



# **Clean Energy Initiative**

**Energy Efficiency,  
Conservation, Renewable  
Energy, R&D Options**

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# **I. Introduction and Overview**

This document provides an overview of Clean Energy program and RD&D (Research, Development and Demonstration) project options currently under consideration by the Long Island Power Authority (LIPA) for implementation in 1999. It is being made publicly available for review and comment. LIPA expects to refine and implement some, but not all, of these options. LIPA receives program proposals on an on-going basis and will continue to evaluate the merit of new proposals as they are received. Decisions about which combination of options to initially pursue will be made following the public comment period.

## **Clean Energy Program Options**

The Clean Energy program options were designed with the following objectives in mind:

- Maximize electricity savings
- Maximize environmental benefits
- Maximize net economic benefits to Long Island
- Minimize electric rate impacts
- Cost effectively address peak load capacity needs.

Most of the program options are designed to capture significant electricity efficiency opportunities or stimulate investment in clean, renewable energy investment on Long Island. They are also designed to generate significant economic net benefits in the form of reduced energy bills for participating Long Island consumers and businesses. These economic savings will increase the disposable income consumers have available, which will in turn stimulate growth in economic activity. And by reducing the high energy costs of doing business on Long Island, these programs will make businesses more competitive and/or profitable. Implementing energy efficiency programs will also reduce power plant emissions due to reductions in energy produced or the utilization of low/no emission generating sources. However, note that any program that reduces energy use also reduces LIPA's revenues. This puts pressure on the utility to raise its rates in order to meet its financial obligations.

Other options, such as those dealing with peak load reduction, are designed to minimize energy costs and electric rates for all customers by delaying the need to build or purchase additional generating capacity. These options serve to reduce costs for everyone, but do not typically generate the type of significant environmental benefits resulting from energy savings attributed to energy efficiency programs. Consequently, they also do not put upward pressure on rates.

In deciding on a final mix of programs to implement, LIPA will be balancing competing objectives, so that customers gain significant benefits at minimal cost.

The Clean Energy Program options under consideration and summarized within this document include:

A. Residential Program Options

1. Residential New Construction
2. Residential Lighting and Appliances
3. Residential HVAC Efficiency
4. Residential Energy Affordability Partnership
5. Rooftop Solar Photovoltaic (PV) Program
6. Residential Information/Education
7. Residential Home Performance Service

B. Non-Residential Program Options

1. Commercial New Construction and Renovation
2. Regional High Efficiency Unitary HVAC
3. Regional Premium Efficiency Motors
4. Comprehensive HVAC Retrofit
5. Resource Conservation Management
6. Commercial Energy Analysis
7. Commercial Energy Cooperative
8. Carbon Dioxide (CO<sub>2</sub>) Offset Tree Planting Campaign

C. All Sector Program Options

1. Customer Driven Efficiency
2. Standard Performance Contracting
3. Revolving Loan Program
4. Geothermal Heat Pump Program

**Clean Energy Research Development, and Demonstration (RD&D) Project Options**

The Clean Energy RD&D project options were designed to maximize LIPA's ability to achieve its Clean Energy program objectives over the long term. Each project represents an investment designed to help develop, test or demonstrate emerging Clean Energy technologies and/or practices.

The Clean Energy RD&D project options currently under consideration and summarized below include the following:

- A. Photovoltaic Systems Project Options
  - 1. Bellport Beach Photovoltaic Project
  - 2. Sunshine AC Photovoltaic Project
  - 3. "One Thousand Homes" Program
  
- B. Fuel Cell Project Options
  - 1. Jones Beach Theater Fuel Cell Station
  - 2. Combined Fuel Cell and Battery Supply Unit
  - 3. Fabrication of Fuel Cell Plates
  - 4. Hydrogen Source for Small Fuel Cells
  - 5. 1 kW PV/Fuel Cell Station
  
- C. Wind System Project Options
  - 1. Wind Energy Assessment
  - 2. Summer Afternoon Peaking Wind Turbine System
  
- D. Electric Vehicle Project Options
  - 1. Advanced Assessment of Electric Vehicles
  - 2. AC/DC Converter - EV Battery Charger
  - 3. Advanced Lead - Acid Battery Implementation
  - 4. EV Charging Stations
  - 5. EV Trolley Demonstration Project
  
- E. EPRI Target Project Options
  - 1. Emerging Distributed Resource Technology
  - 2. Renewable Technology Options and Green Power Marketing
  - 3. Distributed Resource Information and Tools for Business Strategy
  - 4. Municipal Water and Waste Water Technology
  - 5. Healthcare Technology
  - 6. Small Business Solutions
  
- F. Other Project Options
  - 1. Other Distributed Generation Projects
  - 2. Integrated Building Controls for Multi-Family Housing
  - 3. Advanced Direct Exchange Geothermal Technology
  - 4. Roof-Integrated High Temperature Solar Energy Collector
  - 5. Medical Waste Disposal Technology Using Microwave Energy

## II. Document Organization

Immediately following this section are definitions for some key terms used in the tables appearing with each program option summary. Then, we present summaries of each Clean Energy program and RD&D project option.

Clean Energy program option summaries include narratives and tables. The narrative section provides an overall description of the rationale and objectives of the program option. The first table following provides details on the markets to be targeted, the energy uses where efficiency will be captured, the energy efficiency technologies or services that will be promoted, and the strategies the program option will use to intervene in and modify current energy use practices. Two additional tables provide: 1) annual and total electric savings and LIPA program costs; and 2) estimated overall economic costs and benefits that would result from the program.

Also included in the document are a series of summary tables showing data for all Clean Energy program options.

Each RD&D project option summary includes a brief project description, project cost and the expected benefits from implementing the project.

## III. Definitions of Key Terms Used in Program Option Summaries

### Savings

The electricity saved by each program option depends on the individual efficiency improvements made and the number of Long Islanders making them. In addition to annual electricity savings from each program option, the electric savings tables show **lifetime megawatt-hour (MWh)** savings. This represents the total cumulative electricity reduction resulting from the program option over time. This number is substantially larger than the annual numbers. Many program options are assumed to operate for three to five years. However, the programs' effects last considerably longer, for two reasons:

- The energy-efficient equipment that will be installed as a result of the program will last for years, in some cases (such as new construction) thirty years or more. The savings generated from this equipment therefore continue for each year that the equipment remains operating.
- Most program options are designed to change peoples' and businesses' equipment purchasing practices permanently. Permanent changes in behavior will result in Long Islanders purchasing higher efficiency equipment even after the program end, resulting in longer term savings.

## **Benefits and Costs**

The cost-effectiveness tables show the estimated benefits and costs of the program options from two perspectives: society's (i.e., Long Island's) and the utility's (i.e., LIPA's). The first row of each program option cost-effectiveness table indicates the **benefits, costs, net benefits** and **benefit-to-cost ratios** from Long Islanders' perspective ("Societal Test"); the next row provides the same categories from LIPA's perspective ("Utility Test").

### **Societal Benefits**

From Long Islanders' perspective, economic **benefits** consist of the value of electricity saved by the program options. This is measured as the reduction in LIPA's cost of purchasing fuel, paying employees, and maintaining power plants; or of buying wholesale power.

Because the production of electric power can have negative effects on the environment (e.g., from carbon dioxide, sulfur dioxide, nitrogen oxides, etc.), saving electricity provides Long Islanders with environmental benefits as well as direct economic benefits. The economic value to Long Island of these environmental benefits is estimated, and included in the societal analysis (i.e., the avoided costs of cleaning up pollution, the avoided damage to buildings from sulfur dioxide, etc.).

Because the electricity savings occur over time, so do the economic benefits associated with these savings. Since a dollar today is worth more than a dollar in the future, benefits resulting from future savings are reduced by a "discount rate." This reflects the fact that if the benefits were all captured in 1999, Long Islanders' could invest these benefits (e.g., deposit in a savings account) and the investment's value would grow in the future. Therefore, the total benefits numbers in the tables represent the total current value of all future benefits ("present value benefits").

### **Utility Benefits**

As with society, LIPA will benefit from reduced electricity consumption by avoiding the cost of supplying electricity to its customers. However, LIPA does not directly benefit from the reduction in pollution. Therefore, the utility benefits do not include the environmental benefits that are included in the societal estimate.

### **Societal Costs**

Long Island's costs from each program are comprised of two basic components:

- The costs paid by LIPA to implement the program but not including any rebate payments.
- The costs paid by LIPA's customers to install energy efficient equipment promoted by the program.

As with the benefits, the costs may occur over time and are therefore adjusted to represent the total value today ("present value costs").

### **Utility Costs**

As with the societal perspective, the utility costs include all costs paid by LIPA to implement the program, including rebate payments. However, they do not include any costs paid by others.

### **Net Benefits**

The “bottom line” on the economic impacts of each program option is their economic *net benefits*. Net benefits are the difference between the total benefits and the total costs. Net benefits represent the size of the economic gain to Long Island (societal net benefits) or LIPA (utility net benefits) from the program options.

### **Benefit-to-Cost Ratio**

The benefit-to-cost ratio is provided in each cost-effectiveness table. This is the total benefit divided by total costs. A benefit-to-cost ratio (BCR) of 1.0 or greater indicates that the program option provides a net economic gain to Long Island (societal BCR) or LIPA (utility BCR).

## **IV. CLEAN ENERGY PROGRAM OPTIONS**

### **A. Residential Program Options**

#### **1. Residential New Construction Program**

New homes can be built to use much less energy than standard new construction. High-efficiency building practices save money over time and improve comfort. Although it costs far less to make a home more efficient during construction than it does after it's built, the added up-front cost is still a barrier to builders. Builders don't pay the energy bills so they don't see the savings. They are also skeptical about homebuyers' ability to differentiate between efficient and inefficient construction. Most homebuyers care more about location, price, and amenities, so they have not created a demand for builders to spend the extra money to make homes more efficient.

This program seeks to persuade builders to meet the ENERGY STAR standard for new residential construction developed by the U.S. Environmental Protection Agency (EPA). ENERGY STAR homes use 30% to 50% less energy for heating, air-conditioning, and water heating than do conventional new homes. The program gives builders money to cover the extra costs of building ENERGY STAR homes, technical assistance on key elements of efficient construction, and assistance in marketing the homes. The program also helps lenders and real estate agents understand the economic benefits of efficiency so that they can promote them to buyers. Eventually, the program will convince more buyers to demand high-efficiency features and motivate builders to supply them. In addition, the program will coordinate with on-going regional residential new construction efforts in New York and New Jersey.

