equivalent of removing more than 1,200 cars from the road, and a fuel savings of nearly 16,000 barrels of oil.[8]

The Renewable Energy portfolio performed well in 2012, but fell short of the established goals, achieving 92% of its net demand goal and 73% of its energy savings goal, while spending just 72% of budget. The Solar PV program is the clear driver of portfolio performance. The shortfall in savings relative to the portfolio goals is largely attributed to fewer than anticipated solar PV systems installed through the program. Both the Small Wind and Solar Thermal programs completed a very limited number of projects in 2012.

Figure 3. 2012 Renewable Energy Portfolio MW & MWh Impacts



The evaluation team also reviewed the cost-effectiveness of the Renewable Energy portfolio. Based on an analysis of portfolio impacts and costs, the savings generated by the Renewable Energy portfolio are cost-effective. As shown in Table 4, the benefit cost is 1.6. (A benefit/cost value greater than 1 indicates that portfolio benefits outweigh costs.) 2012 levelized cost is $0.126 per kWh, and costs for solar are trending down. It is important to note that this levelized cost does not include the

[8] Displacement and equivalent savings values based on NYS PSC calculator provided by LIPA.

lost revenue associated with net metering, which is consistent with how energy efficiency programs are evaluated.

Table 4. Summary of 2012 Renewable Energy Program Administrator (PA) Cost Test and Levelized Costs

2012 Portfolio	Benefit Cost Ratio (PA)	Levelized Cost ($/KW-yr)	Levelized Cost ($/KWh)
Renewable Energy	1.6	303.37	0.126

2.6 ECONOMIC IMPACTS OF RENEWABLE PORTFOLIO

As noted above, the PY2012 evaluation included an assessment of the economic impact of investments in the ELI and Renewable Energy portfolios on the economy of Long Island. The evaluation team developed an I-O model of the Long Island regional economy for the 2011 evaluation and updated the model inputs for 2012. We estimated economic impacts associated with LIPA's 2012 investments, and then combined those results with our 2011 assessment of the prior three years of implementation of the Renewable Energy programs to arrive at a portfolio-to-date estimate.

As shown in Table 5, our analysis of economic benefits found that LIPA's $21 million investment in the Renewable Energy portfolio in 2012 returned $5 million in total economic benefits to the Long Island regional economy in 2012, including an additional 37 FTEs. Over the 10-year period, these 2012 investments are expected to return $13 million in total economic benefits to the regional economy (2012 dollars[9]), with an employment benefit of 101 new FTEs.

Extrapolating these results over the four-year life of the portfolio, LIPA's $77 million investment in Renewable Energy programs ($84 million in 2012 dollars) has produced approximately $82 million[10] in cumulative economic benefits in first of each program year with an employment benefit of 581 FTE employees. Over the 10 years following each program year investment, these four-year investments are expected to return approximately $137 million[11] to the Long Island regional economy and result in 852 additional FTEs between 2009 and 2021.

[9] Using the energy supply discount rate assumption of 5.643%.

[10] 2012 dollars.

[11] 2012 dollars.

Table 5. Economic Impact of PY1-PY4 Renewable Energy Program Investments

Effect	Impact of 2012 Program Investment		Impact of 2009-2012 Program Investment	
	First-Year Impact	*Impact over 10 years**	*First-Year Impact*	*Impact over 10 years**
Total Economic Output[12] (2012 $1M)	$5.0	$12.8	$82.1	$136.8
Full-Time Equivalent Employees	37	101	581	852

*Includes the 10-year impacts for each program year beginning in that year

2.7 KEY THEMES FOR CONTINUED SUCCESS

As noted above, the ELI and Renewable Energy portfolios demonstrated strong performance in 2012, providing substantial capacity and energy savings in a cost-effective manner despite falling short relative to the established goals. The long-range goals for both portfolios project annual increases in capacity and energy savings. To keep pace with increasing goals, LIPA must identify and consider emerging issues and challenges to success in its planning and management decisions. Below we provide an overview of the performance of the ELI and Renewable Energy programs for the 2012 evaluation cycle, and identify challenges found through our research to be addressed in the future.

