LIPA EFFICIENCY LONG ISLAND PY2009 ASSESSMENT VOLUME I

Prepared for:

LONG ISLAND POWER AUTHORITY

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1. INTRODUCTION TO VOLUME I

1.1 Structure of the Evaluation Report

This report presents the results of the 2009 evaluation of LIPA's Efficiency Long Island (ELI), Renewable Energy and Demand Response programs conducted by the Opinion Dynamics Evaluation Team. The report is divided into two volumes. The information in this volume (Volume I) provides an overview of evaluation findings, including impact and process results for 2009. Volume II provides the appendices to Volume I including detailed program-by-program impact analysis results, specific findings of the evaluation team's engineering review of measure level savings algorithms and assumptions, and program level process findings and is developed with the needs of LIPA's program planners and managers in mind.

1.2 Structure of Volume I

The remainder of Volume I is divided into five sections.

- Section 2 provides an executive summary review of the 2009 energy and demand savings results and process evaluation findings.
- Section 3 provides an overview of the study and its purpose as well as a description of the programs evaluated.
- Section 4 provides a review of the methodology employed to calculate energy and demand savings as well as cost effectiveness measures.
- Sections 5 and 6 provide a more thorough presentation of the impact and process evaluation findings.

2. EXECUTIVE SUMMARY

The 2009 program year was a transitional year for LIPA's energy efficiency, renewable energy, and demand response programs. In 2009, LIPA embarked upon the Efficiency Long Island (ELI) initiative, a 10-year, $924 million portfolio of energy efficiency programs[1] designed to help LIPA's residential and commercial customers reduce energy use. The programs that make up the ELI Portfolio build on LIPA's past successes with the Clean Energy Initiative (CEI) (1999 through 2008), and strive to assist in the transformation of the energy markets on Long Island. LIPA also continued its Renewable Portfolio[2] and demand response efforts in 2009.

2009 also represents a transition in program implementation for LIPA. LIPA, in its role of providing strategic direction to the program efforts and oversight of the organizations working to plan and implement the programs, has identified opportunities to refine and make improvements to its program designs and the structure through which the programs are delivered. As a result, LIPA is seizing those opportunities based on lessons learned through implementing the CEI initiative. Toward that end LIPA has retained a new planning, design, and implementation contractor which should improve transparency in the program design process. LIPA has invested in and is vigorously pursuing implementation of a Siebel database system to centralize program tracking information and store relevant customer data for all program participants. Finally, LIPA has retained an evaluation team led by Opinion Dynamics Corporation to evaluate the ELI and Renewable Portfolios and demand response program. The evaluation team will conduct the research and consulting services required to support the program refinement process and LIPA's efforts to provide the highest quality, best managed, and most effective programs for its customers. The following sections review the ELI and Renewable Portfolio's program impacts for 2009 as well as the key areas identified by LIPA as priorities for process improvements for the ELI, Renewable, and demand response programs.

ELI Portfolio Impacts

In 2009, LIPA spent approximately $27.34 million on the ELI Portfolio.[3] Overall, evaluated savings from the ELI Portfolio included over 118,000 MWhs of energy, and reduced demand by more than 25 MW. This first year of the ELI program resulted in displacement of 75,105 tons of CO_2, 261 tons of SO_2 and 81 tons of NOx. This environmental savings represents the equivalent of removing 12,479 cars from the road and a fuel savings of more than 158,000 barrels of oil.[4]

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[1] The ELI Portfolio includes the Commercial Existing Construction, Commercial New Construction, Efficient Products, Residential Existing and Residential New Construction programs.

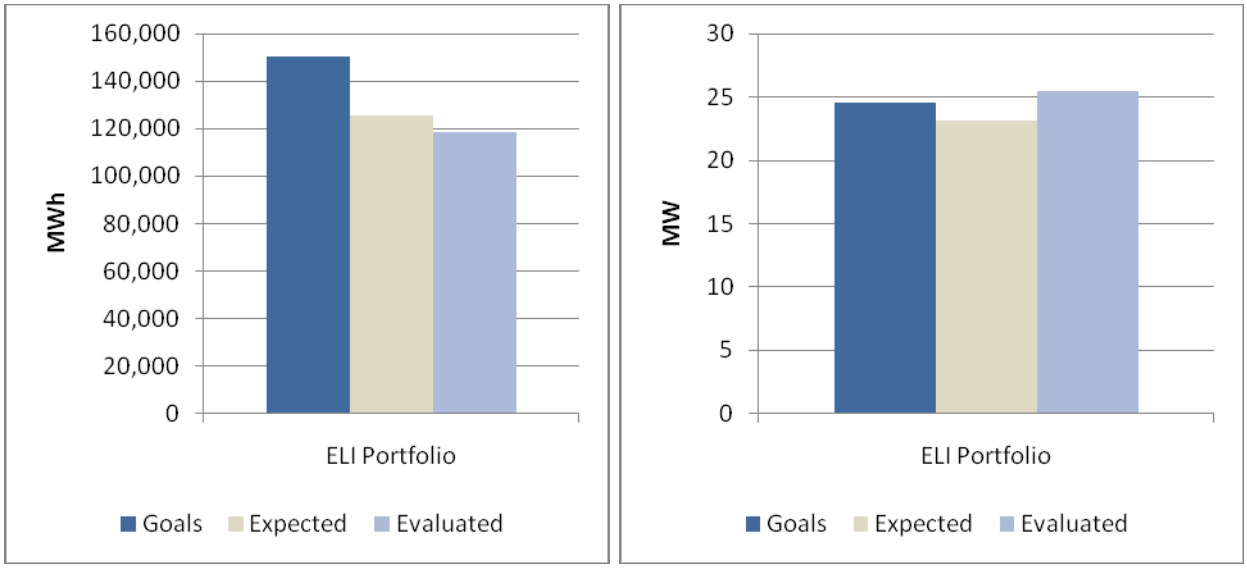
[2] The Renewable Portfolio efforts include the Solar and Small Wind programs.

[3] An additional $2.09 million was spent on professional expenses, Admin & General, and Salaries. These costs were across both the ELI and Renewables Portfolio with $1.19 allocated to ELI based on expenditures.

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

The ELI Portfolio performed well in 2009 and in line with the performance of similar portfolios the evaluation team has assessed. ELI programs exceeded the stated net demand (MW) savings goals by about 4%, while evaluated net MWh savings fell short of the overall net energy savings goals (achieving 79% of stated goals) as shown in Figure 1 below.

Figure 1: 2009 ELI Portfolio MWh & MW Impacts



On a program-by-program basis, the Commercial Efficiency program, as well as five of the six residential programs exceeded their program goals. These programs include Cool Homes, Home Performance Direct, Home Performance with Energy Star, Information & Education, and Residential New Homes. However, the Energy Efficient Products program, which accounts for nearly 60% of the 2009 net savings goals for the ELI Portfolio, did not achieve stated goals. This was the *primary* driver of the shortfall for the ELI Portfolio and was largely due to lower than expected sales of program CFLs[5]. Other key contributors to the portfolio shortfall compared to program savings goals include: 1) the carryover into 2009 of program savings goals associated with the discontinued RECAP program, and 2) the inclusion of savings goals for a program originally slated for implementation in 2009 that ultimately did not launch until 2010 (EEP Refrigerator Recycling).

Based on an analysis of portfolio impacts and costs, the savings generated by the ELI Portfolio are cost effective. The Total Resource Cost (TRC) is 2.2 (a TRC value greater than 1 indicates that portfolio benefits outweigh costs). In addition, the levelized costs for ELI Portfolio savings is $0.050 per kWh— less than the comparable costs of generating the displaced energy and very much in line with the levelized costs realized by the CEI initiative[6].

[5] There are a number of potential causes for the shortfall in CFL sales. To date the evaluation team has not specifically examined market or programmatic factors that may explain this outcome.

[6] LIPA's cost of generation in 2009 varied from approximately $.057 off peak to $.092 during the summer peak.

Table 1: Summary of 2009 Total Resource Costs and Levelized Costs[7]

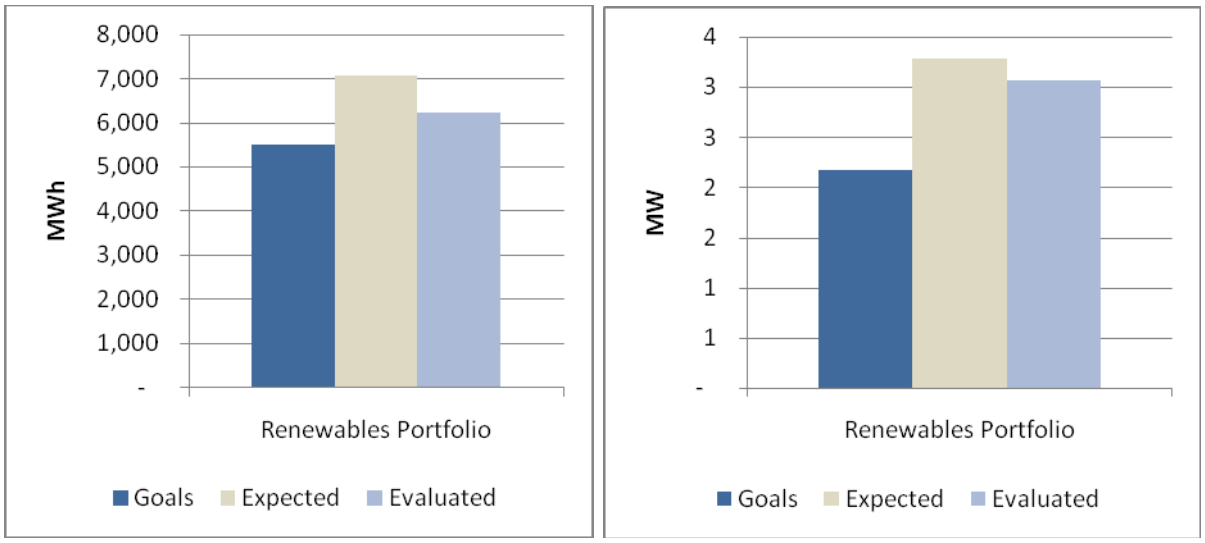
2009 Portfolio	Benefit Cost Ratio (TRC)	Levelized Cost ($/KWh)
Efficiency Long Island	2.2	$ 0.050

Renewable Portfolio Impacts

In 2009, LIPA spent approximately $19.28 million on the Renewable Portfolio. Overall evaluated savings from the Renewable Portfolio accounted for more than 6,000 MWh of evaluated savings and reduced demand by 3 MW. This year of the Renewable Portfolio resulted in displacement of 3,600 tons of CO_2, 5.6 tons of SO_2 and 3.7 tons of NOx. This environmental savings represents the equivalent of removing 605 cars from the road and a fuel savings of more than 7,600 barrels of oil.[8]

The Renewable Portfolio performed well in 2009 and in line with the performance of similar portfolios the evaluation team has assessed. The Renewable programs exceeded both the energy savings and demand goals, as shown in Figure 2 below.