## RESIDENTIAL NEW CONSTRUCTION PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/ Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>Residential New Construction</li> </ul>	<ul style="list-style-type: none"> <li><u>Heating &amp; cooling fuel</u> – program is open to new homes with electric heating, gas heating, and/or central electric cooling (regardless of heating fuel)</li> <li><u>Builders</u> - all builders are program eligible, but marketing will focus on builders of larger track developments (smaller builders of custom homes will be a lower priority)</li> <li><u>House type</u> – the program is open to all home types, but marketing will focus on single family detached homes because of their larger heating and cooling loads (multi-family dwellings &amp; condos will be lower priority)</li> </ul>	<ul style="list-style-type: none"> <li><u>Building Envelope and HVAC Equipment</u> – the program uses EPA’s performance standard</li> <li>ENERGY STAR-labeled appliances (i.e., refrigerators, clothes washers, dishwashers)</li> <li>Hardwired ENERGY STAR fixtures (Indoor and Outdoor)</li> <li>Energy efficient mechanical ventilation systems</li> <li>Customer-sited, grid-connected PV systems</li> </ul>	<p><u>Financial Incentives to Builder or Home-Buyer:</u></p> <ul style="list-style-type: none"> <li>Incentives for reaching ENERGY STAR performance level                             <ul style="list-style-type: none"> <li>&gt; Full incremental cost incentives for homes with both central cooling and either electric or gas heat</li> <li>&gt; Partial incremental cost incentives for homes without central A/C or without gas or electric heat.</li> </ul> </li> <li>Supplemental incentives for efficient appliances, light fixtures, ventilation systems and/or rooftop PV.</li> </ul> <p><u>Technical Assistance</u></p> <ul style="list-style-type: none"> <li>Technical assistance to builders and their subcontractors, particularly on HVAC and duct issues.</li> </ul> <p><u>Marketing Assistance</u></p> <ul style="list-style-type: none"> <li>Energy rating certificates provided</li> <li>Customized marketing assistance for builders committing substantial number of homes to meet program standards</li> </ul> <p><u>Outreach to Realtors, Lenders &amp; Inspectors</u></p> <ul style="list-style-type: none"> <li>Education on the benefits of efficiency</li> <li>Attempts to convince lenders to increase lending limits for customers buying efficient homes</li> <li>Promotion of attractive mortgage products</li> <li>Promote incorporation of energy rating on MLS listings</li> </ul>

**RESIDENTIAL NEW CONSTRUCTION PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	134	582	1,478	2,822	4,614	321,210
Summer Peak kW	272	1,179	2,994	5,716	9,345	N/A
Budget (000's)	\$1,217	\$2,049	\$3,031	\$3,198	\$4,019	\$13,515

**RESIDENTIAL NEW CONSTRUCTION PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$43,127,080	\$155,587,572	\$112,460,492	3.61
Utility	\$15,752,155	\$ 41,235,803	\$ 25,483,648	2.62

## **2. Residential Lighting and Appliances Program**

Most consumers buy a new refrigerator or clothes washer every 10 to 20 years. While premium efficiency appliances cost more to purchase, they cost much less to run, so they *save* money in the long run. High-efficiency lighting also costs more to buy initially, but then uses only about one-third to one-quarter of the electricity of incandescent lighting, saving the product's initial purchase price many times over. Efficient lighting is also unfamiliar to consumers – it comes in a variety of odd shapes and sizes. Because of these factors, relatively few retailers are willing to devote significant shelf or floor space or sales effort to promote high-efficiency lighting and appliances.

This program ties into regional campaigns already underway in the Northeast, including Northeast Energy Efficiency Partnership (NEEP) and New York State Energy Research and Development Authority (NYSERDA) initiatives to make high-efficiency refrigerators, clothes washers and lighting products more readily available and attractive in the market. The program will highlight products that meet EPA's ENERGY STAR standards. It will supply consumers with rebates to lower the price premiums for efficient washers and lighting. It will also provide marketing and training assistance to retailers to make stocking and selling efficient products easier for them. Over time, the program should make high-efficiency choices a routine part of lighting and appliance purchases and sales.

## RESIDENTIAL LIGHTING & APPLIANCES PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• Planned replacement (end of product's life)</li> <li>• Early replacement (before end of product's useful life)</li> </ul>	<ul style="list-style-type: none"> <li>• All residential customers in LIPA's service territory</li> </ul>	<p><u>Refrigerators</u></p> <ul style="list-style-type: none"> <li>• ENERGY STAR labeled models</li> </ul> <p><u>Clothes Washers</u></p> <ul style="list-style-type: none"> <li>• ENERGY STAR labeled clothes washers, consistent with CEE's A-1 through C-2 specifications</li> </ul> <p><u>Dishwashers</u></p> <ul style="list-style-type: none"> <li>• ENERGY STAR-labeled dishwashers</li> </ul> <p><u>Air Conditioners</u></p> <ul style="list-style-type: none"> <li>• ENERGY STAR-labeled room air conditioners (under consideration)</li> </ul> <p><u>Lighting</u></p> <ul style="list-style-type: none"> <li>• Compact fluorescent screw-in lamp direct install replacements</li> <li>• Hardwired ENERGY STAR labeled fixtures</li> <li>• ENERGY STAR labeled torchiere (portable fixture)</li> </ul>	<p><u>Targeted Information and Market Facilitation</u></p> <ul style="list-style-type: none"> <li>• Targeted information to consumers making planned or emergency appliance replacement decisions</li> <li>• Consumer labeling and promotion of ENERGY STAR appliances for retailers and consumers</li> <li>• Identification of product sources (vendor linkages, retailer lists, etc.) for consumers</li> <li>• Direct Mail Order Catalog (lighting products), in-store brochures</li> <li>• Procurement assistance and/or centralized procurement of ENERGY STAR appliances for owners of multi-unit dwellings</li> </ul> <p><u>ENERGY STAR Appliance Incentives</u></p> <ul style="list-style-type: none"> <li>• Financial incentives, marketing incentives and/or marketing support to consumers, manufacturers and/or retailers for selected ENERGY STAR appliances</li> </ul> <p><u>Lighting Incentives</u></p> <ul style="list-style-type: none"> <li>• Financial incentives, marketing incentives and/or marketing support to consumers, manufacturers and/or retailers for qualified lighting technologies</li> </ul>

**RESIDENTIAL LIGHTING AND APPLIANCES PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	5,417	15,933	31,351	48,071	68,795	870,341
Summer Peak kW	464	1,340	2,655	3,937	5,515	N/A
Budget (000's)	\$3,134	\$3,690	\$3,905	\$3,293	\$3,055	\$17,077

**RESIDENTIAL LIGHTING AND APPLIANCES PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$31,477,535	\$39,861,962	\$8,384,427	1.3
Utility	\$14,720,768	\$27,543,602	\$12,822,833	1.9

3. **Residential Heating, Ventilation and Air Conditioning (HVAC) Efficiency Program**

Most Long Islanders replace their air conditioners or heat pumps every 15 years or so. They most often choose the *least efficient* equipment available on the market due to cost considerations. At the same time, the new equipment is often oversized and improperly installed, which leads to major efficiency losses, reduced comfort, increased maintenance costs, and shorter equipment life. The duct systems used by most of these air conditioners and heat pumps are very leaky, further exacerbating efficiency and comfort problems. Opportunities for improving equipment efficiency, installation practices, and duct system problems are usually ignored because they add cost in an extremely competitive, low-bid business. In addition, many contractors lack adequate training on system sizing and installation. Few customers are aware of the resulting efficiency, comfort and cost penalties associated with not making these improvements. Those that are aware have no easy way to identify quality contractors.

This program ties into regional and national efforts to familiarize contractors and consumers with high-efficiency choices when they replace air-conditioning equipment (NEEP, Consortium for Energy Efficiency (CEE), EPA ENERGY STAR). It will provide rebates to customers to ease the financial burden of more efficient equipment and duct repair. The program will train contractors in the sizing and installation procedures that will become mandatory to qualify for rebates. It will also promote the certification of quality contractors. The long-term goal of the program will be to make choosing high efficiency a routine part of all air-conditioning replacements.

## RESIDENTIAL HVAC EFFICIENCY PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• Planned equipment replacement in existing homes</li> <li>• Emergency equipment replacement in existing homes</li> <li>• “First time” equipment installation in existing homes</li> </ul>	<ul style="list-style-type: none"> <li>• All existing residential homes in LIPA service territory</li> </ul>	<p><u>End-Uses</u></p> <ul style="list-style-type: none"> <li>• Central electric cooling</li> <li>• Electric heating</li> </ul> <p><u>Technologies</u></p> <ul style="list-style-type: none"> <li>• High efficiency central air conditioners</li> <li>• High efficiency heat pumps (air source and ground source)</li> <li>• Proper sizing and installation of CACs/HPs</li> <li>• Duct Sealing (only at the time of new CAC/HP installation)</li> <li>• ENERGY STAR-rated programmable thermostats (only at the time of new CAC/HP installation)</li> </ul>	<ul style="list-style-type: none"> <li>• Financial incentives for customers buying high efficiency equipment               <ul style="list-style-type: none"> <li>➢ Efficiency standards and incentive levels will be consistent with neighboring NJ utilities</li> <li>➢ Incentives are conditional – HVAC contractors must provide documentation of proper sizing and installation</li> </ul> </li> <li>• Education and marketing to consumers on the benefits of efficiency and on the keys to proper sizing and installation</li> <li>• Training of HVAC contractors               <ul style="list-style-type: none"> <li>➢ Proper sizing &amp; installation</li> <li>➢ Duct sealing</li> <li>➢ How to “sell” efficiency</li> </ul> </li> <li>• Certification of quality contractors, with marketing assistance provided to those who meet program standards</li> </ul>

**RESIDENTIAL HVAC EFFICIENCY PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	2,758	6,553	12,279	20,787	29,919	823,328
Summer Peak kW	2,797	6,266	11,508	19,283	27,506	N/A
Budget (000's)	\$2,559	\$2,505	\$3,274	\$3,509	\$3,711	\$15,558

**RESIDENTIAL HVAC EFFICIENCY PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$23,193,700	\$79,397,288	\$56,203,587	3.42
Utility	\$13,056,757	\$64,510,025	\$51,453,268	4.94

**4. Residential Energy Affordability Partnership Program**

Low-income households typically devote a much larger share of their total household income to pay for energy than does the general population. This higher energy burden is due in part to energy inefficiency. Both low- and moderate-income households are often unable to invest in energy efficiency because of competing needs for limited dollars. Renters (many of whom are low-income) are even less likely to improve the efficiency of their homes because they may not even directly pay the energy bill. When the energy burden takes up such a large share of a household's income, the household can fall into arrears on their electric and other energy bills.

This program makes a coordinated effort to reducing the barriers to energy affordability for Long Island's low and moderate-income consumers. Modeled after current initiatives on Long Island and successful programs in New Jersey, it will work directly with existing weatherization providers and expand their capabilities. The program will provide qualifying consumers with free installation of cost-effective air-sealing, insulation, HVAC repair, lighting and other energy-saving measures; extensive in-home education and counseling; and a partnership/payment plan including some discounting of LIPA bills in return for meeting specific payment requirements. Together, these strategies will make electricity and gas bills more affordable for the participating households, while cutting back on average expenses for all electric and gas ratepayers.