Commercial ELI Programs

Overview of performance

While falling short of established goals, LIPA's portfolio of commercial programs showed strong performance in 2012, significantly increasing evaluated net demand and energy savings as compared to 2011. The performance of the commercial programs is particularly impressive given the significant revision of the implementation strategy for the commercial portfolio that saw the addition of two new implementation contractors over the last two years, including the full-scale implementation of the SBDI program at the beginning of 2012.

LIPA substantially increased the savings goals for the commercial portfolio for 2012, with nearly half of the increase expected to be achieved by the SBDI program. Due to delays in the procurement process, the SBDI contractor was not engaged until late in the program year and did not become fully integrated in program implementation in 2011 as originally planned. As such, in consultation with the SBDI implementation contractor, the 2012 goals were increased to include the unrealized portion of the 2011 goal. The SBDI program performed well, realizing savings on par with the originally anticipated goal for 2012, but falling short of the combined goal. Notably, much of this shortfall was offset by savings achieved by the Solution Provider delivered component of the CEP program.

[12] Total economic output is the value of industry production. In IMPLAN these are annual production estimates in producer prices.

Throughout 2012 the CEP program continued to enhance its design and implementation strategies to increase participation levels, streamline program delivery, improve program tracking data accuracy, and achieve high levels of customer and trade ally satisfaction. The most significant changes made in 2012 included enhanced incentive structures and bonus initiatives aimed at both customers and trade allies, more versatile measure offerings, improved marketing and outreach strategies, increased trade ally engagement, and more streamlined and optimized application, project coordination, and data tracking processes.

Challenges for Future

The annual capacity and energy savings goals for CEP continue to increase. To meet the aggressive savings goals, the program must continue to increase participation and refine the implementation procedures and program outreach and marketing efforts to ensure that program efforts are leveraged with maximum effectiveness. In recent years, the CEP program has become much more proactive and focused in its outreach to and engagement of customers and trade allies. It has streamlined and automated application and data entry processes to reduce barriers to participation and deployed coordination systems across the implementation contractors allow for improved lead tracking and seamless program delivery. Finally, integration of program protocols and guidelines allow for streamlined and consistent project execution. While opportunities for improvement still exist, the CEP portfolio is well-positioned for strong performance in the coming years.

Despite the strides the CEP program has made over past few years, ever increasing and aggressive savings goals will be challenging to realize given the characteristics and size of LIPA's commercial customer base, code changes that erode the remaining potential for savings, as well as barriers to adoption of energy efficiency that exist in the marketplace. Continuing to deliver high levels of savings will require aggressive customer marketing and outreach and trade ally engagement and continued enhancements to measure offerings and incentive structures.

To the extent that LIPA relies on increased savings from the SBDI program component, while there are opportunities for increased customer education and engagement, there remain a variety of barriers to program participation. The small commercial customer base is often counted among "hard to reach" populations presenting unique challenges. LIPA's program design seems appropriate for the target market with a turnkey approach and generous incentive levels. However, our initial research indicates relatively low program awareness among small commercial customers. Other barriers to participation include a lack of opportunities for the installation of program measures among some recipients of program audits, concerns regarding the cost of participation and the potential disruption of business operations. As the program is in its first year of full-scale implementation, the evaluation team will work with LIPA to carefully monitor the performance of the SBDI program and identify possible enhancements to the program design.

Residential ELI Programs

Overview of performance

The ELI portfolio offers a comprehensive suite of residential programs for LIPA customers. Collectively, the programs provided substantial capacity and energy savings; however, annual MW demand savings at the residential portfolio level fell slightly below established goals while MWh energy savings exceeded goals. Individually, the programs are effectively delivered as participation is strong and there exists a well-established network of participating contractors and retailers working with program staff to help implement the programs.