Figure 2. 2009 Renewable Portfolio MWh & MW Impacts



The evaluation team also reviewed the cost-effectiveness of the Renewable Portfolio. While the Renewable Portfolio exceeded energy and demand goals, these programs were not cost-effective in 2009. The TRC for the Renewable Portfolio is 0.5, with a levelized cost of $0.27. It is important to note that TRC and levelized cost results are not directly comparable between energy efficiency programs and renewable energy programs as cost effectiveness is not commonly considered a key priority for renewable programs. Rather, renewable programs are typically implemented as a matter of policy and are designed with consideration of the societal benefits associated with the program including fossil fuel conservation, pollution reduction, economic stimulus and job creation. Moreover, the cost of

[7] The LIPAedge program was not included in the calculation of TRC or Levelized Cost.

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

program delivery and installed measures for renewable energy and energy efficiency programs are not directly comparable. The funding for LIPA's Renewable Portfolio reflects a policy decision by LIPA, and thus the renewable programs are not designed to achieve cost effective savings. However, LIPA is committed to delivering the most cost effective renewable energy programs possible and is working with their program design team to achieve that goal.

To provide context to the cost effectiveness results, the evaluation team reviewed aspects of the California Solar Initiative (CSI), a multi-year, multi-million dollar effort offering incentives for the installation of photovoltaic projects. As of April of 2009, the residential incentives paid through the CSI program by the three program administrators were $0.22/kWh, $0.26/kWh, and $0.34/kWh.[9] While the incentives reflect but one cost component used to calculate levelized costs and thus are not strictly comparable, it is informative to consider that the CSI program paid incentives for the installation of PV systems at values in line with the total levelized cost of the LIPA program.

Table 2: Summary of 2009 Total Resource Costs and Levelized Costs

2009 Portfolio	Benefit Cost Ratio (TRC)	Levelized Cost ($/KWh)
Renewables	0.5	$ 0.270

Process Findings

Because of the transitional nature of 2009 program efforts, the first year process evaluation was limited in scope and focused on documenting program processes and identifying key-cross-cutting "areas of interest" based on input from LIPA, National Grid, and third party implementation contractors. The evaluation found that program processes overall are functioning reasonably well and ultimately lead to the implementation of effective programs which perform at a level commensurate with other programs the evaluation team has assessed. However, there is always room for improvement. The eight cross-cutting areas of interest identified through these discussions include the following:

- Improved Communication Across Programs and Organizations - According to the 2009 Program Marketing Plan, one of the goals of the 2009 program efforts was to better integrate programs (and organizations). This objective has been communicated and is understood and that actions have been taken in 2009 to achieve this goal though some of the barriers to communication remain as the transition to ELI takes place. In 2010, the evaluation team will examine communication across organizations, and provide recommendations to ensure that third party evaluation and internal feedback are incorporated into the program design process.

[9] California Public Utilities Commission Staff Progress Report. April 2009.

- Clearer Delineation of Roles and Responsibilities – There are a number of parties involved in the design, implementation and management of the 2009 ELI, Renewable, and demand response programs. While the existing structure is delivering effective programs to LIPA customers the evaluation identified some confusion around coordination of specific functions which could lead to inefficiencies. LIPA has directed the evaluation team to identify opportunities to improve program processes and reduce potential inefficiencies. As such, clearly defining roles and responsibilities is an important cross-cutting area for program improvement. The 2009 evaluation included the development of implementation models to document program processes. These are a first step in the process of clearly identifying functional roles and responsibilities. Going forward, the 2010 evaluation will augment the implementation model efforts by conducting internal process evaluations and creating program theory and logic models.

- Adherence to Program Goals by National Grid – The energy (MW and MWh) savings goals for the 2009 programs were well documented (following best practices). However, through the 2009 evaluation effort, it became clear that the details behind the goal setting process, originally developed for the CEI initiative was not as well documented. Moreover, non-energy goals for some programs were not always measurable and attainable (e.g. "address any other potential barriers"). LIPA identified the need to improve the program planning and goal setting process through the transition to ELI and has taken specific action to address the issue including the hiring of a new program planning contractor and will begin to utilize a commercially available industry standard program planning model[10] to establish program goals for 2011 and beyond. In 2010, the evaluation team will work with LIPA, National Grid, and the new planning contractor to improve the transparency of the goal setting process. In addition, the evaluation team will work with LIPA and National Grid program staff to develop program theory and logic models that will help to identify measurable non-energy and energy savings metrics associated with existing program goals.

- Enhancement of Current Marketing and Outreach Efforts – In 2009, some LIPA and National Grid program staff expressed the need for additional information regarding how to effectively promote programs to the targeted markets and expand program participation. Marketing and outreach best practices encourage the use of targeted marketing strategies and cooperation with trade allies to promote programs. Future evaluation efforts will include process evaluations that focus on streamlining program efforts and ensuring that internal efforts are coordinated to provide the most relevant and targeted marketing approach. The evaluation team will also conduct a baseline/market assessment for each sector which will help to ensure that efforts are adequately targeted within the context of the Long Island energy efficiency marketplace.

- Consistency of Verification and Quality Control - National Grid and other LIPA implementation contractors currently implement formalized QA/QC and verification procedures. These procedures are generally in line with those used by implementation contractors in other jurisdictions but in some cases fall short of industry best practices. In 2010, the evaluation team will conduct further research into the QA/QC procedures employed by implementation contractors, with particular focus on the sampling protocol.

[10] LIPA has selected Portfolio Pro as the portfolio planning model.

The evaluation team will also expand its assessment to include an evaluation of QA/QC and verification procedures implemented by LIPA and National Grid program managers and recommend improvements as necessary based on industry best practices. This effort will include a cross-program review of the specific procedures employed by LIPA and National Grid staff when reviewing program tracking data to ensure that the methods used are consistent across all programs.

- Centralization of Data Tracking and Reporting – The evaluation found that while the majority of the data required to support program evaluation and efficient program management are currently being tracked, this data is managed in a decentralized manner. In 2009, information regarding program implementation was tracked by National Grid and Implementation Contractors (IC) using a variety of program tracking databases. While National Grid program managers would compile relevant summary data for reporting to LIPA, LIPA had no direct access to the tracking systems maintained by National Grid and the ICs. Beginning at the end of 2009, LIPA and National Grid began to transition the program tracking data to a centralized database (Siebel). LIPA has directed the evaluation team to work with National Grid and its new planning contractor, Applied Energy Group (AEG) to define the types of data to be tracked in the Siebel system. This is an important first step toward a more efficient data reporting and tracking system. A centralized database will allow LIPA and National Grid to meet best practices by allowing program managers to actively share information in real time, as well as monitor workflow and provide timely reports.

- More Thorough Documentation and Transparency of Savings Estimates –Documenting and promoting transparency of program expected savings estimates used to establish program goals and track performance was identified as an area in which LIPA sought to improve through the transition from CEI to ELI. Best practices suggest that the algorithms on which program planning is based should be well documented, including all inputs such as hours of use and run times for equipment. As such, LIPA directed the evaluation team to conduct an engineering review and update (as necessary) all existing algorithms and assumptions used to develop program and measure level expected savings estimates. This review revealed that while most algorithms and assumptions were reasonable and appropriate, some were not well documented by the former planning contractor, and others required updating. This process resulted in an updated Technical Reference Manual (TRM) document containing the revised algorithms for use by LIPA's new planning contractor (See Volume II).

- Better Integration and Formalization of Evaluation Efforts - In 2009, LIPA took the necessary steps to create a partnership between its evaluation contractor, planning contractor, third party implementation contractors, National Grid, and itself in order to enhance ELI, Renewable, and demand response program performance. Based on interviews with LIPA and National Grid program staff, while some programs were evaluated under CEI, in some cases there appears to have been a lack of coordination between program and evaluation staff in terms of evaluation efforts. Notably, while National Grid was responsible for program evaluation under CEI, some National Grid program managers felt that they were not always aware of the role that they played in coordinating or overseeing evaluation efforts suggesting some degree of disconnect between National Grid evaluation and program staff. Prior to 2009 LIPA had not engaged an independent third-party evaluation contractor who would have assisted in

coordinating and integrating these efforts. LIPA, by contracting with a new evaluation contractor, will now be able to coordinate and engage key stakeholders in evaluation efforts across the portfolio of programs and a full spectrum of researchable issues. Going forward, the evaluation team will seek to engage National Grid program managers more fully in the evaluation process.

3. OVERVIEW OF STUDY

At the close of 2008, LIPA concluded the program cycle for its ten-year CEI program efforts and began the ELI program cycle. The ELI, Renewable, and demand response programs, which build upon experience gained from LIPA's CEI's suite of programs, are designed to encourage market transformation of the energy efficiency and renewable energy markets on Long Island. Over the next ten years, the ELI, Renewable, and demand response programs will work with LIPA residential and nonresidential customers as well as trade allies to facilitate energy savings throughout the service territory.

In 2009, LIPA contracted a single evaluation contractor to assess the ELI, Renewable, and demand response programs. This marks a change from previous evaluation practices of contracting with various evaluation contractors to assess individual markets or program processes and impacts on a case by case basis. Going forward, the evaluation contractor will assist LIPA with holistically evaluating the design, delivery and management of programs, and to identify opportunities for improvement. This report is the first of several documents and memos that are designed to improve program processes as well as assess the annual impacts of the programs.

3.1 Purpose of 2009 Evaluation Study

This report assesses the performance of the ELI, Renewable and demand response programs in 2009. This report has three purposes:

- To provide the energy and demand impacts from measures installed in 2009;
- To describe and make transparent the program delivery and management processes within each program; and
- To provide a base on which to build future assessments.

LIPA's decision to evaluate these programs comes at an opportune time. The 2009 program year marks the beginning of the ELI initiative, building upon ten years of energy efficiency program experience under the CEI initiative. This report provides findings that can inform improvements to program design, implementation and analysis of program performance. These findings critically assess program successes to date by reviewing and validating energy and demand impacts, as well as providing insights to help enhance program implementation going forward.

3.2 Description of Programs

The 2009 ELI Portfolio programs targeted the residential, commercial, municipal and not-for-profit sectors. While these programs vary in their implementation processes and program design, they all seek market transformation by providing financial incentives and energy efficiency information to customers. In addition, LIPA also offers two renewable energy programs and one demand response program that are distinct from the ELI Portfolio. The

Renewable Portfolio includes two programs: Solar[11] and Small Wind. LIPA*edge* is LIPA's demand response program.

