Long Island Power Authority

Draft Electric Resource Plan
2009 - 2018

March 18, 2009

Appendix B, Energy Primer

Table of Contents

Section *Description* *Page*

1 OVERVIEW 1-1

2 BACKGROUND ON LIPA 2-1

2.1 History 2-1
2.2 System Description 2-3
2.2.1 Load Growth 2-6
2.2.2 Generation and Transmission Resources 2-8
2.2.3 Increased use of Off-Island Generation Resources 2-10
2.2.4 System Energy by Fuel Type 2-10
2.2.5 System Capacity by Fuel Type 2-12
2.2.6 Air emissions 2-13
2.2.7 Regional Transmission Interconnections 2-13
2.2.8 Long Island Transmission and Distribution System 2-15
2.2.9 Improved System Reliability from Capital Programs 2-15
2.2.10 Demand Response Programs 2-19
2.2.11 Improved Energy Efficiency Programs 2-20
2.2.12 Increased Emphasis on use of Renewable Resources 2-22

3 LIPA PLANNING PROCESS 3-1

3.1 Electric Resource Planning 3-1
3.2 LIPA Initiatives 3-10
3.2.1 Education Programs 3-10
3.2.2 LIPA Energy Programs for Businesses 3-14
3.2.3 Clean Energy Initiatives 3-16
3.2.4 LIPA Green Choice Program 3-21
3.2.5 Light Solution Initiatives 3-21
3.3 Relationships 3-22
3.3.1 New York Power Authority 3-22
3.3.2 New York Independent System Operator 3-22
3.3.3 Independent System Operator of New England 3-23
3.3.4 PJM Interconnection – Regional Transmission Organization 3-23
3.3.5 New York State Reliability Council 3-23
3.3.6 National Grid / KeySpan Energy Corporation 3-24
3.3.7 New York State Energy Research and Development Authority 3-25
3.3.8 New York Public Authorities Control Board 3-25
3.3.9 New York Public Service Commission 3-25
3.3.10 Federal Energy Regulatory Commission 3-26
3.3.11 North American Electric Reliability Corporation 3-26
3.3.12 Northeast Power Coordinating Council 3-27

4 ENERGY INDUSTRY AND TODAY'S ENVIRONMENT 4-1

4.1 Key Issues that Impact LIPA's Electric Resource Plan 4-1
4.2 Credit Crisis 4-2
4.3 Fuel Markets 4-3

4.4 Global Climate Change Initiatives....4-5
4.5 New Technologies....4-8
4.6 Smart Grid / Intelligrid....4-8
4.7 End-use Energy Efficiency....4-9
4.8 Deregulation and Restructuring of the Electric Power Industry....4-10
4.9 Federal Initiatives....4-11
4.9.1 National Energy Policy Act of 2005....4-11
4.9.2 Energy Independence and Security Act of 2007....4-14
4.9.3 Mandatory Reliability Compliance....4-14
4.9.4 Federal Energy Regulatory Commission Initiatives....4-15
4.10 New York Independent System Operator Initiatives....4-16
4.11 New York State Initiatives....4-17
4.12 Security and Safety Issues....4-20
4.12.1 Infrastructure Security....4-20
4.12.2 Safety....4-21
4.13 Aging Infrastructure....4-22

5 PUBLIC COMMUNICATION CHANNELS....5-1

5.1 The LIPA Web site....5-1
5.2 Alternative Information Sources....5-2
5.3 Responding to Public Comments....5-2

6 UTILITY TERMS AND DEFINITIONS....6-1

List of Exhibits

Exhibit	*Description*	*Page*
Exhibit 2-1	Map of LIPA Service Territory	2-4
Exhibit 2-2	Process of Making and Delivering Electricity	2-5
Exhibit 2-3	LIPA System Peak Loads by Year (1988 – 2008)	2-6
Exhibit 2-4	LIPA Retail Energy Sales (1988 – 2008)	2-7
Exhibit 2-5	New On-Island Generation and Off-Island Transmission since 2001 (Summer Ratings)	2-8
Exhibit 2-6	2008 Power Supply Available to LIPA (Percentage of Capacity)	2-9
Exhibit 2-7	1998 MWh Generation by Fuel Type	2-11
Exhibit 2-8	2008 MWh Generation by Fuel Type	2-11
Exhibit 2-9	1998 MW Capacity by Fuel Type	2-12
Exhibit 2-10	2008 MW Capacity by Fuel Type	2-12
Exhibit 2-11	Service Interruption Frequency	2-16
Exhibit 2-12	Customer Average Interruption Duration	2-19

1 Overview

In order to comprehensively address the various issues facing the electric resource supply in Long Island, LIPA has organized the *LIPA Electric Resource Plan* and its supporting documentation as follows:

- *LIPA Electric Resource Plan*, provides a concise summary of the Electric Resource Plan (ERP) including LIPA's vision, mission and strategic objectives that drive the plan, a summary of the key energy issues that impact the plan;
- *Appendix A, Technical Report*, provides detailed information regarding the Electric Resource Plan. It includes a discussion of the action and policy plans that support the ERP, a description of each supporting element and goal, an overview of the planning process and the methodologies employed to create the ERP as well as a summary of planning analysis that drove the results;
- *Appendix B, Energy Primer*, provides an overview on the current state of the energy industry, background on LIPA, and a review of the initiatives LIPA is undertaking to promote customer understanding of the critical energy issues facing Long Island today;
- *Appendix C, Response to Comments*, summarizes the comments received during the Electric Resource Plan related public hearings, organized according to commenter and content similarities; and
- *Appendix D, Technical Appendices*, provides additional and supporting details including; studies, methodologies, and criteria used in the planning analysis.

This document is Appendix B, Energy Primer. It is intended to be used as a resource by LIPA customers to better understand the current state of the energy industry and the initiatives that LIPA is undertaking to provide reliable, cost-effective, efficient, and clean energy solutions to Long Island. The energy industry has undergone a transformation in many parts of the United States, including here in New York. LIPA has acted assertively to remain in the forefront of this transformation. LIPA, as a public entity, is not regulated in the same manner as most utilities, which are subject to extensive state and federal regulation.

Many changes with broad implications to the energy industry have occurred since the publication of the preceding LIPA Energy Plan in 2004. Costs and price volatility have increased significantly, primarily as a result of fuel price increases and instability throughout the U.S., impacting not just utility costs but transportation costs as well. Congress passed the Energy Policy Act of 2005 (EPACT 2005) and the Energy Independence and Security Act of 2007 (EISA 2007). The EPACT 2005, when passed, was the first comprehensive energy legislation in over a decade. The Energy Policy Act of 2005 also offers funds as an incentive to encourage new nuclear power plant development, and establishes incentives for alternative fuel resources to increase our energy diversity. It also repealed parts of the 1935 Federal Power Act, which was originally adopted to regulate interstate utilities, thus limiting federal regulation on companies operating entirely within one state. Also, the EISA 2007 is a major piece of energy legislation that establishes efficiency standards for vehicles, substantially increases the renewable fuel requirements, and also, of more direct impact to LIPA, phases out the use of inefficient incandescent lights and imposes improved energy efficiency standards on a wide variety of household appliances. EISA 2007 allows the Department of Energy (DOE) to create a national standard for energy efficiency, and recognizing climate variations throughout the U.S., regional efficiency requirements for heating devices and two regional

standards for cooling products. The 2007 EISA also establishes, but does not fund, research and development programs for solar, geothermal and ocean power technologies. The Act does provide a 17% budget increase for the DOE Office of Energy Efficiency and Renewable Energy (EERE).

In other matters, LIPA successfully negotiated Agreements with KeySpan and National Grid US as part of the National Grid acquisition of KeySpan. These Agreements addressed LIPA's many concerns regarding the merger and provide significant economic benefits to LIPA customers, improved reliability and service benefits, and options to acquire important on-Island power resources. The savings to LIPA customers from the negotiations is approximately $270 million over several years.

The advent of deregulation of electric generation supply in the late 1970s, and new rules to provide broader access to regional wholesale power markets in the 1990s, changed the utility landscape significantly.

LIPA is an active participant in this wholesale marketplace and has responded in a bold and successful manner to deregulated market risks and opportunities. It has expended significant efforts at securing long term power supply resources, including investigating repowering existing power plants to increase power output with improved fuel efficiency and reduced emissions. LIPA also has strong on-going programs and efforts to promote and provide incentives for energy conservation and renewable energy development. LIPA continues its investments, started in 1998, in significant transmission and distribution system improvements, upgrades, and expansions on an ongoing basis, including implementation of three underwater electric transmission cables bringing needed power resources to Long Island from surrounding regions.

Section 4 of this volume provides more detailed information on the electric industry today and how it impacts LIPA and its customers. This volume is organized into six sections as follows:

- Section 1 is this overview;
- Section 2 provides background on LIPA, discusses its history and provides a description of its service territory and electric system, including efforts in energy efficiency, renewable energy and repowering existing generation;
- Section 3 provides a discussion of the LIPA planning process including initiatives to provide customer education programs to promote customer understanding of the critical energy issues facing Long Island today, LIPA efforts for sound operation of the electric system, and the relationships LIPA has with various industry organizations, regulators and government agencies;
- Section 4 discusses changes and evolution in the energy industry including: the recent credit crisis; fuel markets; environmental and climate matters; renewables and other sources of energy; and federal, regional, and state initiatives;
- Section 5 describes the communication channels LIPA uses to provide customers with timely information about energy issues; and
- Section 6 offers a list of definitions for commonly used energy industry terms that can be used as a reference when reviewing LIPA's Draft Electric Resource Plan and its appendices.

2 Background on LIPA

2.1 History

In May of 1998, the Long Island Power Authority (LIPA) became Long Island's primary electric service provider. LIPA operates as a non-profit entity, as authorized by an Act of the New York State Legislature in 1986, and is a corporate, municipal, instrumental, political subdivision of the State of New York. LIPA is the third largest public power utility in the nation with respect to customers served, delivering electricity to more than a million customers through a system of thousands of miles of overhead wire, and underground cable.

LIPA has served the Island's population since 1998 with a consistent commitment to cost-containment, efficiency and service reliability. Over the past several years the electrical requirements of the modern home has expanded causing the demand for electricity to grow at a record-breaking pace. Priorities at LIPA have been, and continue to be, focused on the customer - upgrading and enhancing the electric system, advancing energy efficiency, and developing and expanding alternative energy resources.

LIPA stands firmly behind its mission: to deliver safe, reliable and reasonably priced electric service to its customers - serving as a role model of what a public power company should be in the 21st Century. The reliability of the LIPA system has been consistently validated. Since 2004, LIPA has been recognized as the most reliable electric utility with predominately overhead construction in New York State in terms of its quick time to restoration of service, its lowest frequency of interruptions and its shortest duration of outages.

In 1998 LIPA was authorized to acquire the securities or assets of the Long Island Lighting Company (LILCO), a publicly traded, shareholder-owned corporation that was the sole supplier of both retail electric and gas service in the Long Island service area. This transaction had two purposes: (1) to shutdown and decommission Shoreham nuclear plant and (2) to lower electric rates on Long Island.

LIPA successfully fulfilled its first purpose by completing the physical decommissioning of Shoreham in 1994, and by surrendering the Shoreham license to the Nuclear Regulatory Commission in 1995.

In order to fulfill its second purpose, LIPA became Long Island's non-profit retail supplier of electricity when it acquired LILCO in May of 1998, and took over the ownership and operation of the transmission and distribution assets on Long Island and an 18% undivided ownership interest in Unit 2 of the Nine Mile Point generating station in Oswego, New York. LIPA has invested a significant amount of money since 1998 in upgrading its electric transmission and distribution systems. Along with the transmission and distribution system, LIPA also acquired certain agreements and contracts for power supply and transmission. Presently, LIPA only provides electric service, and as described below, National Grid , formerly KeySpan Corporation, provides gas service on Long Island. The former KeySpan Corporation is now, with approval granted by the New York Public Service Commission (NYPSC) in August 2007, a subsidiary of National Grid, a large international electricity and gas company based in Great Britain.

As part of the 1998 transaction, the remainder of LILCO's electric service assets, including all of its fossil-fueled generating units, and its entire gas supply system, were transferred to subsidiaries of the then KeySpan Corporation.

In 2005 LIPA began a series of negotiations with KeySpan Corporation that continued through 2007, which then included discussions with National Grid. LIPA successfully concluded, and its Board of Trustees approved, several agreements, which had been entered into at the time of the LILCO acquisition with KeySpan ("the December 2005 LIPA/KeySpan Definitive Agreement") and with National Grid ("LIPA/KeySpan/National Grid Agreement"). These renegotiations extended the Management Services Agreement (MSA), set a new power plant purchase option for LIPA, and resolved certain outstanding financial issues. The purpose of these negotiations was to provide significant ratepayer, reliability and repowering benefits to LIPA's electric customers and to the Long Island region. These Agreements resulted in net benefits to LIPA of $236 million, plus an annual reduction of $34 million in the Management Services Fee paid by LIPA to National Grid. Significant parts of the savings included the settlement of contract disputes related to prior operating agreements worth $120 million to LIPA, LIPA's $91 million dollar share of savings created by synergies in the National Grid/KeySpan merger, funding for several LIPA programs by National Grid, including $12 million for energy efficiency and $6 million for transmission system improvements aimed at protecting against storm damage or "storm hardening", and finally a lump sum cash payment of $7 million.

Additionally, the Agreements with National Grid serve to freeze the transportation rate for the delivery of natural gas to many power plants on Long Island at the current level through May 2013. National Grid also agreed not to initiate any property tax rate challenges on its Long Island generation assets without prior approval by LIPA.

From the benefits derived from the renegotiated agreements, LIPA established a $1 million Solar Roof Initiative in conjunction with Renewable Energy Long Island (RELI), to increase the use of solar energy for residential homes on Long Island. The Solar Roof Initiative expands upon LIPA's successful Solar Pioneer Program, through which LIPA has rebated over $26 million for the installation of approximately 1,000 PV systems Island-wide. In addition, the renegotiations provided for a $75 million fuel cost reserve used to cover increased fuel costs, enabling LIPA to stabilize electric bills for 2006 and 2007. The agreements LIPA renegotiated also allow the option of purchasing and repowering power plants on Long Island in order for them to operate cleaner and more efficiently. These include the E.F. Barrett facility in Island Park, Far Rockaway, and the Shoreham/Wading River generating facilities. In addition, LIPA and National Grid jointly issued a Request for Proposals (RFP) in December 2007 to conduct repowering studies of the Northport and Port Jefferson Power Stations. The main goal of these studies was to assess the engineering, environmental, and economic feasibility of repowering projects at these sites. The potential benefits derived from repowering existing plants include greater efficiency, increased capacity and reduced emissions.

National Grid, on LIPA's behalf and subject to LIPA's oversight, is responsible for: (1) managing the day-to-day operations and maintenance of LIPA's transmission and distribution system; (2) providing services to LIPA's retail customers; (3) purchasing and selling electricity; and (4) providing a substantial portion of LIPA's power supply requirements.

LIPA is principally responsible for establishing policies for the management and operation of the electric system, setting the electric rates and charges, acquiring power supply resources for present and future needs, issuing debt necessary to fund the electric system, ensuring a reliable and environmentally sound

supply of energy, mitigating fuel cost risks, overseeing the National Grid agreements, and interacting with the public.

Since 2004, to meet current and future needs, LIPA has contracted for power supply with several Independent Power Producers located both on and off Long Island. These included the contracted installation of two new 79.9 MW combined cycle facilities in 2005 as well as several mobile "peaking" power plants intended to provide power at times of highest need, which were taken off the system in 2007. LIPA has also been successful in acquiring regulatory approvals to: (1) allow full operation of the Cross-Sound Cable, an important transmission interconnection to Connecticut, (2) facilitate construction and commercial operation in June 2007 of the Neptune transmission cable, an underwater interconnection to New Jersey and the Mid-Atlantic electric grid, and (3) replace the existing submarine cable to Connecticut in 2008. Also, LIPA has supported initiatives aimed at increasing its renewable power supply through its Solar RFP, issued May 21, 2008.

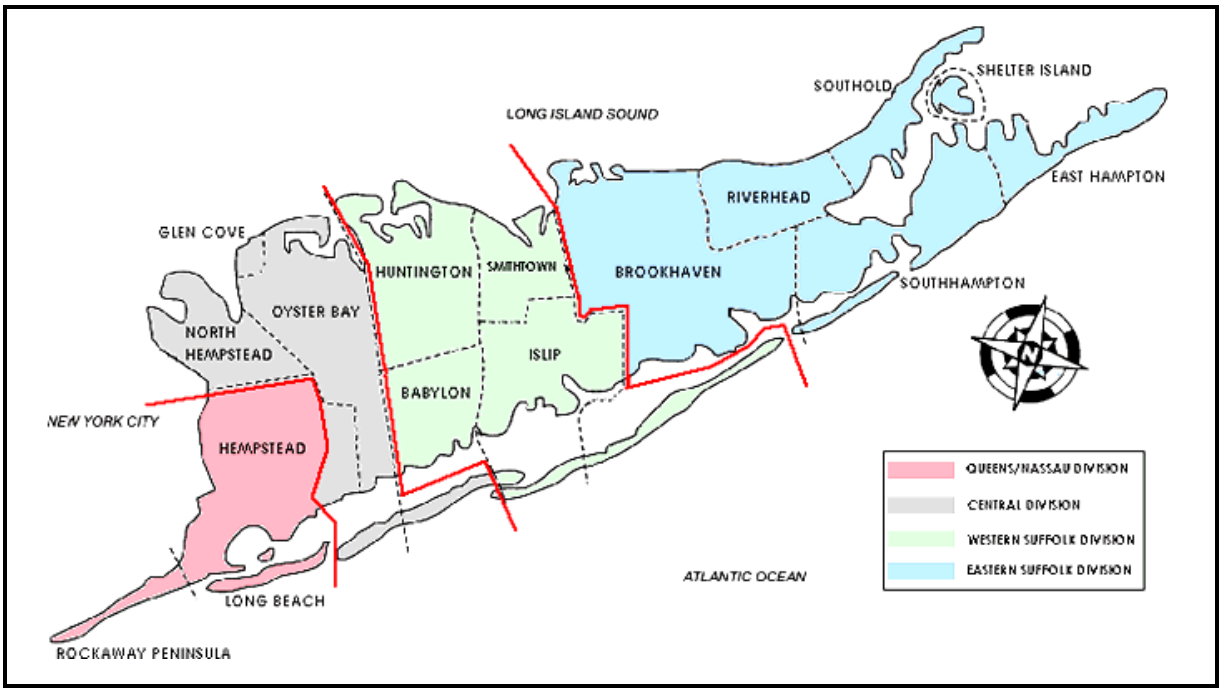
2.2 System Description

Long Island is divided into four counties – Kings, Queens, Nassau and Suffolk – with land area totaling 1,377 square miles. The LIPA service territory consists of most of Nassau and Suffolk counties and the Rockaway Peninsula in Queens. It covers about 1,200 square miles, encompassing nearly 90 percent of Long Island's total land area. LIPA's service territory, divided into the four counties, is displayed in Exhibit 2-1.

LIPA delivers electricity to nearly 1.1 million customers on Long Island. In 2007, LIPA's retail sales were 20,092,907 MWH of which approximately 50.4% were to commercial and industrial customers, 47.3% to residential customers and the remaining 2.2% going to railroad and other public authorities. Almost all of the residents – or more than 95 percent – in the LIPA service area live in Nassau and Suffolk counties. The balance of the population in the LIPA service territory resides on the Rockaway Peninsula in Queens County, within the New York City limits.

