Long Island Institute
for Socio-Economic Policy

LONG ISLAND POWER AUTHORITY (LIPA) EFFICIENCY LONG ISLAND:
ECONOMIC IMPACT OF LIPA'S INVESTMENT IN ENERGY EFFICIENCY

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INTRODUCTION: LIPA'S INVESTMENT IN ENERGY EFFICIENCY

The objective of this report is to examine Efficiency Long Island's projected benefits to consumers, job creation, and the resulting positive economic impact on the Long Island economy. Efficiency Long Island (ELI) is a ten-year comprehensive energy efficiency program of the Long Island Power Authority (LIPA) that emphasizes energy efficiency opportunities for LIPA customers and coincident peak-demand reductions for LIPA. ELI is a major element of LIPA's overall plan to meet the objectives of New York State's energy goal of decreasing electricity use 15% by 2015 through increased energy efficiency. In order to appreciate the perspective of ELI, a discussion of the results of LIPA's past energy efficiency initiatives is required, because energy is cleanest and cheapest and has the greatest economic impact when it is never used.

These savings are important because Long Islander's energy efficiency results in real savings in household budgets because they use less fossil fuel. And, it is LIPA's savings from reduced fossil fuel purchases that generate those savings. Edwards Deming, the quality management guru said chronic problems require structural solutions. Efficiency Long Island is a structural solution to Long Island's energy costs because it can contain costs and is based on solid interdisciplinary financial, conservation, efficiency, and energy delivery goals and objects.

Additionally, McKinsey & Company, whose comments follow, estimate that a 40% pollution reduction is needed to prevent "catastrophic global warming and can be achieved through efficient improvements alone."

LIPA recognized the value and benefits of energy efficiency early on and has pursued the goals in several ways.

Clean Energy Initiative

In May 1999, the LIPA Board of Trustees approved a Demand Side Management program called the Clean Energy Initiative ("CEI" or "the Initiative"), a five-year, $160 million effort targeting: achieving energy and capacity savings for LIPA; delivering electric bill savings to customers; and providing environmental benefits to the region. In 2001, the overall commitment through 2003 was increased by $10 million to $170 million. In 2003, LIPA earmarked $185 million for the CEI from 2004 through 2008. Thus, the CEI became a 10-year, $355 million dollar commitment through 2008 to promote clean, new, electric-generation technologies.

The eight policy objectives for the CEI were: to further customers' ability to control their energy bills; provide a stimulus to the local economy; enhance customer retention; defer or reduce capacity needs; build customer trust and LIPA brand loyalty; promote a positive image for LIPA; reduce power plant emissions; and, contribute to a sustainable energy future.

In 2008, the CEI encompassed ten energy efficiency programs, as well as cutting- edge research and development initiatives. During its ten years (1999 through 2008), the CEI has produced significant savings for Long Island. Along with the reductions in energy use come a variety of benefits from the pollutants that were not generated. The CEI, including Research, Development, and Demonstration (RD&D), has resulted in a total of approximately 3,106,000 MWh of energy saved and/or produced to date, which resulted in reduced emissions of over 1,934,800 tons of CO_2, over 2,628 tons of NOx and over 8,040 tons of SO_2. These energy savings translate into fuel savings of more than 5.00 million barrels of oil, or more than 31.10 million decatherms of gas.

The measures installed from CEI inception through 2008, excluding RD&D efforts, has resulted in 208 MW of peak demand savings and 700,493 MWh of energy savings in the year 2008, 3% higher and 10% lower, respectively, than the originally projected savings of 203 MW and 777,619 MWh for the same period. Thus, the CEI portfolio of programs has resulted in electricity savings and economic impacts that have either met, or exceeded, initial goals.

Economic Impact of CEI

The CEI investment over the ten years of implementation has resulted in $338.13 million of primary savings to over 5.3 million energy efficiency measures being purchased/installed. This has a primary and secondary (or multiplier) economic impact of $676.32 million. This was twice the $338 million investment made by LIPA in Long Island energy efficiencies under the CEI initiative. This is equivalent to over 8,732 jobs created over the ten years, based on the average median Long Island wage for single individuals of $38,720. Furthermore, these energy efficiencies are expected to continue well into this century, further improving the return on LIPA's investment of $338.1 million.

EFFICIENCY LONG ISLAND: LIPA CONTINUES ENERGY EFFICIENCY INITIATIVES

Building on the success of the CEI is LIPA's Efficiency Long Island (ELI) program, a ten- year comprehensive energy efficiency program that emphasizes peak- demand reductions, along with energy savings. ELI is a major component of LIPA's overall plan to meet the objectives of New York State's energy goal of decreasing electricity use 15% by 2015 through increased energy efficiency. The objective of the 15 x 15 Goal, as noted by the Public Service Commission in its E*nergy Efficiency Portfolios Standard*, is to "balance costs impacts, resource diversity, and environmental effects by decreasing New York State's energy use through increased conservation and efficiency."

New York State 15 x 15

The objective of the 15 x 15 Goal, as noted by the Public Service Commission in its E*nergy Efficiency Portfolios Standard*, is to "balance costs impacts, resource diversity and environmental effects by decreasing New York State's energy use through increased conservation and efficiency."

LIPA's *Implementation of 15 x 15*

LIPA has developed a preliminary plan to address its ability to achieve this aggressive 15 x 15 plan on Long Island. The plan relies on a combination of initiatives including: promoting adoption of higher New York State building codes and appliance standards; ensuring LIPA is credited for its investment in the Clean Energy Initiative (*discussion follows*),- adopting Efficiency Long Island (*discussion follows*); implementing the Smart Meter program; encouraging investment in and adoption of electro-technologies representing improved commercial and industrial processes over current fossil fuels; and, implementing Transmission and Distribution system efficiency programs.

The table that follows illustrates LIPA's 15 x 15 energy efficiency targets.

15 X 15 ENERGY EFFICIENCY TARGETS

YEAR	CUMULATIVE ANNUAL ENERGY SAVINGS (GWH)	CUMULATIVE CAPACITY SAVINGS (MW)	ANNUAL BUDGET
2009	462	154	$ 115,904
2010	701	210	$ 154,084
2011	1066	293	$ 178,955
2012	1659	574	$ 198,863
2013	2270	715	$ 231,136
2014	2867	854	$ 260,902
2015	3315	978	$ 286,210
2016	3731	1104	$ 309,220
2017	4140	1232	$ 335,921
2018	4534	1359	$ 376,796
TOTAL	**24,746**	**7,473**	**$ 2,447,992**

Efficiency Long Island

As compared to the base year of 2007, by 2018, ELI is projected to reduce both LIPA's peak demand by 520 Megawatts (MW) or 7.9%, and total energy requirements by 1,600 Gigawatt hours (GWh) or 5.2%. Further benefits are: reductions in dependence on fossil fuels by an equivalent of 10.5 million barrels of oil; reductions in participating customers' electricity bills; reduction in carbon emissions by nearly 20 million tons; to defer the need for new generation resources until 2015; and, to reduce demand growth by .6% per year, from 1.7% to 1.1%.