Table 3 provides a summary of the 2009 ELI, Renewable and demand response programs and their expenditures.[12] Total 2009 expenditures on all programs equaled $50.32 million. Solar had the largest share of overall expenditures. Residential Existing Homes, which includes Cool Homes, Residential Energy Affordability Partnership, Home Performance with Energy Star, Home Performance Direct and Information & Education, had the largest share of ELI Portfolio expenditures. The Commercial Efficiency program, which includes commercial new and existing construction and government and not-for-profit efforts, accounted for the third largest share of expenditures. The Multifamily program was postponed in early 2009 and therefore did not accrue any energy or demand savings. There were expenditures on the RECAP program in 2009 that represent a carryover from the 2008 program year. A number of projects were initiated under RECAP in 2008 that were not completed by the end of the program year. While expenditures were incurred to support these projects, RECAP was discontinued in early 2009. Certain macro level expenditures could not easily be disaggregated into specific program components under the Residential Existing Homes program.

[11] The solar program includes both Solar Pioneer and Solar Entrepreneur.

[12] Note that the expenditures numbers were sourced from LIPA's 2009 Variance Report – December.xls, and NGrid's YTD December Final Full Year 2009.xls files.

Table 3. 2009 Programs and Expenditures

Program	2009 Expenditures (millions)
ELI Portfolio Expenditures	
ELI Portfolio - Commercial Programs	
Commercial Efficiency Program	$9.98
Retrofit Energy and Capacity (RECAP)	$0.28
Commercial Programs Subtotal	*$10.26*
ELI Portfolio – Efficient Products	
Energy Efficient Products	$4.91
Efficient Products Subtotal	*$4.91*
ELI Portfolio - Residential Programs	
Residential Existing Homes	$10.32
Residential New Homes	$1.78
Multifamily	<$0.07
Residential Programs Subtotal	*$12.17*
ELI Portfolio Subtotal	***$27.34***
Renewable Portfolio	
Small Wind	$0.07
Solar Programs	$19.21
Renewable Portfolio Subtotal	***$19.28***
Demand Response Program	
LIPA*edge*	$1.61
Demand Response Subtotal	***$1.61***
Other Expenditures	
Professional Expenses	$0.47
Admin & General	$0.78
Salaries	$0.84
Other Expenditures Subtotal	***$2.09***[13]
Total Expenditures	**$50.32**

All expenditures are sourced from the 2009 end of year status report from National Grid-ELI except Advertising and Evaluation expenditures and Other Expenditures which were sourced from LIPA's Variance Report.
The Commercial Efficiency Program combines expenditures from three separate program areas: Commercial New Construction at $2.24 million, Commercial Existing Construction at $6.36 million and Commercial Government and Not-for-Profit at $1.38 million.

Table 4 provides a brief description of the ELI, Renewable and demand response programs and the measures that each program promotes.

[13] $ 1.19 million of these expenses are allocated to the ELI program based on expenditures.

Table 4: Description of 2009 ELI, Renewable and Demand Response Programs

Program	Description	Energy Efficient Measures
Commercial Efficiency Program	Promotes the application of a broad range of energy efficient electric technologies and design opportunities through prescriptive, custom and whole building components. Influences current design and construction practices as well as among the remodeling and equipment replacement markets on Long Island to achieve greater energy efficiency.	Energy efficient products (C/I Geothermal units, Cooling, Lighting, Motors and VFDs, Compressed Air, Commercial Kitchen Equipment, Vending Machine Controls, Performance Lighting, Custom Component, whole building components, BOC).
Retrofit Energy and Capacity Program (RECAP)	Targets commercial customers, multifamily buildings and publicly owned facilities to identify retrofit or replacement opportunities to reduce overall energy consumption and operating costs. This program was discontinued in 2009.	Replace older equipment, retrofit existing equipment with more efficient technology (such as lighting upgrades and controls, HVAC, refrigeration, motors and VFRD's, EMS).
Energy Efficient Products	Supports the stocking, sale, and promotion of efficient residential products; mostly those bought at retail stores. The program uses a variety of mechanisms, most prominently financial incentives, to increase the market saturation of these efficient products. These incentives typically come in the form of either direct consumer rebates or upstream incentives paid directly to manufacturers or retailers.	Lighting and appliances (i.e., CFLs, lighting fixtures, SSL lamps, cold cathode lamps, refrigerators, dehumidifiers, room air conditioners, pool pumps).
Residential Existing Homes	By late 2010, LIPA customers will be able to participate in an Existing Homes Retrofit program that integrates what currently are three separate components: low-income, non-low-income and non-low-income direct installation.	See below.
➢ Cool Homes	Encourages customers to purchase and install energy-efficient central air conditioning and geothermal heat pumps by providing financial rebates and incentives to offset a portion of the equipment's higher initial cost.	Residential HVAC (CAC and geothermal heat pumps), high efficiency furnace distribution fans, proper sizing and installation incentives.
➢ Residential Energy Affordability Partnership (REAP)	Encourages lower income households to improve energy affordability through free installation of a comprehensive set of cost-effective efficiency measures, extensive energy education and counseling.	Cost-effective measures identified through an energy audit. Installation of energy efficient products, such as CFLs, refrigerators, air filters, shower heads and faucet aerators, duct repair, air sealing.
➢ Home Performance Direct	Provides high value savings from an initial site visit as well as provides sales leads for additional efficiency improvements through LIPA's Home Performance with ENERGY STAR program.	Free CFLs as well as up to 4 hrs of free crew labor for air and duct sealing if the home has electric heat and/or oil heat with high energy use CAC

Program	Description	Energy Efficient Measures
➢ Home Performance with ENERGY STAR®	Targets residential existing homes to implement energy efficiency market transformation through encouraging installation of weatherization, insulation and other building shell measures and facilitating the growth of the nascent building performance industry on Long Island through creating a competent and professional contractor, builder, and designer infrastructure to deliver energy efficiency services.	Whole building, weatherization/building shell.
➢ Information & Education	Provides energy saving information to residential customers through printed materials, home energy audits, advertising and marketing directed to homeowners and students.	Information sessions (In Concert with the Environment), trade show and event participation, home energy audits, NYSERDA Energy Smart Student Program workshops.
Residential New Homes	Targets contractor, builder and designer infrastructure to deliver energy efficiency services as well as consumer awareness/education through marketing campaigns to residential new construction.	ENERGY STAR rated new homes through Home Energy Rating System, in addition to an a la carte menu of individual measures (CFLs, CAC systems commissioning, duct leakage mitigation, heating and cooling equipment, air handler motors, refrigerators, clothes washers and dishwashers.
Multifamily	This program is no longer being implemented.	
Solar	Promotes the use of solar energy by increasing consumer awareness and demand for PV systems, accelerating development of local infrastructure for maintenance and delivery, and overcoming financial barriers to purchasing systems.	Photovoltaics.
Small Wind	Promotes the use of wind energy by increasing consumer awareness and demand for small wind systems, accelerating development of local infrastructure for maintenance and delivery, and overcoming financial barriers to purchasing systems. Supports LIPA's multi-year effort to provide customers who have appropriately zoned properties to tap into the island's available wind power resource.	Wind turbines.
LIPA*edge*	Demand response program that curtails the demand of CAC systems installed by residential and small commercial buildings through direct load control. In addition, there is a pool pump component.	Load Management with residential thermostats, small commercial thermostats and pool pumps.
*Sources include the Residential, Commercial and Renewables Operations Manuals, 2009 Portfolio Marketing Plans, and 2009 Evaluation RFP.		

4. METHODS

This section documents the methodologies employed to determine impact results and process findings.

The terminology used to describe evaluation results can vary. For this report, the evaluation team uses the following terms to describe program impact results:

- Expected Savings – Savings estimates tracked and reported by National Grid and contained in program tracking spreadsheets
- Evaluated Savings – Savings estimates developed by the evaluation team through the evaluation process
- Realization Rate – The ratio of Evaluated Savings to Expected Savings
- Gross Impacts – The change in energy consumption and/or demand that results directly from program-related actions taken by participants, regardless of why they participated.
- Net Impacts – The total change in energy or demand that is attributable to the program.
- Total Resource Costs – A measure of program cost effectiveness calculated as the ratio of the value of program savings over total administrator and customer costs
- Levelized Costs – A measure of cost effectiveness which provides a $/kWh value that can be compared to the cost of generation

4.1 Impact Evaluation Methods

There were several distinct activities that supported the 2009 impact assessment. Impacts were calculated based on a validation of savings through an engineering review. An engineering review includes a comprehensive review of all available documentation, data and algorithms included in program records used to develop expected savings estimates. The effort includes an assessment of the validity and reasonableness of the approach, algorithms and inputs used to develop expected savings estimates to ensure they are in line with standard practice.

The evaluation team conducted an engineering review of the following data sources and analytic tools used by LIPA and National Grid to develop expected savings estimates:

- The ELI and Renewable Portfolio Technical Reference Manual (TRM)[14]
- The Solar Screening Tool
- The Custom Measure Screening Tool
- A sample of custom projects completed in 2009

[14] "Prescriptive Measure Savings Algorithms for use in the 2009 Commercial Construction Program". March 2009. Prepared by Optimal Energy, Inc.

- A census of wind projects completed in 2009

The engineering review effort provided inputs to the following analytical activities:

- Calculation of Evaluated Energy and Demand Savings
- Calculation of Total Resource Costs
- Calculation of Levelized Costs

The following section describes the engineering review and savings calculation process.

Technical Reference Manual

The evaluation team, led by ERS engineers, conducted an engineering review of the savings algorithms and associated assumptions for all prescriptive residential and non-residential measures. The algorithms originally developed by Optimal Energy, LIPA's planning contractor under CEI, were included in the 2009 Technical Reference Manual (TRM) and included in the program tracking databases provided by LIPA and National Grid. The intent of this review was to verify the validity and accuracy of each algorithm based upon engineering judgment. This review clearly and transparently documents each algorithm and each assumption to the extent possible. In cases where the TRM did not provide documentation of the algorithm used to estimate expected savings for a specific measure, the team reviewed other program information and/or external secondary resources in an effort to document the existing algorithm. When unable to document the existing algorithm, the team reviewed secondary sources to develop updated inputs, algorithms and deemed savings values appropriate for the measure.

The engineering review produced a revised TRM with fully documented and, where necessary, updated savings algorithms for all prescriptive measures included in the TRM and the 2009 program tracking databases. Further, the review provides recommendations for how to update energy savings assumptions as standard practices, codes, and best practices change over time. The evaluation team used the revised measure level savings algorithms to calculate an evaluated savings estimate for each installed measure included in the 2009 program tracking databases. The team then summed measure level savings to develop program and portfolio level evaluated savings estimates.