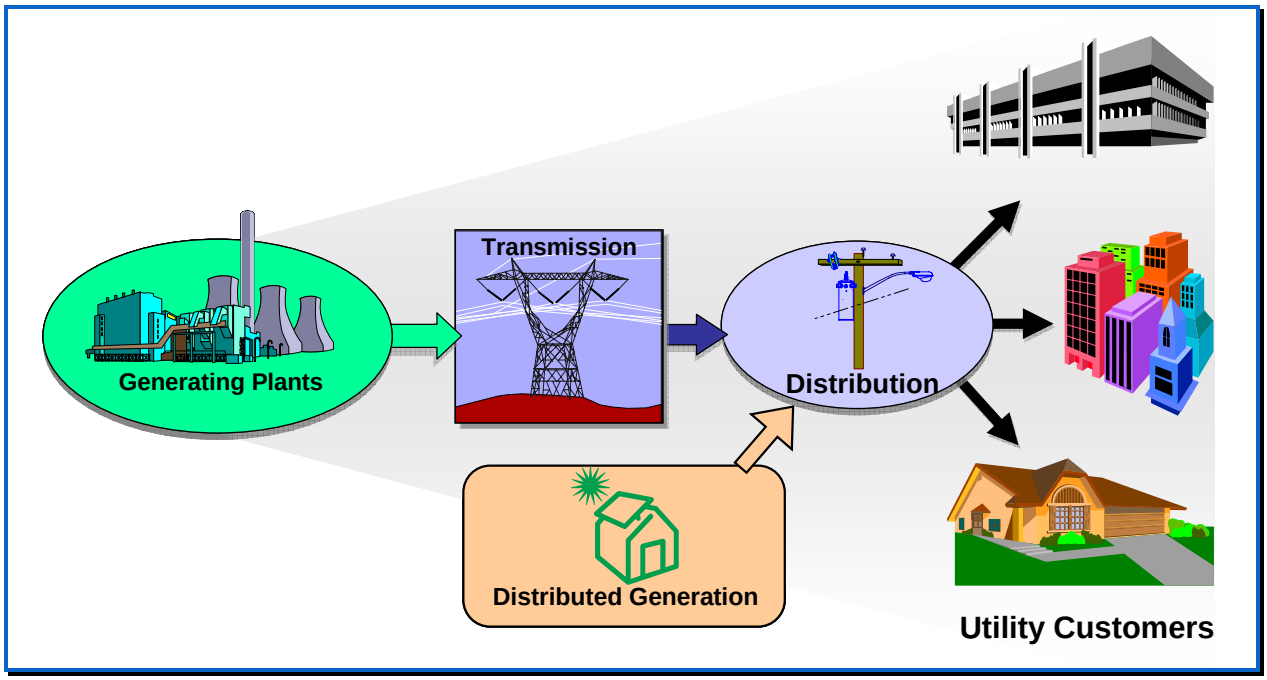
Three small municipal electric systems – Freeport, Rockville Centre, and Greenport – are located within the LIPA service territory. In addition, the New York Power Authority (NYPA) provides energy, distributed by LIPA, for economic development purposes to various customers on Long Island. Both Nassau and Suffolk counties have Municipal Distribution Agencies (MDAs) that purchase power from NYPA and distribute it to businesses throughout the LIPA system. MDAs were established in the 1980s to provide lower-cost power to businesses that contribute to the state's economy by adding jobs or other economic benefits.

Exhibit 2-1 Map of LIPA Service Territory



As pictured, below, in Exhibit 2-2, the process of making and delivering electricity to consumers requires three distinct steps. First, generating units produce the power, which is injected into the transmission system or, in the case of Distributed Generation, the distribution system. Second, it is transmitted at high voltages over the transmission system so that it can travel long distances to locations where the electricity will be used, and third, it is distributed to households over the distribution lines that ultimately connect directly to consumers' homes and businesses. In order for electricity to be "stepped-up" to high voltages for travel over the transmission system, and then, correspondingly, "stepped-down" to move over the distribution network, it passes through transformers located in power substations on the utility network. Electricity is transmitted at high voltages to reduce the electrical losses incurred as it moves over utility lines.

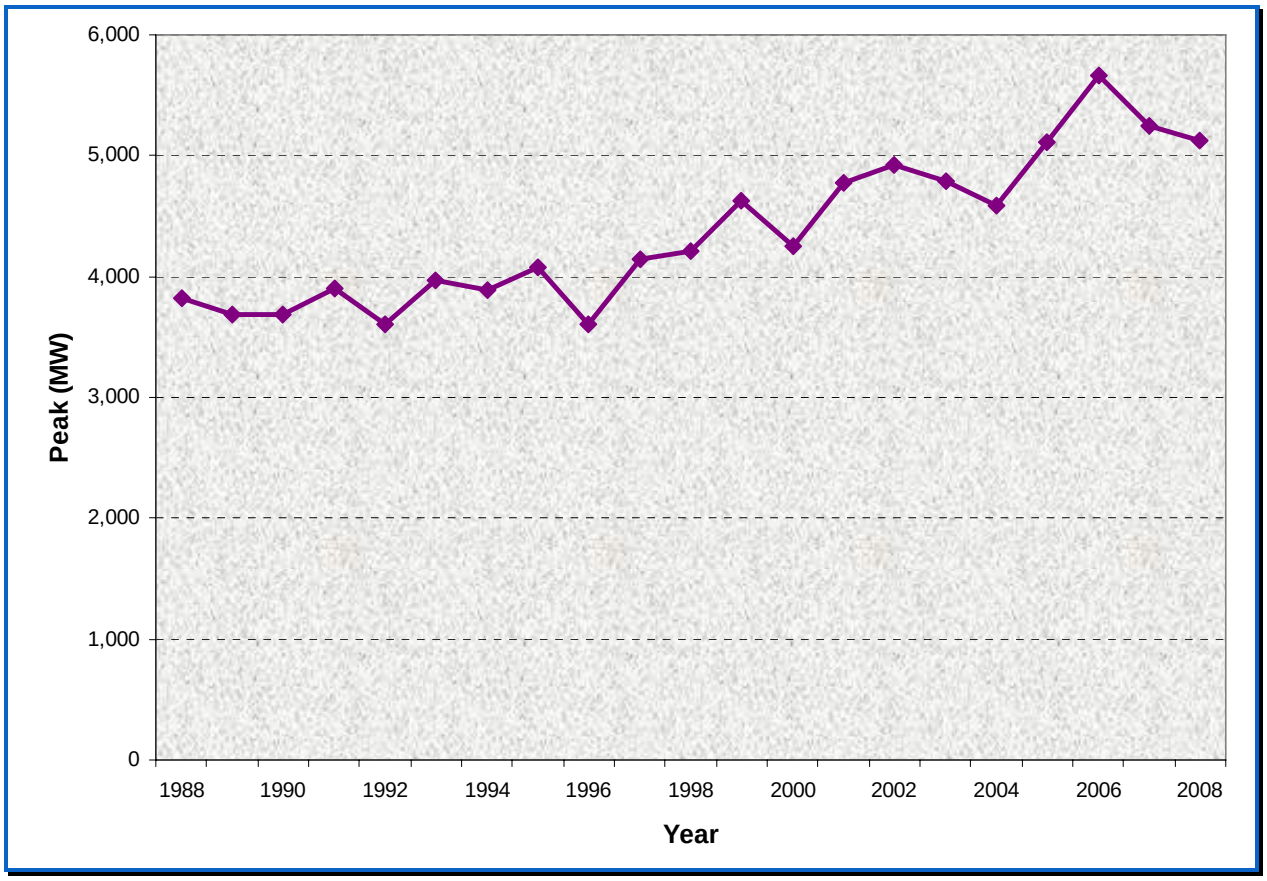
Exhibit 2-2 Process of Making and Delivering Electricity



2.2.1 Load Growth

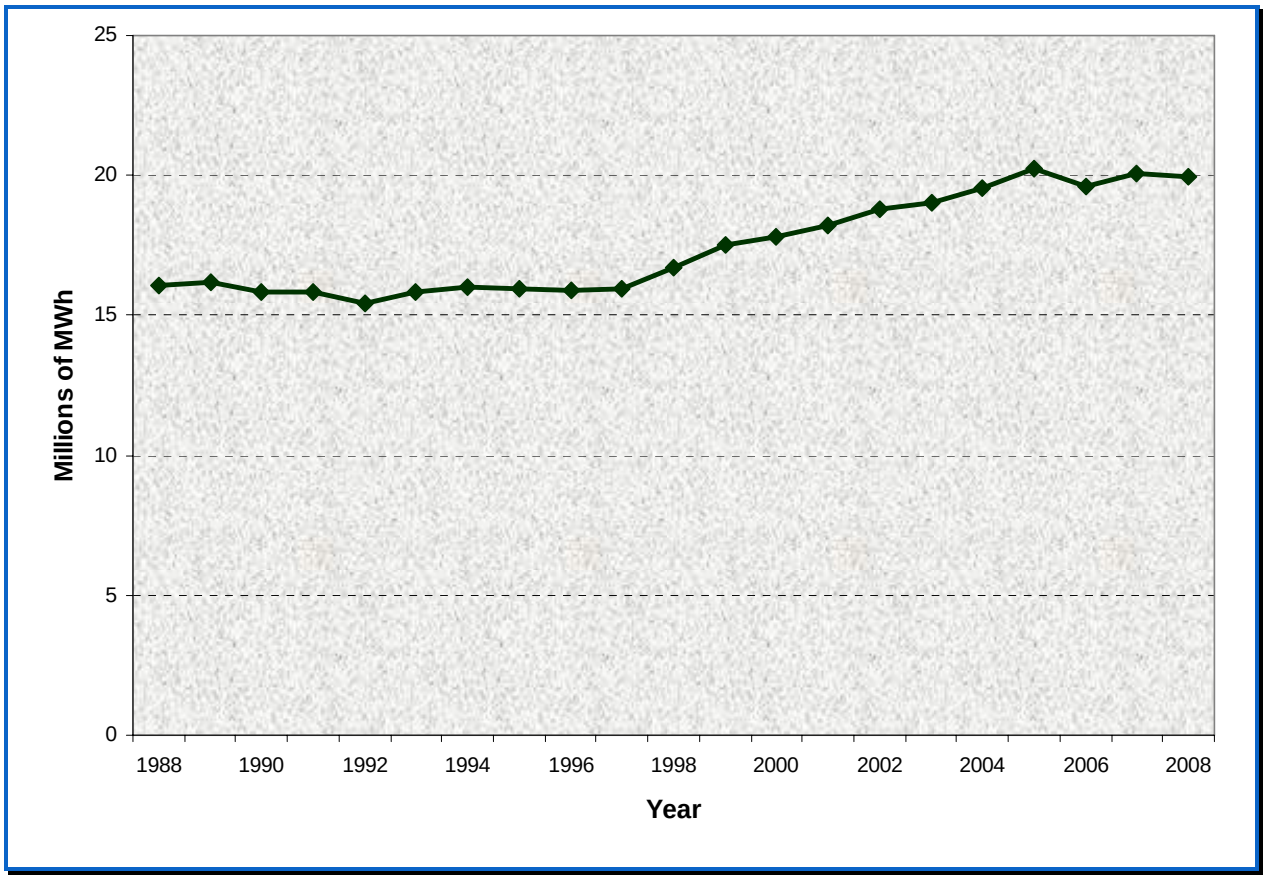
As depicted in Exhibit 2-3, prior to 2005, LIPA's all time peak load was 4,929 MW which occurred in July 2002. The especially hot weather in the summer of 2005, and again in 2006, drove LIPA's peak loads to 5,115 MW and 5,667 MW respectively. Impacts from LIPA's on-going investments in energy efficiency and conservation, along with more normal weather in the summers of 2007 and 2008 resulted in peak loads of 5,247 MW and 5,130 MW respectively, in those years.

Exhibit 2-3 LIPA System Peak Loads by Year (1988 – 2008)



As shown in Exhibit 2-4, below, retail sales also rose to their highest level in 2005, the hottest summer since 1991, when LIPA's energy load was 20,250,068 MWh. That level has not been reached since, due to, among other things, LIPA's significant and persistent efforts to improve its efficiency, to invest in its conservation programs for the electric system, and to encourage its customers to do the same.

Exhibit 2-4 LIPA Retail Energy Sales (1988 – 2008)



2.2.2 Generation and Transmission Resources

Overall, LIPA has available 5,623 MWs of contract capacity resources and 1,485 MWs of tie line capability for a total of 7,108 MWs of resources to meet demand during the summer of 2008. Since 2001 LIPA has added nearly 1,800 MWs of supply capability which include 12 new on-Island generating stations and 2 submarine cables connecting Long Island to surrounding power markets, as further described in Section 2.2.3. Two new generation facilities were added to the LIPA power supply mix in 2005. They were the Calpine Bethpage facility in the unincorporated community of Hicksville located in the Town of Oyster Bay, Nassau County and the Pinelawn facility in Babylon, New York. Both projects employ General Electric turbine/generator equipment, the LM 6000 based combined cycle technology, and were brought on line to help meet high summer loads in July and August 2005.

In the summer of 2007 the 660 MW Neptune Regional Transmission System was brought into commercial operation, creating a new electrical transmission tie with the PJM Interconnect in New Jersey. LIPA expects the 326 MW Caithness Long Island Energy Center to be completed and in operation in 2009. The Caithness project is a state-of-the-art, combined-cycle facility built in Yaphank. LIPA has contracted for the purchase of 255 MW in the summer and 286 MW in the winter of capacity and energy from Caithness beginning in 2009.

Exhibit 2-5 New On-Island Generation and Off-Island Transmission since 2001 (Summer Ratings)

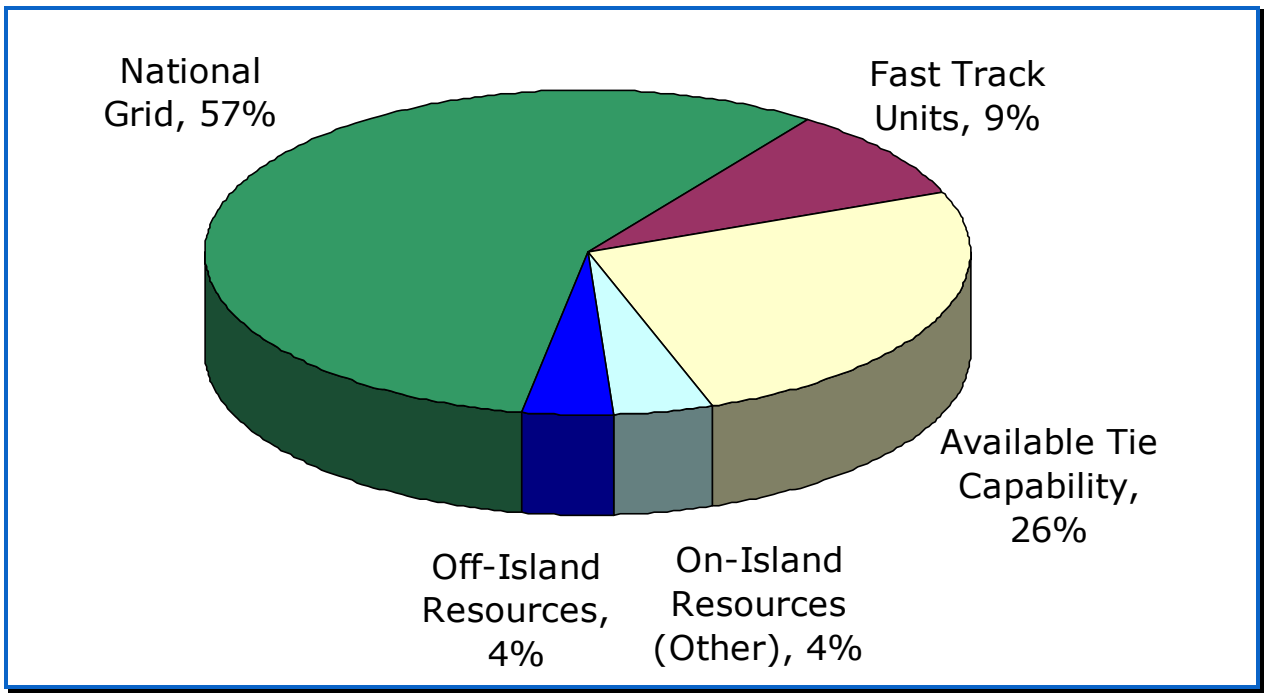
In-Service	Developer	Facility	MW
Generation			
2001	NYPA[1]	Brentwood	47.1
2002	Calpine	Bethpage	47.7
2002	FPLE	Bayswater	50.4
2002	KeySpan	Glenwood Landing	79.9
2002	KeySpan	Port Jefferson	79.0
2002	PPL Global	Brentwood	77.8
2002	PPL Global	Shoreham	75.9
2003	FPLE	Jamaica Bay	51.7
2003	Hawkeye	Greenport	43.9
2004	Equus	Freeport	48.3
2004	Village of Freeport	Freeport	10
2005	Calpine	Bethpage	76.2
2005	Pinelawn	West Babylon	78.0
	Sub-total Generation		**765.9**
Submarine Transmission Cables			
2002	HQ TransEnergie US	Cross Sound Cable	330
2007	Neptune	Regional Transmission	660
	Sub-total Cables		**990**
In Development			
2009	Caithness	Bellport	**286**

[1] Not contracted by LIPA.

In the past several years, LIPA had acquired, caused to be built, or contracted with Independent Power Producers and Transmission Producers for approximately 1,756 MWs or approximately 25% of its power supply in 2008. Another 392 MWs or 5.5%, of LIPA's total supply comes from NYPA purchases and the LIPA ownership of 18% of the Nine Mile 2 Nuclear plant. Currently, less than 60% of the LIPA's resource capacity need is supplied by National Grid and only 42% of the energy – a decrease from the 74% power supplied by National Grid when LIPA was formed in 1998**,** and an 8% reduction in dependence on National Grid since 2003 when 68% of LIPA's power supply came from that utility**.** Exhibit 2-6 provides a graphical display of sources of the available power supply to LIPA in 2008.

LIPA has moved aggressively to facilitate the upgrading and addition of generation on Long Island as one of the solutions to meet growing customer demand. While LIPA still purchases approximately 4,000 MW from National Grid, since 2001 nearly 1,800 MW of new power resource additions have been made available to LIPA, as shown in Exhibit 2-6 below. In addition, LIPA converted one of the Long Island generation facilities (Northport Unit 3) to gas-fire capability. This conversion has increased the efficiency of the unit and well as contributed to achieving cleaner air emissions on Long Island. The conversion enables all major fossil-fired steam units on Long Island with the exception of the Far Rockaway, which is gas-fired only, to switch between burning gas and oil.

Exhibit 2-6 2008 Power Supply Available to LIPA (Percentage of Capacity)



Power Supply Management

On October 17, 2007 LIPA issued a Request for Proposals (RFP) for power supply management services for a minimum 5 year and maximum 10 year term. Services will include power supply purchase and sale transactions as well as system operations. Power accounting, settlement and reporting as well as dispute resolution support are also part of the services sought.

Two vendors were selected to satisfy the scope of this RFP. First, Con Edison Energy Inc. was selected to manage the front and back office operations, including trading, generation bidding, accounting, billing, and accounts payable. In addition, Pace Global Energy Services, LLC was also chosen to handle the middle office operations such as risk management.

2.2.3 Increased use of Off-Island Generation Resources

Wholesale Purchases from the PJM Market

The Neptune cable that runs from New Jersey to Nassau County on Long Island can carry 660 megawatts (MW) of power, which is enough to meet the average electric demand of about 600,000 homes. LIPA customers saved over $20 million in the summer of 2007 by using the new Neptune cable to bring nearly 1.2 million megawatt hours (MWh) of low cost power to Long Island during the peak summer season in July, August and September when demand for electricity was highest. LIPA purchases of wholesale power from the PJM power market provided economic and reliability benefits for LIPA's customers in 2007 and are expected to continue for many years in the future.

In 2006 LIPA selected FPL for 685 MW of capacity from the Marcus Hook generating station in New Jersey. The Marcus Hook purchase is for capacity only with emergency energy, i.e. LIPA can purchase energy from it if both NYISO and PJM ISO declare a system emergency. Otherwise, the capacity is purchased as an unbundled market product used to meet on-Island and statewide capacity obligations set by NYISO. LIPA can and will use the cable to import energy purchased elsewhere, such as the spot market and PJM wholesale market. The Marcus Hook purchase is scheduled to begin on June 1, 2010. LIPA will continue to make energy purchases from a variety of market sources to import over the Neptune cable after the Marcus Hook capacity purchase begins.

Hydroelectric Power from New England

LIPA entered into a 15 year agreement starting in 2006 to purchase up to 345 MWs of electricity, to be delivered to Long Island over the Cross Sound Cable, from the Bear Swamp pumped-storage hydroelectric facility in Massachusetts. The renewable hydro power benefits LIPA's customers by reducing Long Island's reliance on fossil fuels to generate electricity. Bear Swamp is a 600 MW hydraulic pumped-storage facility that straddles the Deerfield River in Rowe and Florida, Massachusetts. The major generating units are twin reversible pump turbines built within the hillside. During low demand periods for electricity, water is pumped 700 feet from the lower to an upper reservoir using renewable power. During peak periods the water is released from the upper reservoir to spin the turbines and produce low cost electricity.

2.2.4 System Energy by Fuel Type

The fuel used to supply LIPA's energy needs has changed somewhat in the last decade. LIPA currently uses a lesser percentage of fossil fuel and nuclear generation to meet its resource needs while the percentage of hydroelectric power has increased and the percentage of purchases from the wholesale market have approximately doubled. The rise of wholesale market activity nationwide is mirrored in LIPA's greater use of these purchases. Various cables and tie-lines have been built in order for LIPA to participate in the activity of other electric markets. The market can be a flexible and cost-effective way to meet seasonal needs for power or to replace older, less efficient generating units. Exhibits 2-7 and 2-8 on

the following page depict the changes that have occurred between 1998 and 2008 with regards to the distribution of fuels LIPA uses to generating electricity.