## RESIDENTIAL ENERGY AFFORDABILITY PARTNERSHIP

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• Retrofit</li> <li>• Home Purchase</li> </ul>	<ul style="list-style-type: none"> <li>• Low income (less than 150% of Federal poverty limit)</li> <li>• Moderate income (less than 60% of territory median)</li> <li>• Weatherization Assistance Program (WAP) participants</li> <li>• Customers with high bill arrearages</li> <li>• Electric primary space heating</li> <li>• Natural gas primary space heating</li> <li>• Fuel Oil primary space heating</li> </ul>	<p><u>Space heating</u></p> <ul style="list-style-type: none"> <li>• Blower door guided air sealing</li> <li>• Insulation upgrades</li> <li>• Duct sealing</li> <li>• Programmable thermostats</li> <li>• HVAC system repair</li> </ul> <p><u>Water heating</u></p> <ul style="list-style-type: none"> <li>• Hot water conservation devices (tank wraps, pipe insulation, low flow showerheads and faucet aerators)</li> </ul> <p><u>Refrigeration</u></p> <ul style="list-style-type: none"> <li>• Selective early retirement/replacement of inefficient refrigerators with ENERGY STAR-labeled units.</li> </ul> <p><u>Lighting</u></p> <ul style="list-style-type: none"> <li>• Compact fluorescent screw-in lamp direct install replacements</li> <li>• Hardwired ENERGY STAR labeled fixtures</li> <li>• ENERGY STAR labeled torchiere (portable fixture)</li> </ul> <p><u>All</u></p> <ul style="list-style-type: none"> <li>• Energy education and customer counseling</li> </ul>	<p><u>WAP Cooperation and Augmentation</u></p> <ul style="list-style-type: none"> <li>• Supplemental direct installation of electric efficiency measures. (Income eligible WAP participants)</li> </ul> <p><u>Comprehensive Affordability Services</u></p> <ul style="list-style-type: none"> <li>• Direct installation of efficiency measures. Differentiated by electric and non-electric primary space heating. (Low and moderate income households)</li> </ul> <p><u>Customer Education and Counseling</u></p> <ul style="list-style-type: none"> <li>• Partnership agreement and education for all participating households.</li> </ul> <p><u>Payment Plan</u></p> <ul style="list-style-type: none"> <li>• Arrearage reduction and partnership action plan for households with high outstanding balances.</li> </ul>

**RESIDENTIAL  
ENERGY AFFORDABILITY PARTNERSHIP PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	4,782	11,285	17,195	22,855	28,439	323,084
Summer Peak kW	331	708	1,087	1,478	1,885	N/A
Budget (000's)	\$2,976	\$3,794	\$3,546	\$3,203	\$3,211	\$16,731

**RESIDENTIAL  
ENERGY AFFORDABILITY PARTNERSHIP PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$11,610,941	\$13,214,519	\$1,603,578	1.1
Utility	\$13,726,714	\$10,066,204	(\$3,660,510)	0.7

## **5. Rooftop Solar Photovoltaic (PV) Program**

Photovoltaic (solar cell) electricity is perhaps the cleanest of all electric supply. It is technically feasible anywhere on Long Island where there is enough southern exposure to locate a PV array. Even though the costs for PV systems have been steadily declining since the 1970s, they remain high. Recently, New York enacted two changes that make PV more affordable - the solar tax credit and net metering. The solar tax credit pays for 25% of the cost of the PV system. Net metering allows New Yorkers with PV systems to earn the full retail rate for any excess electricity they generate.

This program starts by providing rebates to customers for a portion of the installation cost of PV systems. It will link consumers with vendors, and train field professionals in PV applications. It will develop financing packages with low rates and longer terms. Ultimately, the program would offer “turn-key” rooftop PV systems, with straightforward pricing such as monthly charges or prices for solar supply. The program would help solar electricity become a significant part of Long Island’s electric energy future. The program will link, where appropriate, to regional and national solar efforts.

## ROOFTOP SOLAR PHOTOVOLTAIC (PV) PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/ Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• New Construction</li> <li>• Rehabilitation / Renovation</li> <li>• Early Replacement</li> </ul>	<p><u>Targeted Segments</u></p> <p>Primarily residential, some commercial and industrial.</p> <ul style="list-style-type: none"> <li>• New residential construction: PV systems can be building-integrated to lower initial cost; and price of PV system can be integrated into long-term mortgage financing, substantially reducing monthly payment.</li> <li>• General residential: Residential customers can capture additional benefits from (1) NY state “net metering” law for residential systems up to 10 kW; and (2) NY state 25% tax credit for ‘qualified solar electric generating equipment expenditures’ for residential systems up to 10 kW.</li> <li>• Commercial/Industrial: Commercial and industrial customers can capture additional benefits from 10% federal business energy investment credit.</li> <li>• Time-of-use customers with high rates during peak demand periods, which tend to be well correlated with PV system output.</li> <li>• Commercial/industrial customers with high demand charges, who can use PV systems to reduce daytime peak demand.</li> </ul>	<p><u>On-Site Electricity Generation</u></p> <p>Solar photovoltaic technology used primarily to offset the customer’s own electricity use.</p>	<ul style="list-style-type: none"> <li>• Develop and implement consumer awareness campaign regarding PV technology, benefits of customer-sited PV generation, site selection, selection of equipment and contractors, and other consumer information</li> <li>• Develop PV-friendly interconnection agreements for residential-scale PV systems that meet technical requirements for safety and power quality while addressing the consumers need for a simple, easy to understand contractual agreement with the utility.</li> <li>• Provide technical assistance and a vendor linkage service for LIPA customers, particularly early in the program when technical assistance, products, and services will be most difficult for customers to identify on their own.</li> <li>• Offer direct financial incentives for customer investment in rooftop PV systems of approximately \$1.50/Watt in year one.</li> <li>• To encourage early participation, an additional interest rate incentive (in year one only) that reduces financing costs (750-watt system, 10 year loan) by approximately 6 percent.</li> <li>• Provide technical training for utility engineers, municipal electrical inspectors, and electrical contractors to jump-start the process of establishing a network of knowledgeable and experienced PV professionals in the Long Island region.</li> <li>• Develop PV-friendly consumer financing mechanisms in cooperation with private-sector financial institutions, including local and national mortgage lenders, the secondary mortgage market and the appraisal industry.</li> <li>• Develop rooftop PV service offerings to address a broad range of market barriers (including economic barriers, product availability, customer inconvenience, performance uncertainty, and hidden cost barriers) by developing integrated services that provide customers with one-stop, simple access to rooftop PV.</li> </ul>

**ROOFTOP SOLAR PHOTOVOLTAIC (PV) PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	420	1,609	3,241	5,104	7,317	374,657
Summer Peak kW	186	711	1,433	2,257	3,235	N/A
Budget (000's)	\$2,012	\$2,248	\$2,354	\$2,538	\$2,444	\$11,596

**ROOFTOP SOLAR PHOTOVOLTAIC (PV) PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$42,300,744	\$20,092,798	(\$22,257,947)	0.5
Utility	\$9,266,565	\$17,561,730	\$8,295,165	1.9

## **6. Residential Information/Education Program**

Residential customers often want to reduce their energy bills but do not know which measures to implement to achieve the most savings. Other customers are not aware that they can control the size of their energy bills or that they can take actions that can reduce power plant emissions. The objective of this program is to transform energy use attitudes/behaviors in the residential market toward energy efficiency. The information and materials have been developed to instill the conservation ethic and raise awareness about energy use and the environment for residential customers and students. The following program components provide customers with information to make informed decisions about home energy use, facilitate decisions to purchase higher efficiency appliances, provide customers with access to energy efficiency information and help them to gain an understanding of energy use within the home.

Home Energy Survey - Customers complete a comprehensive questionnaire on home energy use habits, specific appliance information, home size and make-up and heating/cooling systems, and then return it to LIPA for processing. Survey answers are combined with the customer's actual electric bill history information on record. Custom reports are then produced which details the approximate cost to operate home appliances, in addition to providing specific energy saving information for large energy users, along with approximate dollar savings to be achieved.

School Outreach - This energy/environmental program designed for 5<sup>th</sup> through 8<sup>th</sup> grade science classes teaches students about energy efficiency and the environment. Students complete a Home Energy Survey (see above), which focuses on dollar savings and achievable environmental benefits. LIPA instructors provide two 40-minute presentations to each class. Students learn about energy production and use, energy and water conservation, recycling, landfill issues, air quality. Teaching materials are provided.

Energy Hotline - Toll free number for LIPA customers to learn about energy conservation and LIPA's Clean Energy Programs.

General Energy Conservation Literature - Comprehensive brochures provide consumers with information to understand their electric costs, as well as specific home energy saving tips. This enables consumers to make informed energy use choices and actively control energy usage.

Nexus Energy Software - LIPA customers can make smart energy decisions at no charge utilizing this custom software on their home computer. Consumers can conduct a comprehensive home audit, receive detailed energy saving strategies, shop for recommended home improvements, select energy suppliers (if eligible), compare time-of-use rate information, and access their energy bills to gain a better understanding of their usage patterns.

## RESIDENTIAL INFORMATION/EDUCATION PROGRAM

DESCRIPTION OF MARKET			
Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Target Market Participants
<ul style="list-style-type: none"> <li>• Customers seek information on energy use in the home</li> <li>• Customers seek information on controlling energy costs.</li> <li>• Teachers and students contact LIPA for energy education programs.</li> </ul>	<p><u>LIPA Residential Customers</u> LIPA electric customers including:</p> <ul style="list-style-type: none"> <li>• Homeowners</li> <li>• Tenants</li> <li>• Apartment dwellers</li> <li>• Condominiums</li> <li>• Cooperatives</li> <li>• Townhouses</li> </ul> <p><u>Students and Teachers</u> Schools with students in LIPA electric service territory.</p>	<p style="text-align: center;"><u>Information is provided on the following technologies</u></p> <ul style="list-style-type: none"> <li>• Lighting</li> <li>• Water Heating</li> <li>• Refrigerators/freezers</li> <li>• Heating/Cooling</li> <li>• Weatherization</li> <li>• Appliances</li> <li>• Home Audit Services software</li> </ul>	<p><u>Assistance on Efficient Appliance Purchases</u> Information on incentives or rebates is provided in the home energy survey report and through the energy hotline. Appliance efficiency improvements recommended in NEXUS software can be purchased with credit cards.</p> <p><u>Technical Assistance</u> Customers can receive answers to basic energy conservation questions, and lists of eligible appliances under incentive programs.</p> <p><u>Survey Programs</u> Customer reports provide breakdown of energy use per appliance and provide recommended actions to reduce energy use. This leads customers to request information from LIPA about electric conservation programs and general information about how to purchase more efficient appliances.</p> <p><u>School Program</u> Relevant information is provided that students can take home to their families about ways to save energy and help preserve the environment.</p>

**RESIDENTIAL INFORMATION/EDUCATION PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	1,977	3,954	5,931	7,908	9,885	148,275
Summer Peak kW	703	1,406	2,109	2,812	3,515	N/A
Budget (000's)	\$663	\$663	\$663	\$663	\$663	\$3,313

**RESIDENTIAL INFORMATION/EDUCATION PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	622,663	1,964,940	1,302,277	2.97
Utility	662,663	1,687,017	1,024,354	2.55

Note: MWh, kW, and B/C information does not include the Nexus software. The initial program evaluation for NEXUS software will commence at the close of 1999, therefore, actual evaluation information is not yet available.