Challenges for Future

Achieving the aggressive Cool Homes targets will be a challenge. LIPA's 2012 plan for the Cool Homes program called for increased program participation, and in particular, customers that replace working central air conditioners (CAC) with energy efficient equipment which reduces peak demand. The program fell short of its savings goal, due in almost entirely to lower than planned program participation. While the Cool Homes program has a strong network of participating contractors, the program accounts for a relatively small share of the residential CAC market in terms of both units sold and contractors. At LIPA's direction, the evaluation team is conducting market assessment research designed to better characterize the size and function of the CAC market and identify opportunities to reduce barriers to program participation and capture increased market share through the Cool Homes program.

With respect to capacity and energy savings, the performance of the EEP program is a significant contributor to the performance of the residential portfolio with Compact Fluorescent Lamps (CFL) savings accounting for a substantial proportion of savings from the EEP program. The CFL market is evolving and the baseline efficiency of incandescent bulbs will increase going forward due to code changes introduced as part of the Energy Independence and Security Act (EISA) of 2007, which requires the phasing out of inefficient 100-watt incandescent light bulbs beginning in 2012, and incandescent bulbs of lower wattages in future years. While we anticipate that CFLs will remain an important part of the residential portfolio into the future, they will gradually yield lower savings per unit as the baseline efficiency of residential lighting increases. While the heavy reliance on CFLs for residential energy and demand savings is common among utilities implementing energy efficiency programs, the reduction in unit savings presents a challenge. LIPA has worked to adjust the portfolio to accommodate this reduction in CFL savings and significantly increased the share of Solid State Lighting products (LED's) through the program in 2012. Code changes will also go into effect in 2014 that reduce savings associated with room air conditioners incentivized through EEP.

Renewable Energy Programs

Overview of Performance

The Renewable portfolio performed well in 2012, both in terms of delivering substantial demand and energy savings and, in particular, with respect to its role in the development of a renewable energy industry on Long Island. The Solar PV program (Solar Pioneer and Solar Entrepreneur) has, over time, effectively developed a strong PV market infrastructure on Long Island and knowledgeable trade ally base.

Challenges for Future

The New York Sun Initiative has a goal to quadruple customer sited solar PV capacity in the State from 2011 to 2013, and continue to grow thereafter. While LIPA has had good success in growing its solar PV program, and costs continue to decline, this is an aggressive goal. It will require a continued strong commitment to the Solar Pioneer and Solar Entrepreneur programs, along with expansion of the Clean Solar Initiative Feed-In Tariff. The recent launch of residential leasing and expansion of net metering up to 3.0% of peak demand should help LIPA meet its share of the New York Sun Initiative goal.

The Backyard Wind and Solar Thermal program components have been in place for three and two years, respectively, and continue to have very low participation. While combined they account for a small share of expected savings, for these programs to achieve annual goals, LIPA should consider strategic market research to assess the potential for expanding acceptance of program measures

among the targeted customer base and if barriers to participation can be addressed through program design enhancements.

3. IMPACT RESULTS

This section presents the evaluated net energy and demand impacts for the ELI and Renewable portfolios.

3.1 ELI PORTFOLIO IMPACTS

Energy and Demand Impacts

The portfolio of ELI programs performed well in 2012, achieving a significant increase in evaluated net savings as compared to 2011, delivering considerable energy and demand savings to electric customers on Long Island. Specifically, the ELI portfolio accounted for more than 51 MW and 244,000 MWh in total evaluated net savings for 2012. This represents a 51% increase in evaluated net demand savings and 43% in evaluated net energy savings over 2011 results, which were approximately 34 MW and 171,000 MWh. Despite these impressive results, the ELI portfolio fell slightly short of its stated goals. As shown in Table 6, the portfolio reached 93% of its net demand and 99% of its net energy savings goals. The 2012 goal was 55 MW, program tracking reported nearly 52 MW, and after a rigorous evaluation, we find evaluated net savings of 51 MW.