Exhibit 2-7 1998 MWh Generation by Fuel Type

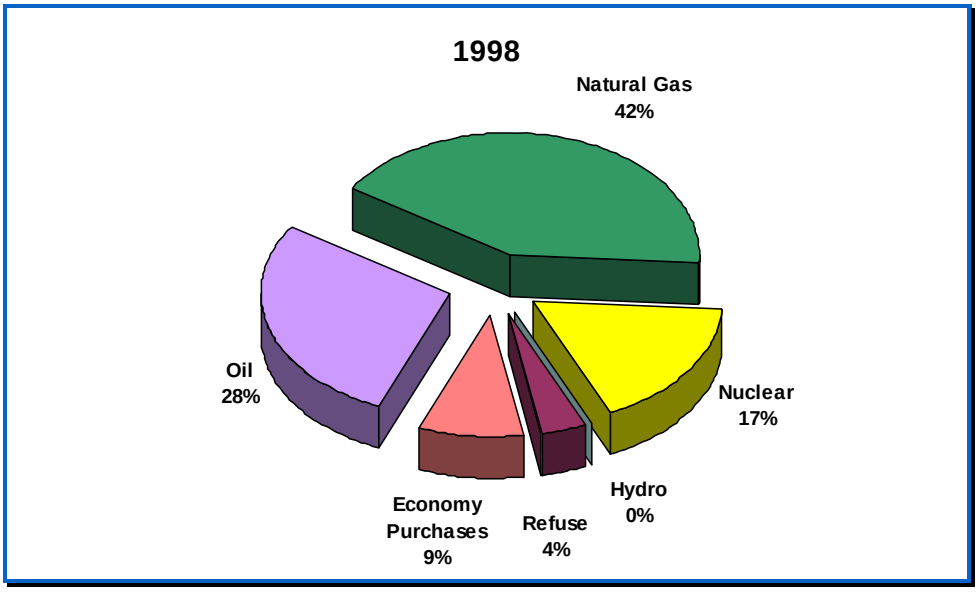
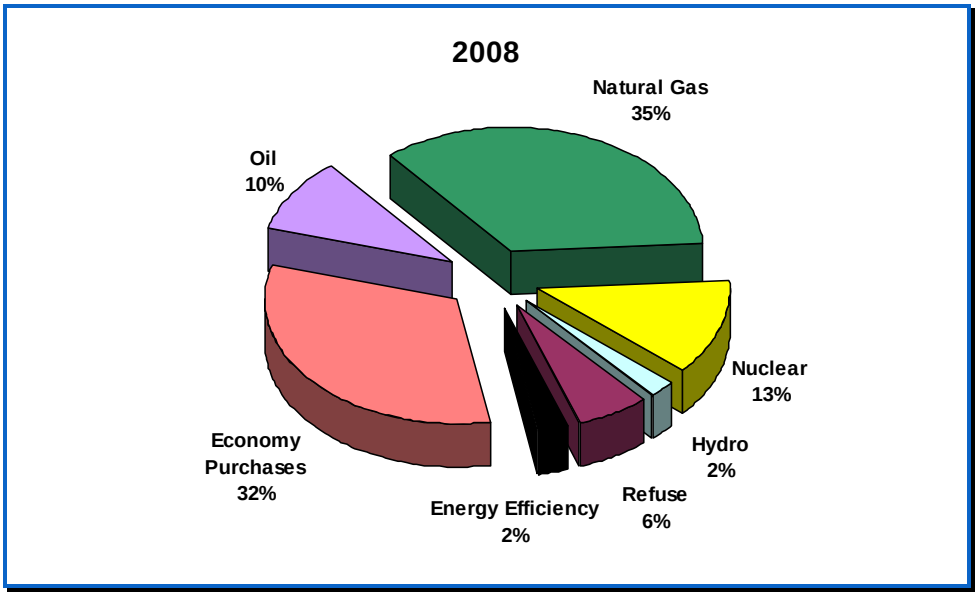


Exhibit 2-8 2008 MWh Generation by Fuel Type



2.2.5 System Capacity by Fuel Type

The fuel used by the electric generation supplying capacity to LIPA has also changed since 1998. A decrease in fossil fuels had been matched with an increase in the use of renewables and purchases in the resource mix. Nuclear power use has also dropped from 8% to 3%, offset by an increase in hydropower. Reliance on fossil fuel capacity has declined by 11% while market purchases have increased by 12%.

Exhibit 2-9 1998 MW Capacity by Fuel Type

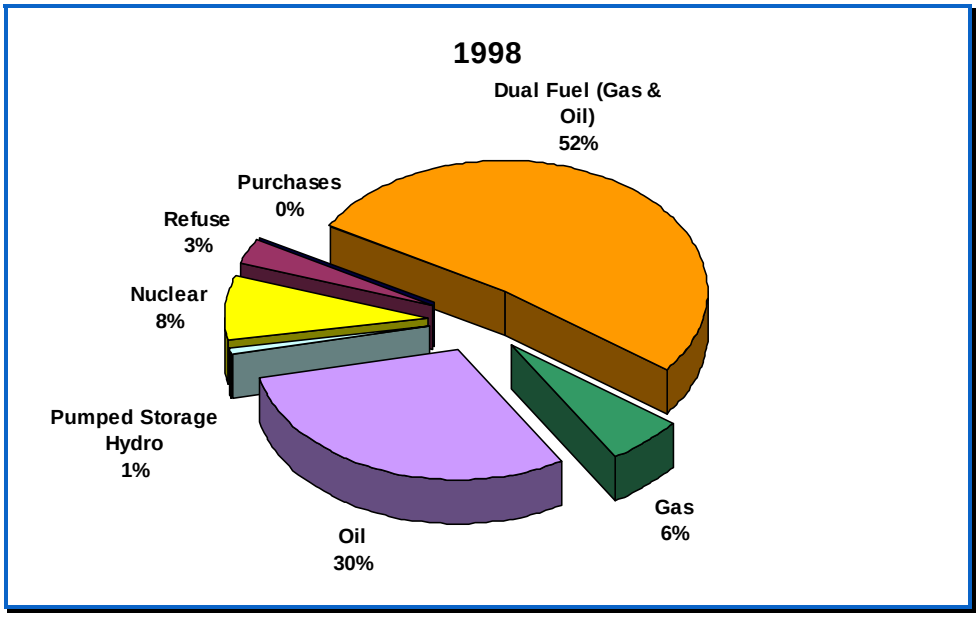
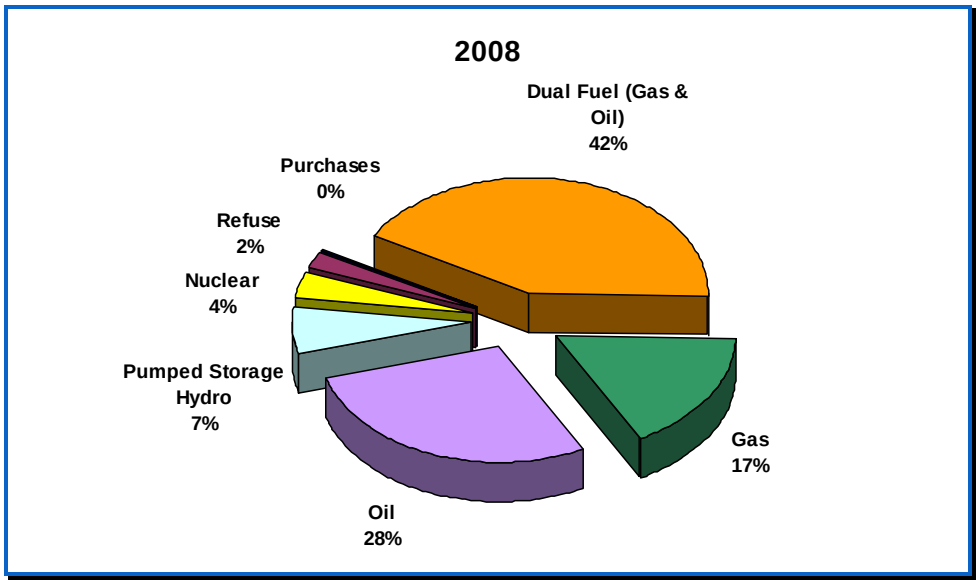


Exhibit 2-10 2008 MW Capacity by Fuel Type



2.2.6 Air emissions

LIPA has taken many assertive, timely and innovative steps to address air emissions related to its power supply resources. Over the last several years significant efforts have been made to switch to natural gas and dual fuel firing capability in LIPA generating facilities. The ability to switch between fuels improves the economics for these units, as well as provides flexibility in controlling air emissions. In addition, to the extent possible and when applicable, LIPA has switched to using lower sulfur fuel oil to reduce SO_2 emissions. The use of combined cycle generation technology, such as the two newest members of the LIPA generation fleet, Bethpage and Pinelawn, reduces NO_x emissions and purchases from renewable energy sources such as Bear Swamp, a hydroelectric facility, also serve to lessen air emissions. Likewise, energy efficiency measures such as the numerous programs enacted by LIPA tend to reduce, among other things, emissions from power plants.

If new legislation designed to reduce emissions from the electric generating facilities is enacted over time at Federal, State and local level, such new rules would be expected to affect the future operation of generating units. Should rule changes occur, they will likely impact LIPA operations, and will be factored into Electric Resource Planning at that time. A possible outcome to be considered in planning efforts will be increases in power costs related to reductions in air emissions.

Existing legislation and clean air initiatives include the Regional Greenhouse Gas Initiative (RGGI), designed to employ a market trading system to increase implementation of energy efficiency measures and encourage development of clean energy resources as a way of helping to address the concerns of climate change. RGGI is a cooperative effort by ten Northeast and Mid-Atlantic states to limit greenhouse gas emissions. RGGI is the first mandatory, market-based CO_2 emissions reduction program in the United States. The states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are signatory states to the RGGI agreement. These ten states will cap CO_2 emissions from the power sector, and then require a 10 percent reduction in these emissions by 2018.

LIPA's on-going and significant commitment to demand side management, energy conservation and efficiency as well as and renewable energy development is consistent with this multi-state initiative.

LIPA also has take steps to comply with the first Phase of New York's Acid Deposition Reduction Program which is intended to reduce sulfur dioxide and nitrogen oxide power plant emissions.

2.2.7 Regional Transmission Interconnections

LIPA has seven transmission interconnections to neighboring electric systems including High Voltage Direct Current (HVDC) interconnections to New England (the Cross-Sound Cable), and to PJM (the Neptune cable). The other interconnections are used to import power from the Nine Mile 2 plant in upstate New York, and to make purchases from other off-island resources, including spot market transactions. These interconnections provide critical access to electricity in the wholesale power markets during periods of high demand or when there is an unexpected loss of system capacity due to generating unit outage or delivery system failure.

System operators in all three regions are continuously managing the interconnected grid and LIPA actively cooperates with the three regional Independent System Operators as well as with New York utilities and other utilities beyond the New York border.

Cross Sound Cable

The Cross-Sound Cable (CSC), which began commercial operations in June 2004, links Long Island to the New England power grid via the 24-mile HVDC connection that runs from Shoreham to New Haven, Connecticut. The CSC, which was temporarily placed into service in August 2003 to help solve the emergency situation caused by the widespread blackout in northeastern U.S. and Canada is capable of carrying up to 330 MW of electricity. The CSC is part of LIPA's comprehensive plan to diversify its energy supply. It has provided Long Island with a reliable source of electricity, helped reduce energy costs experienced in the wholesale electric markets, and has been increasingly important as LIPA works to mitigate rising costs for oil and natural gas. LIPA customers have realized hundreds of millions of dollars in savings by importing lower cost energy via the Cross-Sound Cable since June of 2004.

The Neptune Cable

The 65 mile long Neptune Regional Transmission System (Neptune) began commercial operation on June 30, 2007. It is an undersea and underground HVDC cable that runs from Sayreville, New Jersey to New Cassel in the Town of North Hempstead in Nassau County. It can carry 660 MW of power, which is enough to meet the average electric demand of about 600,000 homes. LIPA entered into an agreement to purchase the entire 660 MW output of the Neptune project in June 2004, and estimates that use of the cable to import power supply to Long Island will save hundreds of millions of dollars during the 20 year contract term with Neptune. This cable gives Long Island direct access to lower cost, diversified power supply in the PJM power market that stretches from New Jersey to Illinois. The PJM Interconnection controls more than 165,000 MW of electric generating capacity. By comparison, the electric generating capacity in the LIPA service area is about 5,000 MW. PJM's relatively low cost power sources include hydroelectric, biomass, natural gas, nuclear, coal, and wind.

Neptune together with the Cross-Sound Cable provides LIPA with direct access to the PJM and New England markets. The two cables add a combined 990 megawatts of transmission resources to LIPA's supply mix.

Northport to Norwalk (1385) Cable Replacement

LIPA and Connecticut Light & Power Company (CL&P) replaced the 300 MW electric transmission cable system that connects Long Island, New York with southwest Connecticut as part of a settlement agreement between the two states that allowed commercial operation of the Cross-Sound Cable between Shoreham, New York and New Haven, Connecticut. LIPA received a Certificate of Environmental Compatibility and Public Need from the New York Public Service Commission in June 2007 for the replacement of the cable system within the existing corridor. Work was completed in 2008.

LIPA and CL&P jointly own and operate the seven cables between Northport and Norwalk, which are known as the 1385 cables. Replacement of the 1385 cables is necessary because of a high outage rate, as well as environmental issues associated with fluid leaks from a number of anchor drags. The new cables, which do not contain fluid, are solid core construction and will be buried beneath the floor of the Long Island Sound. They will help strengthen reliability of the electric system on both sides of the Sound, provide the ability to import lower cost power resources to Long Island, and offer the potential for future upgrade and expansion of the transmission capacity between New England and Long Island.

New York Transmission Ties

LIPA has high voltage AC ties to the rest of New York, via the Con Edison system. The 18 mile 345 KV Dunwoodie – Shore Road (Y50) line to Con Edison, placed in service in 1978, is jointly owned by LIPA and Con Edison. This line has transfer capability of approximately 600 MW. A second 345 KV tie, the 23 mile long East Garden City to Sprainbrook interconnection, built in 1991, can also transfer approximately 600 MW. NYPA owns this tie, alternately known as Y49. It is used by LIPA under contract with NYPA.

LIPA has two 138 kV ties that interconnect to Con Edison's Jamaica substation in Queens County. The facilities are jointly owned and used primarily to deliver power to Con Edison but also with the capability of emergency transfers in either direction if circumstances require. The Jamaica to Lake Success 138 kV line can normally deliver approximately 160 MW to Con Edison. Likewise the Jamaica to Valley Stream 138 kV tie performs a similar function at about 120 MW of delivery capability. The power delivered is based on a wheeling arrangement with Con Edison with power transferred across the Y50 line. Based upon analysis performed for the summer of 2008, the emergency transfer conditions on these lines to Jamaica, Con Edison could deliver approximately 175 MW to Long Island and LIPA could deliver approximately 450 MW to Con Edison.

2.2.8 Long Island Transmission and Distribution System

LIPA owns 1,292 miles of transmission line facilities that deliver power to 183 substations in its electric system on Long Island. From these substations, 13,611 circuit miles of distribution facilities transmit electricity to approximately 1.1 million customers in Nassau and Suffolk counties, and the Rockaway Peninsula in Queens County.

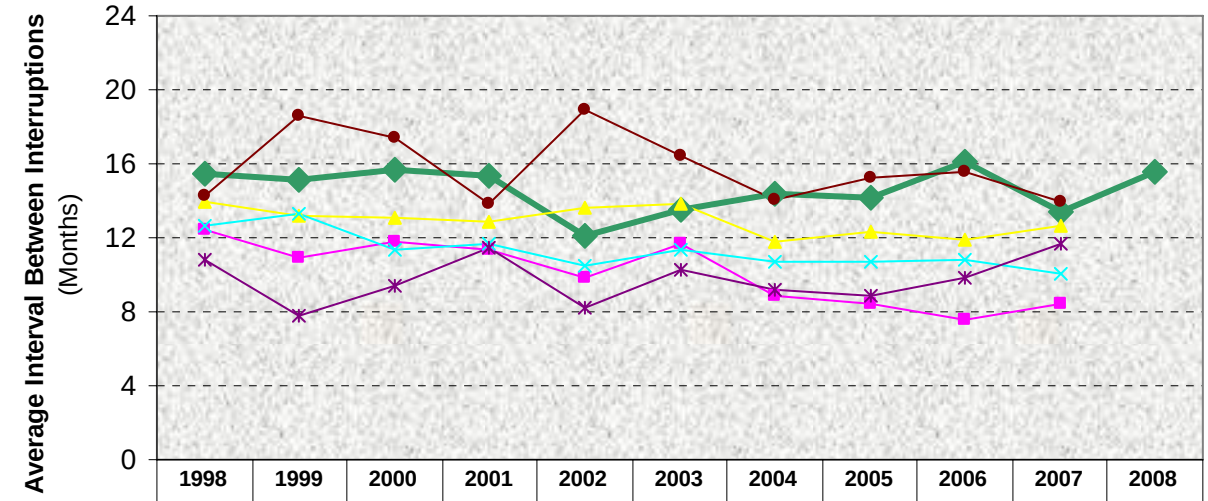
2.2.9 Improved System Reliability from Capital Programs

In 1993, the reliability of LILCO (now LIPA) T&D system was the worst in New York State for overhead systems in terms of interruption frequency to its customers. At that time LILCO customers experienced an average interruption frequency of one interruption every 8.5 months. The System Average Interruption Frequency Index (SAIFI) tracks the number of sustained interruptions, 5 minutes or greater in duration, which the average customer experiences in a year. It is calculated by dividing the total number of sustained customer interruptions during the year by the total number of customers served.

As indicated in Exhibit 2-11, below, the reliability of the LIPA transmission and distribution system has performed at an outstanding level for over a decade. LIPA was number two in the state in 2007 with 13.4 month between service interruptions, which is well ahead of most of the other New York State electric utilities with predominately overhead systems, which average approximately 11.3 months between interruptions.

Exhibit 2-11 Service Interruption Frequency

Comparison to New York State Department of Public Service Overhead Utilities



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
LIPA	15.5	15.1	15.7	15.4	12.1	13.5	14.4	14.1	16.1	13.4	15.6
CHG&E	12.4	10.9	11.8	11.3	9.8	11.7	8.9	8.4	7.6	8.4	
NMPC	14	13.2	13.1	12.9	13.6	13.8	11.8	12.3	11.9	12.6	
NYSEG	12.7	13.3	11.4	11.7	10.5	11.3	10.7	10.7	10.8	10.1	
O&R	10.8	7.8	9.4	11.5	8.2	10.3	9.2	8.9	9.8	11.7	
RG&E	14.3	18.6	17.4	13.8	18.9	16.4	14.1	15.2	15.6	14.0	

- Graph is based on all data available as of February 5, 2009.
- Data Source: New York State Department of Public Service (NYDPS) Annual Reliability Ranking Report.
- Data excludes interruptions during major storm periods as per LIPA/ NYDPS Criteria.
- Months between interruptions is equal to 12/SAIFI.

Since acquiring the LILCO transmission and distribution system in 1998, LIPA has invested approximately $2.5 billion in improvements to the Long Island electric transmission and distribution network. LIPA has budgeted approximately $279 million for further transmission and distribution investments in 2008, and an additional $4 million for "storm hardening" investments to improve the electric system's ability to withstand major storms that might hit Long Island. In regard to the transmission infrastructure, LIPA has undertaken improvements to enhance system reliability and provide greater access to competitive sources of energy both on and off Long Island. Some projects were completed to facilitate operation of the Cross-Sound and Neptune Cables which in turn were undertaken to improve import capability to Long Island from neighboring utility systems. Other improvements on the LIPA system facilitated the movement of power on Long Island, and accommodated competition from new on-Island merchant generators.

Storm Hardening Initiative

In October 2006, LIPA initiated a multi-faceted, $500-million, 20-year program to reduce the amount of damage that can be inflicted upon its electric Transmission and Distribution (T&D) system by severe storms. The 17-point program, the first of its kind for LIPA and Long Island's electric grid, is designed

to improve the T&D system's durability, resilience and restoration capabilities, and is expected to help lessen the number of service outages that can occur as a result of harsh weather. It is also expected to enhance the ability to restore service quicker when damage occurs.

LIPA's extensive electric T&D system, both underground and overhead, is vulnerable to damage from downed trees and flying debris caused by high winds and flooding caused by storm surges in low lying areas on both the south and north shores. To minimize, as best as possible, the service outages that can result from these kinds of extraordinary weather-related events, LIPA's Severe Storm Hardening Initiative sets out three main goals to achieve. They include improving the electric T&D systems':

- *Durability* by hardening the electric system to lessen the potential of damage from storms;
- *Resilience* by enhancing the electric system's flexibility to continue service despite storm damage; and
- *Restoration capabilities* by reducing the time needed to restore service following storms.

To achieve these three main objectives, the Severe Storm Hardening Initiative outlines a number of specific program elements, which include:

- Reconfigure or reconstruct substations to avoid damage from flooding and wind
- Improve transmission and distribution line design and construction to withstand high winds
- Reduce the impact of tree contact on distribution lines
- Seek innovative alternatives to undergrounding transmission and distribution lines in flood and surge zones
- Protect distribution equipment from storm surge damage
- Inspect and replace inadequate poles and equipment
- Leverage LIPA's leading distribution automation system to manage the scope of outages, and speed reconfiguration and restoration
- Employ Distributed Generation and Micro-grids
- Upgrade Outage Management Software
- Improve voice and data communications capabilities
- Implement a more comprehensive resource control system to better manage the use of field personnel during a restoration effort
- Improve damage assessment process

Compared to other New York State predominately overhead utilities, the LIPA Transmission and Distribution system consistently scores well in critical metrics related to service reliability. Our goal is to further reduce the number and length of outages through an aggressive service improvement and maintenance plan.