Additionally, based on a 2002 NYSERDA energy efficiency study which estimated that 965 MW of economically achievable reduction in peak demand is available on Long Island, ELI is projected to obtain: 54% of the economically achievable energy efficiency potential; 27% in the rate of growth of energy requirements (GWh); and, 45% reduction in the rate of growth of peak demand (MW).

There are five elements encompassing the ELI initiative which separately target residential and commercial customers and address energy efficient products and building in both the existing and new construction markets. Each is presented below, inasmuch as each has a different economic impact, which will be discussed later in this report.

The five elements promote: (1) purchasing of EnergyStar or other high energy efficient products by residential customers; (2) efficiency in new residential construction and energy efficient upgrades that exceed New York State Building codes; (3) efficiency in existing residences through central air conditioner tune-ups, retrofit assistance through certified efficiency contractors, and incentives for higher-than-code improvements, while addressing issues of low-income households; (4) efficiency in construction of new buildings and major renovations through use of technical experts and financial incentives; and, (5) efficiency of equipment by replacing or retrofitting in existing commercial buildings.

Efficient Products Initiative

The Efficient Products Initiative targets retail purchases of efficient appliances and lighting. While all LIPA customers (i.e., residents and businesses) are eligible to participate, the target market is the residential customer sector. The initiative provides a variety of incentives and marketing to support the stocking, promotion, and sale of high efficiency lighting and appliance products. Nearly all of the efficient products supported by the initiative are ENERGY STAR® qualified. Financial incentives offered through the initiative are targeted to retailers, manufacturers, and directly to consumers. This initiative will target the following product categories:

- Lighting - compact fluorescent lamps (CFLs) and all efficient fixture types (portable and hard-wired, including ceiling fans), whether utilizing fluorescent or solid-state technology
- Appliances – refrigerators, freezers, dehumidifiers, room air conditioners, clothes washers, and dishwashers. Active promotion of specific appliances may vary over the initiative's planning and implementation horizon, depending on incremental costs and savings.
- Consumer electronics - computers, monitors, set-top boxes, etc.
- Pool pumps – two speed and variable speed

Of these products, lighting will be the primary focus. Not all products on this list will be promoted with financial incentives. Instead, these products will be the subject of marketing and other outreach efforts. Additional products may be added to, or removed from, this list, as product selection and market conditions warrant, including changes to state and federal standards and ENERGY STAR® specifications.

Energy Star Labeled Homes (Residential New Construction)

The ENERGY STAR®-Labeled Homes (ESLH) Initiative seeks to increase the efficiency of new homes in LIPA's service territory through a series of mutually supportive approaches. The initiative provides financial incentives and technical services to builders to construct homes that meet, or exceed, ENERGY STAR® requirements, and that also meet minimum kWh savings thresholds. The initiative also strongly supports efforts by towns on Long Island to adopt ELI ESLH initiative requirements as minimum energy codes. This initiative targets both the efficiency of the building itself and the efficiency and proper installation of the various equipment and systems installed within it. Efficiency measures typically installed by builders to meet ENERGY STAR® requirements and efficiency targets include:

- Building shell upgrades, such as increased insulation, efficient windows, and air sealing
- HVAC; Duct sealing for forced air systems; Fluorescent lighting fixtures and CFL installation
- High efficiency appliances (e.g., refrigerators, clothes washers, dishwashers)

Existing Homes

The Existing Homes Initiative seeks to increase the efficiency of energy use in existing residential homes, with a focus on opportunities that result in both energy and peak-load reductions. The Existing Homes component is comprised of five programs: Home Performance Direct; Residential Energy Affordability Program (REAP); Home Performance with ENERGY STAR®; Cool Homes; and, Information and Education.

The Home Performance Direct Program provides electric heat customers and those with high-use central air conditioning systems with a Comprehensive Home Assessment and installation of energy savings measures, including replacement of incandescent bulbs with CFL's, duct sealing, and air sealing.

The Residential Energy Affordability Program provides to income-qualified customers a defined set of energy saving measures such as lighting replacements, refrigerator replacements, duct sealing, air sealing, and insulation improvements in homes with CAC or heat pump systems, and water saving measures in homes with electric hot water heaters.

The Home Performance with ENERGY STAR® Program provides a Comprehensive Home Assessment which guides customers to install electric savings measures, such as insulation and duct and air sealing. LIPA offers rebates to customers who choose to install these electric savings measures. This program can serve as an area of cooperation between LIPA and National Grid natural gas efficiency programs on Long Island.

The Cool Home Program provides incentives for properly installed, high efficiency, new Central Air Conditioning (CAC) systems. In addition, LIPA will be offering additional rebates that encourage the retirement of older, inefficient CAC systems. This program also provides rebates for the installation of new furnaces that have qualified, efficient fans.

The Information and Education Program will provide the ability for customers to perform an online home energy audit. In addition, through this program, LIPA attends numerous trade shows and events and visits classrooms across Long Island, training teachers and educating students about energy issues.

All programs will be supported by targeted marketing and contractor training programs.

Commercial & Industrial (C & I) New Construction

The Commercial & Industrial New Construction initiative targets all new commercial buildings and significant building expansions. Major renovations, defined as complete replacement of at least two major building systems, are also included; smaller renovation opportunities will be covered under the C & I Existing Buildings Initiative. The initiative will offer comprehensive services, including: financial incentives (covering measure, design, and analysis costs); technical and design assistance; and, coordination services to assist consumers, design professionals, vendors, and contractors to overcome various transaction barriers.

Although incentives will be tied to electric savings, the initiative will take advantage of both electricity and natural gas savings to demonstrate cash flow benefits to customers. The initiative will promote the installation of comprehensive efficiency measures using a systems approach that capitalizes on interactions between technologies serving multiple end-uses. Multiple building systems would be optimized, recognizing sizing and other interactions between systems, including the following end-uses and systems: interior and exterior lighting, HVAC, motors, domestic hot water, building envelope, and refrigeration. Efficiency will be pursued through equipment selection, control equipment and strategies, fuel choice, the design process, and commissioning.

C & I *Existing Buildings*

The C & I Existing Buildings market consists of all existing C & I buildings on Long Island, regardless of type or end-use. Within this market, there are significant differences between large customers and small/medium-size customers—differences in management, building operation expertise, and the capacity to undertake capital projects. Recognizing this, the initiative is divided into two customer segments (large and small-medium). Within each, the initiative will address both lost opportunity (i.e., at the time of new purchase or natural replacement) and retrofit (i.e., discretionary equipment replacement) events. This initiative will take advantage of both electricity and natural gas savings generated by a variety of measures and include:

- Any efficiency measure that can generate positive net benefits will be considered for Large C & I customers;
- The direct install component for small/medium-size customers will focus primarily on lighting, but may include cooling, refrigeration, and other equipment; with prescriptive incentives that include lighting, motors, and cooling equipment.