## **7. Residential Home Performance Service**

Numerous studies have found that up to 10% of residential homeowners have concerns about the comfort level and/or safety of their homes. Additionally, many customers inquire about their home energy use and ways to control their energy costs. A program that addresses both of these needs would be more helpful and appealing to customers. The Home Performance Service Program offers a complete home inspection and follow-up report, as well as making low interest financing available for eligible construction services recommended through the inspection. A LIPA-certified home performance contractor performs the home inspection for a nominal fee. The inspection consists of a carbon monoxide and backdraft check of the heating and hot water equipment, a blower door test of air leakage rates, a duct diagnosis to identify air leakages and imbalances, identification of air leakage between building components, identification of existing insulation levels, a relative humidity test, a fuel consumption evaluation and customer consultation.

After the inspection is completed, the customer receives a follow-up report describing the various test results and recommended improvements. The contractor also provides a detailed proposal to install recommended improvements, which includes the costs of the measures along with estimated energy savings and payback period.

LIPA coordinates and sponsors training and certification for all contractors participating in the program, markets the program to customers, and provides qualified leads to certified contractors. In addition, LIPA inspects a percentage of the completed retrofits to ensure quality and customer satisfaction.

## RESIDENTIAL HOME PERFORMANCE SERVICE PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/Technologies	Intervention Strategies and Target Market Participants
<ul style="list-style-type: none"> <li>• Residential customer response to utility offer of home inspection.</li> <li>• Residential customer seeks to address issues related to the comfort level/safety of their home</li> </ul>	<p><u>Heating</u> The program is open to homes with electric heating, gas heating, oil, heating, and/or central electric cooling.</p> <p><u>House Type</u> The program is open to all home types, but marketing will focus on single family detached homes because of larger heating and cooling loads.</p>	<p><u>Building Envelope</u> The program will address the thermal integrity of the building envelope including identification of existing insulation levels, testing of relative humidity levels and a blower-door test of building air leakage rate</p> <p><u>Heating/Cooling/Hot Water Equipment</u> The home inspection will include a safety check and inspection of the heating and hot water system (CO and backdraft) as well as identification of air leakage in ductwork and between building components.</p>	<p><u>Low Interest Financing</u> Homeowners who participate in the program will be eligible for low interest loans on measures that are recommended as a result of the home inspection.</p> <p><u>Marketing Assistance</u> LIPA will provide qualified homeowner leads to contractors. Leads will be generated through targeted mailings and presence at home and energy shows.</p> <p><u>Technical Assistance</u> LIPA will coordinate and sponsor training and certification for all home performance contractors participating in the program.</p> <p><u>Outreach to Lenders</u> LIPA will strive to educate lenders on the benefits of financing energy-efficient upgrades for residential homes (increased value of the home, PR benefits to lending institution).</p>

**RESIDENTIAL HOME PERFORMANCE SERVICE PROGRAM  
ELECTRICITY IMPACTS AND BUDGETS**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	145	290	435	580	724	10,866
Summer Peak kW	17	33	50	66	83	N/A
Budget (000's)	\$84	\$84	\$84	\$84	\$84	\$420

**RESIDENTIAL HOME PERFORMANCE SERVICE PROGRAM  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs <sup>2</sup></b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	84,000	104,842	20,842	1.25
Utility	84,000	84,474	474	1.01

## **B. Non-Residential Program Options**

### **1. Commercial New Construction and Renovation Program**

Today's new commercial buildings are much more efficient than those built even ten years ago. Nevertheless, new commercial buildings still offer some of the biggest and least expensive opportunities for energy-efficiency savings. The greatest opportunities exist in the early design phases. Those options narrow as the construction process continues, and become most expensive once the building is complete. Planning for energy-efficiency does take extra time and money, and building owners and developers operate on tight budgets and schedules. The extra effort and higher costs pose obstacles for energy-efficiency investment in new construction.

This program will aim to influence current design and construction practices on Long Island to achieve greater energy efficiency. It will offer technical and financial assistance to cover the extra time and effort to make the designs energy-efficient, and will do it in a manner that fits into the client's design and construction process. Rebates will cover the price premium paid for energy-efficient HVAC, lighting, and other equipment that meets LIPA's high efficiency standards. The program will also offer technical and financial help with remodeling projects, where lighting savings are usually plentiful and economical. As more contractors incorporate energy-efficient design and construction into new buildings, building codes can be updated to increase minimum efficiency standards for all new buildings. The program can then shift efforts to new efficiency opportunities as technologies change and design innovations emerge. The program will be coordinated, where appropriate to other regional and national efforts (e.g., EPA ENERGY STAR, NYSERDA).

## COMMERCIAL NEW CONSTRUCTION AND RENOVATION PROGRAM

DESCRIPTION OF MARKET			
Market Event(s)	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• New Construction</li> <li>• Facility expansion</li> <li>• Remodel/Renovation</li> <li>• HVAC equipment replacement</li> </ul>	<p><u>Customers:</u> All commercial and industrial customers in LIPA's service territory</p> <p><u>Potential Market Segmentation By :</u></p> <ul style="list-style-type: none"> <li>• Sector</li> <li>• Owner vs. tenant occupied,</li> <li>• Size</li> <li>• Building type/use (e.g., office, retail, warehouse, etc.)</li> </ul>	<p><u>End uses:</u> Heating, cooling, ventilation, air-conditioning , water heating, lighting, industrial processes, motor drivepower</p> <p><u>Technologies:</u></p> <ul style="list-style-type: none"> <li>• Comprehensive whole building high efficiency lighting equipment (e.g., T8 ballasts, lamps, fixtures, CFL fixtures)</li> <li>• Energy efficient lighting controls and design (e.g. daylighting systems, occupancy sensors, task lighting, light pipes, indirect systems, tandem wiring)</li> <li>• High-Efficiency HVAC equipment (Split-system and packaged unitary air conditioners and heat pumps; electric and gas chillers; gas furnaces and boilers)</li> <li>• High efficiency HVAC system design including optimized distribution system design (VAV systems, oversized cooling towers, etc.) and controls (e.g., temperature reset controls, EMS)</li> <li>• Integrated energy efficiency design (thermal shell improvements, high efficiency glazing, solar design)</li> <li>• High efficiency motors (only motors not part of packaged equipment)</li> <li>• High efficiency motor drive systems (e.g., VSDs; proper sizing; optimal matching of type, size and speed of motor; high efficiency pumps, fans and belts; improved power factor)</li> <li>• High efficiency electric and gas water heating</li> <li>• High efficiency refrigeration system (e.g., multiplex compressors, heat recovery for thermal loads, optimized applications and controls)</li> <li>• High efficiency gas and electric cooking equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted information to architects, engineers, contractors, developers, vendors, and business</li> <li>• Technical assistance to contractors, developers, engineers</li> <li>• Design assistance to architects, engineers and contractors, for integrated design and custom analyses</li> <li>• Design incentives to architects, engineers, and/or contractors/developers, for custom analyses and building simulation modeling, including performance incentives</li> <li>• Development and promotion of commissioning services as routine practice to ensure system performance meets original design intent.</li> <li>• Financial incentives to customers, contractors and developers for measures installed</li> </ul>

**COMMERCIAL  
NEW CONSTRUCTION AND RENOVATION PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	8,330	23,350	44,237	69,379	95,676	2,402,610
Summer Peak kW	2,046	5,781	10,906	17,104	23,763	N/A
Budget (000's)	\$4,885	\$7,395	\$9,617	\$11,170	\$11,684	\$44,751

**COMMERCIAL  
NEW CONSTRUCTION AND RENOVATION PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$37,576,199	\$118,759,453	\$81,183,254	3.16
Utility	\$36,375,113	\$99,561,138	\$63,186,025	2.74

## **2. Regional High Efficiency Unitary HVAC Program**

Many Long Island commercial customers with central cooling have unitary HVAC systems. The best time to improve the efficiency of this equipment is when it is replaced, generally every 15 or 20 years. There are two ways to improve unitary system efficiency: 1) upgrade the efficiency of the equipment, and 2) improve the efficiency of the sizing and the installation practices. Higher-efficiency equipment costs more, so building owners generally do not ask for it, and thus vendors do not order it from distributors. As a result, availability is limited and costs are high from manufacturers. Efficient sizing and installation also costs more up front. Not all contractors have the skills to provide these services properly and economically.

This program takes a coordinated approach in conjunction with NEEP, to these problems by working with utilities throughout the Northeast to increase the opportunities for equipment, sizing, and installation improvements. It promotes higher-equipment efficiency by offering rebates to those who make, stock, sell, and buy high-efficiency unitary equipment. The program combines research, information, and training to improve sizing and installation practices by vendors and contractors. Over time, this regional program will permanently raise the energy-efficiency of unitary equipment sold and installed on Long Island.

## REGIONAL HIGH EFFICIENCY UNITARY HVAC PROGRAM

### DESCRIPTION OF MARKET

Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• Planned replacement of unitary HVAC equipment</li> <li>• Emergency replacement of unitary HVAC equipment</li> </ul>	<p>Commercial and industrial facility owners in LIPA's service territory with central cooling and/or heating using unitary equipment.</p> <p><u>Segmentation By:</u></p> <ul style="list-style-type: none"> <li>• Sector</li> <li>• Building type/use</li> <li>• Building size</li> </ul>	<p><u>End-uses:</u> Heating, ventilation, air-conditioning</p> <p><u>Technologies:</u></p> <ul style="list-style-type: none"> <li>• High-efficiency unitary equipment</li> <li>• Proper equipment sizing</li> <li>• High-efficiency HVAC controls with new HVAC equipment</li> <li>• High-efficiency operation and maintenance procedures</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted information on efficiency options for end-users</li> <li>• End-user technical assistance on efficiency options</li> <li>• Financial incentives for end-users, equipment distributors, and/or manufacturers for qualifying equipment</li> <li>• Sizing/design assistance and training for engineers, contractors</li> <li>• Standard installation protocols/specifications for engineers, contractors</li> <li>• Linkage and promotion for CEE, NEEP, EPA, other product labeling and certification programs</li> <li>• Coordinated market transformation effort with all market participants (e.g. consistent efficiency criteria throughout region)</li> <li>• Financial incentives for engineers, contractors for compliance with sizing and installation protocols</li> <li>• R&amp;D related to sizing and installation practices, costs and benefits.</li> </ul>

**REGIONAL HIGH EFFICIENCY UNITARY HVAC PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	341	1,254	2,470	3,772	4,583	95,001
Summer Peak kW	225	756	1,419	2,122	2,531	N/A
Budget (000's)	\$374	\$514	\$665	\$673	\$654	\$2,880

**REGIONAL HIGH EFFICIENCY UNITARY HVAC PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$2,839,506	\$6,578,599	\$3,739,093	2.32
Utility	\$2,361,649	\$5,761,660	\$3,400,011	2.44

### **3. Regional Premium-Efficiency Motors Program**

Motors represent a major energy load for many of Long Island's industrial customers, as well as for its larger commercial customers. Premium-efficiency motors use less electricity, but also carry a higher purchase price. If market demand for these motors was higher, it is likely that manufacturers' prices would go down. New federal efficiency standards have raised the efficiency levels of standard motors, but there is still significant room for improvement in the marketplace.