Table 6. Net Impacts: ELI Portfolio Evaluated Savings versus Goals

Program	2012 Net Savings Goals		Evaluated Net Savings		Percent of Goal	
	MW	MWh	MW	MWh	MW	MWh
CEP Mid-Market	8.24	34,754	7.30	27,939	89%	80%
Solution Provider	12.64	55,553	15.43	66,166	122%	119%
Direct Install	10.12	43,195	5.24	21,939	52%	51%
Total Commercial	*31.00*	*133,502*	*27.96*	*116,046*	*90%*	*87%*
Energy Efficient Products	13.40	94,432	16.25	117,297	121%	124%
Cool Homes	7.32	8,425	4.42	3,922	60%	47%
Residential Energy Affordability Partnership	0.73	4,700	0.32	2,345	44%	50%
Home Performance with ENERGY STAR®	0.72	669	0.45	735	64%	110%
Home Performance Direct	1.12	3,487	0.84	2,300	75%	66%
Residential New Homes	0.70	896	1.05	1,513	149%	169%
Total Residential	*23.99*	*112,609*	*23.33*	*128,110*	*97%*	*114%*
ELI Total	*54.99*	*246,111*	*51.30*	*244,157*	*93%*	*99%*

For the first year since the inception of ELI portfolio, the commercial programs accounted for more than half of total evaluated net demand savings. At the portfolio level, commercial programs achieved 90% of their combined 2012 net demand savings goal and 87% of their net energy savings goals. Notably, LIPA increased the 2012 demand and energy goals for commercial programs by 48% and 46% respectively over 2011 levels. The portfolio of residential programs fell just slightly below their combined demand savings goals (achieving 97% of goal) and above the combined energy savings goal (achieving 114% of the goal).

The Solution Provider component of the CEP program represented more than 40% of the total annual demand and energy goal for the commercial portfolio. This element of the program performed extremely well, exceeding the goals for demand and energy savings by 122% and 119% respectively, while ultimately accounting for 55% and 57% of the full-year evaluated savings, respectively. In contrast, while both the CEP Mid-Market component of CEP and the SBDI programs delivered substantially more savings than in 2011, both fell below their respective demand and energy goals.

The EEP program continues to account for the largest portion of energy and demand savings within the residential portfolio, and performance of this program, along with the Cool Homes program, has a substantial impact on the ability of the portfolio to achieve savings goals. The EEP program exceeded the demand savings goal by 21%, while the Cool Homes program missed the demand goal by 40%, accounting for the majority of the portfolio-level shortfall for this metric. The EEP program exceeded its net energy savings goal by 24%, significantly contributing to the strong overall performance of the residential portfolio in 2012.

The shortfall in evaluated demand savings attributable to the Cool Homes program is primarily due to lower program participation than would be required to meet the annual goal. At LIPA's direction, the evaluation team is currently conducting targeted research to better characterize the residential HVAC market on Long Island and identify opportunities to increase participation of contractors and customers in the program.

3.2 RENEWABLE PORTFOLIO IMPACTS

Energy and Demand Impacts

The portfolio of Renewable programs fell short of net demand and energy goals by 8% and 27%, respectively. The performance of the portfolio is driven by the performance of the Solar PV program, as shown in Table 7.

The Small Wind program reached 44% and 23% of its demand and energy savings goals, respectively. The Solar Thermal program, in its second year of implementation, achieved 2% and 1% of its demand and energy goals, respectively. In the case of all three renewable energy programs, the shortfall in savings is associated with lower than planned levels of program participation.

Table 7. Net Impacts: Renewable Portfolio Evaluated Savings versus Goals

Program	2012 Net Savings Goals		Evaluated Net Savings		Percent of Goal	
	MW	MWh	MW	MWh	MW	MWh
Solar PV	5.52	15,665	5.31	12,733	96%	81%
Solar Hot Water	0.24	1,384	0.01	9	2%	1%
Small Wind	0.04	490	0.02	113	44%	23%
Total Renewable	**5.79**	**17,539**	**5.34**	**12,855**	**92%**	**73%**

4. PROGRAM SPECIFIC RESEARCH

While the impact assessment was the primary focus of the 2012 evaluation effort, the evaluation team also completed research on specific programs and select markets targeted by key LIPA programs to enhance program design, delivery, and performance. These efforts focused on four aspects of LIPA's program implementation: 1) SBDI market traction, 2) EEP program participation, 3) Cool Homes program market assessment, and 4) ENERGY STAR Labeled Homes program process assessment. Below we summarize the research and associated process findings for each of these implementation areas. More detail on the methods, findings, and recommendations are presented in the 2012 Program Guidance document.