Solar Screening Tool

Currently, all expected energy savings estimates associated with solar measures are developed by National Grid using a solar screening tool. The evaluation team conducted an independent engineering review of this tool to assess the validity and accuracy of the embedded algorithms. The evaluation team reviewed past evaluation work that found actual savings from installed units to assess the accuracy of the screening tool results. This report was found to be technically sound and was used to develop a realization rate that was applied to all solar measures installed in 2009.

Commercial Custom Measure Screening Tool

Currently, expected energy savings associated with commercial custom measures are estimated using a custom measure screening tool developed by Optimal Energy and used by National Grid program staff. The evaluation team conducted an independent engineering review of this tool to assess how it functions and the validity and accuracy of the embedded algorithms. The evaluation team documented the underlying algorithms and inputs used in the algorithms and provided recommended adjustments as deemed appropriate and necessary.

Commercial Custom Projects

Program tracking databases maintained by National Grid were used to estimate impacts associated with commercial *prescriptive* measures only. The evaluation team conducted an engineering review of a sample of commercial *custom* measures to develop verified energy and demand impact estimates attributable to these measures. In addition, we assessed the three wind projects installed in 2009 as custom measures.

The evaluation team employed a widely used statistical approach[15] to select a statistically valid sample of projects for review. The total population of 156 completed custom projects was divided into four strata based on this approach as shown in Table 5.

Table 5. Custom Sample Size

Stratum	N – Population	n - Sample
1	81	5
2	47	9
3	19	6
4	9	9
Total	156	29

Upon selection of the sample, the evaluation team requested complete project files including all supporting documentation provided for each project included in the sample. Engineers thoroughly reviewed each project and developed evaluated energy and demand impact estimates for each sampled project. No onsite verifications occurred.

Upon completion of the engineering review, we developed a custom measure savings realization rate, which is calculated by dividing evaluated savings by expected savings. This rate was applied to the total expected savings estimate for all custom measures based on the sample design.

[15] The team used a stratified sample design, one that divides the sample into two or more groups and samples from within each of the groups, to select the statistically valid sample. The team used the Delanius-Hodges approach to determine the stratum boundaries. In this approach, the expected energy savings per project is used to divide the total population into stratum so that the variation within each stratum is reduced. The sample was chosen with an expected precision of 90±8 (i.e., it is 90% certain that the mean of the sample is within ±8% of the true mean of the population).

This approach allowed the evaluation team to sample a smaller number of projects than would be needed within a simple random sample design. The impact values for the custom projects are 90±2, meaning that we are 90 percent certain that the mean impact value is within 2 percent of the found point estimate (i.e., the sample gave us a good estimate of the true impacts on the total population).

Small Wind Projects

The evaluation team collected customer reported performance data on a census of the three sites completed in 2009. For each project, an inverter tracks cumulative energy production, which is logged on the first of each month by the customer. The evaluation team received the cumulative energy production for each month that the project was active in 2009.

To analyze the reported performance data, the evaluation team performed an extensive analysis to accurately normalize for variations in wind speed from typical wind speed. To normalize for varying wind speed, the evaluation team collected hourly typical wind speed (TMY3 weather data) and actual hourly wind speed from the nearest weather station (Westhampton Airport). This annual wind speed at the airport was compared to hub height annual average wind speed at the sites using data from AWS Truewind.[16] This comparison provided an adjustment factor to scale the weather station wind speeds to reflect those at the sites. The evaluation team formed bins to total hours at each wind speed for each month and collected turbine power curves for each turbine installed. These power curves were used with the actual hourly wind speed bins to calculate the predicted performance, based on actual wind conditions.

This effort replicated the methodology used by LIPA to predict performance, but used actual wind speed instead of typical wind speed. This value was then compared against actual performance over the M&V period to determine a realization rate. The final numbers represent annual savings, forecasted from the current realization rates and extended to an entire year using typical weather data.

Calculation of Total Resource Costs

The evaluation team calculated the TRC at both the program and portfolio level. This analysis utilized a TRC screening tool developed by ERS and information derived from the Optimal Energy Screening tool,[17] LIPA's 2009 Year End Variance Report, and the 2009 ELI Year End Status Report from National Grid. Expenditures were sourced from two separate documents. Table 6 presents the expenditure values used in the TRC calculation.

[16] AWS Truewind is a wind map product that provides the average wind speed at the height of the wind turbine, not at the height found at the weather site.

[17] This tool was developed and used by Optimal Energy to estimate measure and program level TRC values under the CEI initiative.

Table 6: Expenditure Type by Source

Expenditure Type	LIPA Variance Report	National Grid Year End Status Report
Program Level Expenditures		
Evaluation	X	
Advertising	X	
Rebates / Incentives		X
Customer Services		X
Contractors		X
Marketing		X
Portfolio Level Expenditures		
Professional Services	X	
Salaries	X	
Administrative & General	X	

The TRC is a societal benefit cost analysis that determines whether investing in energy efficiency programs is cost justified from a societal perspective. Benefit cost analysis tests review the benefits accrued over the life of the measure from a societal perspective, including energy, capacity, gas and oil savings, and external benefits such as job creation. A Benefit/Cost ratio greater than 1 indicates a cost effective investment of funds from a societal perspective.

The TRC analysis is one method to determine a program or portfolio's societal benefit. The TRC is calculated by taking the net present value (NPV) of benefits and dividing them by costs as shown in Equation 1. NPV discounts for the time value of money. In other words, savings that accrue in the future are less valuable than immediate savings. Taking a NPV normalizes for the present value of future savings. This evaluation used a real discount rate of 2.57%.[18]

$$TRC = \frac{NPV\ of\ Benefits\ [MCE * NRG * EUL + mAD * DR + Ex]}{2009\ Costs\ [NP + PA]}$$

(Eq. 1)

Table 7 presents the sources for inputs used to calculate TRC.

[18] The discount rate came from Optimal's Tool.

Table 7: TRC Algorithm Inputs

Name	Variable	Units	Source	Is a	Notes
MCE	Annual Marginal Utility Avoided Cost of Energy	$/kWh $/MMBTu	LIPA (From Optimal Screening Tool)	Benefit	
NRG	Energy Reductions by Measure	kWh	Net Evaluated kWh, includes transmission losses	Benefit	First year annual value
EUL	Effective Useful Life by Measure	years	LIPA (From Optimal Screening Tool) Averaged by end use	Benefit	
mAD	Marginal Utility Avoided Cost of Demand	$/kW	LIPA (From Optimal Screening Tool)	Benefit	
DR	Demand Reductions by Measure	kW	Net Evaluated kW, includes transmission losses	Benefit	First year value – coincident peak estimate
TL	Transmission losses (input to calculation of NRG)	%	LIPA (From Optimal Screening Tool)	Benefit	
Ex	External Benefits	$/kWh	LIPA (From Optimal Screening Tool)	Benefit	
PA	Program Administrator Cost	$ or % of incentives	LIPA (December 2009 Variance Report)	Cost	
NP	Net Participant Costs	$	LIPA (From Optimal Screening Tool) Estimated for CEP, per unit from tool	Cost	Incremental cost of the measure that the participant paid.
DR	Discount Rate	%	LIPA (From Optimal Screening Tool)	Discount Rate	Interest Rate

Calculation of Levelized Costs

A levelized cost analysis is a way to quickly compare the cost of energy efficiency programs with the energy saved from the programs. Levelized costs are expressed as $/kWh, meaning that the result can readily be compared to the cost of generating electricity. If the cost of the efficiency investment is less than the cost of generated electricity, efficiency is considered a wise investment.

The evaluation team determined levelized cost estimates at the program and portfolio level. The sources for this analysis are the same as the TRC calculations. In order to determine the levelized costs of the program, the evaluation team determined the energy savings over the life of the measure installed in a single year, discounted back to the same year of investment. LIPA's investment (incentives and overhead) as well as customer investments in energy efficiency were divided by the present value of the savings to yield the lifetime levelized cost. Equation 2 shows the methodology used to calculate the levelized cost values. For a description of these costs see Table 7.

$$\text{Levelized Costs} = \frac{\text{2009 Net Program Administrator + Net Participant Costs}}{\text{NPV (Lifecycle kWh Savings from 2009 Installs)}}$$

(Eq. 2)

4.2 Process Evaluation Methods

Because of the transitional nature of the 2009 program year and the evaluation contractor's engagement late in the program year, the first year process evaluation effort was limited in scope and focused on documenting program processes and identifying key cross-cutting "transitional areas of interest" for further evaluation based on current research efforts and input from LIPA, National Grid and third party implementation contractors.

Specifically, the 2009 process evaluation efforts were limited to two key tasks:

- *Development of Program Implementation Models* – LIPA provides strategic direction to the program efforts and oversight of the organizations working to plan and implement the programs. The evaluation team drew on information gleaned from meetings with LIPA, National Grid and third party implementation contractors, interviews with National Grid program staff and available program documentation to develop comprehensive implementation models for each program outlining program delivery processes for 2009. These models were created to document the program processes and provide program staff, including LIPA, National Grid and third party implementation contractors, with a visual picture of the delivery process for each program. The models highlight program information flows and decision points and document QA/QC activities.
- *Identification of Cross-Cutting Areas in Need of Further Research* – Beginning in late 2009, the evaluation team conducted interviews with LIPA, National Grid and third party implementation contractors as well as reviewed program databases and materials. Based on these interviews, the evaluation team identified cross-cutting areas for exploration for ongoing process evaluation efforts. These areas were also compared to industry best practices[19] to help identify both the strengths and weaknesses of the ELI, Renewable, and demand response programs.

A more extensive process evaluation at both the portfolio level (i.e., cross-cutting), as well as for each individual program, will be conducted in 2010. The following section describes the data collection efforts that supported these two process evaluation tasks.

Data Collection and Document Review for 2009 Process Evaluation

In the fall of 2009, the evaluation team conducted preliminary meetings with LIPA, National Grid and third party implementation contractors. In addition, the evaluation team gathered the available program documentation throughout the fall and winter of 2009 as well as early

[19] Best practices were sourced from three areas: the Best Practices Self-Benchmarking Tool for Energy Efficiency Programs at http://www.eebestpractices.com/benchmarking.asp, S.M.A.R.T. Project Management goals from Doran, George T. "There's a S.M.A.R.T. way to write managements' goals and objectives."Management Review 70.11 (Nov. 1981), and Opinion Dynamics' extensive experience with other similar energy efficiency and renewable programs.