In this program, LIPA joins forces with numerous utilities throughout the Northeast (as part of the Northeast Energy Efficiency Partnership initiative) to move the regional market to "premium efficiency motors", as established by an industry-approved rating system. The program offers both rebates and marketing support to dealers to increase the availability and demand for premium motors. It also provides education to help vendors sell the benefits of premium motors to customers. After several years, the regional initiative should gain widespread market acceptance for premium motors by increasing sales, thereby bringing down their price. The program will also coordinate with other regional and national efforts, including NYSERDA's motor distributor effort and Department of Energy's (DOE) Motor Challenge Program.

## REGIONAL PREMIUM EFFICIENCY MOTORS PROGRAM

DESCRIPTION OF MARKET			
Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>• Emergency and planned replacement of motors and motor drives</li> </ul>	<p><u>Customers:</u> All commercial and industrial</p> <p><u>Segmentation:</u></p> <ul style="list-style-type: none"> <li>• By motor size</li> <li>• Application</li> <li>• Customer class</li> </ul>	<p><u>End-uses:</u> Motor drivepower</p> <p><u>Technologies:</u></p> <ul style="list-style-type: none"> <li>• High-efficiency motors, pumps, fans and selected equipment</li> <li>• Efficient motor controls</li> <li>• Optimal sizing and application of motors, pumps, and fans</li> </ul>	<ul style="list-style-type: none"> <li>• Targeted end-user information (e.g., motor efficiencies, costs and savings data)</li> <li>• End-user technical assistance (e.g., Motor Master software and training, analysis of savings and paybacks)</li> <li>• Financial incentives for end-users and equipment distributors. Prescriptive component-based per motor.               <ul style="list-style-type: none"> <li>➤ Segmented by motor type, speed and size.</li> </ul> </li> <li>• Linkage and promotion for DOE, CEE, NEEP, EPA, other market transformation, product labeling and certification programs. (e.g., DOE's Motor Challenge)</li> <li>• Coordinated market transformation effort with all market participants (e.g., consistent efficiency criteria across state and throughout region, stocking and promotion incentives and education to vendors)</li> <li>• Sizing/design protocols, assistance and training for end-users, vendors, engineers, contractors</li> </ul>

**REGIONAL PREMIUM EFFICIENCY MOTORS PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	42	156	384	657	973	48,252
Summer Peak kW	9	34	85	144	214	N/A
Budget (000's)	\$250	\$252	\$275	\$289	\$300	\$1,366

**REGIONAL PREMIUM EFFICIENCY MOTORS PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$1,195,012	\$2,053,093	\$858,081	1.72
Utility	\$1,130,915	\$1,723,994	\$593,078	1.52

#### **4. Comprehensive HVAC Retrofit Program**

Commercial customers perform extensive overhauls of cooling equipment every 10 to 12 years. While overhauls keep cooling equipment in working order, they also perpetuate the use of inefficient heating, ventilation, and air-conditioning (HVAC) equipment. The national ban on the sale of ozone-depleting refrigerants makes this worse. Chiller overhauls now require expensive refrigerant conversions. While this helps the environment, it reduces operating efficiency and cooling capacity.

Energy-efficiency offers a way out of all these environmental, energy, and economic problems. Instead of overhauling old equipment, building owners can invest in lighting efficiency and other energy-saving measures. Lighting efficiency improvements cut the amount of heat introduced into buildings, in addition to saving electricity used for lighting. This reduces the amount of cooling capacity needed to keep occupants comfortable. The next step involves investment in a brand-new cooling system, sized to meet the smaller cooling load. The new cooling system is much more efficient, saving even more energy. This comprehensive approach to HVAC replacement will help Long Island businesses lower energy costs, reducing facility electricity use by as much as 40%.

All this efficiency requires owners to invest much more than they would otherwise spend on HVAC overhauls. It also takes coordination between vendors and contractors who don't ordinarily work together. Good coordination reduces the size of the investment: the lighting efficiency improvements can pay for themselves, at least partially, by shaving the size and cost of the new cooling equipment.

This program uses a coordinated approach to help Long Island businesses realize the tremendous opportunities from comprehensive HVAC retrofit. It borrows the integrated design services from the New Construction and Renovation Program, and builds on the rebates offered for high-efficiency new equipment. This program offers the technical help to size new HVAC equipment properly, and rebates or financing to allow building owners to realize large energy bill savings immediately. The long-term result of the program will be to get owners, vendors, and contractors used to integrating efficient lighting into HVAC investments.

## COMPREHENSIVE HVAC RETROFIT SUMMARY

### DESCRIPTION OF MARKET

Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Targeted Market Participants
<ul style="list-style-type: none"> <li>HVAC system rehab — planned investment in existing chiller overhaul or unitary compressor replacement; or complete planned replacement of HVAC equipment</li> </ul>	<p>All commercial and industrial customers</p> <p><u>Market Segmentation By:</u></p> <ul style="list-style-type: none"> <li>Sector</li> <li>Building type/use</li> <li>Size</li> <li>Rental vs. owner occupied</li> </ul>	<p><u>End-uses:</u> Heating, ventilation, air-conditioning, lighting</p> <p><u>Technologies:</u></p> <ul style="list-style-type: none"> <li>Early replacement of existing chillers or unitary equipment with high efficiency electric equipment</li> <li>Early replacement of, high-efficiency gas heating equipment</li> <li>Optimal sizing of new HVAC equipment, integrating load reductions from :                             <ul style="list-style-type: none"> <li>➤ Comprehensive high-efficiency lighting equipment</li> <li>➤ High-efficiency HVAC-distribution system engineering and installation</li> <li>➤ High-efficiency building shell technologies (e.g., high-performance windows)</li> <li>➤ Energy-management systems (for HVAC and lighting)</li> <li>➤ High-efficiency operation and maintenance procedures</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Targeted information on all efficiency options for end-users</li> <li>End-user technical assistance in evaluating/designing efficiency options</li> <li>Standard design, sizing and installation protocols/specifications for engineers, mechanical and lighting contractors, ESCOs</li> <li>Sizing/design assistance and training for end-users, engineers, contractors, ESCOs</li> <li>Financial incentives for end-users for qualifying equipment</li> <li>Attractive financing for end-users (combine extended term, discounted rate, energy service charge, or possibly on utility bill)</li> <li>Development and promotion of commissioning services as routine practice to ensure system performance meets original design intent.</li> <li>Direct installation of lighting retrofits, in combination with HVAC equipment replacement, for small commercial, rental market segments.</li> </ul>

**COMPREHENSIVE HVAC RETROFIT PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	4,665	12,689	24,143	39,601	59,257	1,043,601
Summer Peak kW	1,387	3,777	7,186	11,798	17,650	N/A
Budget (000's)	\$2,420	\$2,805	\$3,455	\$4,287	\$5,224	\$18,191

**COMPREHENSIVE HVAC RETROFIT PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$17,128,011	\$53,686,830	\$36,558,819	3.13
Utility	\$14,789,645	\$44,931,250	\$30,141,605	3.04

## **5. Resource Conservation Management Program**

Few public buildings are operated and maintained at top efficiency because no single person is responsible for managing all of the building's resource costs - electricity, gas, oil, water and waste. Documented experience has proven that there are enough hidden efficiency savings in municipal and school building operations to fully recover the salary costs of a person who has the skills to find and realize those savings. This requires a person whose job is to coordinate the work of all the individuals who work on the different aspects of building maintenance and operation. Most schools and other public facilities do not have such a staff position.

The Resource Conservation Management program would provide a LIPA guarantee for the salaries of individuals hired to fill this resource coordination position. If the person recovers his/her salary and costs in resource savings, the guarantee is not exercised and LIPA bears no cost. LIPA pays the salary difference only if savings fall short. Savings would come from better control over electricity, gas, oil, water, and waste disposal costs. Building occupants are included in the search for ways to waste fewer resources. The program builds on the success of similar programs pioneered in the Pacific Northwest. After three years, the position would become self-sustaining in the public sector. By then, the program should have proven its value to taxpayers and will be incorporated into school and municipal budgets.

## RESOURCE CONSERVATION MANAGEMENT PROGRAM

DESCRIPTION OF MARKET			
Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Target Market Participants
<ul style="list-style-type: none"> <li>• Building operation and maintenance</li> </ul>	<p><u>Customers:</u></p> <ul style="list-style-type: none"> <li>• LIPA Governmental and institutional customers, particularly school districts</li> </ul> <p><u>Potential Market Segmentation By :</u></p> <ul style="list-style-type: none"> <li>• School districts</li> <li>• Municipalities</li> </ul>	<p><u>End uses:</u></p> <p>Heating, cooling, ventilation, air-conditioning, water heating, lighting, motor drivepower, water; waste disposal</p> <p><u>Technologies:</u></p> <ul style="list-style-type: none"> <li>• Improved utilization of existing controls</li> <li>• Optimize equipment operation and scheduling</li> <li>• Occupant education and behavior modification</li> <li>• Check and repair water leaks</li> <li>• Optimize waste management</li> </ul>	<ul style="list-style-type: none"> <li>• Dedicated position for RCM within institution</li> <li>• LIPA salary guarantee for RCM staff position</li> <li>• Audits and surveys coordinated by RCM</li> <li>• Development and use of resource tracking system by LIPA, RCM</li> <li>• Education, training, and promotional activities throughout institution by RCM, LIPA</li> <li>• LIPA promotion of networking between RCMs across institutions</li> <li>• LIPA publicity for and promotion of RCM within municipal government and school districts</li> </ul>

**RESOURCE CONSERVATION MANAGEMENT PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	4,187	13,398	25,790	40,863	56,940	817,089
Summer Peak kW	1,568	5,019	9,661	15,307	21,330	N/A
Budget (000's)	\$760	\$235	\$220	—	—	\$1,215

**RESOURCE CONSERVATION MANAGEMENT PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$23,650,311	\$50,212,538	\$26,562,228	2.12
Utility	\$1,104,286	\$42,011,721	\$40,907,435	38.04

## **6. Commercial Energy Analysis Program**

Commercial/Industrial customers often contact LILPA seeking an understanding of current energy use in their facilities and recommendations on controlling these energy costs. LIPA's Commercial/Industrial (C/I) Energy Analysis Program provides energy management consultation services to commercial, industrial, government and not-for-profit customers to address these needs. Under these analyses, which are provided free of charge, trained energy auditors conduct in-depth on-site audits of the customer's facility at the request of the customer, to collect information on the facility, its equipment and energy use patterns. An analysis of this data, including a comparison to the customer's actual billing history, is performed. A comprehensive audit report is then prepared which summarizes energy saving strategies and the costs and estimated energy savings associated with each recommended measure. The report is delivered to the customer and follow-up debriefing sessions are offered as a means to assist customers in interpreting the information in the report.

As an alternative option, energy consultations are offered when the customer desires an audit on a specific end-use or when the customer's facility is small in size. Consultations are also available to customers who are moving into a new facility and seeking to upgrade the existing lighting system. Though these consultations are smaller in scope than the large audits, they are an effective means to meet the customized needs of the customer.

Overall, this program helps customers better understand their energy use, makes them aware of energy efficient alternatives and ultimately helps them to better control their energy costs.