The projected cumulative impact of the five elements of the ELI initiative, including the efficient products initiative, appears on the following table.

PROJECTED CUMULATIVE IMPACTS OF ELI IN 2018

SECTOR	DEMAND SAVINGS (MW)	ENERGY SAVINGS (MWh)
Residential	274	644,972
Commercial & Industrial	246	1,016,885
TOTAL	**520**	**1,661,857**

LIPA *Contractor Training Programs*

As noted in the elements of ELI above, marketing the benefits of ELI and contractor training is included. The easiest and most efficient way to market the benefits of ELI is to train contractors, sales persons, and realtors how to recognize potential savings from energy efficiency and, then, to be able to market, sell, and install those efficiencies construction and improvements to new or existing residential and commercial buildings.

Training efforts provide an economic benefit because without training, contractors would not be able to maintain their businesses, and durable goods manufacturers and retailers would not be able to maintain market share in a changing energy marketplace that is heavily influenced by energy efficiency programs. This will be the case with ELI, as has been the case in the states already initiating energy efficiency programs (*discussed later in this report*).

The following discussion illustrates the skills obtained by nearly 2,000 people in specific technical training, along with retail trainings performed at nearly every appliance store in the service territory under LIPA's Training Programs. The retail trainings for sales personnel are an on-going program where they receive updated information regarding efficiency upgrades for appliances and products.

ENERGY STAR® *Labeled Homes Program*

Home Energy Rating Systems (HERS) *Rater Training*: 152 *Individuals Trained*

This Residential Energy Systems Network (RESNET) accredited training is intended to prepare individuals to become certified Home Energy Rating System (HERS) raters. The course covers building science basics, building diagnostics, RESNET standards for HERS ratings, and use of REM/Rate (Residential Energy Modeling) rating software program. Combustion Safety Training is also included. Training is both in class and on-site, and culminates with the nationally standardized HERS rater exam on the fifth day of training, after a morning review.

Introduction to ENERGY STAR®: 100 *Individuals Trained*

Most Long Island towns have adopted ENERGY STAR® standards into their building codes. All new homes in these towns must be tested and certified as meeting the ENERGY STAR® standards.

LIPA *New York* ENERGY STAR® *Labeled Homes Program*: 400 *Individuals Trained*

Classes are offered at the Long Island Builders Institute location, associated with the New York State Builders Association Research and Education Foundation The curriculum includes town mandates; building science – house as a system of air leakage ventilation; insulation-thermal bypass inspection checklist blower door, duct blaster testing; and, home energy rating system.

Adding to the economic potential of these trained individuals is that their participation in the following programs result in a designation that builds an expertise that will add to their skills and be more marketable in the changing energy efficiency market place. The economic impact will be more about retaining jobs in the Long Island region, rather than having members of the workforce lacking these skills falling out of the Long Island employment base. The training provided by LIPA results in the following designations:

Certified Graduate Remodelor® (CGR): 151 *Individuals Trained*

This is an exclusive professional designation designed to emphasize business management skills as the key to a professional remodeling operation. The CGR designation requires that graduates meet prescribed standards of business practice, possess a minimum of five years remodeling industry experience, have a proven track record of successful project management, complete a comprehensive education curriculum, and pledge to uphold the program's code of ethics. The five core areas are: Marketing & Sales, Business Administration, Design Estimating & Job Cost, Contracts, Liability & Risk Management, and Project Management

Certified Graduate Builder (CGB): 111 *Individuals Trained*

This is an exclusive professional designation designed to emphasize business and project management skills as the key to a professional building operation. Designation requires that graduates meet prescribed standards of practice, possess a minimum of two years building industry experience, have a proven track record of successful project management, complete a comprehensive education curriculum, and pledge to uphold the program's code of ethics. Courses for the CGB certification are: Building Technology; Business Finance; Project Management; Sales & Marketing; and, Safety:

Certified New Home Sales Professional (CSP): 40 *Individuals Certified*

The three objectives of the CSP are to sharpen selling skills, provide insight into how to relate to customers, and learn techniques to achieve superior customer service. This course has been approved by the State of New York and carries 11.5 hours of CEUs for New York State realtors. The student is required to successfully complete the Certified New Home Sales Professional course (24 hours) and pass the accompanying CSP test.

Certified Aging-in-Place Specialist (CAPS): 51 *Individuals Certified*

The Certified Aging-in-Place Specialist (CAPS) designation program teaches the technical, business management, and customer service skills essential to competing in the fastest growing segment of the residential remodeling industry: home modifications for the aging-in-place. The NAHB Remodelors™ Council, in collaboration with the AARP, NAHB Research Center, and NAHB Seniors Housing Council, developed this program to provide comprehensive, practical, market-specific information about working with older and maturing adults to remodel their homes for aging-in-place.

Green Verifier Training: 71 *Individuals Trained*

Eligible prospective verifiers must participate in training approved by the NAHB Research Center — either in person, or via self-guided online materials — and pass a verifier accreditation test. The course covers the protocol for verifying that a house meets the national certification program requirements and is intended to ensure all verifiers across the country evaluate homes in a consistent manner. This training does not include developing the "green" expertise each prospective verifier is expected to have as a prerequisite.

Code Primer for Builders: 20 *Individuals Trained*

This is a four-hour seminar covering the changes and updates to the Residential and Energy Conservation Construction Codes of New York State. It has been approved by the New York State Department of State for four-hours of in-house training credits. These courses include:

- **Energy Code Update – What You Really Need To Know**
  This program is an update on the new Energy Code (*effective January* 1, 2008.) This focuses primarily on the changes from the previous code, as well as the really necessary information needed for compliance with the Energy code (ECCCNYS-2007) for 1 and 2 family and low rise multifamily construction for the Residential Construction industry. In this coming year, the program will also offer some preview of the upcoming code changes that will go into effect either in 2009 or 2010.

- **The Code, New and Green Technologies – Building the Partnerships**
  This program focuses on the real and perceived barriers and misunderstanding around the application of new and green building technologies in Residential Construction. Hot topics in New York State green and high performance/energy efficient construction are updated regularly.

- **Manual J & D for Code Officials and Builders**
  This program covers the basics of demonstrating compliance with the Residential and Energy Code requirements for HVAC and duct sizing, as well as the benefits of doing this right, the downfall of doing it wrong, and the tools that make it easy.

ENERGY STAR® *for Realtors*: 50 *Individuals have been trained*

This program will provide Realtors with technical and practical information on ENERGY STAR® homes. Students will be able to effectively convey the homes' benefits and values to prospective homebuyers. As a result of this course, you will gain an increased understanding of these homes which will produce more sales and promote a more energy efficient and sustainable New York.