2010. Finally, the team conducted follow-up interviews with National Grid program managers to review program processes in support of the evaluation efforts. (See Volume II for a review of the data sources utilized for the process evaluation).

Based on these research efforts, the evaluation team created implementation models for the ELI, Renewable, and demand response programs evaluated in 2009. A description of the effort and the implementation models are included in Volume II.

The evaluation team also utilized these meetings and interviews and an extensive review of program materials and prior evaluation reports to identify eight key cross-cutting process areas for further research. The process results section (Section 6) describes each of these cross-cutting process areas (specifically during the 2009 program implementation cycle) and benchmarks the program efforts in each area against established best practices for energy efficiency and renewable programs. This comparison allows the evaluation team to qualitatively discuss the current practices of the ELI, Renewable, and demand response programs compared to stated best practices, as well as to identify those program areas that are best suited for further evaluation in 2010 and beyond.

5. IMPACT RESULTS

This section presents the evaluated net energy and demand impacts for the ELI and Renewable Portfolios. Section 4.1 of this report provides an overview of the methodology used to develop the impact results reported below. This section also documents portfolio and sector (residential and commercial) TRC and levelized cost values as described in Section 4.1.

5.1 ELI Portfolio Impacts

Energy and Demand Impacts

The portfolio of ELI programs delivered considerable energy and demand savings to electric customers on Long Island. Specifically, the ELI Portfolio accounted for 118,651 MWh and more than 25 MW in total evaluated net savings for 2009. The ELI Portfolio performed well exceeding 2009 net demand savings goals by 4%. However, the portfolio fell short of net energy savings goals by 21%.

Table 8: Net Impacts: ELI Portfolio Evaluated Impacts versus Goals

Program	Evaluated Net Impacts		2009 Net Impact Goals		Percent of Goal	
	MW	MWh	MW	MWh	MW	MWh
Commercial Efficiency	9.00	42,252	8.81	37,000	102%	114%
Retrofit Energy and Capacity[20]	0.18	1,086	2.39	13,220	8%	8%
Total Commercial	*8.91*	*42,033*	*11.20*	*50,220*	**80%**	**84%**
Efficient Products	8.78	61,178	8.04	89,613	109%	68%
Cool Homes	3.55	3,278	3.28	1,977	108%	166%
Residential Energy Affordability Partnership	0.94	6,257	0.67	6,000	140%	104%
Home Performance with ENERGY STAR / Home Performance Direct[21]	1.59	2,911	0.76	830	209%	351%
Information / Education	1.18	2,239	0.32	900	369%	249%
ENERGY STAR New Homes	0.54	754	0.27	584	197%	129%
Total Residential	*16.58*	*76,618*	*13.34*	*99,904*	*124%*	*77%*
Total ELI	**25.49**	**118,651**	**24.54**	**150,124**	**104%**	**79%**

[20] This program was discontinued in January 2009, but the savings goals were set for the entire year.

[21] Home Performance Direct was a pilot program in 2009 and did not have separate goals. Therefore we report it as part of the Home Performance with Energy Star program here.

As a group, the commercial programs accounted for approximately 35% of total evaluated net energy savings of the ELI Portfolio. These programs fell short of the 2009 net energy goals by 16%, and fell short of net demand goals by 20%. The Commercial Efficiency program, the core commercial program offered in 2009, performed well exceeding net energy and demand goals by 14% and 2%, respectively. However, the overall commercial portfolio fell short of goals due to the discontinuation of the RECAP program. The RECAP program was a CEI program that had additional projects in the pipeline at the end of 2008. It was discontinued in the first month of 2009 and is no longer part of the ELI Portfolio. However, savings associated with projects that were specified under RECAP, but not completed by the end of the 2008 program year were added to the ELI commercial portfolio goals for 2009. Many of these projects were not completed under the RECAP program in 2009 due to the discontinuation of the program resulting in lower than expected savings.

Residential programs accounted for approximately two-thirds of total ELI evaluated net energy savings. Residential programs exceeded demand savings goals by 24%, but fell short of energy savings goals by 23%. As the Energy Efficient Products program accounts for the vast majority of energy and demand savings within the residential portfolio, the performance of this program dictates the ability of the portfolio to achieve savings goals. The Energy Efficient Products program fell 32% short of the program level energy savings goal due to lower than projected sales of program CFLs[22] causing the residential portfolio to fall 23% short of goal. With the relatively compressed timeline for this evaluation, in general the reason for why programs did or did not meet goals was not explored. This will be a part of the 2010 annual report.

Total Resource Costs

The TRC test measures the net costs of each program as a resource option based on the total costs of the program. Total costs for each program include both the participants' and the utility's costs. (Section 4.1 documents the methodology employed to determine TRC values). The results of the TRC test are commonly expressed in terms of a benefit cost ratio. When the benefit cost ratio is greater than one, the program is considered a cost effective investment of funds from a societal perspective. Table 9 presents the TRC test results for the ELI Portfolio.

[22] There are a number of potential causes for the shortfall in CFL sales. To date the evaluation team has not specifically examined market or programmatic factors that may explain this outcome.

Table 9: Summary of ELI Portfolio Total Resource Costs

Program/Sector	NPV Benefits	Incremental Cost + Program Overhead	Benefit Cost Ratio (TRC)
Commercial Programs	$ 57,242,592	$ 28,678,127	2.0
Energy Efficient Products (EEP)	$ 41,363,639	$ 10,064,484	4.1
Residential Programs[a]	$ 29,064,024	$ 18,487,082	1.6
ELI Portfolio[b]	**$ 127,648,095**	**$ 59,254,849**	**2.2**

[a]Project cost for Info Ed was not tracked. Cost was estimated by using an incremental measure cost/kWh from EEP for the portion of the savings that was non behavioral (equipment purchases). Behavioral changes are no cost.

[b]ELI Portfolio results include expenses not allocated to individual programs such as admin, salaries and professional services.

The TRC values for the 2009 ELI Portfolio are greater than 1, indicating that the portfolio was a cost effective investment of funds. The portfolio achieved a TRC of 2.2. Commercial programs achieved a TRC value of 2.0. Residential programs achieved a TRC value of 1.6. Notably, Energy Efficient Products had a very high TRC value at 4.1 due in large part to the proportion of program benefits derived from CFLs, an extremely cost effective measure. These results are consistent with those associated with the CEI initiative and are generally in keeping with the established trend of decreasing levelized costs and increasing cost effectiveness of LIPA's energy efficiency program efforts.

Levelized Costs

Levelized cost is another measure of portfolio cost effectiveness. The levelized cost value is a way to compare the cost of energy efficiency with the cost of generation.[23] Levelized cost presents the total costs of the program to the utility and its ratepayers on a per kilowatt hour basis levelized over the life of the program. (Section 4.1 documents the approach used to calculate levelized cost values.)

Table 10 presents the levelized costs for the 2009 ELI Portfolio and separately for the residential and commercial programs. Overall, the ELI Portfolio levelized cost totaled $0.050. This value is minimally different than the 2008 portfolio levelized cost of $0.048. For commercial programs, the levelized cost was $0.050 per kWh. The Energy Efficient Products program achieved a levelized cost value of $0.023. For residential programs the levelized cost was $0.103 per kWh.

[23] Cost of generation varies depending on time of year (summer, winter) and time of day (peak, shoulder, and off-peak periods). LIPA's cost of generation varies from $0.057 for off-peak to $0.092 for summer on-peak. The cost of generation numbers are provided in the Optimal Screening Tool.

Table 10: ELI Portfolio Levelized Costs

Program/Sector	$/kWh
Commercial Programs	$ 0.050
Energy Efficient Products (EEP)	$ 0.023
Residential Programs[a]	$ 0.103
ELI Portfolio[b]	**$ 0.050**

[a]Project cost for Info Ed was not tracked. Cost was estimated by using an incremental measure cost/kWh from EEP for the portion of the savings that was non behavioral (equipment purchases). Behavioral changes are no cost.

[b]ELI Portfolio results include expenses not allocated to individual programs such as admin, salaries and professional services.

5.2 Renewable Portfolio Impacts

Energy and Demand Impacts

The portfolio of renewable programs exceeded net energy and demand goals by 13% and 41%, respectively. These goals were achieved largely through the success of the Solar program. This program exceeded MW and MWh goals by 46% and 37%, respectively. This achievement was largely due to the fact that the program provided rebates for over 780 photovoltaic systems in 2009, far more than was originally planned. The Small Wind pilot program obtained 3% and 4% of the energy and demand savings goals, respectively. This was the first year of the pilot program with three residential installations completed and up to seven installations planned in 2009.

Table 11: Net Impacts: Renewable Portfolio Evaluated Impacts versus Goals

Program	Evaluated Net Impacts		2009 Net Impact Goals		Percent of Goal	
	MW	MWh	MW	MWh	MW	MWh
Solar	3.06	6,203	2.10	4,528	146%	137%
Small Wind	<0.01	34	0.07	983	4%	3%
Total Renewable	**3.06**	**6,237**	**2.17**	**5,511**	**141%**	**113%**

Total Resource Costs

As stated above, the TRC test measures the net costs of each program as a resource option based on the total costs of the program. Total costs for each program include both the participants' and the utility's costs. (Section 4.1 documents the methodology employed to determine TRC values). The results of the TRC test are commonly expressed in terms of a benefit cost ratio. When the benefit cost ratio is greater than one, the program is considered a cost effective investment of funds from a societal perspective.

Table 12 presents the TRC test results for the Renewable Portfolio.

Table 12: Summary of Renewable Portfolio Total Resource Costs

Program/Sector	NPV Benefits	Incremental Cost + Program Overhead	Benefit Cost Ratio (TRC)
Small Wind	$ 55,633	$ 171,285	0.3
Solar	$ 15,062,553	$ 30,813,936	0.5
Renewable Portfolio	**$ 15,118,185**	**$ 30,985,221**	**0.5**

The Renewable Portfolio TRC value was 0.5 indicating that the portfolio was not cost effective. It is important to note that TRC and levelized cost results are not directly comparable between energy efficiency programs (ELI) and renewable energy programs as cost effectiveness is not commonly considered a key priority for renewable programs. Rather, renewable programs are typically designed with consideration of the societal benefits associated with the program including fossil fuel conservation, pollution reduction, economic stimulus and job creation. Moreover the cost of program delivery and installed measures for renewable energy and energy efficiency programs are not directly comparable. The funding for LIPA's Renewable Portfolio reflects a policy decision by LIPA, and thus the renewable programs are not designed to achieve cost effective savings. However, LIPA is committed to delivering the most cost effective renewable energy programs possible and is working with their program design team to achieve that goal.