- *Line Clearance* – Keeping tree limbs away from electric wires is our most effective method of reducing outages. We trim trees along 2,000 miles of lines annually. We also encourage the planting of shorter, "wire-friendly" trees near power lines. Read about our Forestry Program.

- *Equipment Improvements* - We're upgrading lightning arresters, redoing wire splices on our poles using new equipment, and installing guards to prevent animals from contacting high-voltage connections.
- *Radio-Controlled Switches* – These remote controlled switches allow us to isolate electric line problems without dispatching a field crew, enabling our operators to restore service faster.
- *Reconducting Wire* - We're replacing old wire with new wire that has a resistant plastic covering for use in heavily wooded areas.
- *Infrared Scanning*_- Through helicopter and vehicle surveys, we're using infrared equipment to detect potential trouble spots before they can cause power outages. Approximately 6,000 miles of line are surveyed annually.

Distribution System Improvements

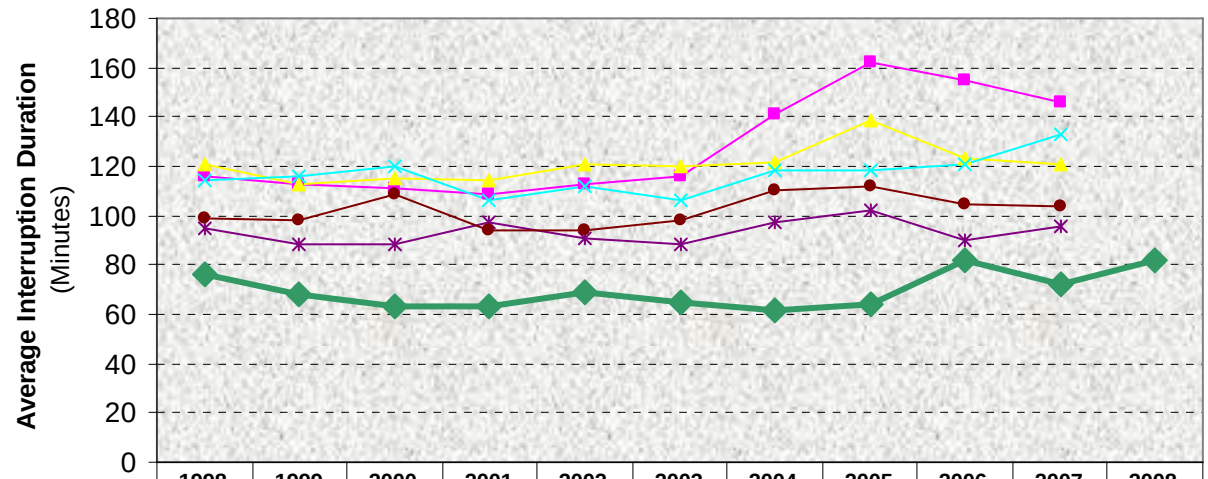
LIPA has made numerous improvements to the distribution system as well. These upgrades and additions have been undertaken to provide the extra system capacity needed to serve load growth from new customers, increases in load from existing system users, improvements in the reliability of service to all LIPA customers. One of the most effective programs to reduce electric outages and improve safety is LIPA's Forestry Program, which features line clearance and the planting of smaller, "wire-friendly" trees near electric lines. Because the distribution system is predominantly radial in design and utilizes overhead construction it is more exposed to damage from trees. Annually vegetation related outages account for approximately 40% of the sustained customer interruptions. In order to minimize these types of outages LIPA invests millions of dollars annually on its Tree Trimming Program and its Wire-Friendly Tree Program.

The Wire-Friendly Tree Program promotes the use of trees that will have a less adverse impact on Long Island's electric wires and poles. Due to its efforts in this area LIPA was the first electric utility in New York State to be honored as a "Tree Line USA" utility by the National Arbor Day Foundation and the National Association of State Foresters.

Exhibit 2-12, below, tracks LIPA's performance against other New York State utilities regarding duration of outages once an interruption occurs. The average interruption restoration time index measures the average time to restore an interruption. It is calculated by dividing the total number of customer hour duration of interruptions during the year by the total number of customers affected. LIPA leads New York State in this key reliability index for predominately overhead electric transmission and distribution systems with the shortest customer average interruption duration index (CAIDI). LIPA has consistently been the New York State leader in this category since 1998.

Exhibit 2-12 Customer Average Interruption Duration

Comparison to New York State Department of Public Service Overhead Utilities



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
LIPA	76	68	63	63	69	65	62	64	82	72	81.7
CHG&E	116	113	111	109	113	116	141	162	155	146	
NMPC	121	113	115	114	121	120	122	139	123	121	
NYSEG	114	116	120	106	112	106	118	118	121	133	
O&R	95	88	88	97	91	88	97	102	90	96	
RG&E	99	98	109	94	94	98	110	112	105	104	

- Graph is based on all data available as of February 5, 2009.
- Data Source: New York State Department of Public Service (NYDPS) Annual Reliability Ranking Report.
- Data excludes interruptions during major storm periods as per LIPA/ NYDPS Criteria.

2.2.10 Demand Response Programs

Demand response programs reduce electricity demand on peak days, thus reducing or deferring the need for additional supply resources and transmission improvements. These dynamic demand mechanisms cause lower peaks through reducing energy consumption at critical times, such as hot summer days. By shedding demand for electricity by curtailing load, fewer supply resources are necessary to balance the grid and transmission investment can be deferred. These decreased peaks serve to both decrease the cost of electricity and increase system reliability by decreasing the stress on the transmission and distribution lines. The following sections summarize LIPA's "LIPA*edge*" and "Watts Going Down" demand response programs.

LIPA*edge*

LIPA*edge* is a demand response program for residential and small commercial customers to reduce demand from central air conditioners. This program offers LIPA customers unique control features while giving LIPA the increasingly necessary capability to tap into consumer-based "power reserves" when needed. By only using the central air conditioner when absolutely necessary, customers lower their summer electric bills.

Customers who enroll in the LIPA*edge* Program agree to have their central air conditioner system adjusted between the hours of 2 PM and 6 PM, for a maximum of 7 days, throughout the summer. The LIPA*edge* program, which has more than 33,000 participants Island-wide, recruits residential customers and small businesses with central air conditioning systems. Programmable thermostats are installed on the central air conditioner units that allow LIPA to remotely control the temperature settings and AC compressors. By elevating the temperature of the unit, or by turning off the compressor unit for 30 minutes every hour during the peak summer demand period, Island-wide electric demand is reduced. It is expected that the LIPA*edge* program will save about 50.7 MW of electricity annually.

Watts Going Down

LIPA also has a volunteer program called Watts Going Down, which recruits both residential and commercial customers who agree to reduce consumption on high demand days by following basic energy control and conservation measures. Over 20,000 volunteers have been recruited to-date for this program.

2.2.11 Improved Energy Efficiency Programs

Energy Efficiency programs are those that save energy and thus reduce the use of the fossil fuels necessary to generate that energy. These programs differ from the demand response programs mentioned earlier because they aim to provide the same electric services while using less energy. In contrast, demand response programs temporarily curtail service during critical peak times. Energy efficiency programs also do more to achieve carbon reductions than demand response programs do because they have a more direct relationship to the consumption of fossil fuels in a specified time frame. Demand response programs work to lower electricity consumption during critical peak periods, while energy efficiency programs are continuously working to lower electricity consumption, not just during peak periods. Additionally, these energy efficiency programs can reduce cost because they also delay the need to build more and/or buy more energy supply by using those supply resources already available in a more efficient manner.

Transition from the Clean Energy Initiative to the new Efficiency Long Island Program

LIPA's Clean Energy Initiative (CEI) began in 1999 and has been one of the most ambitious and comprehensive programs of its kind in the U.S. The CEI is a 10-year, $355-million dollar commitment to promote clean, renewable electric generation technologies and energy conservation and efficiency programs. It encompasses a dozen programs including a cutting-edge research, development, and demonstration effort. LIPA's CEI, through its various conservation, energy efficiency, and load reduction programs, has produced cumulative annual energy savings of nearly 600 million kilowatt-hours through its ninth year of operation. That's enough electricity to power 105,000 average sized Long Island homes for one year. CEI programs have also reduced Long Island's peak demand by approximately 190 megawatts.

LIPA is currently implementing a CEI successor program named Efficiency Long Island (ELI) which was adopted by LIPA's Board of Trustees in 2008. ELI is a peak reduction driven program which expands energy efficiency programs by targeting reduction in LIPA's peak load requirements. The new program is focused on energy efficiency measures and does not include solar and renewable initiatives, which will stay in place and continue under the administration of other LIPA initiatives.

The following is a breakdown of the programs that continue under ELI:

CEI Initiatives that are continued under ELI

- Lighting and Appliances
- Cool Homes
- Residential Energy Affordability Partnership
- Information and Education
- New York ENERGY STAR® Labeled Homes
- Home Performance with ENERGY STAR®
- Commercial Construction
- Retrofit Energy and Capacity Program
- Customer-Driven Efficiency
- LIPA*edge*

In addition to maintaining residential programs, ELI increases the emphasis on commercial customer programs, and also includes a stronger focus towards working with architects and building designers to adopt greater energy efficiency in new and retrofitted buildings. ELI is designed as a nearly $1 billion program over 10 years from Jan 1, 2009 to December 31, 2018. The budget will be set each year by the LIPA Board of Trustees. The target savings for the 10th year is a 567 MW reduction in peak load and a 1,600,000 MWh reduction in energy consumption by LIPA's customers.

New York State Energy Efficiency Portfolio Standard

The New York Public Service Commission (NYPSC) opened Case 07-M-0548 in May 2007 with the intent to establish an Energy Efficiency Portfolio Standard (EPS) for electricity and natural gas use in the state. The intent was to create targets for energy efficiency and "reverse the pattern of increasing energy use in New York".

The NYPSC acknowledged that, while it did not establish an EPS in 2004 when it mandated a Renewable Portfolio Standard for future electric generation, it is now timely and appropriate to institute a requirement for energy efficiency. The Commission found that "realizing the state's energy efficiency potential and reducing New York's electricity usage 15% from expected levels by 2015 are in the public interest". The purpose of the Energy Efficiency Portfolio Standard proceeding is to design a program to meet the targets for energy efficiency. Increased efficiency, along with additional renewable resource development and other programs, is expected to decrease the state's dependence on fossil fuel-based generation and imported fuels, and reduce its greenhouse gas emissions. The EPS will ultimately reduce customer bills, stimulate state economic development, and create jobs for New Yorkers.

The "15 x 15" campaign was launched with the intent to effect a 15% reduction of energy usage by the year 2015. This is one of the more aggressive efficiency campaigns in America. The initiative is designed initially with three main components, first to eliminate the disincentive to electric utilities that has historically existed whereby the utility earns less money if it or its customers enact efficiency measures that result in less electricity being sold. The NYPSC has initiated a proceeding to separate utility profit from volume of electric sales. Second, the state is considering efficiency standards for appliances and buildings, the intent being to reduce unnecessary and wasteful use of energy. Third, the State of New

York is the largest energy user in the state, and the Governor intends to make the state more energy efficient by adhering to energy efficiency standards. Each of these three steps is expected to have a significant impact on energy use, and the anticipation is that together these actions can offset New York's expected increase in energy demand between now and the year 2015. The project is ongoing and will require continuing efforts to inform and engage participants.

While LIPA is not regulated by the PSC, LIPA has participated in the proceedings and is examining ways to implement programs that help the state reach its 15 x 15 target. Please refer to the Electric Resource Plan Volume for more information on LIPA's efforts in support of 15 x 15.

2.2.12 Increased Emphasis on use of Renewable Resources

LIPA is continuing to expand its efforts to foster renewable energy development and diversify its electricity resources. The acquisition and use of renewable energy resources will lower power plant emissions and provide for growing electricity needs without contributing to global warming and air pollution. LIPA has adopted aggressive renewable goals in support of the NYS RPS which is targeting 25% renewable resource supply by 2013. LIPA is currently evaluating increasing its renewable goal to 30% by 2015. LIPA's renewables plan relies on the continued operation of existing renewable projects and an ongoing commitment to the development of new renewable projects. Renewable energy projects committed and planned by LIPA include pumped storage hydroelectric, wind, fuel cells, and solar photovoltaic technologies.

LIPA explored viability of fuel cell technology with its 2005 RFP for a 10 MW fuel cell and a 2006 RFP for a 5 MW fuel cell to be located on-Island. The proposals regarding fuel cells proved to be uneconomical to pursue. While this technology may hold promise as a useful and flexible future generation source, LIPA's investigation shows the economics of the present fuel cell technology to be too costly.

In response to a RFP in 2006 LIPA entered into a 15 year agreement to purchases up to 345 MW of electric capacity to be delivered to Long Island over the Cross Sound Cable from the Bear Swamp pumped-storage hydroelectric facility in Massachusetts.

In May 2007 LIPA issued an RFP for 25 MW of land-based wind power resources in the PJM area to be transmitted to Long Island over the Neptune Cable. LIPA has also been working with the Long Island Farm Bureau for a number of years to site five 50 kW electric generating wind turbines on Long Island farms to help demonstrate the feasibility of using wind power technology. To date, permits have been granted for only one site. LIPA has encountered significant public opposition.

LIPA issued another RFP in November of 2007 soliciting proposals from firms interested in providing electric energy generated from renewable generating facilities. As a result of this RFP LIPA is entering into two new contracts for renewable energy sources. The first contract is for hydro-electric electricity provided by Brookfield Energy for approximately 300,000 MWh of energy each year beginning in 2009. This is a ten year contract. The second renewable contract is for power produced at a landfill gas plant and provided by PPL. This contract, which is expected to begin during 2009, will provide approximately 25,000 MWh/year to LIPA customers over a ten-year period.

LIPA has, for many years, supported solar power initiatives to encourage and promote solar electric generation on Long Island. The Solar Pioneer Program has allowed LIPA to rebate over $26 million for

the installation of approximately 1,000 PV systems Island-wide. That number breaks down to 954 residential and 46 commercial systems and 28 systems installed at educational, not-for-profit, and government facilities. This program has acted as an excellent gateway into the next generation of PV programs – the Solar RFP. More information on this Request for Proposals can be found at http://www.lipower.org/company/papers/rfp/solar08.html.

In concert with the Governor of New York, an interdisciplinary working group between LIPA and Consolidated Edison, Inc. has been formed to study the potential for an offshore wind project that would be situated at least ten miles off the Rockaway Peninsula. This project, which originated from Governor Paterson's Renewable Energy Task Force, could provide significant market development benefits to the wind industry, create clean-tech jobs, and help diversify the state's electricity system. In addition, any project resulting from this work could demonstrate that we can meet the state's energy supply needs in an environmentally sound manner while also benefiting the state's economy by reducing dependence on imported energy.

Further, LIPA has issued an RFP for acquisition of solar resources for to support further diversification of its system resources. The proposals are in the process of being evaluated with decisions expected in early 2009.

LIPA has been and will continue to be active issuing RFPs for renewable energy sources to meet its customers' energy needs. These RFPs serve to promote the establishment of new renewable energy projects on Long Island and in other markets accessible to LIPA.

3 LIPA Planning Process

3.1 Electric Resource Planning

The Draft Electric Resource Plan (ERP), as presented in this report and its accompanying four appendices, is part of an ongoing process created to communicate the steps that LIPA is taking to both meet the overall electricity requirements of Long Island, while also working to maintain compliance with environmental standards. The ERP, a living document that is updated continually and published periodically, is comprehensive in incorporating energy efficiency and demand-side initiatives, increasing investment in alternative and renewable energy technologies, evaluating the repowering of existing generation plants, and investigating the purchase of energy resources from merchant transmission and generation facilities. Simultaneously, it reviews the range of actions required to enhance LIPA's transmission and distribution system in order to maximize the efficient use of available and future resources to meet LIPA's power needs while also reducing power plant emissions and achieving various environmental standards.

While addressing the needs of Long Island is the major objective of the ERP, LIPA also explicitly considers how to support the objectives of the New York State Energy Plan, as well as comply with all state and federal rules and regulations that govern the operation of a retail electric utility system.

Due to the changing nature of the industry, energy planning requires a flexible, responsive, dynamic process that considers both short-term and long-term needs of consumers. LIPA's process is designed to respond positively and quickly to the changing system and industry conditions. The ERP utilizes a multifaceted approach to ensure an affordable, reliable supply of electricity for Long Island, and addresses both short-term and long-term energy needs.

LIPA's ERP consolidates the planning process for all of the system components utilized to provide the ultimate delivery of electricity to customers. Specifically, the ERP includes a resource adequacy assessment, energy efficiency energy programs, resource expansion alternatives including an emphasis on renewable sources, repowering existing generation facilities, transmission system utilization and expansion plans including effective use of the transmission ties to off-Island power markets, and distribution system expansion plans.

In the short-term, LIPA has developed specific plans including energy efficiency programs, contracts for merchant power, repowering older generators, energy efficiency initiatives, renewable generation and other supply alternatives. Specific plans have been developed for improvement and expansion of the transmission and distribution systems. LIPA has designed a system and power supply which is flexible and able to respond to unanticipated changes in the energy market and/or disruption due to system component failures.

For the longer term, LIPA utilizes an approach that maintains flexibility by investing in multiple areas including: reaching large scale energy efficiency goals, evaluating the impact of new technologies, encouraging the development of generation alternatives, exploring additional transmission import capability, and enhancing its existing power supply resources.

LIPA was an active participant in the New York Public Service Commission proceedings that led to the establishment of the Renewable Portfolio Standard in New York. While LIPA is not subject to the regulatory purview of the NYPSC, and therefore is not required to comply with the RPS order, LIPA supports the use of renewable energy resources as an important component to its Electric Resource Plan. As a result, LIPA's planning is consistent with the goals of RPS, and aims to expand the role of renewables in meeting the energy needs of Long Island.

LIPA is supportive of the New York State 15 x 15 initiative, to reduce energy use by 15% from projected levels by the year 2015. LIPA is continually exploring ways to contribute to this effort, which was first introduced by the Governor of New York, and then supported by the NYPSC.

LIPA analyzes and assesses the risks of various possible scenarios and provides for contingencies by preparing alternative plans and responses, should these less likely events occur. This approach requires a vigilant and continuous scrutiny of the system and of market conditions, but is rewarded by the flexibility brought about by maintaining multiple alternatives. In an open and free market, it is important to have competitive alternatives available.

Description of Energy Technologies

This section provides informative descriptions of the power generation technologies that LIPA either currently employs in its resource portfolio or is actively investigating for possible future use. Detailed analysis of these technologies can be found in Appendix A, Technical Report.

Solar Energy

The sun produces clean and unlimited energy throughout the year that heats up our land and waterways. By harvesting this energy using photovoltaic (PV) panels or other solar technologies, energy produced by the sun is converted into electricity. This process avoids the production of greenhouse or acid gas emissions associated with power generated by the combustion of fossil fuels.

The word "photovoltaic" means the generation of an electric voltage using light. A photovoltaic device generates an electric voltage that in turns produces electric current. Both voltage and current are needed to provide electric power. PV technology was originally developed at the Bell Laboratories in the mid 1950s. Until the oil crisis of 1973, the primary application of photovoltaic technology was powering satellites in space. Based on the same solid state semiconductor technology used in transistors and computer chips, improvements over the last several decades have allowed the cost of PV cells to decrease however, at this time it is still not cost competitive compared to conventional technologies on a large scale.

Because sunlight is a widespread resource, photovoltaic's can capture energy from the sun virtually anywhere on earth, even under very cold conditions, allowing homes and businesses to utilize photovoltaic's to generate electricity year round. The sun is an unlimited resource and utilities can harvest its energy to assist in reducing the amount of electricity that must be produced by non-renewable resources.

Based on geography, weather, and energy cost, solar power could become cost effective. With the proper financial incentives and greater participation from the public, solar energy can produce enough energy to provide a potentially significant alternative energy resource for tomorrow's power needs.

Governor Paterson's Renewable Energy Task Force, with its first meeting held in June of 2007, is working to attract clean energy industries in New York. LIPA is a participant in this task force and continues to be supportive of its goals. For more information please visit the New York State website at http://www.dec.ny.gov/environmentdec/42592.html.

LIPA launched its Solar Pioneer Program to encourage the use of clean solar energy by making the installation of a PV system more affordable. The Solar Pioneer Program offers direct customer incentives toward the installation of LIPA-qualified PV systems between 250 and 10,000 watts. Since 2000, LIPA has supported the installation of solar panels for 1554 residential participants and 81 commercial participants and expects 20 more participants in December of 2008.