Home Performance with ENERGY STAR®: 118 *Individuals have been trained*

Offered are Building Performance Institute (BPI) certifications to ensure that participating contractors are schooled in building science technology. The following courses are offered:

- Building Analyst - Fundamentals of building science, identifying and understanding building performance problems, and diagnostic and combustion safety applications.

- Envelope Professional - A continuation of the Building Analyst course includes advanced applications and health and safety assessments, etc..

Residential Energy Affordability Partnership (REAP): 10 *Individuals have been trained*

This program offers Building Performance Institute (BPI) certifications to ensure that participating contractors are schooled in building science technology. The following courses are offered: Building Analyst - Fundamentals of building science, identifying and understanding building performance problems, and diagnostic and combustion safety applications.

Cool Homes Program: 649 *Individuals have been trained*

Training includes:

- Manual J: Residential calculation determines the correct size (tons) central air system to install

- Manual D: Residential design and repair of duct work, which provides airflow through the home

North American Technician Excellence (NATE) *certification review*

This is a course for technicians preparing to take the Core and/or Gas specialty NATE exam so that they can become a NATE certified professional in the HVAC industry. Skills taught include:

- Residential airflow and system charging for central air systems.

- Instructs on airflow and system charging procedures and standards on central air systems.

- Correct charging procedures and airflow measurements are taught as well as the correct use of an air duct calculator.

Energy Efficient Products Program: 15,598 *individuals have been trained*

LIPA's ENERGY STAR® field representatives train retail store associates, cashiers, owners, and managers on the features and benefits of ENERGY STAR® qualified lighting and appliance products. Topics covered in these training sessions include: updates on federal ENERGY STAR® standard changes, in-store labeling and notification of products in the store that are eligible for LIPA's rebate incentives, how to calculate energy savings, and the second price tag (overall product cost when comparing the energy consumption of qualified to non-qualified products).

Establishing the Foundation *for the* Economic Benefits *of* ELI

The primary economic benefits will come from the deferral and avoidance of new power plants, and the reduced fuel use and purchased energy that would have been necessary to serve the higher demand for energy, had the ELI initiative not been implemented. Energy efficiency will reduce demand and diminish the need to purchase energy producing plants. The direct program cost of ELI is $924 million (in 2007 dollars). The table below illustrates the ELI annual targets necessary and the applicable required investment.

ELI PROGRAM ANNUAL TARGETS (1)

YEAR	INCREMENTAL ANNUAL ENERGY SAVINGS (MWh)	INCREMENTAL CAPACITY SAVINGS (MW)	ANNUAL BUDGET (USD)
2009	137,123	22.5	$ 29,993,028
2010	158,170	34.3	$ 54,218,945
2011	190,646	44.9	$ 70,176,745
2012	214,738	53.4	$ 76,572,993
2013	208,565	59.3	$ 87,915,420
2014	221,238	64.7	$ 98,108,804
2015	230,496	69.7	$ 109,532,517
2016	230,913	71.0	$ 119,295,524
2017	233,869	73.9	$ 131,792,562
2018	247,196	78.0	$ 147,169,467

Note 1: In each year, savings accumulate from investments made in that year, plus the savings from previous years. However, some efficiency savings are discontinued over time, as measures reach the end of their useful lives and are not replaced. As a result, annual demand and energy savings increase steadily throughout the ten-year implementation period, but at a slower rate than might be expected.

To put the projected benefits to Long Island ratepayers of the ELI initiative in perspective and to develop a theoretical framework for projecting the resulting economic impact, other domestic energy efficiency programs were reviewed, with their descriptions and results illustrated in the following discussion.

BENEFITS OF INVESTING IN ENERGY EFFICIENCY PROGRAMS

The following discussion of implemented energy efficiency programs indicates that they have been a proven means of delivering promised benefits. Thus, the following programs are cited as examples of that fact. With that perspective, the elements and results of each cited program should not be viewed as an alternative to, or comparison with, Efficiency Long Island, but viewed as an indication of the success that energy efficiency programs can have.

Unlocking Energy Efficiency *in the* U.S. Economy

In July 2009, McKinsey & Company released a report that outlined opportunities for American businesses, consumers, and organizations to save nearly $1.3 trillion in energy costs by 2020. The report titled "*Unlocking* Energy Efficiency *in the* U.S. Economy," authored by Hannah Choi Granade, Jon Creyts, Anton Derkach, Philip Farese, Scott Nyquist, and Ken Ostrowski, concluded that non-transportation energy usage could be reduced by 23% by investing in energy efficiencies. Non-transportation uses exclude vehicles such as trucks, cars, trains, airplanes, and ships, as well as agricultural, mining, and construction activities.

Granade, et al. (2009), observed that pursuing energy efficiency opportunities requires recognizing energy efficiency as an important resource that meets future energy needs while concurrently developing new no- and low-carbon energy resources. To accomplish this requires integrated strategies, employing the full potential of energy efficiency by upfront funding of: energy efficiency plans that capture potential efficiencies; align needs of utilities, regulators, government agencies, manufacturers, and energy consumers; and, foster innovation in development and deployment of next-generation energy efficiency technology, ensuring ongoing productivity gains.

End-use efficiency potential is estimated at 35% for the residential sectors; 40% for the industrial sector; and, 25% for the commercial sector. Engaging these sectors in a meaningful energy efficiency program will result in savings in conversion, transmission, and distribution costs of providing light, heating, cooling, running motors and electronic devices, and powering industrial processes (Grande, et al., 2009).

While energy efficiency strategies will result in a decline of end-use BTUs, and delay construction of new power plants and gas pipelines, beyond these economies, efficiency represents an emissions-free energy resource. If captured at full potential, energy efficiency abatement could approach the prevention of 1.1 gigatons of greenhouse gas emission per year in 2020. This would serve as an important bridge to a future era of advance low-carbon supply side energy options (Granade, et al., 2009).

To accomplish this requires informing and educating energy consumers to the benefits of energy efficiencies; providing incentives and financing for energy efficiency projects; developing codes and standards that expedite energy efficiencies; and, an entity to develop and supervise the program.

The conclusions of the McKinsley & Company report attracted the attention of Federal Environmental Protection Agency Administrator Lisa P. Jackson, who said, "The energy that most effectively cuts costs, protects us from climate change, and reduces our dependence on foreign oil is the energy that is never used in the first place and prevents up to 1.1 gigatons of greenhouse gases annually, averting the worst effects of climate change. (Jackson, 2009)"

Another view of how energy efficiencies can have a positive national economic impact was illustrated in a 2009 report from the University of California at Berkeley. The analysis, based on an economic model developed in partnership with Yale University and the University of Illinois at Urban-Champlain, concluded that clean energy and climate protection policies would result in clean energy- and energy efficiency-related economic activity. Cited as an example of their reasoning was the American Clean Energy and Security Act (ACES), which was passed by the House of Representatives in June 2008 and, as of July 2009, was placed on Senate Legislative Calendar No. 97 under General Orders. ACES would strengthen the domestic economy by establishing pollution limits and incentives that, when combined, would encourage large-scale investments in clean energy and energy efficiency (David Roland-Holst and Fredrich Kahrl, 2009).