## COMMERCIAL ENERGY ANALYSIS PROGRAM

DESCRIPTION OF MARKET			Intervention Strategies and Target Market Participants
Market Events	End User Segments	End Uses/Technologies	
<ul style="list-style-type: none"> <li>• Commercial customers seeking to understand their facility's current electric use and/or upgrade their facilities to more energy efficient technologies</li> <li>• Customers seeking to participate in LIPA's Economic Development Program</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial customers</li> <li>• Manufacturers</li> <li>• Municipalities</li> <li>• Multi-family dwellings</li> </ul>	<ul style="list-style-type: none"> <li>• Lighting and Lighting controls</li> <li>• HVAC Equipment</li> <li>• Motors</li> <li>• Energy Management Systems</li> <li>• Custom Process Equipment</li> </ul>	<p><u>Technical Assistance</u></p> <ul style="list-style-type: none"> <li>• Technical assistance to commercial customers who want to upgrade their facilities to more efficient technologies (e.g., more efficient lighting and controls, motors, HVAC, EMS systems) as a means to reduce their energy costs.</li> <li>• Technical assistance to customers who participate in the Economic Development Programs.</li> </ul> <p><u>Marketing Assistance</u></p> <ul style="list-style-type: none"> <li>• Auditors promote the various Clean Energy programs offered by LIPA.</li> <li>• Auditors promote the Security Lighting Program</li> </ul>

**COMMERCIAL ENERGY ANALYSIS PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	1,007	2,014	3,021	4,028	5,035	75,525
Summer Peak kW	238	476	714	952	1,190	N/A
Budget (000's)	\$622	\$622	\$622	\$622	\$622	\$3,112

**COMMERCIAL ENERGY ANALYSIS PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$622,400	\$641,800	\$19,400	1.03
Utility	\$622,400	\$783,300	\$160,900	1.26

**7. Commercial Energy Cooperative Program**

LIPA has projected that, in certain cases, it may be unable to meet customers' peak demand without acquiring additional costly electric supply (capacity). The Commercial Energy Cooperative Program is a cost-effective load management program which is designed to encourage LIPA customers to reduce their electric demand during peak demand periods. Specifically, eligible LIPA commercial and industrial customers are provided incentive payments when they temporarily reduce their peak electrical demand in response to requests to do so from LIPA. Customers can effectively shed this load by switching to backup on-site generation, shifting production schedules to non-peak periods, or reducing lighting and cooling at the facility.

Under this program, customers will contract with LIPA for the amount, which they can shed during "Critical Days". These Critical Days represent time periods when LIPA estimates that customer demand will exceed available supply and typically occur in late afternoon, from June 1 through September 30. LIPA will provide at least four hours notice to the customer when that load reduction will be necessary. Incentives will be paid on a basis of \$/kW for actual demand shed, calculated on a pay-for-performance basis.

## COMMERCIAL ENERGY COOPERATIVE PROGRAM

DESCRIPTION OF MARKET			Intervention Strategies and Target Market Participants
Market Events	End User Segments	End Uses/Technologies	
<ul style="list-style-type: none"> <li>• Participants agree to reduce their electric demand during critical days when LIPA determines that customer demand is expected to meet or exceed the company's available supply.</li> </ul>	<p>Commercial/Industrial customers</p>	<p><u>Demand can be reduced by -</u></p> <ul style="list-style-type: none"> <li>• Standby generators</li> <li>• Reduced cooling/heating</li> <li>• Lower lighting</li> <li>• Defer production</li> <li>• Shut-down non-essential equipment</li> </ul>	<p><u>Financial Incentives -</u></p> <p>Each customer who responds to declared critical days during the summer period can receive dollar rebate per kW shed per year. Incentives will be calculated on actual number of critical days called and the actual load shed.</p>

**COMMERCIAL ENERGY COOPERATIVE PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	1,173	1,668	2,167	3,235	3,235	11,478
Summer Peak kW	58,667	83,417	108,333	161,750	161,750	N/A
Budget (000's)	\$3,691	\$5,701	\$8,077	\$13,047	\$13,047	\$43,563

**COMMERCIAL ENERGY COOPERATIVE PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$338,466	\$5,950,062	\$5,611,596	17.58
Utility	\$3,690,866	\$5,950,042	\$2,259,176	1.61

## 8. **Carbon Dioxide Offset Tree-Planting Program**

Carbon dioxide emissions from commercial/industrial facilities have negative effects on the environment. It is expected that the federal government will enact a variety of policies and/or incentives to ensure a reduction of emissions of green house gases. This may translate into requirements that municipalities and individual businesses must meet. While some firms can reduce their emissions, others cannot do so cost effectively or would like to offset the harmful effects of their emissions by taking measures that specifically help the environment. This program promotes tree-planting projects on Long Island as part of a campaign to offset carbon dioxide emissions. In accordance with the Kyoto Protocol, the major, developed countries have committed to reducing emissions of key greenhouse gases and this program helps to further that commitment.

This campaign will be provided with all commercial rebate applications, allowing the customers to donate a portion of their rebate to a tree-planting project. The program will also offer a mechanism for customers to voluntarily contribute to the tree-planting project. LIPA will provide certificates of participation and may conduct other promotional advertising in return for customer participation. Tree-planting outings with volunteers from Long Island commercial customers will also be considered.

## CO<sub>2</sub> OFFSET TREE PLANTING PROGRAM

DESCRIPTION OF MARKET			Intervention Strategies and Target Market Participants
Market Events	End User Segments	End Uses/Technologies	
<ul style="list-style-type: none"><li>LIPA solicits participation of commercial/industrial customers to offset effects of CO<sub>2</sub> emissions.</li></ul>	Commercial customers	<ul style="list-style-type: none"><li>All commercial systems eligible for rebates</li><li>Trees</li></ul>	All commercial rebate applications will include information allowing the customer to donate a portion of their rebate to a tree-planting project.

**COMMERCIAL CO<sub>2</sub> OFFSET TREE PLANTING PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	N/A	N//A	N/A	N/A	N/A	N/A
Summer Peak kW	N/A	N/A	N/A	N/A	N/A	N/A
Budget (000's)	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000

**COMMERCIAL CO<sub>2</sub> OFFSET TREE PLANTING PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	N/A	N/A	N/A	N/A
Utility	N/A	N/A	N/A	N/A

## **C. All Sector Program Options**

### **1. Customer Driven Efficiency Program Summary**

Customers often desire to implement electric efficiency projects, which are specific to their facility, home, or business. LIPA's Customer Driven Efficiency Program provides assistance to residential and commercial customers wishing to make energy efficiency improvements not covered in its other Clean Energy programs. The program will provide technical energy analyses and audits to assist customers in evaluating potential energy savings opportunities and, where opportunities are shown to be cost effective, financial incentives and/or financing will be made available.

This program targets energy electric energy efficient measures not covered in LIPA's other conservation program offerings.

## CUSTOMER DRIVEN EFFICIENCY PROGRAM

DESCRIPTION OF MARKET			
Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Target Market Participants
<p>Customers seek to implement electric energy efficient measures (custom measures) not addressed under LIPA's other Clean Energy programs.</p>	<p><u>Customers:</u> All customer segments</p>	<ul style="list-style-type: none"> <li>• Energy Efficient electric technologies not addressed in other LIPA Clean Energy programs. Eligible equipment may include:               <ul style="list-style-type: none"> <li>➤ Heating equipment</li> <li>➤ Cooling equipment</li> <li>➤ Lighting and lighting controls</li> <li>➤ Motors</li> <li>➤ Process equipment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Technical Assistance in evaluating efficiency opportunities.</li> <li>• Energy analyses and audits to further enhance energy efficiency of customer facilities.</li> <li>• Financial assistance where the implementation of energy efficient measure is shown to be cost effective.</li> </ul>

**CUSTOMER DRIVEN EFFICIENCY PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	2,130	4,260	6,390	8,520	10,650	159,750
Summer Peak kW	471	942	1,413	1,884	2,355	N/A
Budget (000's)	\$633	\$633	\$633	\$633	\$633	\$3,167

**CUSTOMER DRIVEN EFFICIENCY PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	838,583	1,769,462	930,879	2.11
Utility	633,363	1,470,030	836,667	2.32

## **2. Standard Performance Contracting**

One of the primary goals of LIPA's Clean Energy Initiative is to help to create an environment in which consumers and businesses routinely make energy-efficient choices in their behaviors and purchases, so that they can reduce their energy bills and also help to minimize emissions from power plants. Most of LIPA's customers do not know enough about energy efficiency to be able to select and implement cost-effective efficiency improvements on their own and, to date, few firms offering such services have entered the Long Island market. Energy Services Companies (ESCOs) are reluctant to commit marketing resources to Long Island when they do not know the extent to which customers will respond to their offerings. Customers are reluctant to engage ESCOs for energy-related projects because they don't understand the benefits of making certain efficiency improvements, don't know how to select ESCOs, and don't know what "a good deal" for ESCO services would look like. They also face restraints in the amount of financial resources they could contribute to implement efficiency projects, even if those projects would more than pay for themselves over time.

The Standard Performance Contracting Program will provide incentives for both customers and ESCOs to make investments in energy efficiency, while allowing the market to transition to one that is self-sustaining without significant financial involvement from LIPA. LIPA will offer to pay set fees for each kW or kWh of verified savings that an ESCO (or customer) can produce. Specific measures and market segments will be targeted, depending on the total mix of programs selected for implementation under the Clean Energy umbrella. Essentially, ESCOs or customers present ideas for energy efficiency projects to LIPA or show proof that an efficiency measure on LIPA's approved list of measures has been implemented. Once projects are approved and implemented, savings are verified according to standard monitoring and verification protocols (e.g., International Performance Measurement and Verification Protocols), payments are made according to a pre-specified schedule and are linked to proof of continued savings from the implemented measures. The ESCO or customer assumes the risk of measures that fail to generate verifiable savings. By facilitating the use of ESCOs by customers, it is hoped that this mode of doing business and the concept of achieving money savings through measure implementation will become more commonplace and the risks of doing business will be lowered for both ESCOs and customers in the future.

**LIPA CLEAN ENERGY PORTFOLIO:  
PERFORMANCE CONTRACTING**

DESCRIPTION OF MARKET			Intervention Strategies and Target Market Participants
Market Events	End User Segments	End Uses/Technologies	
Multiple events, depending on customers' situation and needs	<u>Eligibility</u> Eligible market sectors and measures selected so as not to overlap with those of other Clean Energy programs.	<u>End Uses</u> Eligible end uses and technologies selected so as not to overlap with those of other Clean Energy programs.	<ul style="list-style-type: none"> <li>• Pre-specified list of approved measures, and incentives per unit of savings.</li> <li>• Pre-approved list of ESCOs eligible, based on financial solvency and record of performance (lowers risk for customers).</li> <li>• Marketing of program to customers through bill inserts.</li> <li>• Publicity of successful projects, to encourage other customers to make similar improvements.</li> </ul>

**Electricity Impacts and Budget:**      Dependent upon measures and market sectors selected.

**Benefit Cost Results:**    Dependent upon measures and market sectors selected. Stipulated incentives for verified savings helps to ensure program cost effectiveness.