4.1 SBDI MARKET TRACTION

LIPA launched the SBDI program in late 2011 and realized full-scale implementation in 2012. The program targets small commercial customers located on capacity constrained circuits on Long Island and features a turnkey program design and generous incentives for the installation of high efficiency lighting measures.

LIPA has established aggressive savings goals for its commercial programs, SBDI included. As SBDI is designed to target a market segment that is typically characterized by low levels of efficiency program participation, LIPA directed the evaluation team to conduct research to identify barriers to participation and opportunities to optimize program uptake. Specifically, the evaluation team completed the following efforts:

- Analysis of LIPA customer and SBDI program tracking data
- In-depth interviews with SBDI program staff
- Primary research with non-participating SBDI qualifying customers

Our research indicates that, while the potential for substantial savings from LIPA's small commercial customer base exists, this potential may be challenging to realize through the SBDI program due to the size and characteristics of LIPA's commercial customer base and common barriers to participation among small commercial customers. For example, SBDI qualifying customers represent a considerable share of LIPA's commercial customer base, as the program currently targets approximately one-quarter of all commercial customers in LIPA's service territory. While LIPA may consider expanding the number of circuits currently targeted by the program to increase SBDI participation, such a change may increase overlap with the commercial customer base targeted by the Mid-Market program component, thus potentially reducing CEP program savings and confusing customers.

As is commonly the case in the initial phases of program implementation, program awareness among eligible customers appears to be a barrier to SBDI participation. While of the program has targeted nearly the entire eligible customer base with direct mailing efforts, primary research revealed that in general, SBDI qualifying customers lack awareness and knowledge of the program and its benefits, including incentives and financing options. SBDI qualifying customers also cite upfront costs, potential disruption to business operations, and lack of time and resources to plan and oversee equipment retrofit projects among the barriers to program participation. These findings suggest that more aggressive marketing and outreach and improved messaging strategies focusing on incentives, financing offerings, and hassle-free, fast, and seamless program delivery will be beneficial in engaging existing customer base. Enhancing the program design and implementation

structures to ensure minimal upfront investment and fast and seamless project delivery may be beneficial as well.

To date, approximately 38% of the audits completed by the program implementation team result in the installation of energy efficient measures. Our review of program records, interviews with program staff and customers that received an audit but did not install measures through the program indicate that 21% of completed audits fail to identify program eligible retrofit opportunities. This may suggest that lighting savings potential among the eligible customer base could be lower than expected and that LIPA may wish to consider offering additional measures through the program, such as small, packaged air conditioning systems. In cases where audits identified opportunities to install program measures, customers report other barriers to participation including the up-front cost, the length of time required to complete the retrofit, and lack of availability of incentives for measures other than lighting in which customers are interested.

4.2 ENERGY EFFICIENT PRODUCTS (EEP) PROGRAM PARTICIPATION

The Energy Efficient Products (EEP) program offers discounts on several energy efficient products, including lighting, appliances, pool pumps, and televisions. Rebates are also provided for recycling old appliances. We based our process assessment of the 2012 EEP program on data and information from two data collection and analysis efforts, including:

- **In-depth interviews with program staff and program implementation contractors**: We conducted interviews with three LIPA staff members, two Applied Proactive Technologies, Inc. (APT) staff members, two Energy Federation, Inc. (EFI) staff members, and one representative from Appliance Recycling Centers of America, Inc. (ARCA).

  Key questions explored during these interviews included:

  - What are the goals of the program?
  - Have roles or responsibilities changed for the program in 2012?
  - What are the major strengths or successes of the program, and what are the major challenges or barriers?
  - Were there changes to rebate levels, product types, program designs or processes?

- **Review of program databases and materials**: We reviewed the program-tracking database and program promotional materials.