Wind Energy

The term 'wind energy' or 'wind power' describes the process by which wind is harnessed to produce electricity. Wind turbines, which resemble aircraft propeller blades, turn slowly in the moving air at about 8 to 15 revolutions per minute, a rotation that produces electric current through a generator. The most economical application of wind electric turbines is in groups of large machines known as "wind farms" ranging in unit size from a few megawatts to hundreds of megawatts in capacity. These farms can be located both offshore and on land.

Wind can also be turned into electricity by small wind turbines – 1 to 100 kW – sized to help meet the needs of individual homes and businesses. A number of such 'small-wind' technologies are available in the market today, however they are much more limited in size and technical complexity. These small wind electric turbines typically generate electricity for homes and businesses, and for sale to utilities.

Offshore turbines are currently being placed in waters up to approximately 60 feet, but technology is still being developed for even greater water depths. Undersea electrical cables are used to deliver the energy produced by the offshore wind plants to the existing grid systems. There are higher costs associated with offshore development, but these can be largely offset by fewer siting conflicts and by higher energy production results from the stronger, steadier winds available offshore. Recent engineering advances in wind tower foundation design and transportation techniques have proven successful in mitigating the obstacles posed by the marine environment. There is now sufficient experience with offshore wind facilities to demonstrate its feasibility and to improve its performance.

Wind energy technologies have become more reliable and more cost effective over recent years, increasing international interest in wind energy. Over the last 20 years, the cost of electricity from utility-scale wind systems has dropped by more than 80%. Today, state-of-the-art wind power turbines with available cost subsidies generate electricity in a competitive range with many conventional energy

technologies. Local public opposition, however, primarily on the basis of aesthetics, remains a major hurdle to wind energy development.

North America has the potential to be one of the largest wind energy markets in the world. It is possible that wind power could supply affordable, inexhaustible energy to the economy without causing pollution, generating hazardous waste or depleting natural resources. It also provides the potential for jobs and other sources of income. Wind farms expand the local tax base and keep energy dollars in the local community instead of spending them elsewhere to pay for imported coal or gas resources.

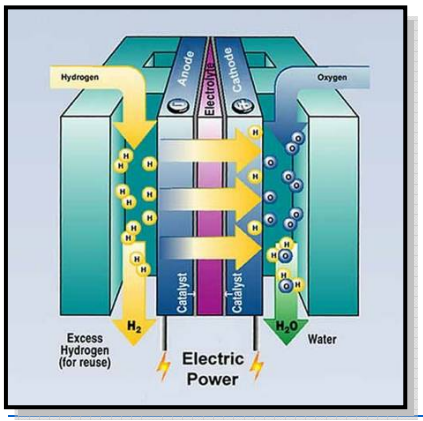
LIPA is pursuing wind energy as a potentially significant source of supply for Long Island. Offshore wind power could possibly provide a significant portion of Long Island's electricity needs. LIPA is supportive of the Renewable Energy Task Force which continues to explore opportunities for new renewable energy resources in New York. More information can be found at http://www.dec.ny.gov/environmnetaldec/42592.html.

Distributed Generation

Distributed generation (DG) generally refers to small electrical generators located adjacent to electric customers that allow utilities to defer or eliminate investments in transmission and distribution system upgrades. It provides customers with reliable energy supplies in an environmentally friendly manner. DG can take the form of a variety of technologies, including diesel generators, fuel cells, and small gas fired generators called micro turbines.

In certain applications, DG provides a more efficient way of delivering power to customers. Typically, 8 to 10 percent of the power generated at central station power facilities is lost before reaching the customer. By positioning DG at or near the customer site, losses associated with delivering power over long distances are significantly reduced. In addition, a large number of small DG units have the potential to improve the reliability of electric system operation, especially with modern computer controls that easily integrate DG into the electric system. Customers can own DG and safely feed excess power into the grid, creating new sources of income for some businesses. Current distributed generation technologies, however, remain more expensive to build, operate, and maintain on a per kW basis. They are less efficient at converting fuel to electricity than the best of the central station power technologies. A large number installed on the same feeder can defer the need for additional infrastructure; however, a single DG unit on a feeder has limited reliability benefits.

Fuel Cells



Fuel cells generate electricity, thermal energy, and form water by means of an electrochemical process that combines hydrogen and oxygen. Natural gas, methanol, and hydrogen are typical fuels for this device. Fuel cell operation creates minimal low-level emissions in the process of fuel reforming, which precedes the power generation step in fuel cell operation. The emissions include small amounts of hydrocarbons and nitrogen oxides, which contribute to the build up of ground level ozone.

Unlike batteries, fuel cells do not run down. They convert energy from a hydrogen rich fuel source directly into electrical energy and

continue operation as long as they are supplied with fuel. Fuel cells are small, quiet, and efficient. They are a well suited technology for moving from a highly centralized, large scale electric power generation system to one that is modular, easily scalable to the level of demand, and distributed to provide power where needed, thus avoiding the significant amounts of energy lost in the transmission and distribution system.

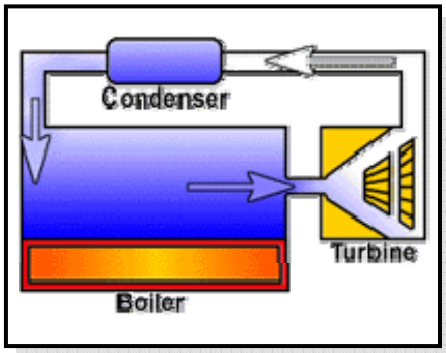
Fuel cells are in specialized operation at many commercial facilities around the world today – including Long Island – providing power to hospitals, universities, military installations, manufacturing plants, and municipal facilities. Relative to combustion processes, fuel cells operate quietly and emit fewer pollutants. However, despite great promise and recent advances in research, this technology still faces major hurdles before it is adopted on a widespread basis.

For example, although prototypes have been produced, there are few commercially available fuel cells for the residential sector. Although the technology currently employs the use of fossil fuels to create the hydrogen that is necessary to run a fuel cell, ideally the advent of cheaply produced hydrogen and the development of the infrastructure necessary to deliver hydrogen will allow the technology to mature past these efficiency and cost barriers.

Fuel Cell technology is another renewable energy that is included in the focus of the Renewable Energy Task Force and LIPA continues to help in developing incentives to attract this type of technology to New York State.

Unfortunately LIPA's most recent effort to solicit proposals to build a 10 MW fuel cell power plant as a means of deferring a distribution upgrade at its West Babylon plant produced no viable proposals**.**

Steam Turbine Plant



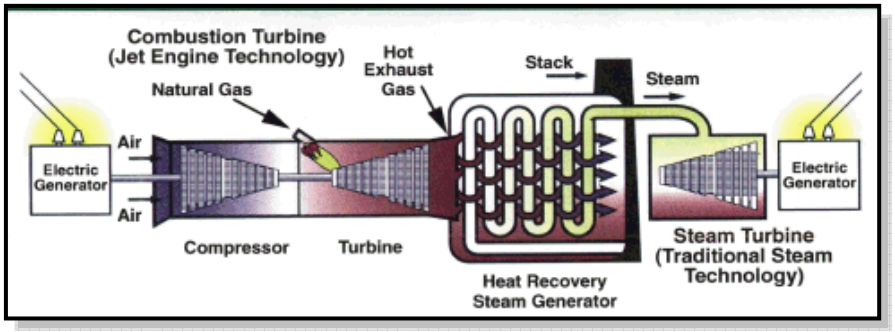
Steam turbine power generating plants are a commonly used type of power technology. Fossil fuel, like coal, oil and gas, is used to create steam through a boiler. The boiler feeds the steam to a generation turbine, which then uses the steam to drive an electric generator to produce electricity. The steam boiler is essentially a large tea kettle and the steam turbine acts much like a windmill to turn the generator to make electricity. After the steam passes through the turbine, it is condensed back into water and pumped back into the boiler to be reheated into steam again. This condenser may use cool water from a lake, river, or bay or may be air-cooled using cooling towers. LIPA currently has about 2,700 MW of oil and gas fired steam turbine generation in its power supply mix, providing approximately 38 % of its total power supply.

Combustion Turbine Plant

A combustion turbine uses the same technology as jet engines to burn natural gas or distillate oil to generate power. A fan at one end of a hollow tube sucks air into the center of the tube, where fuel is injected and burned. This mix of burning gas and air rushes through the tube and propels a second fan at the other end, which turns a generator to produce electricity.

This technology's most significant advantage is that it can be started and it can produce electricity significantly faster than a steam turbine. This rapid response makes it an attractive source for providing capacity during periods of peak electrical generating requirements or in the event another generating unit or transmission line suddenly trips offline. Gas turbines are also much smaller and less expensive to install than their steam turbine counterparts, which makes them easier to transport and construct on short notice. At the present time, LIPA has around 1900 MW[2] of combustion turbine plant generation to help meet its electric power needs. This is nearly 33% of LIPA's power supply.

Combined Cycle Plant



A combined cycle facility uses combustion turbine and steam turbine technology to extract more energy from the fuel. It burns natural gas or distillate oil to generate electricity through a combustion turbine. The high temperature exhaust heat from the combustion turbine is used to make the steam that is used in the steam turbine part of the plant. These facilities are more efficient than combustion turbines, steam turbines and fuel cells. Currently, LIPA has almost 400 MW[3] of combined cycle generation that make up 5.6% of its power supply. The Caithness project with its combined cycle technology will add another 326 MW to Long Island's supply in 2009. Due to the use of combined-cycle technology, the Caithness facility will be the most energy efficient and environmentally sound base-load plant on Long Island. It also adds the additional benefit of an eighth independent on-Island power producer.

Repowering Existing Generation

Repowering refers to the process of upgrading existing generation turbines located on existing plant sites with new state-of-the-art, cleaner and more efficient generation equipment. Repowering alternatives fall into two major categories:

- "Hybrid Repowering" which involves the re-utilization of existing steam turbine facilities using new or existing condensers, and
- "Backyard or Site Repowering" which involves the building of a stand alone new combined cycle capacity on the site with a new steam turbine generator. In this case certain supporting site facilities are typically considered for re-use in the design.

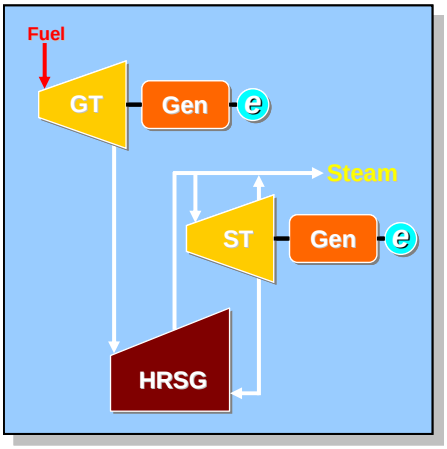
Typically, repowering requires temporarily shutting down the facility while the improvements are made. In the vast majority of cases, the new technology installed is a gas-fired combined cycle power plant which results in more electricity being generated in a more efficient and environmentally friendlier manner. Repowering is advantageous for other reasons as well. Land use is less of an issue because

[2] The 1900 MW includes NGrid/KeySpan Combustion Turbines and the Combustion Turbine Fast Track Units (FTUs) capacity in October of 2008.
[3] The 400 MW is made up of Combined Cycle Fast Track Units (FTUs), Trigen NDEC Combined Cycle, Stony-brook Calpine, and Holtsville-Flynn power plants capacity in October of 2008.

existing sites are reused which reduces the need for siting new generation facilities. Electric delivery and fuel supply infrastructure are also already in-place at the existing site. Finally, the environmental benefits can be significant because older technologies are replaced with cleaner power solutions. It should be noted, however, that increasing the plant capacity and/or converting from one fuel source to another may require the addition of costly infrastructure improvements, such as upgrades to the electrical transmission system and/or the installation of new fuel delivery capability. While a repowered plant typically is a combined cycle plant, repowered plants are often less efficient and more expensive on a $/kW basis than new combined cycle plants. Re-using the older plant components in combination with the newer components often results in a less than optimum design. The economics of repowering versus building new on a greenfield site must be carefully analyzed.

LIPA is investigating the repowering of older power plants on Long Island to produce more electricity with fewer emissions from the same amounts of fuel. In 2008 a Repowering Study Stakeholder Committee was commissioned to assist LIPA and National Grid in evaluating repowering as a planning option. Please refer to Appendix A, Technical Report for a more detailed discussion of this analysis.

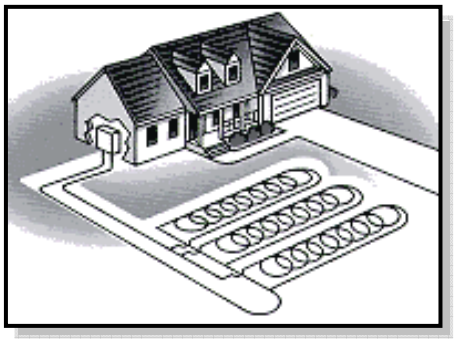
Combined Heat and Power



Combined heat and power (CHP), or cogeneration, is an electricity generation technology that involves the recovery of waste heat from the electric generation process to produce other forms of useful energy simultaneously, such as useable heat or steam. CHP is a very efficient technology that is designed for generating electricity and heat together from a single heat source. The term CHP is synonymous with 'cogeneration' and 'total energy', which are terms that have been used often in the past. The basic elements of a CHP plant are comprised of one or more prime movers, usually driving electrical generators, where the heat generated in the process is captured with heat recovery equipment and can be used for a variety of purposes, including industrial processes, community heating, and space heating. In the appropriate application, CHP can provide a secure and efficient method of generating electricity and heat, and can typically achieve a significant reduction in primary energy usage compared with power stations and heat only boilers. CHP installations can also achieve a reduction in CO_2 emissions compared to older fossil fueled power plants. LIPA's efforts, however, to investigate CHP in combination with fuel cells did not produce cost effective results.

The Renewable Energy Task force recognizes cogeneration as an eligible renewable energy resource. This task force, initiated in 2007, aims to review state policies and regulations affecting the development of these alternative technologies, and find a way to incorporate them into the New York supply mix through additional research and development.

Geothermal Energy



Geothermal energy technologies use the heat of the earth to operate geothermal heat pumps and produce electricity. In the United States, most geothermal resources suitable for power production and direct use are concentrated in the West, but geothermal heat pumps can be used nearly anywhere. Geothermal heat pumps, also referred to as ground-source heat pumps, use the relatively constant temperature of soil or surface water as a heat source and sink, providing heating and cooling for buildings as well as domestic hot water.

Geothermal systems for heating and cooling are available for business and residential applications, and are especially cost-efficient when installed in conjunction with a new construction project. In winter, heat is absorbed from the ground or ground water via an underground piping system or well and carried to the geothermal heat exchanger unit. The heat is then transferred to the air, which is distributed through the building's ductwork. In the cooling mode, the process is reversed. In the summer, geothermal units can provide central air conditioning. Systems can also be used to produce hot water.

Geothermal systems can be more efficient than the most efficient fossil fuel furnace. Instead of burning a combustible fuel to make heat, they simply move heat that already exists. There are all types of places where geothermal energy can be found, ranging from shallow ground to hot water and rock several miles below the earth's surface.

Through its Clean Energy Initiative programs, LIPA has offered cash incentives to individual consumers and companies who incorporate geothermal heat pumps into their residences and commercial facilities, or who replace an existing geothermal system. Consumers and several Long Island businesses have taken advantage of this opportunity.

Ocean Energy

Although few commercial applications are in existence, the ocean is another renewable resource that can be used to produce electricity. The ocean provides three types of energy, thermal, potential, and kinetic. Thermal energy comes from the temperature differences between the sun's heating of the surface water and the colder water below. Mechanical energy is generated from either the potential energy or the kinetic energy inherent in the tides and waves. Several types of ocean energy can be exploited to generate electricity, including the heat differences in the ocean (ocean thermal energy conversion), constant movement of the ocean (waves), the moving water masses between low and high tide (tidal or current).

Based on geography and weather, the availability of ocean power can be limited. Thermal energy can only be produced efficiently when water temperature differentials are about 35 degrees and the colder water is no more than 3,000 feet below the surface, and therefore is not easily applicable to Long Island. Wave energy relies on the wind to produce waves in the ocean. The bigger the wave, the more energy it generates. Tidal energy comes in two forms, one harnessing potential energy and the other harnessing the

kinetic energy associated with tides. Tidal power can captures the incoming tide by damming the water at high tide and letting it out at low tide, thereby converting the potential energy of tidal waters using hydro power technology. Alternatively, tidal power can be produced by placing a water turbine in an area that experiences tidal currents, thus capturing the kinetic energy of tides.

These technologies are in use in some parts of the world but are still in their infancy. Due to the inevitable depletion of fossil fuels like oil and gas, infinite sources of energy like that from the ocean are potentially important to our long term energy future. The Energy Policy Act of 2005 adds ocean energy sources, including wave power and tidal power, for the first time as separately identified renewable technologies.

A LIPA study on the viability of wave energy in meeting the energy requirements of Long Island is included in Appendix D, Technical Appendices.

Biofuels

Biomass and biodiesel are two examples of Biofuels. Biomass (organic matter) can be used to provide heat, make fuels, and generate electricity. This is called bioenergy. Wood, the largest source of bioenergy, has been used to provide heat for thousands of years. There are also many other types of biomass such as plants, residue from agriculture or forestry, and the organic component of municipal, agricultural and industrial wastes that can now be used as an energy source. Today, many bioenergy resources are replenished through the cultivation of energy crops, such as fast-growing trees and grasses, called bioenergy feed stocks. It is estimated that biomass currently supplies 14% of the world's energy needs, including wood for cooking and heating in areas without developed energy systems. Most present day production and use of biomass for energy is carried out in a very unsustainable manner with a great many negative environmental consequences.

More sustainable technologies and processes exist today which, if used properly, make biomass based fuels less harmful to the environment than fossil fuels. Bioenergy technologies are proven generation options in the United States, with 10,000 MW of installed capacity. All of today's capacity is based on mature direct-combustion technology. Future efficiency improvements will include co-firing of biomass in existing coal fired boilers and the introduction of high-efficiency gasification combined-cycle systems, fuel cell systems, and modular systems.

Biodiesel is another type of fuel made from organic matter. Oils and fats are chemically treated with and alcohol to produce a crude biodiesel that is the refined to make more purified biodiesel. LIPA has tested biodiesels on several 2 MW diesel engines at the East Hampton and Montauk peaking facilities. The three 2 MW diesel engines at each location were fired with a biodiesel fuel blend to determine operating and emissions performance. The biodiesel blend burns at higher temperature than the diesel oil, though it has a lower heating value. The test results indicated that an up to 5% commercially available biodiesel can be safely fired in the units with minor adjustments to engine settings. The environmental and economic aspects of the tests have been evaluated to determine whether use of biodiesel can be

demonstrated on a larger scale for existing diesel fired units. Further information on this topic from the Renewable Energy Task Force can be found at http://www.dec.ny.gov/environmentdec/42592.html.

3.2 LIPA Initiatives

3.2.1 Education Programs

One of LIPA's key objectives is to promote a healthy environment by fostering use of energy efficient technology and alternative technologies/renewable energy resources. Public education and outreach form a critical foundation for this effort by providing information regarding these resources and technologies to consumers so that they can make informed decisions about their energy choices.

LIPA utilizes various channels for disseminating information regarding its Electric Resource Plan and associated programs. LIPA utilizes public hearing as both a way to incorporate public concerns about the Electric Resource Plan as well as a vehicle to distributed updated and pertinent information regarding the plan. LIPA has also implemented a variety of education campaigns to provide information to schools and consumers at large on overall energy issues that impact Long Island.

Public Participation in the Electric Resource Plan

LIPA strongly supports a public planning process in developing its Electric Resource Plan as well as educating the public on energy related issues. LIPA considers public hearings as a critical step in fostering collaboration with Long Island citizens and groups that represent environmental, civic, and other entities. This collaboration will develop a jointly sponsored Electric Resource Plan that can guide future energy policy on Long Island. In the past, these hearings have provided a meaningful and important opportunity for concerned citizens to participate in the formation of Long Island's energy policy and plans to conduct public hearings periodically to retain consumer focus on energy issues.

In order to support the public's participation in the formation of LIPA's energy policies, a number of initiatives have been undertaken to educate the public on LIPA's Electric Resource Plan as well as the studies that led to the initial conclusions which include:

- Dissemination of energy education materials to Long Island residential, business and government sectors;
- Communication with the media by issuing press releases, scheduling press conferences and promoting public service announcements to advise local newspapers, television and radio stations of the plan;
- Coordination and advertisement of pubic forums and town hall meetings in which residents can voice their concerns, suggestions, and reactions to the Electric Resource Plan; and
- Solicitation of input from groups not typically represented on energy issues such as low-income customers, the small business sector, and other groups.

LIPA Energy Programs for Schools

LIPA is helping teachers and their students become environmentally and safety conscientious and energy-efficient individuals. Initiatives underway include:

- *Electric Safety Poster Contest* - For 10 years, LIPA has been conducting an Electric Safety Poster Contest. Information is mailed to all pubic and parochial schools in the LIPA Service Territory, inviting students in the 3rd, 4th and 5th grades to design posters with Electric Safety messages. The mailing drives teachers and students to the LIPA Web site for ideas on poster design. Small monetary rewards are offered for the top four (4) posters from each grade level. To date, approximately 100 schools submit entries. This program deepens the understanding for respect and safety around indoor and outdoor electrical facilities.