Roland-Holst and Kahrl (2009) concluded that enactment of ACES would have important economic consequences between 2010 and 2020 by creating between 918,000 and 1.9 million new full-time-equivalent jobs; increasing annual household income, expressed in 2008 dollars, by $487 to $1175 per year; and, improving the Gross Domestic Product by 0.2% to 0.7%, or $39 billion to $111 billion (expressed in inflation-adjusted value-added dollars). While the domestic economy and job creation are expected to increase between 2010 and 2020 exclusive of ACES, without ACES, the aforementioned economic gains would not be possible.

The underlying principle is that the lessening of domestic dependence on imported energy and fluctuating oil prices will provide surplus domestic resources that could be invested in energy efficiency job creation activities. Additionally, energy efficiencies reduce transportation and energy costs, saving household and businesses money that can be spent on domestic goods and services which will create domestic jobs (Roland-Holst and Kahrl, 2009).

California Energy Efficiency, Innovation, and Job Creation

An example of how energy efficiencies can impact a local economy is found in the State of California, which over the past 35 years reduced its per-capital electricity consumption to 40% below the national average. These energy efficiency measures enabled California households to redirect the $56 billion in resulting household energy savings toward other goods and services, with those savings creating nearly 1.5 million additional full-time-equivalent California jobs with total payroll of $45 billion (Roland-Holst, 2008).

California's energy efficiency resulted in reduced energy import dependence, resulting in a greater percentage of its consumption to in-state, employment-intensive goods and services, creating a multiplier effect of in-state job creation. These same efficiency measures, while resulting in slower, albeit, positive, growth in oil, gas, and electric power, still resulted in net job growth, with every job foregone in these energy sectors creating more than 50 new jobs in California's economy. The jobs created were in less energy intensive services, facilitating California's economy transition to a low carbon future (Roland-Holst, 2008, p. 5).

48 State Meta Analysis

Furthermore, a mega-analysis of studies conducted for 48 state and regional clean energy efficiency programs in the 16 years between 1992 and 2007 concluded that energy efficiency results in a net positive benefit for the American economy when policies emphasizing investment-led energy efficiency improvements are initiated. The studies reviewed indicated that an average of 23% efficiency gain, with a nearly 2-to-1 benefit-to-cost ratio could result. Thus, for every dollar invested in energy efficiency potential, the total energy bill savings averaged $1.95 (adjusted for base-year dollars), suggesting that low cost investment in energy efficiency can have substantial returns on that investment. Also estimated was that a 20% to 30% energy efficiency gain within the domestic economy could lead to a net gain of 500,000 to 1,500,000 jobs and a 0.1% increase in the nation's Gross Domestic product by 2030. The number of jobs per trillion BTUs of efficiency gains, ranged between 9 jobs and 95 jobs created. The average among all studies was a net benefit of 49 jobs per trillion BTUs of savings (Laitner, John A. and Vanessa McKinney, 2008, pp. 4-5).

Other states have implemented energy efficiency programs that have reduced energy use. These programs range from electric efficiency-targeted programs, like LIPA's, to multi-fuel programs that target other fuel sources, as well as alternative generation technologies. The following table illustrates those programs and their actual and/or intended results.Each program, which is explained in the sections following the table, discusses the different components and specific area of service.

OTHER STATE AND REGIONAL ENERGY EFFICIENCY PROGRAMS AND THEIR PROJECTED SAVINGS (1)

STATE PROGRAM	TIME PERIOD	PROGRAM SPENDING & INCENTIVES	CONSUMER EFFICIENCY (SPENDING)	CUMULATIVE ENERGY BILL SAVINGS	AVOIDED UTILITY COSTS	ESTIMATED JOBS CREATED
Maryland 15x 2015	2008 to 2025	$3.4 billion	$5.9 billion	$21.0 billion	$3.9 billion	12,000
Energy Trust of Oregon	2002 to 2008	$511.0 million	$709.0 million	$1.0 billion	$1.4 billion	1,800
Minnesota Conservation Improvement Program	2006 to 2020	$1.4 billion	(Est) $4.5 billion	$3.9 billion	$2.5billion	5,260
Efficiency Vermont	2000 to 2007	(Est) $102.0 million	$400.0 million	Not Available	$133.0 million	Not available

Note 1: The sources of this information were the annual reports and related literature of each respective program.

OTHER STATE AND REGIONAL ENERGY EFFICIENCY PROGRAM COMPONENTS

The intent of this discussion is not to compare each program and resulting benefit to LIPA's Efficiency Long Island. The intent is to show that energy efficiency programs are tailored to the needs of each service area with components that may or may not compare to each other or to LIPA's Efficiency Long Island. Each of the following state programs have different variables of concentrations in efficiency which are geared towards fuel conservation in gas and oil for residential and commercial structures, but does not directly impact power plant pollution, as is the case with LIPA's Efficiecy Long Island. What is consistent with each energy efficiency program is the resulting energy efficiency savings and economic growth in the area of service.

Maryland 15 x 2015 Programs

Commercial projects: Existing buildings retrofitted, efficient new buildings constructed, solar water heating commercial installations

Residential projects: ENERGY STAR® new homes constructed, ENERGY STAR® new homes enhanced, efficient new manufactured homes purchase, home energy reviews conducted, single family homes retrofitted, manufactured homes retrofitted, multi-family units retrofitted, new multi-family units enhanced, residential solar water heating installations, ENERGY STAR® clothes washer rebates, CFL packages sold/provided

Renewable Energy Installations: Bio-power project installations, open solicitation project installations, solar electric residential installations, solar electric commercial installations, utility scale project installations, wind project installations

Energy Trust of Oregon Programs

Residential projects: Incentives and costs savings for residential, such as single-family homeowners, multi-family property owners, manufactured homeowners, with home energy reviews, installing energy efficient bulbs, purchasing energy efficient clothes washers and shower heads for homes with electric and gas hot water. Installed energy-efficient sealed ducts, insulation, high efficiency space heating equipment and energy-efficient windows. Supported ENERGY STAR® new homes built and retrofitted single-family residences, and installed solar water heating systems. Also offered are no- and low-cost energy saving tips for renters and the general public, which support a network of more than 1,000 local trade contractors who deliver services

Commercial: Installed high efficiency lights and heating, ventilating, and air conditioning equipment; retrofitted existing buildings; installed solar water heating systems; and, completed electric saving energy projects

Renewable Energy: Provided incentives for installing solar electric systems, a wind farms, a landfill-to-gas energy project; an anaerobic digester project, and a hydropower project.