In the Program Guidance document, we present our detailed process findings by product type, and discuss program participation, any changes that occurred during the program year, marketing and outreach efforts, data tracking, and potential recommendations. Below we provide a summary of our conclusions and recommendations resulting from the data collection and analysis described above.

LIPA's EEP program exceeded its demand and energy savings goals by more than 20%, driven by a significant increase in sales of efficient lighting products. The program exceeded its unit sales goals for several product categories, including ENERGY STAR common CFLs, LEDs, fixtures, dehumidifiers, refrigerators, room air conditioners, advanced power strips and dehumidifier recycling. The program fell short of unit goals for specialty CFLs, pool pumps, televisions, room air conditioner recycling, and refrigerator/freezer recycling.

Overall, the program processes work well. However, we have identified a few areas the program may want to consider addressing in the future related to quality assurance efforts, program participation, and marketing. These recommendations are presented below by product type.

Lighting

- **Quality Assurance Efforts:** The 2012 data provided by the program included some invoices for LEDs that were reported at the end of 2012 but with invoices that did not go through until early 2013. To be consistent with how savings were accounted for in prior years, the evaluation team did not count these units in the 2012 totals. In the future LIPA should work with its implementers to ensure that units are reported in the year in which they are invoiced.

Appliances

- **Quality Assurance Efforts**: LIPA added an additional tier to its refrigerator program for "most efficient" models. In the bi-weekly file outputs there were 316 entries where the product is an ENERGY STAR refrigerator and the rebate amount is $100 when it should be $75. Given this discrepancy, we recommend adding an additional quality assurance check to ensure that data is consistent across the rebate amount and product fields.

- **Program Participation**: The addition of the ENERGY STAR "Most Efficient" category proved to be a popular option for customers, with LIPA almost doubling its per unit goal. The program may want to consider increasing its goal for this category while at the same time decreasing its goal for the standard ENERGY STAR units in order to achieve higher levels of program savings.

Pool Pumps

- **Marketing and Outreach:** In 2012 the pool pump program did not meet its goals. LIPA already promotes the program through a direct mailing to pool owners, bill inserts, and print advertising. LIPA also promotes the program to contractors. To gain more traction in the market, we encourage LIPA to consider increasing its outreach efforts to both pool dealers/installers and pool owners. Aside from the cost barrier, lack of awareness of pool owners and contractors about benefits of efficient pool pumps is also a market barrier. Among pool owners, the program could also promote the requirement for contractor training as a signal of quality which might separate it from non-eligible pool pumps. Program messaging could focus on the energy-saving benefits of a qualifying pool pump, in addition to non-energy saving benefits, such as a longer-lasting system and a quality installation by a trained professional.

Appliance Recycling

- **Quality Assurance:** LIPA's appliance recycling has program restrictions on age and unit size. According to program language, recycled units must be manufactured prior to 2001 and be 10 to 30 cubic feet. As shown in Table 2-20, entries that were outside of program bounds were included in LIPA's 2012 EEP reported participation. There were 242 units manufactured after 2001 (2002 to 2011) and picked up through the program. Additionally, 146 units were outside of program size limitations. While we are assuming that these are input errors, LIPA should put a policy in place to check the data every month for eligibility and follow up with ARCA if ineligible units are found.

- **Marketing and Outreach:** Despite increasing the incentive to $50 per appliance, LIPA did not meet its participation goals. Program staff project that the market for secondary appliances

on Long Island may be close to exhausted. We will conduct additional research to help LIPA understand the remaining potential and barriers to participation that could be addressed through special or targeted promotions.

4.3 COOL HOMES PROGRAM MARKET ASSESSMENT

For the last two program years, the LIPA Cool Homes program has not experienced the anticipated level of program participation, resulting in savings below the program goals. Prior market research conducted by the evaluation team has indicated that the program is capturing a relatively small share of the overall residential CAC market, and that participating Cool Homes contractors comprise a relatively small portion of all Long Island residential cooling contractors. In addition, past research indicates that due to perceived burdens associated with the program requirements, some participating contractors are not taking advantage of the program as often as they could to promote qualifying high-efficiency equipment and quality installations. To meet program goals in future years, significant efforts aimed at capturing a greater share of the Long Island cooling market will be necessary.