- *Lineman's Academy Events* – Each May, LIPA acknowledges "National Electrical Safety Month." The Authority conducts field trips to the Hicksville Lineman's Academy, where new linepersons are trained for work on both transmission and distribution electrical work. A miniature circuit has been built in order to show children what happens when common items, like pool skimmers, trees and balloons come in contact with live electric lines. On average 300 students are treated to this presentation annually. The event also attracts media attention, thus widening the safety message penetration.

- *LIPA/IBEW LOCAL 1049 "Lineperson for a Day" event* – The Authority partners with the International Brotherhood of Electrical Workers Local 1049 in Hauppauge to make a 4th grade class "Linepersons for a Day." The program was developed to allow children the experience of what it takes to work on an overhead utility system. Several exhibits allow children hands on knowledge of tree trimming skills, line sleeving skills, tool operation and a bucket truck rise. Approximately 125 children participate in the event annually.

- *Electric Safety Classroom Presentations* – LIPA contracts with three former linemen to conduct in-classroom demonstrations for children in the 3rd, 4th and 5th grades throughout the LIPA service territory. In August, just before the start of the new school year, all school principals receive a letter outlining the in-classroom offering. The presenters travel with a model called "Safety Town," which recreates a typical suburban community and the challenges children might face if encountering damaged electrical facilities. The children also are educated on how electricity gets to their homes via transmission and distribution lines. Also reviewed are power generation stations, types of fuels used to make electricity, and substations safety. All children received activity and coloring books, both of which are on the LIPA Web site for download by teachers for other electric lessons.

- *Get EcoSmart!* - An environmental and energy education program that teaches middle and high school students about wise use of natural resources, energy production, the environmental impact of energy use, energy efficiency, and what they can do in their homes to save energy and the environment.

- *On-line Electric Safety Games* - Children play these electricity games that teach, among other things, how electricity is made and how it gets to your home. This site includes a variety of games that are appropriate for a range of ages.

- *In Concert with the Environment Program* – This is a nationally acclaimed, award-winning energy/environmental program, which is offered free of charge to all students in grades 5-8. LIPA's In Concert with the Environment Program has been helping teachers and their students become environmentally conscientious, energy-efficient individuals for nearly a decade. More than 16,000 students on Long Island have participated in the Program. The program helps students learn about:

- The use and cost of energy
- How electricity is produced
- How to save energy, money and the environment
- Energy and water conservation;
- Renewable and clean forms of electric generation technologies; and
- Recycling.

- *LIPA's Kid-Friendly Electric Universe* - The Electric Universe is a safety education Web site with sections designed for students of various age groups, teachers, and parents alike. Lesson plans, games, activities, and tutorials can be found at http://lipa.electricuniverse.com. The Web site is 600 pages deep with available materials for students, teachers and parents ranging from elementary to middle school. The Web site was developed by electric and gas professionals with more than 30 years of experience educating both children and adults about electrical matters. It includes:
  - Louie's Space - Grades 1 to 4
  - New Frontiers - Grades 5 to 8, contains four sections:
    - Safety First covers safety of electricity
    - Talking Fun focuses on using the English language and other forms of communication
    - Energy and You teaches how to conserve energy. It also covers careers in the field of electricity
    - How and When teaches the science and history of electricity
  - Teachers Lounge – A resource for educators that provides lesson plans, experiments and a reference section that includes a glossary of terms and links to other education sites.
  - Power Plus – Adults, provides two sections:
    - Addresses electric safety around the home
    - Addresses electric safety around the work place
  - Wise Energy Use – Includes Power Bandit, a game designed to instruct about avoiding energy waste, and an Environment section that describes the link between wasteful energy use and environmental pollution.

LIPA also seeks to work with the Healthy Schools Network and PTA's of Long Island School districts through creative projects such as an Island-wide poster and T-shirt contests in elementary and middle schools.

LIPA Energy Programs for General Consumers

In addition to the specific programs conducted under LIPA's Clean Energy Initiative, LIPA offers informational and energy conservation programs and tools for customers. These programs help consumers reduce energy consumption and their electricity costs. Initiatives offered include:

- *53 Ways to Save Energy* - From heating tips and cooling tips to advice on appliance use, LIPA supplies information to families so they can make their home more energy efficient.
- *Electric Appliance Energy Guide* – First issued in 2001, this Guide has been updated and provides user-friendly energy consumption information in many commonly used household appliances. LIPA customers can use the Guide to calculate electricity consumption of, and usage costs of their appliances
- *Energy Saving Calculators* – This useful tool is under the "My Home" tab, in the "Save Energy & Money" section, http://www.lipower.org/residential/efficiency/calculator.html. It is meant as a free and helpful tool to tally energy savings by making changes around a customer's home.
- *Home Energy Audit* – An important program is LIPA's free internet based Home Energy Audit. This on-line resource helps customers analyze and lower energy costs by answering a few questions about their home and how it uses energy, and recommend steps to reduce their energy costs. It is available to any LIPA customer at the following web page: http://www.lipower.org/residential/efficiency/center.html .
- *Online Product Catalog* – Through EnergyFeederation.org LIPA maintains a commercial web page that allows LIPA customers to browse and purchase many high efficiency light bulbs and related products. Offered at a reduced price compared to retail a large number of highly efficient light bulbs may be purchased for lighting needs. The web address is available by following the link: http://www.energyfederation.org/lipa/default.php
- *Electric Safety and You* - The Long Island Power Authority (LIPA) has assembled this collection of information on electric safety and other tips to make your home safer. The following can be found on-line at: http://www.lipower.org/residential/safety
    - 64 Ways To Make Your Home A Safer Place
    - Magnetic field Levels Around Your Home
    - PCBs: Polychlorinated Biphenyls
    - Pets and Electric Safety
    - Protect Your Sensitive Home Electronics
    - Seniors and Electric Safety
    - Your Home's Power Supply
    - Your Home's Service Panel
- *Home Generator Safety* - Generators should be used for emergency standby power ONLY and for short periods of time and must be installed and wired by a licensed electrician. LIPA customers should sure all standby generators fire underwriter regulations. The My Home/Electric Safety section of the LIPA Web site, found at http://www.lipower.org/residential/safety/generators.html provides more information critically important for customers to know prior obtaining a standby generator.
- *Storm Safety*
    - Be Prepared: Weather Safety Tips - The Storm Center pages on the LIPA Web site offer numerous safety tips to help improve safety and comfort during a variety of storm conditions. http://www.lipower.org/stormcenter/safety/

- Online Outage reports - LIPA's computer systems automatically detect neighborhood service interruptions and begin the restoration process by alerting system operators of the outage. Visit the Storm Center section of the LIPA Web site to view web-based information regarding electric outages at http://www.lipower.org/stormcenter.

Education Initiatives under Consideration

Looking ahead, LIPA is also considering a number of new initiatives to foster public awareness of energy issues on Long Island which include:

- *Establishment of an Energy Center* – LIPA supports the concept of an energy center and can provide educational material on generation technologies, environmental issues, LIPA's involvement in powering Long Island and other papers and documents LIPA may have published.
- *Support of the Healthy Schools Campaign* – LIPA has been actively involved with the schools helping teachers and students become environmentally conscientious and energy-efficient individuals. LIPA sponsors an Energy Conservation Essay Contest, Poster Contest, the nationally acclaimed Concert with the Environment Program and the Electric Universe Web site.
- *Establishment of Community Organization Partnerships* – LIPA is considering partnering with grassroots environmental, conservation and builders' organizations to advance a series of measures called Urban Heat Island Reduction Initiatives. LIPA encourages grassroots organizations to continue work in areas of conservation and is willing to offer technical support if needed.
- *Expansion of the Island-wide Energy Campaign* – LIPA seeks to launch Island-wide public education campaigns, including flyers, direct mail and upcoming events which educate individuals on energy savings initiatives and the availability of highly energy efficient appliances and rebates.
- *Establishment of an Energy Directory* – LIPA will consider producing a directory of alternative and energy efficient consumer choices. To help kick off this initiative, LIPA is seeking the help of outside advertising agencies and pursuing grant opportunities to promote and partially fund this initiative. The purpose for creating the directory will be to list all available merchants and providers of available clean energy technologies on Long Island, information on where and how to buy energy efficient products for homes and businesses and other helpful hints that consumers can use to achieve maximum energy efficiency and save money.
- *Enhancement of Communication Channels* – LIPA is considering advertising through different media outlets to communicate energy and environmental related issues. The goal is to identify new channels that are more effective than previous media outlets. One example, is implementing an energy advertising campaign on available advertisement locations on the Long Island Railroad.

3.2.2 LIPA Energy Programs for Businesses

- *Commercial and Industrial Energy Services, Energy Analysis* - Through the CEI Customer Driven Efficiency program, LIPA energy experts conduct a free, thorough examination of existing equipment at customer facilities, and will analyze potential energy savings by making improvements in areas such as lighting, motors and drives, HVAC and more. Upon completion, customers may be provided with a report that includes an analysis of present costs, and

recommendations for energy saving measures, estimated costs and projected savings. Detailed are provide in a specially crafted Energy Analysis Brochure.

- *Light Solutions Program* - This program provides lighting choices that fit business customers' specific needs. Take advantage of the latest lighting choices on the market today, and have professionals help design lighting that suit specific requirements helping make businesses attractive, safe, and environmentally-friendly.
- *e-LERT* / *MY ACCOUNT* – These programs are designed to provide customers online access to their electric account and billing information and to provide a quick and easy way of electronically paying their electric bills. The programs save time and money for both customers and LIPA and are therefore win-win programs.
- *Major Account Programs* – These CEI programs are aimed at the large Commercial customers and focus on identifying "Solutions" for these customers that include both energy and business issues. The Solutions include recommendations on new electro-technologies and how to use the technologies within a business.
- *LIPA E-News and LIPA Business E-News* – LIPA prepares two versions of an on-line energy newsletter, the first one specifically targeted to residential customers, at http://www.lipower.org/residential/enews.html, and one tailored to serve commercial and industrial customers at http://www.lipower.org/commercial/enews.html.
- *Research and Development* - LIPA and NG/KeySpan Energy jointly publish Tech Talk, a newsletter for Long Island Energy Research and Development Initiative Participants.
- *Trade Ally: Information for the Trades* - As an energy partner, LIPA is committed to supporting the success of its business associates by making the most current, relevant information available and being available to answer any of their energy questions. Offerings include:
    - Codes and Standards, "The Red Book" - The Redbook is a collection of information and specifications, which provide a general guideline to electrical contractors and assures that any work performed involving LIPA's electrical distribution system is completed in a safe and reliable manner.
    - Trade Ally Message Board - As an energy partner, LIPA is committed to supporting the success of its business associates by making the most current, relevant information available and being available to answer any of their energy questions.
    - Trade Ally News & Events - LIPA uses this publication as an additional way to communicate with its trade allies.
    - Annual Awards Program - Each year LIPA nominates installing contractors, architects and/or engineering professionals for the "Trade Ally Partnership" and "Clean Energy Achievement Award. To find out more or to download a copy of the Recognition Categories go to the following Web site: http://www.lipower.org/pdfs/commercial/tarpf.pdf
    - Online Learning Center - The Online Learning Center enables Trade Allies to earn continuing education credits or professional development hours via the Internet. It features quarterly seminars on targeted education topics at a special savings for participating LIPA Trade Allies. http://www.lipower.org/commercial/trade/online.html

- Trade Ally Phone Directory – "Call Before You Dig" brochure. Provides contractors with telephone numbers to call before they dig, new/change service requests, electric emergency and more.

3.2.3 Clean Energy Initiatives

Through LIPA's Clean Energy Initiative, various programs are implemented to achieve energy and capacity savings for Long Island electricity consumers. These programs offer both residential and commercial consumers ways to achieve energy efficiencies and reduce their peak load requirements. Programs are offered to all customer segments, including lower-income consumers, so that all LIPA customers can enjoy the benefits of such programs. The CEI program also includes a number of research, development and demonstration projects.

Energy savings information including descriptions of all customer programs is provided to customers through multiple channels, ranging from comprehensive multi-media campaigns, to general printed materials, comprehensive Web site delivery, customer hot-line representatives, electronic news delivery, bill inserts, local shows and community outreach, and partnering relationships with various trade allies. LIPA seeks to work with all stakeholders, including the customer, to ensure that energy efficiency is part of the decision making process, to ensure that the customer understands the value equation associated with energy efficient equipment and practices, to ensure that products and services are available in our territory, to ensure that contractors see value in promoting energy efficiency and that proper training and market development support is readily available to the contractor community, to ensure that adequate notice and planning is conducted with the local supply channel community, and to ensure that demand is capable of being met and that an orderly transition of inventory and stock can be accomplished.

An important design element of the CEI is fostering market transformation to support clean generation technologies and energy efficiency programs. Public education is a critical element required to ensure success of transformation initiatives. In addition to changing the efficiency decisions of individual customers, these programs aim to change how the entire market functions. Over time, the intent is to cause an increasing percentage of customers not directly subsidized by the programs, or those that do not receive rebates, to make more efficient choices with regard to energy-using equipment and behaviors. Market effects are changes in the structure of the market or the behavior of the market participants that reflect increased adoption of energy efficient products or practices due to program stimuli, such as rebates, marketing, education, etc.

CEI Program Detail

More detail regarding the information available to LIPA customer's regarding CEI programs is provided below.

- *Residential Cool Homes Program* - The Residential Cool Homes Program is focused on Central Air Conditioning (CAC) and Residential Geothermal Heat Pumps. The program encourages customers to purchase and install energy-efficient central air conditioners and heat pumps by providing financial incentives to offset a portion of the incremental cost of the higher efficiency equipment. The long-range program goal is to encourage contractors to use energy efficiency as a marketing tool, thereby stocking and selling more efficient units and influencing the entire central air conditioning and heat pump market toward greater energy efficiency.

Recent studies show that the average central air conditioner (CAC) can use twice as much energy as necessary. That translates into wasted energy use – which translates into wasted money.

A properly installed and sized energy-efficient CAC or heat pump can: save hundreds of dollars on an electric bill year after year, reduce maintenance costs, and lengthen the life of new equipment.

Therefore, LIPA's Cool Homes Program is focused on ensuring that customers not only purchase the most energy efficient equipment, but also have the equipment properly sized and installed.

- *Residential Energy Affordability Partnership (REAP) Program* – The REAP Program is dedicated to improving energy affordability for lower-income households through the direct installation of a comprehensive set of cost-effective energy efficiency measures and extensive energy education and counseling. The program is designed to establish "partnerships" between the customer and LIPA. Each "partner" makes mutually beneficial commitments to help other partners with respect to energy consumption, management, efficiency and bill payment. In the partnership, LIPA provides substantial electric energy efficiency investment and extensive customer energy education and counseling.

  - Assisted Home Performance – Another component of the REAP Program is *Assisted Home Performance with ENERGY STAR®*. Assisted Home Performance with ENERGY STAR is offered to low-income customers through a partnership with the New York State Energy Research and Development Authority (NYSERDA), the Long Island Power Authority (LIPA) and Community Development Corporation (CDC) of Long Island Assisted Home Performance with ENERGY STAR takes the REAP Program one step further by offering customers the opportunity to improve the overall energy efficiency performance of their home. Through Assisted Home Performance with ENERGY STAR, the home is evaluated by a Certified Home Performance Contractor. Utilizing state-of-the art techniques and current diagnostic equipment, he/she will provide recommendations to maximize the comfort and efficiency of the home. The Assisted Home Performance with ENERGY STAR component also provides financial incentives in the form of a homeowner subsidy and/or low-interest loan to enhance the delivery of eligible energy efficiency services.

- *Residential Information/Education Program* - This program provides energy saving information to customers through a multi-faceted marketing program, printed materials, a student education component, an Energy Info line (1-800-692-2626), Web site information, and self-directed energy audit services, local shows, and special events. Through this program LIPA participates in Long Island community events, and trade shows, advertising and schools based energy education and on-line internet resources. LIPA's Clean Energy Initiative is a proud sponsor of ENERGY STAR® and encourages purchase of appliances and lighting products that have earned the ENERGY STAR label. Through LIPA's Clean Energy Initiative efforts, 100% of Long Island Appliance retail stores now carry refrigerators, dishwashers and clothes washers that bear the ENERGY STAR label.

- *Residential Lighting and Appliances Program* - LIPA offers residential customers opportunities to improve lighting efficiency through the Residential Lighting and Appliances (RLA) Program. This initiative is designed to transform specific components of the residential lighting and appliance markets through comprehensive and coordinated market intervention strategies. Customer awareness and market demand for ENERGY STAR® lighting and appliance products

is promoted through this program. LIPA is currently offering rebates of up to $50 on certain ENERGY STAR qualified clothes washers. Additional information on this rebate is available to customers via LIPA's Web site http://www.lipower.org/efficiency.

- *Solar Pioneer Program* - LIPA has launched this program to encourage the use of clean solar energy and help make the installation of photovoltaic (PV) systems more affordable. Working with the United States Department of Energy (USDOE), the New York State Energy Research and Development Authority (NYSERDA), local interest groups and solar contractors, LIPA hopes to continue raising public awareness of the benefits of solar power and financial incentives available for solar power. In the future, LIPA will work with schools and students on energy efficiency in the schools as well as installing PV on schools around the Island. It is intended, that these installations have an education component built into them.

  Although required by regulation, the building permit process for PV installations also varies considerably throughout the many different Long Island municipalities that have jurisdiction in this area. LIPA is working towards developing streamlined standards that can be universally accepted to expedite the inspection and approval process. Meetings are being scheduled with local Town and Village officials to educate them about LIPA's Solar Pioneer Program, and PV technology in general, to solicit their support to standardize permit requirements.

  Additional information can be found at http://www.lipower.org/solar. LIPA offers direct consumer incentives that can save as much as 50% towards the cost of a qualified PV system. Low interest financing is also available. In order to promote the PV program, LIPA provides information regarding the following solar program incentives:

  - Direct rebates, currently $3.75 per watt, which saves program participants approximately 50% on system costs
  - New York State's 25% tax credit towards the total cost of a PV system up to a maximum credit of $3,750
  - Recent Federal, State and County governments have joined together to offer additional tax incentives to help promote the installation of Solar Electric (Photo- voltaic or PV) equipment. These recent incentives are in addition to LIPA's incentives for PV installations.
    - Effective December 1, 2005, Suffolk County and Nassau County have also eliminated their portion of the sales tax on PV equipment purchases.
    - Effective September 1, 2005, New York State has eliminated the state portion of the sales tax on PV equipment purchases.
    - New York State currently offers a tax credit of up to 25% of the net costs for the installation of a PV system. The current incentive has a cap of $3,750 which will rise to $5,000 September 1, 2006.
  - As part of the recent Federal Energy bill, the Federal Government offers additional tax incentives for the purchase of PV equipment:
    - Residential customers are being offered (from 1/1/06 to 12/31/07) up to a 30% tax credit (with a cap of $2,000) for PV.
    - Business customers are being offered (from 1/1/06 to 12/31/07) up to a 30% tax credit (with no cap) for PV.
  - 15-year real property tax exemption through New York State's Real Property Tax Law for solar systems installed in New York State.

- Through New York State's Net Metering Law and LIPA's Tariff for Electric Service, residential customers with PV systems 10 kW or less are entitled to "net metering" to run their electric meters backwards, offsetting their normal utility bill.

- *New York ENERY STAR® Homes* - The NY ENERGY STAR® Labeled Homes program is now available on Long Island due to a collaborative effort between the Long Island Power Authority (LIPA) and the New York State Energy Research and Development Authority (NYSERDA). New York ENERGY STAR labeled homes must pass a stringent evaluation, including computer-based energy analysis, inspections, and certification testing. Only those homes that meet high-efficiency standards are certified as New York ENERGY STAR.

  While many builders claim to build "energy-efficient" homes, only builders of New York ENERGY STAR labeled homes can prove it. Homes in this program are required to be tested by a Home Energy Rater to ensure that they perform to the New York ENERGY STAR Labeled Homes Program standard.

  Participating New York ENERGY STAR labeled home builders pay rigorous attention to construction detail, making sure walls and ducts are tighter, and ultimately improving overall quality. Some new homes in New York already meet ENERGY STAR standards without additional costs, depending on the construction practices of the builder.

- *Home Performance with ENERY STAR®* - Under Home Performance with ENERGY STAR®, a participating Building Performance Institute (BPI)-certified Home Performance contractor will inspect a home and provide recommendations for energy improvements and provide a cost estimate to do the improvements. They can even do the work - it's one stop shopping. Home owners may also be eligible for low-interest financing to make the energy efficiency improvements even more affordable. The cost of improvements may be paid for through energy savings.