### **3. Revolving Loan Program**

Some residential and commercial customers lack the capital to install energy-efficiency technologies in their homes and/or businesses, thereby precluding them from participating in LIPA's electric energy conservation programs. By partnering with Energy Service Companies (ESCOs) to subsidize and reduce financing interest rates, LIPA will introduce a Revolving Loan Program to eliminate these participation barriers and enable customers to install energy saving technologies. The Revolving Loan Program will target residential and commercial technologies that are not included in the general 1999 conservation program offerings.

**Electricity Impacts and Budget:** Dependent upon measures and market sectors selected.

**Benefit Cost Results:** Dependent upon actual measures and market sectors selected, as well as mode of implementation (i.e., actual financing arrangement).

#### **4. Residential and Commercial Geothermal Heat Pump Program**

Customers considering the installation or replacement of their heating and air conditioning systems are often faced with a number of potential options. Geothermal Heat Pumps are the most efficient systems available, but often more costly than the alternative systems (gas/oil heat systems with central air conditioning). The Geothermal Heat Pump Program encourages customers to purchase and install geothermal heat pumps (GTHP) by providing financial incentives to offset a portion of the higher initial cost of the equipment. The program's long term goals are to encourage contractors to use energy efficiency as a marketing tool, thereby promoting these more efficient units and influencing the market toward energy efficiency, as well as increasing the awareness and acceptance of the GTHP technology among customers and HVAC trade allies.

Customers who purchase and install geothermal heat pumps are eligible for cash rebates based on the Energy Efficiency ratio (EER) and the size of the unit, in accordance with the program's qualifying criteria. As part of this program, comprehensive training sessions and certification workshops on the GTHP technology are delivered to local trade allies, including architects, engineers, builders and HVAC contractors. Promotion of this technology helps to ensure that the benefits of energy efficiency are captured at the time of new construction.

Note: It may be possible to incorporate this technology into a broader new construction or high-efficiency equipment program, should such a program be selected by LIPA for implementation.

## RESIDENTIAL AND COMMERCIAL GEOHERMAL HEAT PUMP PROGRAM

DESCRIPTION OF MARKET			
Market Events	End User Segments	End Uses/Technologies	Intervention Strategies and Target Market Participants
<ul style="list-style-type: none"> <li>• Residential and Commercial New Construction</li> <li>• Residential and Commercial major renovation (new installation replacement)</li> </ul>	<p><u>Heating &amp; Cooling Fuel</u></p> <ul style="list-style-type: none"> <li>• Electric</li> </ul> <p><u>Builders</u></p> <ul style="list-style-type: none"> <li>• All builders are eligible</li> </ul> <p><u>House and Building Type</u></p> <ul style="list-style-type: none"> <li>• Program is open to all home and building types</li> </ul>	<p style="text-align: center;"><u>Geothermal Heat Pumps</u></p> <ul style="list-style-type: none"> <li>• Open Loop</li> <li>• Closed Loop</li> </ul>	<p><u>Financial Incentives</u> -</p> <ul style="list-style-type: none"> <li>• Residential incentives for new installation</li> <li>• Residential incentives for replacement</li> <li>• Commercial incentives for new installation</li> <li>• Commercial incentives for replacement</li> </ul> <p><u>Technical Assistance</u> -</p> <ul style="list-style-type: none"> <li>• Information/training on all issues of geothermal systems</li> </ul> <p><u>Marketing Assistance</u> -</p> <ul style="list-style-type: none"> <li>• IGSPHA certification workshop</li> <li>• Hosting geothermal teleconferences on geothermal related issues for builders, HVAC contractors, architects and engineers</li> </ul>

**RESIDENTIAL AND COMMERCIAL  
GEOTHERMAL HEAT PUMP PROGRAM:  
ELECTRICITY IMPACTS AND BUDGET**

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total \$/Lifetime MWh</b>
MWh	150	300	449	599	749	18,729
Summer Peak kW	174	348	522	696	870	N/A
Budget (000's)	\$309	\$309	\$309	\$309	\$309	\$1,545

**RESIDENTIAL AND COMMERCIAL  
GEOTHERMAL HEAT PUMP PROGRAM:  
BENEFIT COST RESULTS**

<b>Cost Effectiveness Test</b>	<b>Present Worth Costs</b>	<b>Present Worth Benefits</b>	<b>Net Benefits (Benefits – Costs)</b>	<b>Benefit/Cost Ratio (Benefits/Costs)</b>
Societal	\$380,114	\$415,009	\$34,894	1.09
Utility	\$309,000	\$389,615	\$80,615	1.26



**PROPOSED NEW CLEAN ENERGY PROGRAM OPTIONS  
ELECTRICITY IMPACT PROJECTIONS  
Cumulative Annual MWh Saved**

<i>PROGRAM</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>TOTAL</i>
<b>RESIDENTIAL PROGRAMS</b>						
<b>1. Residential New Construction</b>	134	582	1,478	2,822	4,614	321,210
<b>2. Residential Lighting &amp; Appliances</b>	5,417	15,933	31,351	48,071	68,795	870,341
<b>3. Residential HVAC</b>	2,758	6,553	12,279	20,787	29,919	823,328
<b>4. Residential Energy Affordability Partnership</b>	4,782	11,285	17,195	22,855	28,439	323,084
<b>5. Long Island Photovoltaic</b>	420	1,609	3,241	5,104	7,317	374,657
<b>6. Residential Information/Education</b>	1,977	3,954	5,931	7,908	9,885	148,275
<b>7. Residential Home Performance Service</b>	145	290	435	580	724	10,866
<b>NON-RESIDENTIAL PROGRAMS</b>						
<b>8. Commercial New Construction and Renovation</b>	8,330	23,350	44,237	69,379	95,676	2,402,610
<b>9. Regional High Efficiency Unitary HVAC</b>	341	1,254	2,470	3,772	4,583	95,001
<b>10. Regional Premium Efficiency Motors</b>	42	156	384	657	973	48,252
<b>11. Comprehensive HVAC Retrofit</b>	4,665	12,689	24,143	39,601	59,257	1,043,601
<b>12. Resource Conservation Management</b>	4,187	13,398	25,790	40,863	56,940	817,089
<b>13. Commercial/Industrial Energy Analysis</b>	1,007	2,014	3,021	4,028	5,035	75,525
<b>14. Commercial/Industrial Energy Cooperative</b>	1,173	1,668	2,167	3,235	3,235	11,478
<b>15. Carbon Dioxide (CO2) Tree Planting Campaign</b>						
<b>ALL SECTORS PROGRAMS</b>						
<b>16. Customer Driven Efficiency</b>	2,130	4,260	6,390	8,520	10,650	159,750
<b>17. Performance Contracting</b>						
<b>18. Revolving Loan Program</b>						
<b>19. Geothermal Heat Pump Program</b>	150	300	449	599	749	18,729

**PROPOSED NEW CLEAN ENERGY PROGRAM OPTIONS  
ELECTRICITY IMPACT PROJECTIONS  
Cumulative Summer kW Saved**

<b>PROGRAM</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>RESIDENTIAL PROGRAMS</b>					
<b>1. Residential New Construction</b>	272	1,179	2,994	5,716	9,345
<b>2. Residential Lighting &amp; Appliances</b>	464	1,340	2,655	3,937	5,515
<b>3. Residential HVAC</b>	2,797	6,266	11,508	19,283	27,506
<b>4. Residential Energy Affordability Partnership</b>	331	708	1,087	1,478	1,885
<b>5. Long Island Photovoltaic</b>	186	711	1,433	2,257	3,235
<b>6. Residential Information/Education</b>	703	1,406	2,109	2,812	3,515
<b>7. Residential Home Performance Service</b>	17	33	50	66	83
<b>NON-RESIDENTIAL PROGRAMS</b>					
<b>8. Commercial New Construction and Renovation</b>	2,046	5,781	10,906	17,104	23,763
<b>9. Regional High Efficiency Unitary HVAC</b>	225	756	1,419	2,122	2,531
<b>10. Regional Premium Efficiency Motors</b>	9	34	85	144	214
<b>11. Comprehensive HVAC Retrofit</b>	1,387	3,777	7,186	11,798	17,650
<b>12. Resource Conservation Management</b>	1,568	5,019	9,661	15,307	21,330
<b>13. Commercial/Industrial Energy Analysis</b>	238	476	714	952	1,190
<b>14. Commercial/Industrial Energy Cooperative</b>	58,667	83,417	108,333	161,750	161,750
<b>15. Carbon Dioxide (CO2) Tree Planting Campaign</b>					
<b>ALL SECTORS PROGRAMS</b>					
<b>16. Customer Driven Efficiency</b>	471	942	1,413	1,884	2,355
<b>17. Performance Contracting</b>					
<b>18. Revolving Loan Program</b>					
<b>19. Geothermal Heat Pump Program</b>	174	348	522	696	870

**PROPOSED NEW CLEAN ENERGY PROGRAM OPTIONS  
ELECTRICITY IMPACT PROJECTIONS**

<i><b>PROGRAM</b></i>	<b>Societal</b>			
	<i><b>Present Worth Costs</b></i>	<i><b>Present Worth Benefits</b></i>	<i><b>Net Benefits</b></i>	<i><b>Benefit/Cost Ratio</b></i>
<b>RESIDENTIAL PROGRAMS</b>				
<b>1. Residential New Construction</b>	\$43,127,080	\$155,587,572	\$112,460,492	3.61
<b>2. Residential Lighting &amp; Appliances</b>	\$31,477,535	\$39,861,962	\$8,384,427	1.27
<b>3. Residential HVAC</b>	\$23,193,700	\$79,397,288	\$56,203,587	3.42
<b>4. Residential Energy Affordability Partnership</b>	\$11,610,941	\$13,214,519	\$1,603,578	1.14
<b>5. Long Island Photovoltaic</b>	\$42,300,744	\$20,092,798	(\$22,207,947)	0.47
<b>6. Residential Information/Education</b>	\$662,663	\$1,964,940	\$1,302,277	2.97
<b>7. Residential Home Performance Service</b>	\$84,000	\$104,842	\$20,842	1.25
<b>NON-RESIDENTIAL PROGRAMS</b>				
<b>8. Commercial New Construction and Renovation</b>	\$37,576,199	\$118,759,453	\$81,183,254	3.16
<b>9. Regional High Efficiency Unitary HVAC</b>	\$2,839,506	\$6,578,599	\$3,739,093	2.32
<b>10. Regional Premium Efficiency Motors</b>	\$1,195,012	\$2,053,093	\$858,081	1.72
<b>11. Comprehensive HVAC Retrofit</b>	\$17,128,011	\$53,686,830	\$36,558,819	3.13
<b>12. Resource Conservation Management</b>	\$23,650,311	\$50,212,538	\$26,562,228	2.12
<b>13. Commercial/Industrial Energy Analysis</b>	\$622,400	\$641,800	\$19,400	1.03
<b>14. Commercial/Industrial Energy Cooperative</b>	\$338,466	\$5,950,062	\$5,611,596	17.58
<b>15. Carbon Dioxide (CO2) Tree Planting Campaign</b>				
<b>ALL SECTORS PROGRAMS</b>				
<b>16. Customer Driven Efficiency</b>	\$838,583	\$1,769,462	\$930,879	2.11
<b>17. Performance Contracting</b>				
<b>18. Revolving Loan Program</b>				
<b>19. Geothermal Heat Pump Program</b>	\$380,114	\$415,009	\$34,895	1.09

## V. Research and Development Project Options

### A. Photovoltaic Systems Project Options

#### 1. Bellport Beach Photovoltaic Project

**Description:**

- Repair existing photovoltaic distributed generation site
- System is used in place of distribution upgrade

**Funding:** \$12,000

**Benefit:**

- Avoidance of distribution system upgrade (>\$50,000)
- No emissions
- Peak load reduction

#### 2. Sunshine AC Photo Voltaic Project

**Description:**

- Integrate five sunshine integrated photovoltaic panels into LIPA grid
- Confirm inverter A/C characteristics

**Funding:** \$36,000

**Benefit:**

- Reduces Emissions

#### 3. “One Thousand Homes” Photovoltaic (PV) Program

**Description:**

- 1998 - 1999 Install 100 Residential PV Sites
- Average System Size 3 kW PV. Total Installed about 300 kW.
- Reduce installed cost from approximately \$7.00/Watt to \$3.00/Watt.
- Leverage Funding to Maximize NYS Residential Tax Credit for PV.
- Bulk purchase materials to reduce cost of materials.
- Hire contractors for entire job and competitively bid the package.
- Directly subsidize the effort.