Levelized Costs

As shown in Table 13, the Renewable Portfolio had a lifetime levelized cost of $0.270. To provide context to the cost effectiveness results, the evaluation team reviewed aspects of the California Solar Initiative (CSI), a multi-year, multi-million dollar effort offering incentives for the installation photovoltaic projects. As of April of 2009, the residential incentives paid through the CSI program by the three program administrators were $0.22/kWh, $0.26/kWh, and $0.34/kWh.[24] While the incentives reflect but one cost component used to calculate levelized costs and thus are not strictly comparable, it is informative to consider that the CSI program paid incentives for the installation of PV systems at values in line with the total levelized cost of the LIPA program.

Table 13: Renewable Portfolio Levelized Costs

Program/Sector	$/kWh
Small Wind	$ 0.275
Solar	$ 0.270
Renewable Portfolio	**$ 0.270**

The following section presents initial process evaluation results.

[24] California Public Utilities Commission Staff Progress Report. April 2009.

6. PROCESS RESULTS

The 2009 program cycle built on the past CEI programs to develop a new portfolio of energy efficiency programs with aggressive energy savings goals (i.e., ELI). In addition, the 2009 programs worked to continue growing the renewable energy market on Long Island. Because of the transitional nature of the 2009 program year, the first year process evaluation effort was limited in scope and focused on (1) documenting program processes through implementation models (Volume II includes models for each ELI, Renewable and demand response program) and (2) working with LIPA to identify eight cross-cutting areas that required exploration and development in order to enhance program efforts.

Overall, the evaluation found that program processes are functioning reasonably well and ultimately lead to the implementation of effective programs in 2009. However, through discussions with LIPA, National Grid and the third party implementation contractors, the evaluation effort identified eight cross-cutting areas where LIPA and their partners are working to make improvements to enhance future program efforts. The eight cross-cutting areas include the following:

- Improved Communication Across Programs and Organizations
- Clearer Delineation of Roles and Responsibilities
- Adherence to Program Goals by National Grid
- Enhancement of Current Marketing and Outreach Efforts
- Consistency of Verification and Quality Control
- Centralization of Data Tracking and Reporting
- More Thorough Documentation and Transparency of Savings Estimates
- Better Integration and Formalization of Evaluation Efforts

This section describes each of these cross-cutting areas during the 2009 program implementation cycle; benchmarks the 2009 program efforts against established best practices for energy efficiency and renewable programs; identifies key changes currently underway; and describes the areas that are best suited for further evaluation in 2010 and beyond.

Note that a more extensive process evaluation at both the portfolio level (i.e., cross-cutting), as well as for each individual program, is planned for 2010.

Improved Communication Across Programs and Organizations

According to the 2009 Program Marketing Plan, one of LIPA's goals for 2009 was to integrate programs (and organizations) better: "because the old CEI programs were structured along vertical markets, there were insufficient opportunities for program managers and other stakeholders to communicate with each other." LIPA and the evaluation contractor identified communications across organizations (i.e., LIPA, National Grid and the implementation contractors) as an area for improvement. Notably, with the transition from

the CEI initiative to the 2009 programs, communication has improved; however, some barriers to communication remain.

Best practices indicate that building feedback loops into program design and logic can enhance program design and administration as well as communication across groups. Program implementers and subcontractors are a unique source of data regarding the effectiveness of program design. Incorporating their experience into program re-design is essential to administering effective and targeted programs. While it appears that LIPA, National Grid and the implementation subcontractors are contributing to program design and administration via established monthly meetings; further efforts can be made to specifically identify what contributions are made and if systematic feedback is being provided.

LIPA's 2010 evaluation efforts will include internal process analyses, which will focus on recommendations to point the way so that both third party evaluation and internal feedback can be incorporated into the program design process. Specifically, the evaluation team will conduct in-depth interviews with program staff to identify methods to "close the communications gap". These interviews will serve to develop actionable recommendations that could include increasing cross-functional teams working across programs and markets, as well as documenting protocols for decision making and information sharing.

Clearer Delineation of Roles and Responsibilities

As part of the transition from CEI to the 2009 ELI, Renewable, and demand response programs, LIPA and the evaluation team also identified the need for a clear delineation of roles and responsibilities for all program efforts. As such, the evaluation team worked with LIPA and National Grid staff to develop implementation models that identify the key functions, roles and responsibilities of each stakeholder as a first step towards clarifying roles going forward.

In 2009, the program evaluation team found that the number of staff and contractor organizations involved in the implementation of each of the 2009 programs varied widely, from two stakeholders for Commercial Efficiency, to five stakeholders for the Cool Homes program. Each program was found to have a unique implementation structure, determined by each program's design and the available resources. LIPA also maintains a contract with an outside advertising agency for all of its marketing efforts, a new program planning contract with AEG, and an evaluation contract with Opinion Dynamics. In addition, the evaluation of program implementation revealed differing implementation structures across the programs. For example the Commercial Efficiency program does not make use of third party implementation contractors while many of the residential programs rely on one or more implementation contractors to carry out program implementation. Given the number of parties involved and the varied structure of the programs, clearly defining roles and responsibilities is an important cross-cutting area for program improvement.

The evaluation contractor's review of program literature revealed that roles and responsibilities are documented in program Operations Manuals at a macro level. However, LIPA and National Grid staff identified a need to provide more detailed descriptions of roles and responsibilities in order to clarify internal processes and coordinate efforts. Marketing (and cross marketing with Information and Education programs) was one area where some

confusion over roles was apparent in the interviews with LIPA and National Grid program managers.[25] In addition, in 2009, there was also an overlap in customer interaction responsibilities for some programs. Specifically, customers might seek program information from LIPA staff, National Grid staff (including Infoline staff), or the implementation contractor's call centers. As such, there could be the potential for providing customers with disparate and confusing information unless the information provided is standardized. It also has the potential to lead to less effective dissemination of information. Despite the lack of defined roles in the available program documentation for the 2009 program year, LIPA and National Grid program staff were able to clearly articulate the roles and responsibilities of most of the stakeholders involved in the program implementation process and worked with the evaluation team to document these roles through implementation models.

The implementation models (provided in Volume II) identify functional roles and responsibilities. The evaluation team recommends updating and refining these models as programs change in subsequent years. Going forward, 2010 evaluations will augment earlier implementation model efforts by conducting internal process evaluations and creating program theory and logic models.

Adherence to Program Goals by National Grid

With the implementation of a new portfolio of programs, 2009 marked a transition for the development and documentation of program goals. In 2009, LIPA projected ELI Portfolio goals for 2009 through 2018. The ELI Portfolio seeks to invest $924 million in efficiency and demand reduction options over a ten year period, generating a peak demand reduction of approximately 520 MW and savings of 1,600 GWh of energy.[26]

The Renewable Portfolio seeks to capture 25% of the energy requirements of LIPA's customers by the year 2013, and possibly 30% by 2015.[27] Further, continued funding for renewable programs are expected to result in over 14,000 PV installations by 2015, producing roughly 32 GWh annually.[28]

Finally, LIPA*edge* is currently in a maintenance mode and only adding customers to make up for program attrition. This program annually achieves approximately 50.71 MW of demand reduction.[29]

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[25] The evaluation team found that there is an established marketing and outreach process in which LIPA, National Grid and LIPA's independent advertising agency review, prioritize and promote LIPA programs. While LIPA considers National Grid program managers an integral part of the entire process, from brainstorming up until printing and mailing, in-depth interviews with National Grid program managers revealed that for some programs there was concern over the coordination between LIPA and National Grid on these efforts. This indicates that there may be a need for additional training and communication for all program staff, including LIPA, National Grid and independent advertising contractors, about their specific roles in the marketing and outreach process. Taking steps to ensure that all parties communicate and are cognizant of each others' efforts would ease coordination concerns and enhance transparency.

[26] 2009 Electric Resource Plan, Section 5-2.

[27] 2009 Electric Resource Plan, Section 1-2.

[28] Renewable Program Operation Manuals, December 2009, pp.7.

[29] 2009 Portfolio Marketing Plan, pp. 79.

The ELI and Renewable Portfolios energy goals are documented in a variety of sources including the 2009 Draft Electric Resource Plan, the 2009 Portfolio Marketing Plan and the various sector-level Operations Manuals. In addition, each program has several non-energy goals that are documented in the 2009 Marketing Plan. These include goals such as:

- "Expand services to small as well as large customers";
- "Use financial mechanisms to increase the market saturation of these efficient products"; and
- "Maximize energy savings through proper sizing and installation of high efficiency residential cooling and heating equipment and furnace distribution fans".

The specific non-energy saving goals as presented in the marketing plan for each program are outlined in Volume II.

Best practices indicate that program goals should be clearly and consistently documented. In addition to being clearly and consistently documented, best practices suggest that goals should be specific, measurable, attainable, realistic and timely (i.e., S.M.A.R.T.).

LIPA is following best practices for energy goals - each program's energy saving goals include MW and MWh savings related to program efforts as well as program budgets and the goals are provided for the full ten years of the ELI and Renewable Portfolios. In addition, the goals are consistently documented in the 2009 Draft Electric Resource Plan, the 2009 Portfolio Marketing Plan and the various sector-level Operations Manuals.

While most of the documented non-energy saving goals are attainable, realistic and timely, some of the non-energy goals documented in the 2009 Marketing Plan are either non-specific or not tied to a measurable objective. For example, one of the three non-energy savings goals for the Energy Star Labeled Homes program is to "address any other potential barriers." This goal should be refined by identifying the program barriers and linking them to measurable strategies to address existing barriers. In addition, Home Performance with ENERGY STAR® seeks to "provide support to existing Home Performance with ENERGY STAR® infrastructure," without identifying what it is and how to measure support. Specifying these goals and identifying metrics for them is a key step in quantifying the effect of these programs on non-energy saving impacts. Non-energy saving goals comprise important benefits for energy efficiency, renewable and demand response programs, especially those engaged in market transformation efforts. The evaluation team suggests that program goal setting would be enhanced by clearly articulating the data requirements for measuring program success as well as clearly defining and identifying key information needed to track and report early in the program development process.

Notably, according to discussions with LIPA, National Grid and implementation contractors, while the energy goals for programs are well documented the process of setting goals is not fully transparent. Goal setting under CEI, and for PY2009, was directed by LIPA's former planning contractor, Optimal Energy. National Grid program managers report that they did not participate in the goal setting process and assumptions used to develop the goals were not fully communicated. As such, energy and demand goals were oftentimes not appropriately balanced based on the structure of the programs and in some cases were deemed "unrealistic" by National Grid program staff. This led to National Grid, in some

cases, developing and managing to goals that they deemed more appropriate. While the Master Service Agreement (MSA) between LIPA and National Grid does not include language that specifically requires National Grid to adhere to the program goals provided by LIPA, this finding supports LIPA's decision to revise the planning process.