Minnesota Conservation Improvement Program

The Minnesota CIP is intended to meet four primary goals: promote consumer and industry awareness of energy conservation and its positive effect on the environment; reduce utility bills for homes and businesses; generate innovations in developing energy efficient products and technologies; and, promote new energy resource development.

Commercial and residential customer energy savings initiatives:

Cooling: Rebates for chiller replacement, cool storage systems, refrigeration efficiency improvements and rooftop air conditioners

Lighting: Rebates for lamp ballast replacement, street lighting or new lighting systems

Industrial process/motors: Rebates for farm equipment, high-efficiency motors or customer-designed projects

Financial services: Grants or low-interest loans may be available for energy efficiency improvements

Residential customers CIP Projects:

Energy audits and check-ups: where a trained energy consultant examines a home and offers specific advice on energy improvements.

Energy efficient appliance rebates, including appliances such as air conditioners, furnaces, water heaters, heat pumps, refrigerators and freezers

Energy efficient lighting rebates to encourage homeowners to switch from traditional incandescent lighting to compact fluorescent.

Low-flow showerheads, which serve a dual purpose by conserving water and the energy needed to heat the water

Financial services, such as low-interest loans or grants for making more substantial home energy improvements

Energy efficient home construction guidelines, calling for high insulation levels coupled with air quality control systems and efficient appliances.

Commercial/industrial CIP Projects:

Cooling: Rebates may be offered for chiller replacement, cool storage systems, refrigeration efficiency improvements and rooftop air conditioners

Lighting: Most utilities offer rebates for lamp ballast replacement, street lighting, or for entire new lighting systems

Industrial process/motors: Rebates on farm equipment, high-efficiency motors, or for customer-designed projects

Financial services: Grants or low interest loans may be available for most energy efficiency improvements

Efficiency Vermont

Efficiency Vermont helps Vermonters statewide reduce energy costs by making their homes and businesses energy efficient. They provide technical assistance and financial incentives to help Vermonters identify and pay for cost-effective approaches to energy efficient building design, construction, renovation, equipment, lighting, and appliances.

These include: commercial lighting incentives; energy efficient motors and VFD Program; home performance with ENERGY STAR® (Existing Residential); compressed air systems; HVAC equipment rebate program; incentives for integrated design and high-efficiency equipment; multi-family apartment rebate program; residential energy efficiency rebate programs; small commercial refrigeration incentive; vending machine controller incentive; ENERGY STAR® homes (new construction); and small-scale renewable energy incentive program.

ECONOMIC IMPACT OF EFFICIENCY LONG ISLAND (ELI)

As previously discussed, ELI differs from the Clean Energy Initiative in its design and implementation. Whereas CEI focused primarily on new construction, ELI targets both new construction and the significant energy efficiency potential in existing homes and businesses. Thus, the economic impact of the ELI investment of $924 million will come in two segments. The first segment is the economic impact during the ten-year ELI investment period, ending 2018 when the efficiency investments are phased in with economic benefits expected to exceed ELI's costs. The second segment will be during the period after 2018, when the ELI investments end and consumers begin to enjoy the savings from the efficiency efforts.

As had been the case in other efficiency programs presented, the primary economic impact benefits will come from savings of reduced fossil fuel use and purchased energy. The other contributor of economic benefit will come from deferral and avoidance of new power plants that would have been required to meet the higher demand and energy requirements, had consumers not engaged in energy efficiency efforts through ELI.

Other benefits of the ELI program that will result in a positive regional economic impact are: reducing dependence on fossil fuels from foreign countries; reducing electric bills to consumers; market transformation for energy efficiency products and services; substantially reducing carbon dioxide emissions; improving load factor; and, efficient utilization of the electric system; all of which will strengthen the Long Island economy through greater disposable income in households and businesses who participate in ELI.

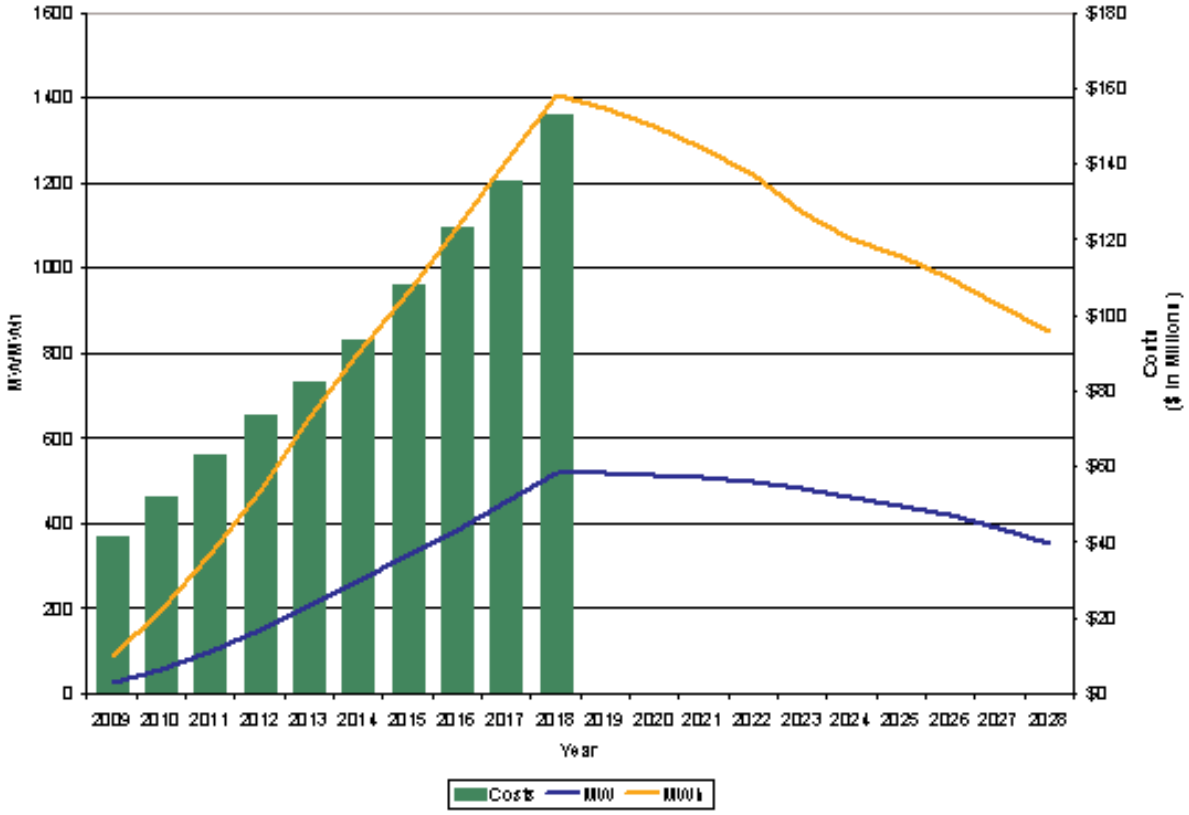
The following table presents a summary of investment in the 10-Year ELI initiative in residential new construction, residential efficient products, existing residential, existing commercial and industrial, and new commercial and industrial construction. Discussion of the elements of these programs was discussed earlier in this report.