To help the program effectively target these efforts, the evaluation team conducted a process assessment of the Cool Homes program in 2012. It consisted of:

- Interviews with non-participating residential cooling contractors on Long Island
- A focus group with participating Cool Homes contractors
- A review of existing high-efficiency cooling programs in the U.S.

While the preliminary results of these activities are presented below and in detail in the 2012 Program Guidance document, ultimately this research will feed into the comprehensive Cool Homes Market Characterization study, which is ongoing. The Cool Homes market characterization research will also be informed by a participant survey, a non-participant survey (including on-site survey of baseline efficiencies of newly installed CACs), and in-depth interviews with non-active participating Cool Homes contractors. The results of these activities and those described above will be fully analyzed and integrated into a report on the CAC market on Long Island to be completed in the fall of 2013.

Non-Participating Contractor Interviews

The evaluation team interviewed several Long Island residential cooling contractors to: 1) identify the reasons why more contractors are not participating in the Cool Homes program; 2) identify characteristics of non-participating contractors that will assist the program in its marketing and outreach efforts (e.g., demographics, best means of reaching target market, etc.); and 3) better understand the awareness and influence of the Cool Homes program on contractor equipment recommendations as a means of assessing non-participant spillover and market transformation. Preliminary findings from these interviews include:

- For some small businesses, the main barriers to participation in the Cool Homes program are the amount of time required to complete necessary paperwork and quality installation, as well as upfront costs.
- Some non-participating contractors have misconceptions about the Cool Homes program regarding what is required and the benefits of the program. This misinformation may be keeping some from joining the program.

- When customers ask about Cool Homes rebates, in order to keep their business, some non-participating contractors reported that they tell customers that even with the rebates, the higher-efficiency systems would only be cost-effective if the customer lives in the home for 10 to 20 years or more.

Participating Contractor Focus Group

The evaluation team conducted a focus group with participating Cool Homes contractors to identify specific aspects of the program requirements that prevent them from increasing their level of participation. Participating contractors were asked about general concerns they had about the program, the level of burden they perceived to be associated with various requirements of the program, and their opinions of different potential program designs and features. Findings from the focus group include:

- Participating contractors sometimes do not put qualifying systems through the Cool Homes program due to the burden associated with the application process.
- The primary burden for contractors is paperwork. Contractors reported that streamlining the application process would greatly decrease the burden and potentially increase the number of systems submitted to the program.
- Contractors find Manual J sizing to be time-consuming and the main factor in deciding not to put some qualifying systems through the program. Four of five contractors indicated that they usually do not do Manual J outside of the Cool Homes program.
- In order to avoid under-sizing systems, and to speed the process of Manual J sizing, contractors reported taking liberties with the inputs to the Manual J software.
- Contractors indicate that airflow checks may not be completed properly in systems sent through the Cool Homes program due to the time-consuming nature of this process, and because it rarely, if ever, results in any changes or adjustments to the system.
- Contractors suggested and were highly receptive to the idea of electronic submission of applications and associated documentation, and had numerous suggestions for streamlining the application submittal process and reducing duplicative requirements.

Review of High-Efficiency CAC Programs

The evaluation team researched other programs in the U.S. that incentivize high-efficiency central air conditioning (CAC) equipment in order to better understand how other programs are structured, program requirements, incentive levels, and what level of participation they experience. From an initial review of 23 residential cooling programs, we focused our efforts on seven programs representing a variety of different program structures and features. For these programs we conducted a literature review and secondary data collection, and interviewed program administrators and implementers. From this we assessed which processes and procedures appear to be working and why. Initial findings from this effort include:

- Financial Incentives for Customers – All of the programs reviewed provided financial incentives to customers, but there were significant differences in the amounts paid (incentives range from $100 to $1,500 per system) and the payment process. Rebates that are applied directly to customers' invoices and reimbursed to the contractors encourage those customers who are reluctant to pay for the incremental cost of the high-efficiency system upfront to participate in the program. Two of the seven programs reviewed offer

instant customer savings only, and two offer the option of having either an instant savings on the contractor's bill or a rebate. Three only offer rebates mailed to the customers after the application is processed. While the Cool Homes program offers instant savings by allowing customers to assign their rebate to the contractor, contractors in the focus group indicated that they rarely give this option to their customers due to perceived risks about if and when they will receive the incentive from LIPA.