- *LIPAedge* – This is an energy conservation program that combines the power of the Internet with new technologies. Customers who have Central Air Conditioning (CAC) can participate. LIPA*edge* partners agree to have their CAC system compressors cycled off for a period of time between the hours of 2 PM and 6 PM, for a maximum of 7 days, throughout the summer. The LIPA*edge* Program now provides the potential for approximately 38MW of peak demand savings. LIPA is accepts new LIPA*edge* applications from time to time. If any eligible customer would like to sign up or – if enrollment is closed at the time – file an application for future consideration, they are encouraged to sign up electronically via LIPA's Web site, http://www.lipower.org/cei/lipaedge.html .

- *Commercial Construction Program* - LIPA's Commercial Construction Program (CCP) provides financial incentives to customers who agree to specify and install energy-efficient equipment in buildings under construction or pursuing a major renovation. The program also offers technical assistance to building owners/developers and their design teams to facilitate the construction or major renovation of buildings with an energy use performance that exceeds standard building practice. The CCP has three components: prescriptive, custom and comprehensive whole building design.

  The Prescriptive component is geared towards less complex projects where the selection of energy efficient equipment does not require detailed engineering. The customer chooses energy efficiency measures from a list of pre-qualified, off-the-shelf equipment that can easily be

integrated into an existing building. The Custom component is intended for situations where detailed engineering analyses are required to support more complex applications for energy efficiency or specific equipment that is not included on the prescriptive equipment list. The Comprehensive Whole Building component addresses the building process by influencing building owners, developers and design professionals to work with LIPA to design and construct the most energy efficient buildings from the onset. All commercial and industrial new construction, major renovation and expansion projects on Long Island are targeted by this initiative.

It is important to recognize that a key objective of this program is for LIPA to be involved in a new construction or major renovation project as early as possible. This ensures that the maximum energy savings opportunities are realized. One way that we pursue this key objective is to provide technical assistance early in the design process. The CCP has several Architect/Engineer (A/E) firms on retainer that specialize in energy efficient design. These firms are utilized to work cooperatively with the building owner/developers design team to ensure that all potential energy savings opportunities are explored and as many as possible are included in the final design.

Finally, LIPA's CCP provides an excellent vehicle for those customers interested in pursuing Leadership in Energy and Environmental Design (LEED) certification. The LEED Green Building Rating System® is a voluntary, consensus-based national standard for developing high performance, sustainable buildings. The United States Green Building Council members, representing every sector of the building industry, developed and continue to refine LEED.

- Customer-Driven Efficiency Program - Through this program, LIPA provides assistance to residential and commercial customers who want to improve their energy efficiency. This program provides technical energy analysis and audit assistance to aid customers in the evaluation of energy efficient equipment saving opportunities. Once energy efficient equipment is demonstrated to be cost effective, the program may provide customers with financial incentives to encourage the necessary enhancements and/or modifications. Technical and audit assistance and financial rebates are offered to governments, schools and other customers to install energy efficient technologies and capture energy efficiency opportunities that reduce consumption and lower electricity bills.
- Retrofit Energy and Capacity (RECAP) Program - In a unique three-way partnership to help our commercial customers find solutions for their energy issues and lower their energy bills, LIPA has created a new energy efficiency program. The RECAP Program is designed to lower demand which will help gain the greatest utilization of our energy resources, especially during peak summer months when electricity consumption is traditionally at its highest levels. RECAP targets both large and small commercial customers, multi-family buildings with more than four apartments, and publicly owned facilities, and looks for retrofit or replacement opportunities that provide incentives and energy savings for:
  - Lighting upgrades (retrofit and new fixtures)
  - Lighting controls
  - Upgrading HVAC units
  - Refrigeration upgrades
  - Motors and variable frequency drives

- Energy Management Systems
- Retro-commissioning of HVAC systems

3.2.4 LIPA Green Choice Program

The LIPA Green Choice program provides information and assistance to Long Islanders on how they can become Green Power purchasers and help in the advancement of Green Power Resource development. Green Power refers to electricity that is generated from "renewable" sources, such as wind, hydroelectric, biomass or solar energy. These sources create less pollution than burning fossil fuel like oil, gas, and coal. This voluntary program will allow customers to purchase Green Power from specialized "Green Power Marketers", which are energy services companies who specialize in marketing renewable resources. The customer will not actually purchase the electricity, but will purchase the "green attributes" of that electricity. Green Power Marketers need to certify to the NY Public Services Commission that they have purchased the attributes of green power that is then delivered into the electric grid serving all of New York State. The marketer must then also provide assurance that each customer purchasing the Green attribute receives the value for that purchase. For more information, or to get involved in this program please visit http://www.lipower.org/residential/green.html .

3.2.5 Light Solution Initiatives

LIPA distributes illustrated educational materials on good lighting solutions, with listed resources. Identification of good outdoor lighting practices is also included in Energy Savings literature, Web sites, and inserts. LIPA would like to include a review of outdoor night lighting in LIPA's energy audit program.

LIPA reached agreement with the International Dark Sky Association, a nonprofit organization that aims to stop the adverse environmental impact of light pollution, resolve issues associated with outdoor illumination and identify further enhancements to reduce glare and light trespass. LIPA will work with state, county and local governments to improve street and outdoor lighting policies. LIPA understands the use of lighting for security purposes, and is committed to advising residents on how to efficiently and sensibly light outdoor areas. Under a commitment to this agreement and through a tariff change, LIPA commits to installing only Full Cut Off fixtures and to expanding the range of fixture sizes to include lower wattage fixtures. Further, LIPA agrees to replace the existing floodlight-style fixtures currently in service with Full Cut Off fixtures when the existing fixtures reach the useful service life or a new customer occupies the service location. International Dark Skies Association recognized and commended LIPA's commitment in their December 2003 Newsletter.

- *Nightlight Program* - This is a dusk-to-dawn lighting program for LIPA's commercial/industrial customers. LIPA designs, installs and maintains high-pressure sodium or metal halide fixtures illuminating your business from dusk to dawn, automatically. No deposit or upfront costs are required from the customer, who pays LIPA a monthly charge for the complete lighting service.
- *Customer-Owned Light Solution Program* – The LIPA Light Solutions Program provides lighting choices that fit business's specific needs. The program allows businesses to take advantage of the latest lighting choices on the market today, and to work with certified professionals to design and install lighting that meets specific requirements to help make business attractive, safe, and environmentally-friendly. Because LIPA respects the contractor's right to competitively bid for

private property work, this program will provide lighting solutions where application of the Nightlight Program is not available.

3.3 Relationships

LIPA has built relationships with various private and public organizations from its inception. These relationships help LIPA operate its electric business, coordinate its activities with industry initiatives, engage in wholesale power markets, and transmit and distribute electricity to its customers. LIPA has benefited from these relationships through a mutual exchange of information and ideas. LIPA has also joined with these organizations to assist them in Electric Resource Planning, identifying promising renewable technologies, and implementing conservation and energy efficiency initiatives. A summary of these organizations and their relationships with LIPA are provided in the following sections.

3.3.1 New York Power Authority

The New York Power Authority (NYPA) is the largest state-owned public power enterprise. It provides some of the lowest cost electricity in New York State, operating 17 generating facilities and more than 1,400 circuit-miles of transmission lines. NYPA is a non-profit, public-benefit energy corporation. NYPA sells power to government agencies, to community owned electric systems and rural electric cooperatives, to job-producing companies, to private utilities for resale to their customers without profit, and to neighboring states under federal requirements.

LIPA has long-term power purchase agreements with NYPA. LIPA purchases the full output of NYPA's Flynn combined-cycle plant in Holtsville under a contract expiring in 2014. LIPA also purchases 50 MW of pumped-storage capacity from NYPA's Blenheim-Gilboa (B-G) plant under a contract expiring in 2015.

NYPA promotes energy efficiency and the development of clean energy technologies and electric vehicles. They provide a variety of energy related services to businesses and municipalities as they pursue new ways to create and protect jobs and reduce the cost of government. LIPA also operates the Commercial Peak Reduction program jointly with NYPA.

NYPA also contracts for use of LIPA transmission facilities to supply power and capacity to NYPA customers and the NYISO market from its Brentwood generating station on Long Island.

3.3.2 New York Independent System Operator

The New York Independent System Operator (NYISO) was formed in 1997, and began operations in 1999 as a not-for-profit corporation regulated by the Federal Energy Regulatory Commission and governed by a 10-member Board of Directors. It serves New York State, including LIPA's service area, by managing the 10,775-mile network of high-voltage lines that forms the state's transmission grid, facilitating the dispatch and operations of electric generating stations and, administers the wholesale power market in New York.

The NYISO is an outgrowth of the New York Power Pool that was formed in 1966 by the state's eight largest electric companies to provide coordinated oversight, management and economic operation of the state's electric grid.

As a member Transmission Owner of the NYISO, LIPA adheres to a set of rules and criteria that prescribes the technical and reliability conditions under which the system must be designed and operated. The electric system is in compliance with all applicable utility planning and design standards of the North American Electric Reliability Council, the Northeast Power Coordinating Council, the New York State Reliability Council, and the New York Independent System Operator.

3.3.3 Independent System Operator of New England

The Independent System Operator of New England (ISO-NE) serves the six states of the New England region: Rhode Island, Maine, Vermont, New Hampshire, Massachusetts and Connecticut. Like New York, the ISO-NE is an outgrowth of the New England Power.

The Cross-Sound Cable is considered part of the New England system and is operated by ISO-NE. It connects to the LIPA system at Shoreham and along with the additional link to the ISO-NE system provided by the 1385 line connecting Northport to Norwalk Harbor, allows LIPA to purchase and sell electric capacity and energy through transactions within the wholesale power market administered by the ISO-NE. LIPA is a member of ISO-NE, benefiting from participation in the regional power market, and participating actively in ISO-NE rule-making and operating committees.

3.3.4 PJM Interconnection – Regional Transmission Organization

In 2005, LIPA became a Participant in the PJM Interconnection, the Regional Transmission Organization that ensures the reliability of the largest centrally dispatched control area in North America. PJM coordinates the generation and movement of electricity and administers the wholesale power market in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM is responsible for maintaining the integrity of the regional power grid and for managing changes and additions to the grid to accommodate new generating plants, substations and transmission lines. PJM also analyzes and forecasts the future electricity needs of the region and ensures that the growth of the electric system takes place efficiently, in an orderly, planned fashion, and that reliability is maintained.

The 660 MW Neptune Regional Transmission System was brought into commercial operation in June 2007, creating a new electrical transmission tie between Long Island and the PJM electric system. This new interconnection provides Long Island direct access to lower cost, diversified power supply in the large PJM wholesale market. LIPA estimates that use of the cable to import power supply to Long Island will save hundreds of millions of dollars during the 20 year contract term with Neptune.

3.3.5 New York State Reliability Council

LIPA is one of the New York Transmission Owners that, along with other interested parties formed the New York State Reliability Council to promote and preserve the reliability of the New York Power System. It does this by developing and monitoring implementation of rules and criteria ("Reliability Rules") for the secure operation of the New York Bulk Power System. The Reliability Rules require that New York maintain enough surplus generation so that under normal conditions an outage would occur due to lack of generation on average no more than once in ten years. The Reliability Rules define the reliability of the New York State Power System using the following two terms:

- Adequacy – *The ability of the electric systems to supply the aggregate electrical demand and energy requirements of their customers at all times, taking into account scheduled and reasonably expected unscheduled outages of system elements.*
- Security – *The ability of the electric systems to withstand sudden disturbances such as electric short circuits or unanticipated loss of system elements.*

3.3.6 National Grid / KeySpan Energy Corporation

LIPA has historically had several agreements for generation, transmission and distribution services from KeySpan, which was one of the largest distributors of natural gas in the Northeast and the largest investor owned electric generator in the State of New York. KeySpan Corporation was formed in May 1998 as a result of the merger of KeySpan Energy Corporation, the parent company of Brooklyn Union Gas, and certain businesses of the Long Island Lighting Company. The former KeySpan Corporation is now, with approval granted by the NYPSC in August 2007, a subsidiary of National Grid, a large international electricity and gas company based in Great Britain.

In 2005 LIPA commenced a series of negotiations with KeySpan that continued through 2007 which then included discussions with National Grid. LIPA successfully concluded and its Board of Trustees approved several renegotiated agreements that extended the Management Services Agreement, set out a new power plant purchase option for LIPA, and resolved certain outstanding financial issues. The new agreements also allow LIPA the option of purchasing and repowering generating plants on Long Island so they operate cleaner and more efficiently. These successful negotiations provide significant ratepayer cost reductions, as well as potential power supply, system reliability and environmental benefits to LIPA. The benefits derived have allowed LIPA to establish several innovative renewable energy, energy efficiency and low income programs for its customers.

The recently renegotiated Management Services Agreement, which runs through 2013, provides for National Grid to perform the day-to-day operation and maintenance of the transmission and distribution system, including T&D facility operation, customer service, billing and collection, meter reading, financial and operations reporting, planning, engineering, and construction in accordance with policies and procedures adopted by LIPA. National Grid furnishes such services as an independent contractor and does not have any ownership or leasehold interest in the T&D System. LIPA exercises control over the performance of the T&D System through specific standards for performance and incentives to National Grid contained in the Management Services Agreement..

LIPA and National Grid also have several contracts pertaining to the operation and maintenance of generating facilities located on Long Island. The Power Supply Agreement provides for the National Grid sales to LIPA of all of the capacity and, to the extent LIPA requests, energy from the existing oil and gas-fired generating plants on Long Island formerly owned by LILCO. Such sales of capacity and energy from the National Grid facilities are made at cost-based wholesale rates regulated by the Federal Energy Regulatory Commission.

In addition to cost control, the Power Supply Agreement provides incentives and penalties for National Grid to maintain the output capability of the generating facilities as measured by annual industry-standard tests of operating capability, and to make capital improvements that benefit plant availability.

3.3.7 New York State Energy Research and Development Authority

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation created in 1975 by the New York State Legislature. NYSERDA administers the New York Energy $mart^{SM} program, which is designed to support certain public benefit programs during the transition to a more competitive electricity market. Some 2,700 projects in more than 30 programs are funded by a charge on the electricity transmitted and distributed by the state's investor-owned utilities. The New York Energy $mart^{SM} program provides energy efficiency services, including those directed at the low-income sector, research and development, and environmental protection activities. NYSERDA derives its basic research revenues from an assessment on the intrastate sales of New York State's investor-owned electric and gas utilities. Although LIPA does not contribute funds to NYSERDA programs, through an assessment based on sales it was found that these programs still benefit Long Island. LIPA has implemented Clean Energy Initiatives that provide similar benefits to NYSERDA initiatives. LIPA and NYSERDA jointly implement some Clean Energy Initiative Programs. LIPA also participates in selected NYSERDA research projects.

NYSERDA administers the New York Renewable Portfolio Standard program adopted by the Public Service Commission in September 2004 in an effort to increase the renewable power resources used in New York from 19% to 25 % by 2013. Goals of this initiative include adding diversity to the New York generation fuel mix, and improving the environment. While LIPA is not required to participate in the RPS program, it has initiated its own RPS with the voluntary goal of meeting the state targets.

3.3.8 New York Public Authorities Control Board

The Public Authorities Control Board (PACB) was created pursuant to the New York Public Authorities Law. The law directs that eleven statewide public authorities, which includes LIPA, must receive a resolution of approval from PACB prior to entering into any project-related financing. The five members of PACB are appointed by the Governor to serve one-year terms.

3.3.9 New York Public Service Commission

The New York Public Service Commission (NYPSC) regulates the state's electric, gas, steam, telecommunication and water utilities. The Commission also oversees the cable television industry. While not subject to the regulatory authority of the NYPSC, LIPA has a significant interest in decisions of the NYPSC which affect, among other things the public policy regarding use of renewables and energy efficiency investments, as well as the competitive structure of New York's electric industry. LIPA is subject to Article VII transmission siting regulations which are implemented by the NYPSC.

The Department of Public Service has a broad mandate to ensure that New Yorkers have access to reliable and low-cost utility services. The Commission is charged by law with responsibility for setting rates and ensuring that adequate service is provided by the New York utilities it regulates. Department staff represents ratepayers and the public interest in Commission proceedings, sets service and operating standards for utilities, and administers regulations issued by the Commission. Staff responsibilities include advising the Commission on all decisions it must make in matters such as rate determinations, utility financing, and certificates of environmental compatibility and public need. Department staff represents the Commission in state and federal proceedings that have an impact on New York consumers and a bearing on how the Commission carries out its legislative mandate. They also represent the Commission in state and federal court proceedings, developing and implementing state regulatory and

energy policies, receiving, investigating and resolving complaints on billing, services, or other utility practices, and inspecting and reviewing utility equipment and apparatus necessary for rendering service to the public.

3.3.10 Federal Energy Regulatory Commission

The Federal Energy Regulatory Commission (FERC) is an independent regulatory agency within the Department of Energy, that holds the responsibility of the following: regulating the transmission and wholesale sales of electricity in interstate commerce; licensing and inspecting private, municipal and state hydroelectric projects; overseeing environmental matters related to natural gas, oil, electricity and hydroelectric projects; administering accounting and financial reporting regulations and conduct of jurisdictional companies; and approves site choices as well as abandonment of interstate pipeline facilities; regulating the transmission and sale of natural gas for resale in interstate commerce; and regulating the transmission of oil by pipeline in interstate commerce.

Due to its non-jurisdictional status, LIPA is not subject to most of FERC's regulations. In those limited areas where it is subject to FERC regulation, LIPA adheres to FERC rules and files the necessary documents required by FERC. LIPA is affected by many FERC actions which affect the NYISO and regional markets. LIPA actively participates in FERC regulatory proceedings when its interests are at stake. The Commission recovers all of its costs from regulated industries through fees and annual charges. In New York these fees are collected through the NYISO.

3.3.11 North American Electric Reliability Corporation

The Energy Policy Act of 2005 authorized the creation of an Electric Reliability Organization ("ERO") with the statutory authority to enforce compliance with reliability standards among all market participants. Effective January 1, 2007, the North American Electric Reliability Council (NERC) and the North American Electric Reliability Corporation merged, with NERC Corporation being the surviving entity. NERC Corporation was certified as the ERO by the Federal Energy Regulatory Commission on July 20, 2006.

NERC's mission is to improve the reliability and security of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel. As the Electric Reliability Organization, NERC is subject to audit by the U.S. Federal Energy Regulatory Commission and governmental authorities in Canada.

NERC works with eight Regional Reliability Councils to improve the reliability of the bulk power system. The members of the regional councils come from all segments of the electric industry: investor-owned utilities; federal power agencies; rural electric cooperatives; state, municipal and provincial utilities; independent power producers; power marketers; and end-use customers. These entities account for virtually all the electricity supplied in the United States, Canada, and a portion of Baja California Norte, Mexico. NERC's proposal to delegate enforcement authority to eight regional entities is pending before the Federal Energy Regulatory Commission.

The information provided above as well as more detailed explanations are available at the NERC Web site: http://www.nerc.com/regional/ .

3.3.12 Northeast Power Coordinating Council

The Northeast Power Coordinating Council (NPCC) is the regional NERC reliability council for New York, the northeastern U.S. and eastern Canada. It is the NPCC mission to promote and enhance the reliable and efficient operation of the international, interconnected bulk power system in Northeastern North America. It accomplishes this by developing and enforcing regional reliability standards and coordination of system planning, design, and operations pursuant the authority of the ERO. The NPCC develops criteria and standards to facilitate fair, effective and efficient competitive electric markets.

For more in formation on the NPCC please refer to the NPCC Web site at http://www.npcc.org/.

4 Energy Industry and Today's Environment

The electric utility business is in the midst of a multi-year revolution that has fundamentally changed the industry in the U.S. Industry shifts began during the 1990's with the adoption of competitive wholesale power markets and, in some sections of the country, with the introduction of competitive retail markets. Customers are able to choose their electric supplier of choice in New York, although the delivery of that power is still provided by an entity that operates in a defined geographic service territory in which there is no competition to provide wires service. More recent changes in the energy industry that have occurred since publication of the last Electric Resource Plan include:

- Credit Crisis
- Significant fuel market and price volatility
- Climate change initiatives, including RGGI and federal carbon reduction legislation
- Expanding emphasis on new technologies and improved energy efficiency investments
- New federal regional and state initiatives aimed at improving electric reliability, adding to industry infrastructure, and reducing power plant emissions
- Continued security and safety issues for utility infrastructure
- Concerns about the aging infrastructure of the electric system

This section of the Draft Electric Resource Plan provides an overview of the electricity industry and summarizes the key changes that have the potential to impact and to be considered in LIPA's Electric Resource Plan. These changes have already occurred, are in the early stages of implementation, or are in an evolutionary stage that makes planning more uncertain. As these changes and developments are described, this document also identifies potential implications for the LIPA Electric Resource Plan. LIPA has committed significant planning and implementation resources to meeting the challenges of an evolving utility environment. As a result of its efforts, LIPA has established itself as an industry leader in New York and nationally, particularly in the areas of power resource and transmission planning, energy efficiency, and renewable energy development.

4.1 Key Issues that Impact LIPA's Electric Resource Plan

Several important changes have occurred since publication of the previous LIPA Energy Plan in 2004, each of which plays a key role in the current energy planning framework. The volatility and significant rise in fossil fuel costs and new regulatory and legislative requirements currently affect planning efforts. In addition, an increased concern with power plant emissions and global climate issues has focused emphasis on renewables and energy efficiency. Power supply and environmental concerns have sparked deepening interest in repowering aging generating plants on Long Island.