SUMMARY OF INVESTMENT IN 10-YEAR ELI INITIATIVE

INITIATIVES	2009	2010	2013	2015	2018
Residential New Construction	$2,428,656	$3,763,160	$4,476,778	$5,325,032	$6,601,898
Residential Efficient Product	$8,437,600	$9,863,339	$13,826,639	$12,891,718	$12,097,388
Residential Existing	$9,898,000	$13,005,240	$16,974,329	$19,652,650	$24,571,675
C & I Existing	$2,705,354	12,679,798	$18,193,324	$17,895,191	$14,371,890
C & I New Construction	$6,523,418	$14,907,408	$34,444,350	$53,767,927	$89,526,617
Annual Incremental Total	$29,993,028	$54,218,945	$87,915,420	$109,532,517	$147,169,457
Cumulative Investment		$84,211,973	$318,877,132	$526,518,453	$924,776,007

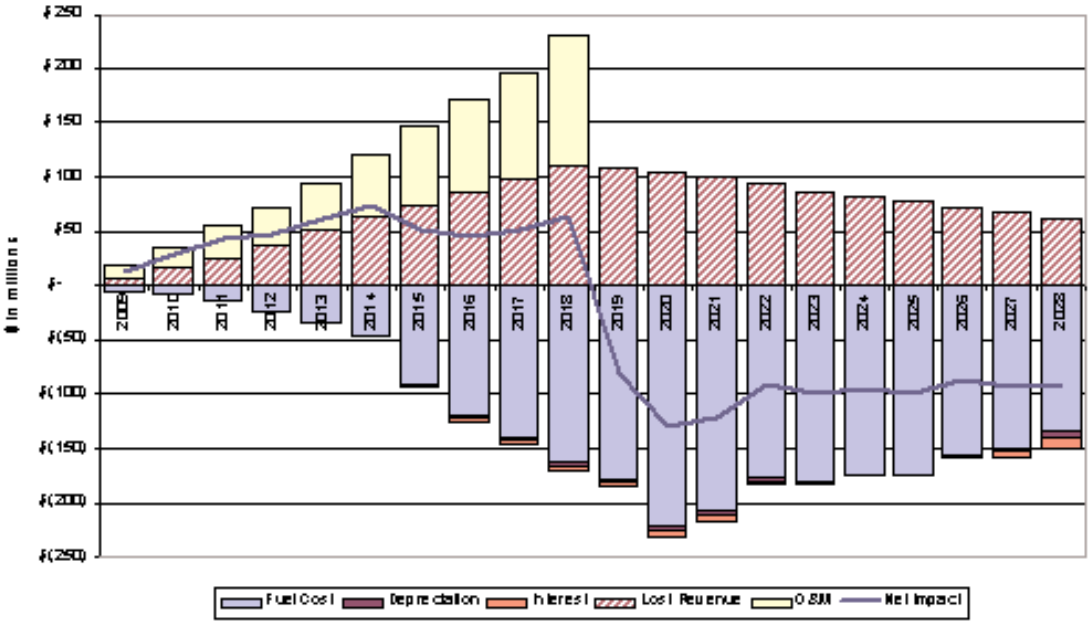
The following graph depicts the projected peak electric demand and energy sales impact over a 20-year period, for the ten-year ELI program. The funding plan includes ten years of savings and investments, plus an additional ten years of post-initiative market effects without additional funding. Illustrated are how base rate revenues will be reduced (or lost) from what they would have been if ELI was not initiated, as participating energy consumers use fewer kilowatt-hours. Offsetting these lost revenues to LIPA will be resulting reduced fuel and purchased power costs and reduced capital expenditures and interest costs associated with the long-term borrowing, as LIPA will be purchasing less fuel and energy, and planned capital additions to the LIPA system can be deferred.

Estimated 10-Year Expenditure and 20-Year Impact



The direct costs of the ELI program and the associated lost revenues from reduced energy sales will be recovered from a cost recovery rider. The benefits of ELI will be passed along to energy users through bill savings resulting from reduced energy consumption and lower fuel and purchased power costs. Participation in ELI at moderate or higher levels is projected to yield net bill savings for both residential and commercial customers.

Estimated Net Impact on LIPA Expenses of a 10-Year ELI Program Over 20 Years



It is also estimated that 77% of residential customers will have participated in ELI at some level by 2018. It is also projected that by 2018, 28.5% of commercial structures will participate in ELI. The following table illustrates the estimated bill impact of ELI for typical energy users.

ESTIMATED BILL IMPACTS FOR TYPICAL CUSTOMERS

	RESIDENTIAL RATE 180 CUSTOMER				COMMERCIAL RATE 281 CUSTOMER			
	PARTICIPANT		NONPARTICIPANT		PARTICIPANT		NONPARTICIPANT	
	$/Year	%	$/Year	%	$/Year	%	$/Year	%
2010	-$28.70	-1.6%	$15.77	0.9%	-$1,700	-14.9%	$82	0.7%
2014	-$9.21	-0.5%	$35.21	1.8%	-$1,996	-15.9%	$350	2.8%
2018	-$12.34	-0.6%	$24.38	1.1%	-$2,390	-16.6%	$614	4.3%

Note: Negative values mean bill decreases.

Basis for projecting economic impact

Given the financing and benefit structures of ELI, a positive economic impact is likely to result from job retention in the regional economy, as energy technicians learn new skills relating to installing, repairing, and selling energy efficient products and appliances. The savings during the first ten years come from the incremental household savings in energy costs due to energy efficiency, lower usage costs due to efficiency, and LIPA savings on fossil fuel costs. However, as the ELI investment is phased in, so are the economic benefits, until 2018, when the ELI investment period ends. At that time, ELI's investment begins to produce the greatest projected benefits, primarily from continuously decreasing fuel purchasing costs that exceed lost revenues from energy efficiency.

Further are the differences between how the efficiency savings generated from residential and commercial structures will be used. Data suggests that savings from residential energy efficiency will first shore up lost personal savings and pay down debt. Neither will lead to economic impact until lost personal savings are replaced and debt levels are as low as possible. After that, the savings will go directly into the economy, with an economic multiplier of two. The economic job sectors most likely to be positively impacted will be the lower paying wholesale/retail sectors, office, financial, and, hopefully, technology. To attach a figure to potential new wages to be created is the average Long Island median income for a single individual between 2002 and 2008 of $38,629. Given the current economic condition, the short-term economic impact over the next two years will be modest, as well as job increases.