With ELI, LIPA has taken steps to revise the program planning and goal setting process with the aim of improving transparency of the process and underlying assumptions. Toward that end LIPA selected a new planning contractor, AEG, in late 2009 to develop program plans and associated goals for 2011 and beyond. LIPA plans to employ a team approach that works with AEG and uses evaluation results and secondary research to drive goal setting processes. These efforts are fully supported by both LIPA and National Grid and will enhance the transparency and documentation of program goals. As part of this effort, the new program planning contractor plans to utilize a commercially available and widely used portfolio planning model to establish program goals for 2011 and beyond. This will allow LIPA to work with AEG to develop a more transparent program planning process which includes feedback loops into program design that build upon program managers' existing knowledge about the market and program. Further, it will allow for feedback to confirm that these goals are considered attainable so that programs are consistently implemented to achieve documented program goals.

In addition, in 2010 the evaluation team will work with ELI, Renewable, and demand response program staff to develop program theory and logic models that will help to identify measurable non-energy and energy savings metrics associated with existing program goals. These metrics will be incorporated into baseline and market characterization efforts and measured in future evaluation efforts.

Enhancement of Current Marketing and Outreach Efforts

With the implementation of a new portfolio of programs, 2009 also marked an opportunity for the enhancement of marketing and outreach efforts. The 2009 marketing and outreach efforts included new initiatives to reach out to targeted customers, including identifying potential customers for the Home Performance Direct program using customer billing data. While the 2009 Marketing Plan identifies each program's marketing efforts, LIPA and National Grid program staff report that they currently do not have the detailed information regarding some market segments required to effectively market programs to targeted customers. Therefore, in 2009, program marketing efforts ranged from very little, if any, marketing efforts to multiple efforts making use of targeted phone calls and outreach. It should be noted that LIPA also oversees an advertising contract for program promotion as well as maintains the energy efficiency content on the lipower.org website.

Marketing and outreach best practices include: (1) encouraging the use of targeted marketing strategies to promote the program, and (2) recommending engaging trade allies in program marketing efforts by providing training and resources to enhance their marketing of programs.

Table 14 on the following page presents the status of the marketing and outreach efforts for each of the evaluated programs. Many of LIPA's efficiency programs have made attempts to employ these best practices. Specifically, the REAP and Home Performance Direct programs have used targeted marketing strategies to reach their intended audience, meeting with varying degrees of success according to the program managers. In addition, the Home Performance Direct program provides training to contractors, which includes some support for marketing the Home Performance with Energy Star program to customers. However, overall the programs identified additional opportunities to incorporate these best practices into their marketing and outreach efforts.

Table 14: Marketing and Outreach Efforts for Evaluated Programs

Program Name	Description of Program Marketing & Outreach Efforts
Commercial Efficiency	LIPA and National Grid create and maintain collateral and implement marketing efforts.
Energy Efficient Products	The program provides resources for trade allies. In addition, implementation contractors negotiate buy downs and recruit market actors, create program/marketing collateral and maintain an online lighting catalog.[30]
Cool Homes	The program offers targeted marketing strategies as well as provides resources for trade allies. In addition, National Grid and LIPA create and maintain collateral and implement marketing efforts.
Residential Energy Affordability Partnership (REAP)	The program offers targeted marketing strategies. Specifically, National Grid creates and implements bill inserts and direct mail, National Grid provides outreach at events in conjunction with LIPA, implementation contractor provides outreach in neighborhoods/multifamily units.
Home Performance Direct	The program provides targeted marketing strategies and provides resources for trade allies. In addition, National Grid creates collateral and customer lists for targeted mailings and phone calls by implementation contractor.
Home Performance with ENERGY STAR®	The program also provides resources for trade allies. In addition, LIPA and National Grid create collateral and provide to InfoEd for promotion at outreach events.
Information & Education	The program may promote the audit program by staff at outreach events and via the In Concert with the Environment program.
ENERGY STAR® Labeled Homes	The program provides targeted marketing strategies and provides resources for trade allies. In addition, implementation contractor performs outreach to builders and local code officials, program incentivizes display homes.
Solar	The solar programs provide resources for trade allies. In addition, the program manager, with assistance from an outreach coordinator to handle logistics, conducts outreach events and seminars for customers and trade allies, National Grid creates and maintains marketing collateral in conjunction with LIPA.
Small Wind	The program provides resources for trade allies. In addition, the program manager, with assistance from an outreach coordinator to handle logistics, conducts outreach events and seminars for customers and trade allies. In addition, the program manager hosts meetings with stakeholders, and other interested parties in conjunction with LIPA representation. National Grid creates and maintains marketing collateral.
LIPAedge	The implementation contractor maintains the LIPAedge website.

[30] The online catalog was offered through 2009. LIPA is working to continue offering the catalog going forward.

Future evaluation efforts include conducting baseline and market assessments for each market sector which will help to ensure that marketing efforts are adequately targeted within the context of the Long Island energy efficiency marketplace. The evaluation contractor will collect on-site and survey data to determine what type of equipment is currently in the market, understand how this equipment is used, and identify how specific markets function. This information will serve as an input into the new planning contractor's program planning tool as well as be used as a basis for clarifying energy and demand savings impacts, determining whether market transformation occurred, and prioritizing and targeting market segments.

Consistency of Verification and Quality Control

During the 2009 program year, LIPA emphasized the importance of improving verification and quality control for future programs. Each program currently has procedures for verification and quality control in place. These are designed and operated by implementation contractors and National Grid. They are also documented in the Operations Manuals and disseminated through discussions with National Grid project managers.

The quality control and verification processes undertaken in 2009 varied by program. At a minimum, the implementation contractors conduct their own quality control and verification of the programs and the tracking reports are reviewed by both LIPA and National Grid staff. Certain programs, including Small Wind and Commercial Efficiency, include more rigorous on-site quality control procedures including monitoring and verification and pre- and post-inspection. National Grid project managers also conduct screenings of custom measures for the Commercial Efficiency program. In addition, several programs, including Home Performance Direct, conduct customer satisfaction surveys.[31]

Verification and quality control best practices focus on conducting on-site verification activities such as pre- and post-inspection and monitoring as well as using statistical features in inspection sampling protocol.[32]

Table 15 presents the status of the quality control and verification procedures for each of the evaluated programs.

[31] In particular, the Home Performance Direct program employs an ongoing customer satisfaction survey effort with weekly feedback provided to the National Grid and LIPA program manager by the implementation contractor.

[32] Using statistical features in sampling efforts may include activities such as creating tiers for sampling based on expected savings or rebate/incentive levels in order to ensure that the largest projects are reviewed.

Table 15: Quality Control and Verification Procedures for Evaluated Programs

Program Name	Description of Program QC and Verification Efforts
Commercial Efficiency	This program has procedures in place for pre-approval for certain projects, post-inspection for all whole building, custom, and pre-approved prescriptive projects and 10% of other prescriptive projects. In addition, this program builds in statistical features to sampling.
Energy Efficient Products	This program builds in procedures such as monthly feedback reports provided to the National Grid program manager by the implementation contractor, and verification of coupon counts by implementation contractor.
Cool Homes	This program verifies equipment and customer eligibility, as well as inspects 10% of sites post-installation by implementation contractor. This program also verifies rebates, coupons and/or invoices as well as builds in statistical features to sampling.
REAP	This program provides weekly feedback reports provided to the National Grid program manager by the implementation contractor, as well as inspection of 10% of sites post-installation by implementation contractor. This program reviews and verifies rebates, coupons and / or invoices, as well as builds in statistical features to sampling.
Home Performance Direct	This program provides weekly feedback reports provided to the National Grid program manager by the implementation contractor, including customer satisfaction results. This program also inspects 10% of sites post-installation by HPD contractors, as well as verifying invoices submitted for payment of services.
Home Performance with ENERGY STAR®	This program provides weekly feedback reports provided to the National Grid program manager by the implementation contractor. This program This program also inspects 10% of sites post-installation by HPwES contractors, as well as verifying documentation submitted for payment of rebates/incentives.
Information & Education	This program has procedures in place to have the National Grid program manager observe classes, conduct, and review event evaluation. In addition, monthly feedback reports on audits are provided to the National Grid program manager by the implementation contractor.
ENERGY STAR® Labeled Homes	This program builds in statistical features to sampling. For example, 10% of sites are inspected post-participation by the implementation contractor. This includes re-tests of HERS ratings.
Solar	This program reviews and pre-approves program applications. In addition, it conducts M&V of a small sample of installations by subcontractor.
Small Wind	This program conducts M&V of kWh data, installation certificate, permitting verification, site-visits, quarterly meetings with subcontractors.
LIPAedge	This program has procedures in place to provide the National Grid program manager with event reports by the implementation contractor. In addition, customer satisfaction surveys are conducted by the implementation contractor (not done in 2009).

LIPA believes that quality control and verification is a cornerstone of effective program implementation, and will continue to work with evaluation contractors in 2010 to develop a complete understanding and recommendations for best practices going forward. In particular, in 2010 the evaluation team will conduct further research into the QA/QC procedures employed by implementation contractors, with particular focus on the sampling protocol. This effort will also conduct a cross-program review of the specific procedures employed by LIPA and National Grid staff when reviewing program tracking data to ensure that the methods used are consistent across all programs.

Centralization of Data Tracking and Reporting

A key objective associated with the 2009 program cycle was to revise the manner in which program tracking data is managed. LIPA's efforts serve to improve program tracking, evaluation, and reporting as well as support real-time information sharing among LIPA and National Grid program staff and the various organizations that support program implementation.

As LIPA's efforts to enhance program data tracking remain a work in process, the programs relied on existing systems and structures to manage program data throughout 2009. The evaluation team's review of the data and systems found that:

- Program information was tracked in a variety of program tracking spreadsheets (in some cases multiple spreadsheets for a single program), maintained by the implementation contractor(s) or in the case of the CEP program, National Grid.
- The format and level of detail/granularity of the data tracked by National Grid and third party implementation contractors varied by program.
- Program tracking spreadsheets are typically provided to National Grid program managers who in turn use the information to populate a variety of internal tracking reports for LIPA program staff.
- Program tracking databases are often proprietary to National Grid and/or implementation contractors; therefore LIPA does not typically have access to the tracking data itself. Instead, LIPA receives program information via internal tracking reports from National Grid's program staff.