**Funding:** \$800,000

**Benefit:**

- Solar is a true renewable resource generation technology.
- This program is anticipated to increase the levels of production which is expected to within five years reduce the cost of this technology to an affordable level. Eliminate need to subsidize this technology.

**B. Fuel Cell Project Options**

**1. Jones Beach Theatre Fuel Cell Station**

**Description:**

- Install four 200 kW fuels cells totaling 800 kW.
- Provide power to Jones Beach Theatre and surrounding communities.
- Highly visible location.

**Funding:** \$2,500,000

**Benefit:**

- Offset \$1,500,000 cable replacement cost.
- Provide reliable, on-site distributed power supply.
- Showcase advanced, high technology, energy efficient, clean distributed generation alternative.

**2. Combined Fuel Cell and Battery Supply Unit**

**Description:**

- Develop a fuel cell/battery system capable of providing energy to meet varying energy needs.
- System will provide managed energy storage system (buffer) between the fuel cell and the electric load.
- Project would design, prototype and test a system to support a 5 kW fuel cell.

**Funding:** \$196,000

**Benefit:**

- A more efficient cost effective fuel cell would provide certain Long Island energy consumers a clean energy alternative.
- Virtually no emissions.

**3. Efficiency Optimization and Cost Effective Fabrication of PEM Fuel Cell Bipolar Plates**

**Description:**

- Develop a cost effective fabrication technique to produce proton exchange membrane (PEM) fuel cells commercially.
- New materials (metallic bipolar plate) and new processes used (stamping followed by thermal spray coating).

**Funding:** \$290,000

**Benefit:**

- Improve overall efficiency of a PEM fuel cell 30-40%.
- Emissions very low.

**4. Novel Hydrogen Source for Small Fuel Cells**

**Description:**

- Utilize borohydride salt with catalyzed methanol to create a thermally controlled hydrogen delivery system for use with hydrogen/air fuel stacks.
- Project plan would prove feasibility for this concept.

**Funding:** \$118,000

**Benefit:**

- Safely feed hydrogen to specialized fuel cell applications (i.e., back up power to critical communications equipment).

**5. 1 kW Photovoltaic (PV)/Fuel Cell Station**

**Description:**

- 1 kW PV Site.
- Excess power used to charge Hydride storage tank.
- H<sub>2</sub> powers fuel cell for low sun periods.
- Grid connected - excess power to grid.
- No central station.
- This technology is in the development stages.

**Funding:** \$200,000

**Benefit:**

- Coupling of two synergetic technologies.
- Environmentally friendly “Green Power”.

**C. Wind System Project Options**

**1. Wind Energy Assessment**

**Description:**

- Assess Long Island’s generating potential using commercial scale wind turbines
- Feasibility and site evaluation for former Town of Babylon landfill location
- Key issues are foundations, electric distribution, new turbine technology, environmental impact, town resource requirements

**Funding:** \$221,000

**Benefit:**

- Produce energy without burning fossil fuel
- Leverage an already “open space” suited to wind energy
- Potential synergy with wind system demonstration project

**2. A Summer Afternoon Peaking Wind Turbine System****Description:**

- Design, construct and demonstrate a 1-m wind turbine prototype and conceptual design of all full scale system for grid-synchronized power generation.
- Leverage meteorological phenomena in conjunction with a promising wind turbine design to meet summer peak loads
- The Fosdick Hi-Tek Wind Turbine (FWT) is inherently rugged, maintenance-free and long-lasting relative to conventional wind turbines. It is a one-piece rotor and generator mounted on a tower pivot bearing.

**Funding:** \$141,000**Benefit:**

- Test data repeatedly demonstrate aerodynamic performance greater than the universally-accepted theoretical limit for a given rotor diameter.
- Lower rotor speeds (relative to conventional wind turbines) and large blade count make the FWT quieter and able to begin producing power at a lower wind level. Its low noise level and compact structure lend it to use in close proximity to habitations and aesthetically-sensitive regions.

**D. Electric Vehicle Project Options****1. Advanced Assessment of Electric Vehicles****Description:**

- Demonstrate electric vehicles on Long Island.
- Evaluate the performance of these EVs over three (3) years.

**Funding:** \$200,000**Benefit:**

- Determine issues associated with the operation and maintenance of electric vehicles
- Reduces emissions

**2. AC/DC Converter: EV Battery Charger****Description:**

- From 1996 Long Island R&D Initiative

**Funding:** \$30,000

**Benefit:**

- Address practical issues associated with using electric vehicles

3. **Advanced Lead-Acid Battery Implementation**

**Description:**

- Co-funded by NYSERDA
- 1996 Long Island R&D Initiative

**Funding:** \$108,182

**Benefit:**

- Address issues associated with storage of electricity for electric vehicles

4. **Electric Vehicle Charging Stations**

**Description:**

- 1996 LI R&D Initiative

**Funding:** \$4,520

**Benefit:**

- Further adoption of EV technology by increasing availability of EV charging stations

5. **Electric Vehicle Trolley Demonstration Project**

**Description:**

- Utilize local towns/villages to promote awareness and acceptance of electric vehicles through implementation of demonstration projects

**Funding:** \$100,000

**Benefits:**

- Further acceptance and awareness of electric vehicles
- Provide opportunities for reduced traffic congestion, resulting in reduced vehicle emissions thereby providing positive environmental benefits

## **E. EPRI Target Project Options**

The Electric Power Research Institute (EPRI) helps electric utilities to work together to improve the systems, operations and programs. LIPA is considering participating in specific EPRI research efforts, called “targets” in the area of environmental improvement, including the following:

### **1. Emerging Distributed Resource Technologies**

**Description:**

- EPRI Target Number 63
- Microturbine products and assessments
- Fuel cell assessments

**Funding:** \$75,000

**Benefit:**

- Learn how to integrate Distributed Resources into the LIPA System

### **2. Renewable Technology Options and Green Power Marketing**

**Description:**

- EPRI Target Number 66
- Technical assessment and market intelligence on options

**Funding:** \$128,704

**Benefit:**

- Reduced Emissions
- Peak Energy Load Savings

### **3. Distributed Resource Information & Tools for Business Strategy Development**

**Description:**

- EPRI Target Number 64
- Distribution planning tools for Distributed Resources

**Funding:** \$128,704

**Benefit:**

- Understand the full potential of Distributed Resource based business strategies

### **4. Municipal Water and Wastewater Technology**

**Description:**

- EPRI Target Number 21
- Improve efficiency of wastewater facilities on Long Island utilizing electrotechnologies

**Funding:** \$35,207

**Benefit:**

- Further acceptance of efficient wastewater electrotechnologies
- Improved efficiency of wastewater provides environmental benefits

**5. Healthcare Technology**

**Description:**

- EPRI Target Number 20
- Improve efficiency in healthcare facilities
- Uses advanced electrotechnologies
- Will Work with 25 Hospitals Representing \$45 Million in Revenue to LIPA

**Funding:** \$36,242

**Benefit:**

- Further acceptance of advance electrotechnologies for healthcare facilities

**6. Small Business Solutions**

**Description:**

- EPRI Target Number 16
- Small Business Marketing Tools
- Directly assist LIPA small businesses in utilizing electricity more efficiently

**Funding:** \$21,529

**Benefit:**

- Provide tools to small businesses to control energy bills by utilizing energy more efficiently

**F. Other Project Options**

**1. Other Distributed Generation Projects**

**Description:**

- Photovoltaic
- Fuel Cells
- Microturbines

**Funding:** \$445,000

**Benefit:**

- Better understand feasibility of using clean energy alternatives to meet electric capacity needs
- Reduce emissions

## 2. **Integrated Building Controls for Multi-Family Housing**

### **Description:**

- Integrate boiler optimization, energy management, electrical submetering & lighting controls utilizing advanced power line carrier (PLC) technology
- Determine practical issues associated with the technology to assess feasibility of more widespread application

**Funding:** \$200,000

### **Benefit:**

- Reduced peak energy usage
- Reduced emissions

## 3. **Advanced Direct Exchange Geothermal Technology**

### **Description:**

- Develop and demonstrate refrigerant and heat exchanger technology at a Long Island site.
- Enviro Therm ADX™ uses a proprietary heat valve assembly and maintains required refrigerant flow.
- Geocolumn requires a vertical well of 2' diameter and 12' to 15' depth per ton of capacity.

**Funding:** \$146,000

### **Benefit:**

- Reduced installation (estimated savings \$500 to \$1,200 per ton) and operating costs over conventional ground-source heat pumps.
- Up to 60% energy saved: reduced peak demand, CO<sub>2</sub> and NO<sub>x</sub>.

## 4. **Demonstration of Roof-Integrated High Temperature Thermal Solar Energy Collector as Part of a Double-Effect Absorption Water Chiller HVAC System**

### **Description:**

- Demonstrate a solar powered HVAC (heating, ventilation and air conditioning) system using solar energy collectors for a 170,000 square foot building at the National Aviation and Transportation Center on Long Island.
- HVAC system of 100 tons (Phase I) powered by new Integrated Compound Parabolic Concentrator (ICPC) solar collectors and double-effect absorption water chiller.

**Funding:** \$250,000

**Benefit:**

- NAT Center annual energy savings of approximately \$1.00 square foot.
- If technology proves economically viable, possibility for peak energy commercial customers using solar systems.

**5. Medical Waste Disposal Technology Using Microwave Energy**

**Description:**

- Develop a pre-production prototype to safely and efficiently treat medical hazardous waste.
- Electric technology utilizes combination of microwave, autoclaving, and mechanical processes.

**Funding:** \$261,000

**Benefit:**

- Reduction of disposal costs for Long Island's healthcare industry.
- Less environmental exposure by enabling smaller decentralized medical waste processing.