The commercial energy efficiency savings will be used differently and be dependent on the industry sector that the commercial user is in. Retail/wholesale, real estate, finance, health care, and education—the savings would be used to sustain their current workforce, replenish the capital that was used during the recession, and pay down debt. Publicly traded companies would be more concerned about stock value and privately owned companies would be more concerned about building equity in their businesses. None of these alternative uses would generate new jobs. At best, they will keep their current workforce employed. After the several years it will take to accumulate new capital, build up stock value and business equity, and pay down debt sufficiently, then, depending on whether consumer spending increases, businesses should be willing to make new investments in inventory, technology, and workforce. At that time, it would be expected that the economic impact envisioned by ELI would begin to gain traction in the regional economy.

These supply-and-demand issues, compounded by the longest recession since the *Great Depression*, will play a critical role in determining where consumers will spend their money. It is difficult to make these projections because it is not clear, at present, which sectors will retrench—certainly wholesale/retail has, and which will emerge stronger. From a micro-economic perspective, where the demand for goods and services will come from and what that demand will be cannot be determined with confidence.

Thus, any projections must take into account this emerging industry sector uncertainty. It is for that reason that the positive economic impact of ELI on the Long Island economy is expressed from a macro-economic perspective. This will capture the regional economic impact in a way that avoids the uncertainty of which industry sectors will generate new economic activity and which sectors will struggle.

ELI *Program Costs and Projected Benefits*

The following table illustrates that the ten-year ELI Program costs of $924 million is projected to generate approximately $3.7 billion in nominal gross benefits, or $1.9 billion in net present value gross benefits, which recognize the time value of money between 2009 and 2028. Offsetting the gross benefits are the $924 million of ELI program costs, resulting in a nominal gross benefit net of the ELI program of $2.8 billion, with a respective net present value benefit of $1.3 billion.

ELI PROGRAM COSTS AND PROJECTED BENEFITS (2009-2028)

COSTS	NOMINAL ($ MILLION)	NET PRESENT VALUE ($ MILLION)
ELI Program Direct Costs	924	651
TOTAL COSTS	**924**	**651**
BENEFITS	**NOMINAL ($ MILLION)**	**NET PRESENT VALUE ($ MILLION)**
Fuel & Purchased Power Costs	2,828	1,410
Operations & Maintenance Costs	798	474
Revenue Taxes	32	15
Interest Expense	36	16
Depreciation Expense	24	11
TOTAL BENEFIT	**3,718**	**1,926**
NET BENEFIT	**2,794**	**1,275**

Since recovering from the recession introduces uncertainties as to how energy consumers, both commercial and residential, will spend their savings, it is appropriate to use a range of economic benefits between the net nominal gross benefits and gross net present value benefits.

As such, the range of projections of efficiency savings are based on reduced fossil fuel and purchased energy costs, whose efficiency savings can be assumed to go directly into the budgets of energy consumers for spending in the local economy. Thus, the economic impact of the net present value savings of $1.3 billion can conservatively be projected to be $2.6 billion and the economic impact of the net nominal benefit of efficiency savings of $2.8 billion can conservatively be projected to have an economic impact of $5.6 billion.

Therefore, the range of projected primary jobs to be created between 2009 and 2028 will be based on the 2008 projected median income for a single Long Islander of $40,780. Consequently, the jobs estimated, based on the nominal net benefit, is projected to be between 68,661 and 137,322, or annual jobs created of between 3,433 and 6,866. The jobs created using the net present value of the net benefit is projected to be between 31,878 and 63,756, or annual jobs of 1,594 and 3,188.

The economic impact and jobs created from the net benefits of ELI are summarized in the following table.

	NET BENEFIT	ECONOMIC IMPACT	ANNUAL JOBS CREATED	TOTAL JOBS CREATED
Net Present Value	$ 1.3 Billion	$ 2.6 Billion	1,594 - 3,188	31,878 – 63,756
Nominal	$ 2.8 Billion	$ 5.6 Billion	3,433 - 6,866	68,661 – 137,322

ELI ECONOMIC IMPACT AND JOBS CREATED (2009 – 2028)

Another aspect to be considered is the economic benefit of LIPA's education and training programs for contractors, real estate professionals, and retailers of durable goods. These individuals can be expected to support the ELI program by their knowledge of the benefits and incentives available through ELI. As previously discussed, 12,368 individuals have been trained through the Energy Efficient Products Program and, based on the average median wage for single individuals between 2002 and 2008 of $38,629, LIPA's education program is estimated to have contributed to retaining an economic impact on the Long Island economy of an estimated $477.86 million of payroll. This is because the individuals trained have gained knowledge of Efficiency Long Island, green energy, and the necessary skills in a changing energy delivery market.

CONCLUSION

The basis for the positive and substantial economic impact projections of Efficiency Long Island is that it continues the positive economic impact of its predecessor, LIPA's Clean Energy Initiative. Success of ELI is dependent on a culture change of Long Island's energy customers —to embrace and invest in efficiency that will ultimately result in lower fossil fuel and purchased fuel costs, thousands of jobs created and retained, and billions of dollars of retained and created economic activity.

This conclusion is justified, based on the past success of LIPA's conservation and efficiency programs, and is supported by the success of similar efficiency initiatives in various regions of the United States, indicating that it is reasonable to assume that real energy savings to consumers through efficiency efforts can happen on Long Island.

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He is a Certified Public Accountant in private practice; He served as Director of the Long Island Economic and Social Policy Institute at Dowling College from 2007 through 2010 and as an Adjunct Associate Professor of Economics; economic development and planning consultant to counties, towns, villages, Industrial Development Agencies, and communities; and, Chairman of the Suffolk County Judicial Facilities Agency which financed the acquisition of the Cohalan State Court Complex and the construction of the Suffolk County Jail in Yaphank. He provides economic and business commentary on television and radio; is a columnist for the *Long Island Business News*, Long Island's largest business weekly; LI *Pulse*, has appeared in the *New York Times* and *Newsday*, and has been syndicated nationally by *Newsday*, *Bridge News* and *Knight-Ridder/Tribune News Service*. He is an Honorary Member of Delta Mu Delta - The National Honor Society in Business Administration and has been recognized by the National Association of Counties for innovative uses of Industrial Revenue Bonds, for international trade promotion initiatives, for downtown revitalization policies, and for minority business incubator initiatives. He was invited by Dr. William Julius Wilson of Harvard University's John F. Kennedy School of Government to present his paper, entitled *Race Neutral Sustainable Economic Development*. He is the author of the recently published *Long Island, The Global Economy and Race: The Aging of America's First Suburb*.

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