Maintaining program tracking data in multiple tracking spreadsheets was inefficient as there was no central source for participant and measure level information. In addition, there was no central entity responsible for maintaining consistency in the data that is tracked and reported.[33]

[33] In aggregating program tracking data for this evaluation, inconsistencies were identified in the content, format and level of detail of the data across programs. This lack of consistency presented challenges in terms of effective program tracking, verification and quality control and evaluation. For example, the monthly tracking spreadsheet for the REAP program does not include information on the number and type of measures installed, instead reporting the number of visits conducted and the associated savings. In another instance the project files associated with custom measures included .pdf copies of the output of engineering calculations and analytic tools used to estimate expected savings instead of active spreadsheets containing savings

Best practices suggest that program data should be collected in a methodical way to ensure consistency and collection of the information necessary to support program planning and evaluation. There should be an established portfolio-wide standard that specifies what data should be tracked and how the data are managed and reported to allow for effective program tracking, quality control and verification, and program evaluation.

At the end of 2009, LIPA and National Grid began to transition the program tracking data to a centralized database (i.e., the Siebel database). This will allow all program stakeholders, including LIPA, National Grid implementation contractors, AEG, and the Opinion Dynamics evaluation team access to program tracking and reporting systems in one central location. This transition is an important step towards a more transparent and efficient data reporting and tracking system as a centralized database will allow LIPA, National Grid, and implementation contractor staff to actively share information in real time, as well as monitor workflow and provide timely reports. In addition, by building in requirements for evaluation into monthly and weekly reporting, LIPA and National Grid can ensure that the proper data will be tracked and readily available for evaluators in future program years.

The evaluation team is working with LIPA, National Grid and AEG as they move forward with the transition to a centralized system, identifying how best to use the system and what data to store and track. The team will continue to participate in the Siebel planning process in order to provide valuable input from an evaluation point of view. The team recommends that it become standard practice to have any analytic tools or spreadsheets with algorithms and assumptions for estimating savings, and/or program tracking be uploaded to Siebel or otherwise maintained in program records.

More Thorough Documentation and Transparency of Savings Estimates

The documentation and transparency of algorithms used to develop program expected savings estimates was identified as a priority area during the 2009 transition year. Best practices suggest that the algorithms on which program planning and goals are based should be well documented, including all inputs such as hours of use and run times for equipment. As such, LIPA directed the evaluation team to conduct an engineering review and update (as necessary) all existing algorithms and assumptions used to develop program and measure level expected savings estimates.

For 2009, the ELI and Renewable program expected program savings estimates were based on the CEI algorithms developed by the prior planning contractor. While these estimates served as a starting point, the 2009 evaluation team identified that some assumptions were not clearly documented. For those assumptions, the team worked with LIPA, National Grid and implementation contractors to determine the appropriate assumptions (and document the source of each assumption for future efforts). For assumptions that were already documented through earlier CEI efforts, the team revisited the assumptions to determine whether they needed to be updated to reflect current market conditions. As such, 2009 was a transitional year in which LIPA worked to create well documented and transparent savings

algorithms. Without a central source for program information, resolving issues like these becomes a cumbersome process of identifying the appropriate responsible party and source for the required data.

algorithms and associated assumptions that will serve as a foundation for the next program cycle. The result includes several recommendations for revisions to past updates, as well as a revised TRM document containing the revised algorithms for use by LIPA's new planning contractor. The recommended revisions are documented in Volume II.

Better Integration and Formalization of Evaluation Efforts

In 2009, LIPA brought on a contractor (Opinion Dynamics) to act as the sole evaluation contractor for all ELI, Renewable, and demand response programs. In addition, LIPA took the necessary steps to create a partnership between its evaluation contractor, new planning contractor (AEG), third party implementation contractors, National Grid and itself in order to enhance program performance. The use of a single evaluation contractor (in partnership with program planning and implementation) is a departure from past evaluation efforts in which individual programs were evaluated by a variety of contractors on a case by case basis. The transition to one evaluation contractor is intended to enhance cross-functional and cross-cutting evaluation practices that provide holistic and integrated research findings. This transition comes at an opportune time as according to LIPA and National Grid staff, many programs will benefit from a more integrated and formal program evaluation effort.

Best practices for evaluation include: routinely conducting detailed impact evaluations, though not necessarily annually; clearly defining and estimating free-ridership[34] and spillover;[35] and performing frequent process evaluation and market studies. In order to determine if the ELI, Renewable, and demand response programs were integrating evaluation efforts into their program processes, the evaluation team reviewed prior evaluation reports for each program since 1999. Table 16 provides a review of past evaluation efforts in each of these areas. (Volume II also provides detailed tables for each best practice area). Notably, specifics on each effort will be described under a separate document (e.g., the 2010 evaluation plan).

[34] Free ridership refers to program participants deemed to be free riders. Free riders are participants who would have implemented the program measure or practice in the absence of the program.

[35] Spillover refers reductions in energy consumption and/or demand in a utility's service area caused by the presence of the DSM program, beyond program related gross or net savings of participants.

Table 16: Best Practices for Evaluation Efforts Summary

Best Practice Area	Findings
Conduct detailed, impact evaluations routinely, though not necessarily annually	While the 2009 impact evaluations were limited to a review and implementation of program algorithms; the evaluation team also found that prior to 2009 many programs had not conducted impact evaluations. In fact, Energy Efficient Products and the Commercial Efficiency Program, programs that contain some of the largest share of energy impacts, never conducted an impact evaluation for all program measures.[36] Those programs that did conduct third party impact evaluations include Cool Homes, Residential Energy Affordability Partnerships (REAP), Solar, Information & Education, and LIPAedge. REAP and LIPA*edge* impact evaluations were typically billing or metering analyses conducted annually, and required minimal data collection efforts. It is important to note that many of these programs strive for market transformation, and impact evaluations in the early stages of the programs will likely not identify program effects.
Include periodic estimation of free-ridership and spillover	Of the nine programs that were re-designed into ELI energy efficiency programs, only three conducted evaluations that provided an estimate of free-ridership and spillover. These programs include Energy Efficient Products, Cool Homes and LIPA*edge*. Energy Efficient Products conducted two market assessments in which data was collected in 2002-2003 and 2006 which estimated free-ridership and spillover. The 2006 data only estimated free-ridership and spillover for CFLs. The Cool Homes market assessment estimated free-ridership and spillover from both contractors and customer participants for residential HVAC measures. LIPA*edge* provides a free riders estimate within their impact evaluation spreadsheet. These are units with 0% usage for the whole day (the day the event was called).
Use regular process evaluation activities to provide timely and fresh data	As of 2009, there had been three process evaluations conducted for currently existing programs.[37] These process evaluations were conducted solely for the Residential Energy Affordability Partnership (REAP) program (2001, 2002, and 2003). The transition from CEI to ELI is an opportune time to conduct process evaluations.
Perform market assessments for those programs that have a market transformation component	The review of prior evaluation reports indicates that the largest number of evaluations conducted were baseline and market assessments. This is consistent with best practice, as many of these programs seek market transformation. Six market transformation programs conducted baseline or market assessments. In the majority of cases, baselines were initially assessed and were then followed up with market assessments. However, some programs conducted baseline assessments, which were not followed up with a market assessment to track market effects (Solar). Energy Efficient Products recently conducted a Residential Appliance Saturation Survey (RASS), which provided relevant and necessary information about the saturation and penetration of energy efficient equipment within the Long Island market. However, some programs have not conducted a market assessment within the last three years. These include Cool Homes, REAP, Solar, and Information & Education. The programs that have conducted recent market assessments can provide valuable inputs to Opinion Dynamics' ongoing evaluation planning.

[36] Energy Efficient Products conducted an impact evaluation for CFL's in 2008. However, this evaluation did not cover the full suite of measures offered by the program.

[37] Customer Driven Efficiency, which was discontinued in 2008, also performed one process evaluation. This program provided assistance to residential and commercial customers wishing to make energy efficiency improvements not covered by other programs by providing technical, on-site energy analysis and audits to help commercial and industrial customers evaluate potential energy saving opportunities.

7. FOCUS OF FUTURE EVALUATION EFFORTS

Going forward, the evaluation team will also seek to engage the program teams, including LIPA, National Grid, and implementation contractors, more fully in the evaluation process (i.e., this engagement will not be limited to providing data). In addition, the evaluation team will formalize planned evaluation efforts, including but not limited to: (1) impact studies; (2) process evaluations and (3) market assessments.

In 2010, the evaluation team will work with LIPA to design an ongoing impact evaluation schedule that is relevant to each program. These evaluation efforts will also include free-ridership and spillover estimates, where relevant. Notably, however, certain programs are less likely to have large adjustments to their energy savings due to free-ridership and spillover due to a variety of reasons (e.g., REAP). Due to this, the 2010 evaluation plan will provide a program by program review of the rationale for including free-ridership and spillover estimates within each evaluation. (This will be documented in a formal evaluation plan, which will be submitted as a separate document.)

Further, the evaluation team plans to conduct process evaluations for all ELI, Renewable, and demand response programs. These evaluations will serve to increase program effectiveness, delivery and satisfaction. The evaluation team will also ensure that the programs periodically review and update market level information about construction practices, energy efficiency market share and measure adoption.

8. CONCLUSION

In 2009, LIPA embarked upon the Efficiency Long Island (ELI) initiative, a portfolio of energy residential and commercial efficiency programs that build on LIPA's past successes with the Clean Energy Initiative (CEI) (1999 through 2008). LIPA also continued its Renewable Portfolio[38] and demand response efforts in 2009. LIPA has communicated a firm commitment to improving program performance and has taken specific steps to achieve this goal.

In general, our evaluation of the ELI and Renewable Portfolios indicate that the programs are well designed and performing well in terms of delivering cost effective energy and demand savings to the customers of Long Island. At the portfolio level, both the ELI and Renewable Portfolios exceeded the net MW goals. The Renewable Portfolio also exceeded the net energy savings goal. While the ELI portfolio fell short of the net energy savings goal at the portfolio level, performance was consistent with that of similar portfolios we have evaluated and all but one program, Energy Efficient Products, exceeded goals.

The process evaluation, which was limited to interviews with program staff and implementation contractors and a review of program documentation, found that program processes overall are functioning well and ultimately lead to the implementation of effective programs which perform at a level commensurate with other programs the evaluation team has assessed. However, the process evaluation did identify areas for potential program improvement. The evaluation team will work with LIPA and National Grid to prioritize among these areas for improvement and conduct the research necessary to inform recommendations for program adjustments.

The Renewable Portfolio has performed extremely well, both in terms of achieving net energy and demand goals and in particular with respect to its role in the development of a renewable energy industry on Long Island. Specifically, the performance of LIPA's Solar programs in terms of transforming the market for solar energy installations has been exceptional.

[38] The Renewable Portfolio efforts include the Solar and Small Wind programs.