- Minimum Efficiency Levels – While all CAC programs reviewed have efficiency requirements for qualifying equipment, the minimum efficiency requirements receiving incentives vary from 14 SEER to 16 SEER. LIPA's minimum incentivized efficiency level is 15 SEER.

- End-of-Life and Early Replacement – Six of the seven programs reviewed offer rebates for CAC systems that are replaced at the end of the life of a previous system. These incentives range from $100 to $750 per unit. Early replacement programs incent customers and contractors to remove old or low-efficiency systems before the end of their useful life and replace them with new, high-efficiency equipment. In most cases the previous equipment must still be operational. Five of the programs reviewed offer early replacement programs.

- Types of Contractor Participation – At least three programs allow both program-affiliated and non-program-affiliated contractors to participate in their residential CAC programs. These programs offer higher contractor rebates to program-affiliated contractors who have gone through additional training or who are Builder Performance Institute (BPI) qualified and show they have completed specific steps necessary for a quality installation.

4.4 ENERGY STAR LABELED HOMES

LIPA's ENERGY STAR Labeled Homes (ESLH) program works with local residential building contractors and the supporting contractor and architect infrastructure to encourage the construction of more energy efficient, ENERGY STAR certified homes. The program draws on an established network of Home Energy Rating System (HERS) providers to work with builders during the design and construction of participating homes. The program also uses the HERS rating to verify that ENERGY STAR standards have been met. In addition, the program uses marketing and outreach to educate both homeowners and builders about the program and the benefits of participating.

In 2012, a total of 429 ENERGY STAR homes were completed through the program. Program staff noted that builder participation dropped in 2012 as ENERGY STAR Version 3.0 went into effect. Many builders decided not to participate in the program due to added requirements of meeting ENERGY STAR Version 3.0 standards. This is consistent with many other ENERGY STAR New Homes programs across the country. Challenges mentioned include the myriad of checklist items that must be tracked, additional training required for HVAC contractors, and other non-energy related requirements that must be met. These requirements add to the complexity of the program and can increase the cost of building an ENERGY STAR home.

Citing the program's influence on local building practices, the program also claimed incremental savings above code on 301 non-ENERGY STAR homes with a HERS score below 70 (referred to as "HERS Index homes"). The program worked with raters to identify the homes and provided a $100 incentive to submit the REM/rate file. Program staff note that this effort also helped to inform future program design and document the levels of HERS scores being achieved on Long Island.

Twenty-two builders who previously participated in the ESLH program accounted for 103 of the 301 HERS index homes, or 34%. Builders with no prior experience with the program built the remaining 198 homes. The evaluation team assigned savings associated with the 103 HERS Index homes built

by previously participating builders as program spillover, as it is likely that their building practices have been influenced by the program.[13] With the added spillover from the HERS Index homes, the program exceeded its unit goal by 4%.

In 2013, LIPA reports that the program began offering builder incentives for non-ENERGY STAR homes that achieve a HERS score below 70, along with other requirements. This will allow builders who do not want to build to ENERGY STAR Version 3.0 standards to participate in the program. Additionally, it will allow the program to continue to have a presence in the market and influence building practices for different types of builders.

Additional research in 2013 may be required by the evaluation team to determine the influence of the new program structure on participant's building practices, and explore process-related questions, as appropriate, in order to provide feedback to LIPA on the program's design and operations and to validate the program's claim of savings associated HERS index homes. In addition, the evaluation team will investigate whether LIPA's training and education programs and prior influence on town building codes can be credited with increasing efficiency of new homes.

[13] Without additional research we do not have a basis for apportioning spillover savings to the 198 homes built by non-participating builders. Additional research will be conducted in 2013 to explore LIPA's influence on local building practices.