Fuel price increases have been volatile during the past few years, with expectations for continued volatility. Fuel costs are a key factor in the cost of electricity and LIPA's Electric Resource Plan must consider the impact of changing fuel costs and fuel sources on its long term customer costs through its choice of supply resources. In addition to the rising cost of burning fossil fuel, LIPA has on-going and

enduring concerns about air and other emissions that are a by-product of these fuels. Discussed below utility planning emphasis factors in such emissions to a greater extent than in past decades, and LIPA has focused significant resources toward improving the health and safety of the Long Island environment.

Regulatory and legislative initiatives on a national, regional and local basis are undergoing significant change. The National Energy Policy Act of 2005 (EPACT 2005) introduced numerous opportunities for market changes including requirements for FERC to introduce new reliability standards and issue revisions of its rules to encourage construction of new infrastructure. The EPACT 2005 also introduces grants and initiatives for adoption of new and encouragement of older technologies, in the latter case in particular updated nuclear technologies. The Energy Independence and Security Act of 2007 established significant energy efficiency standards and encouraged the use of renewable resources, among other initiatives. LIPA's planning and program implementation continues to place it in the forefront of U.S. utilities with its significant and on-going focus on efficiency and renewables.

The Renewable Energy Task Force, initiated by New York's Governor David Paterson in 2007, is striving to create an environment in New York where renewable energy technologies can prosper. The task force works to promote energy efficiency and conservation, identify areas prime for further research and development, review policies and regulations affecting the development of renewable and alternative technologies, and develop incentives to bring those technologies to the New York area. LIPA has been an active participant in the task force and will continue to support its mission and goals.

The New York ISO has fostered improved joint planning and reliability to ensure reliable power for the region. This effort, similar to those that are being initiated on a national basis, allows NYISO participants to participate and contribute solutions to the national debate on this subject. The NYISO initiative is the Comprehensive Reliability Planning Process and a Reliability Needs Assessment (CRPP, RNA). This initiative is a 10 year look at reliability and power generation issues within New York, with the goal to identify needs and potential solutions, and encourage the market to respond to resolve reliability concerns.

LIPA plans for continued evolution of the competitive generation market and some uncertainty regarding its large customer loads due to competitive choice of electric suppliers. The deregulated market provided both opportunities and risks for LIPA as described in this Draft Electric Resource Plan. The number, size, and load characteristics of the remaining large customers are factors in long term planning. Deregulation and customer choice allows any customer to leave, and subsequently return to, LIPA for commodity services at any time and LIPA must be prepared to provide that service. Similarly, LIPA assesses, through its planning process, the need for diverse supply resources and the impact of lack of diversity on security and cost of power supply and the environmental impacts of the resource choices. LIPA faces changes in these areas as generation and transmission technologies are evolving, fuel prices remain volatile, environmental and market rules are changing, and all of these considerations are factored into the LIPA planning process.

4.2 Credit Crisis

The electric power industry is one of the most capital intensive in the U.S. economy and the decrease in available financing caused by the current credit crisis has put a strain on that industry. The construction of new power plants necessary to maintain the reliability of the bulk power system requires significant amounts of capital investment. Anticipated improvements in the transmission system throughout the country also require financing. The 2008 credit crisis has resulted in a more difficult market for raising the capital necessary to improve the electricity infrastructure. Developers of new conventionally powered

and renewable energy power plants found it increasing difficult to secure the capital to build new facilities. Larger developers resorted to relying upon their own balance sheet to build new projects. Other developers partnered with customers that had excellent credit ratings through the use of long term power supply contracts in order to obtain the necessary financing. Electric utilities, like other companies, found it more difficult to raise funds. However, the impact on most electric utilities was less severe than most other industries due to the continuing demand for electricity. It is anticipated that most utilities will have sufficient reserves or the ability to raise the necessary funds in order to meet the critical needs of the electric system.

LIPA's strong credit rating and active management of its finances has allowed LIPA to continue to raise funds when required. Its policy of issuing long term contracts for power supply has allowed developers on Long Island to provide the resources needed by Long Island. These strategies combined with continued reliance on long term strategic planning and the ability to stay flexible in a constantly changing environment should result in an effective electricity resource plan for LIPA and its customers.

4.3 Fuel Markets

The volatility in fuel prices, coupled with the increases in fuel prices, are a key consideration within the LIPA Draft Electric Resource Plan as supply sources are considered and as the diversity of fuel sources is analyzed and optimized. LIPA explicitly considers the risk associated with reliance on each fuel through its Electric Resource Planning tools and decision process. LIPA has increased the diversity of its resource mix through its wind energy RFP and through the use of off-Island transmission resources.

The recent record-setting and unprecedented volatility in the cost of oil, natural gas and coal, two of which are the primary fuels used by suppliers to produce electricity for distribution to customers on Long Island, has had and will continue to have significant impacts on LIPA. Worldwide market forces have driven fuel prices as never before.

Natural Gas Pipeline

According to the Energy Information Agency's "Natural Gas Year-in-Review 2007" report, natural gas pricing in the past years has remained in a state of flux. Volatility has ranged from as low as 56.7% in 2002 to as high as 118.9% in 2003 to most recently, 61.6% in 2007. Major events causing supply disruptions are a main factor in gas supply pricing volatility, for example the hurricanes of 2005 and the recovery stage that extended into 2006. Natural Gas prices in August of 2008 were up 38% over August of 2007, although they have decreased 23.5% from July of 2008.

Net imports have increased 7.7% from 2006 to 2007, which reflects a record high of 3,729 BCF. Imports account for roughly 16% of U.S. natural gas consumption. In the Lower 48 states, more than 50 natural gas pipeline projects were completed, adding 14.9 BCF per day of capacity to the national natural gas grid.

LNG Development

Energy price volatility has focused the nation's attention on natural gas markets. However, North American natural gas production faced challenges, even prior to the hurricanes. In order to meet projected North American natural gas demand, energy companies are increasingly looking to import liquefied natural gas (LNG) as an alternative to domestic and Canadian natural gas. There are currently eight

terminals (7 import, 1 export) where LNG can be offloaded from tankers and shipped to North American customers via pipelines and trucks. An average of 30 billion cubic feet per month was imported into the United States between January and August of 2008. Energy companies have proposed 40 LNG projects, both new construction and expansions, totaling over 47 billion cubic feet per day of capacity. Such LNG capacity, if fully utilized, has the potential to flood the North American market with natural gas and drive prices down substantially. There are also questions about the viability of some projects due to legal, environmental, and engineering issues. In addition, the ultimate capacity will not be fully utilized 100% of the time, since the number of available tankers and the quantity of available supply will likely be limiting factors. Finally, the U.S. will be increasingly dependent on a highly competitive global marketplace for LNG, with established consumers such as Japan competing for available supplies, which may tend to keep U.S. natural gas prices elevated.

Oil

Petroleum liquids have increased in price 103% from in August of 2007 to August of 2008. This dramatic increase reflects the worldwide oil pricing trends and also explains the 40.8% decrease in petroleum liquid receipts in August of 2008 compared to a year earlier in August of 2007. Prices in early 2007 were in the $47/bbl to more than $58/bbl range compared to a mid 2008 range of $110/bbl to $135/bbl. The run-up in price along with growing discussion of peak oil concerns may be influenced by significant increases in use of fossil fuels worldwide in recent years. According to the USDOE EIA, China became the world's second largest consumer of petroleum products in 2004 (after the U.S.), passing Japan in 2003; China's increasing demand for oil is a key factor in world oil markets. Since May 1998, when a barrel of oil was $15, the price of a barrel of oil has increased over 600%. The cost of a barrel of oil hit a high of $134.44 /bbl in the U.S. on July 18 2008 before dropping precipitously.

Coal

According to the EIA, the average price of delivered coal to utility plants in New York increased 6.6% from 2003 to 2004. Recent spot prices have been fairly volatile. In the electric power sector, coal prices rose by an average of 7% in 2006 and by an additional 1% percent in 2007, according to the EIA short term outlook for coal. There has been renewed and increased interest in coal as the resource of choice in the U.S. with the announcement of numerous coal based units for construction in the next ten years.

Uranium

The demand for uranium is expected to increase drastically in the near future. In recent years, the nuclear industry has seen increased capacity at existing nuclear plants, extensions of plant licenses, and proposed new plant construction. For example, the China Atomic Energy Authority has announced plans to accelerate construction of up to 30 new nuclear power plants in order to quadruple its nuclear power capacity by 2020. New reactors are scheduled for construction in India, Finland, France, Russia, and the Ukraine. UEX believes that public opinion in many countries has moved in favor of nuclear power, and rising natural gas and oil prices have made nuclear energy the lowest cost option in several countries. In the U.S., other than hydroelectricity, nuclear energy is the cheapest source of electricity, and in recent months, several U.S. utilities have taken steps towards the construction of new nuclear power plants. Global warming concerns also support increased interest in nuclear power.

Currently, uranium produces approximately 16% of the world's power from more than 400 nuclear reactors.

In 2000, uranium spot prices reached 26 year lows of $7.10 per pound U3O8 due to the increased availability of secondary supplies and increased inventory sales. The spot price has since increased to $93.00 per pound U3O8 as of November 21, 2007, and the long term uranium market outlook remains positive with increased consumption, and the continuing draw down of secondary uranium sources. Given the lead time necessary to find and develop new mines, the projected gaps in both supply and future depletion of existing high grade uranium deposits means that uranium exploration must be accelerated in order to meet future demand. Even now, with the spot price of U3O8 at $93.00 per pound, uranium exploration budgets still fall short of the exploration expenditures carried out in the Athabasca Basin during the 1970's and 1980's when several new discoveries were made. The recent resurgence of concern over energy security and supply, and the corresponding interest in nuclear power as a reliable and clean source of energy has heightened the awareness that new uranium supplies will be needed in the long term. The new uranium production is likely to come from deposits in Canada, Australia, Africa, Kazakhstan and the United States. Most deposits generally have much lower grades than the high-grade deposits in the Athabasca Basin, and consequently it is anticipated that the new supply will come at higher cost, which is expected to put further upward pressure on the uranium price over the next several years.

4.4 Global Climate Change Initiatives

Growing concerns over air quality and global climate change has placed the energy and utilities industry under increasing pressure to limit its carbon footprint. The industry is gradually turning from the question of whether greenhouse gas regulation will occur, to now looking more closely at when it will occur, what the regulatory framework might be, and how carbon dioxide reductions might be accomplished. This issue is being addressed simultaneously with industry efforts to upgrade, expand and modernize its supply and delivery infrastructure. The ultimate cost of a "de-carbonized" industry, the investments in emerging technologies, and the utility rate treatment as utilities and energy companies recover related costs will remain key questions that will be intensely studied over the next several years.

Regional Greenhouse Gas Initiative

The Regional Greenhouse Gas Initiative (RGGI) is a cooperative effort by ten Northeast and Mid-Atlantic States to limit greenhouse gas emissions. RGGI is the first mandatory, market-based CO_2 emissions reduction program in the United States.

Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont are signatory states to the RGGI agreement. These ten states will cap CO_2 emissions from the power sector, and then require a 10 percent reduction in these emissions by 2018.

RGGI is composed of individual CO_2 Budget Trading Programs in each of the ten participating states. These ten programs are implemented through state regulations, based on a RGGI Model Rule, and are linked through CO_2 allowance reciprocity. Regulated power plants will be able to use a CO_2 allowance issued by any of the ten participating states to demonstrate compliance with the state program governing their facility. Taken together, the ten individual state programs will function as a single regional compliance market for carbon emissions.

To reduce emissions of greenhouse gases, the RGGI participating states are using a market-based cap-and-trade approach that includes:

- Establishing a multi-state CO_2 emissions budget (cap) that will decrease gradually until it is 10 percent lower than at the start
- Requiring electric power generator to hold allowances covering their emissions of CO_2
- Providing a market-based emissions auction and trading system where electric power generators can buy, sell and trade CO_2 emissions allowances
- Using the proceeds of allowance auctions to support low-carbon-intensity solutions, including energy efficiency and clean renewable energy, such as solar and wind power
- Employing offsets to help companies meet their compliance obligations, such as greenhouse gas emissions reduction or sequestration projects at sources beyond the electricity sector

RGGI's phased approach means that reductions in the CO_2 cap will initially be modest, providing predictable market signals and regulatory certainty. Electricity generators will be able to plan for and invest in lower-carbon alternatives and avoid dramatic electricity price impacts.

The first RGGI allowance auction was held on September 25, 2008. All of the 12,565,387 allowances offered for sale were sold at a clearing price of $ 3.07 per allowance. Fifty-nine participants from the energy, financial and environmental sectors took part in the first-in-the-nation auction, indicating a strong start in the first of many CO_2 allowance auctions. The demand for the allowances was very strong, with a total of 51,761,000 allowances demanded which was four times the available supply for this first auction. The $38,575,783 in proceeds from the auction were distributed to Connecticut, Maine, Maryland, Massachusetts, Rhode Island and Vermont, which were the six RGGI states that offered allowances for sale during the first auction. The states are investing those funds in energy efficiency and renewable energy technologies and programs to benefit energy consumers.

New York State will be participating in the next allowance auction set for December 17, 2008. These early auctions, combined with the others being held in the first compliance period, ensure there is ample opportunity for bidders to obtain the allowances they will need for compliance across the entire 10-state region. RGGI intends to hold quarterly auctions during the first RGGI three-year compliance period, from January 1, 2009 to December 31, 2011.

Much more information on the RGGI initiative is available at http://www.rggi.org.

Proposed Federal Carbon Legislation

Growing concerns over air quality and global climate change has placed the energy and utilities industry under increasing pressure to limit its carbon footprint. The industry is gradually turning from the question of whether greenhouse gas regulation will occur and now looking more closely at when it will occur, what the regulatory framework might be, and how carbon dioxide reductions might be accomplished. This issue is being addressed simultaneously with industry efforts to upgrade, expand and modernize its supply and delivery infrastructure. The ultimate cost of a "de-carbonized" industry, investments in emerging technologies, and utility rate treatment as utilities and energy companies recover related costs remain key questions that will be intensely studied over the next several years.

Opportunities to Reduce Carbon Footprint

The use of Plug-in Hybrid Electric Vehicles (PHEVs) represents a significant potential shift in the use of electricity and the operation of electric power systems. Electrification of the transportation sector will create additional loads on generators and transmission and distribution systems. Well-publicized failures of the electric grid have increased concerns regarding grid reliability and the need for additional transmission and generation capacity. Widespread acceptance of PHEVs may require assurance that this technology will neither result in decreased electric system reliability nor require massive new unsightly and unpopular infrastructure. Previous studies of pure electric vehicles (EVs) have demonstrated that existing capacity can meet the overnight charging loads of a modest penetration (up to 20%) of these vehicles.

Relatively few PHEVs have been built, essentially as demonstration vehicles and prototypes. While no major manufacturer has yet produced PHEVs, a study by the Electric Power Research Institute found a significant potential market for PHEVs, depending on vehicle cost and the future cost of petroleum. The economic incentive for drivers to use electricity as fuel is the comparatively low cost. The electric equivalent of the "drive energy" in a gallon of gasoline delivering 25-30 miles in a typical midsized car is about 9-10 kWh, assuming a vehicle efficiency of 2.9 mile/kWh. The cost of this electricity using the U.S. average residential rate for 2003 (7.6 cents/kWh) is less than $1, and could be less than 50 cents when using off-peak power at preferential rates

Other Emission Initiatives

Under the Clean Air Mercury Rule (CAMR), the EPA has promulgated regulations requiring the reduction of mercury emissions from all coal-fired power plants. The rule limits the total combined mercury emissions from all operating coal-fired power plants, and creates a market-based cap-and-trade program that will permanently limit utility mercury emissions in two phases: the first phase cap is 38 tons per year beginning in 2010, and the second phase cap is 15 tons per year beginning in 2018. These mandatory declining caps, coupled with significant penalties for noncompliance, will ensure that mercury emission reduction requirements are achieved and sustained. Compliance costs associated with these regulations could affect the purchase pricing for coal-fired generation.

In the same rulemaking, the EPA delisted nickel and is currently not regulating nickel emissions from oil-fired generators. However, both the mercury and nickel rulemakings are currently being litigated, with the possibility that either more stringent mercury rules may be required or that some control of nickel may be warranted.

In addition, numerous states are enacting their own regulations requiring mercury reductions from coal-fired units. These reductions will most likely require source specific reductions and will not allow or allow minimal trading of allowances. States that are in the process of developing mercury reduction regulations include Pennsylvania, Maryland, New Jersey, and New York.

Regarding other emerging air quality matters, there are numerous legislative initiatives on the local, state and federal level designed to reduce emissions from the electric generating sector. The implementation of any combination of proposals will effect the future operation of generating units. As these occur, they will likely impact, and must be factored into energy planning.

LIPA has taken significant steps to comply with the New York State Acid Deposition Reduction Program. This initiative is intended to reduce sulfur dioxide and nitrogen oxide power plant emissions

known to contribute to the production of acid rain. LIPA's assertive action on air emissions has allowed it to meet the New York Phase 1 Acid Deposition Reduction Program requirements. On the local level, both Suffolk and Nassau counties have enacted legislation to regulate the emissions of the green house gas, carbon dioxide, from local power plants. New York City has similar legislation pending. On the federal level, multi-pollutant and hazardous air pollutant reduction legislation and regulatory rules and orders may be adopted in the next three to six years, which will further impact emissions from electric generators nationwide.

Regarding clean water issues, the cooling water regulations are contained in the federal "Clean Water Act" which is administered in New York State by the Department of Environmental Conservation (NYSDEC). New and more stringent regulations recently issued by the EPA, and partly on its own initiative, have prompted NYSDEC to required new aquatic studies of power plant cooling water. Biological studies have been completed at Northport, Port Jefferson, EF Barrett, Far Rockaway, and Glenwood which indicate significant capital investments will be required to achieve compliance with the new clean water rules at most National Grid generating facilities.

4.5 New Technologies

To encourage early commercial projects that employ new or significantly improved energy technologies, EPACT authorizes DOE to issue loan guarantees for qualifying projects.

These include: clean coal projects that generate electricity and produce fuels; new nuclear power plants; production facilities for fuel efficient vehicles; plants that convert cellulosic biomass into ethanol and other commercial products; and renewable energy projects that employ innovative technologies. Loan guarantees offer a significant tool to help address a major capital market gap as lenders may be reluctant to provide loans to projects utilizing new technologies. These guarantees allow the government to create value by sharing the "first mover" risk with private sector investors who develop alternative energy projects. Progress: DOE established a Loan Guarantee Program Office and issued program guidelines that will govern the first round of loan guarantee applications.

The program will provide backing for up to $2 billion of loans to finance new energy projects. By sharing some of the financial risks associated with new energy technologies, DOE hopes to spur industry to invest in new technologies. Within the next several weeks, draft regulations for public comment designed to govern future solicitations will be offered for public comment. The Department views the first-round solicitation as a learning opportunity that will assist in building capability and expertise at the Department and in developing permanent regulations.

4.6 Smart Grid / Intelligrid

The U.S. power grid is increasingly operating near its technical limits and often faces shortfalls in capacity, reliability, security and power quality. Advancing technology, often referred to as "Smart" facilities are beginning to replace aging infrastructure and expand capacity where practical. This "Smart" investment represents a once-in-a-generation opportunity to apply new technologies and systems to update rather antiquated designs and technologies of the 1960s and earlier. New advances in power delivery, communications and information technology have laid the groundwork for a modern grid that has proven effective in lab tests and field trials. These cutting-edge solutions offer dramatic improvements in power quality, service, and cost savings.

The U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability sponsors the Modern Grid Strategy, aligning its efforts with existing programs such as Transmission Reliability, Electricity Distribution, GridWise Distributed Generation, GridWorks, and others. It builds on a national technology strategy that includes Grid 2030 and the National Electric Delivery Technologies Roadmap.

Creating a modern grid will require numerous years of continual investment and upgrade as the system evolves through the incremental deployment and integration of "smart" equipment or systems. For example, a utility might change out its conventional electro-mechanical house meters with solid state, two-way communicating meters. Over the past 5 years there has been a movement toward Advanced Metering Infrastructures (AMI), meter systems based on infrared, radio and cellular technologies. AMI has dramatically changed the way many utility companies perform their meter reading tasks, provide information and choice to customers, and cut operating and maintenance costs and increase operational effectiveness. These advanced meter systems will provide enhanced service to customers while providing the utility with new capabilities for operating and maintaining the grid. Intelligent metering offers a wide array of functionality above and beyond what traditional AMR metering offers. While there is no consistent definition for intelligent metering, key capabilities include: near-real time metering, 2-way communication and demand-side management options. Installing advanced metering systems is one step in a utility's evolution towards a smart grid. LIPA has begun a pilot program to test and understand the effectiveness of these systems as a precursor to a full scale deployment plan.

4.7 End-use Energy Efficiency

Energy efficiency has long been a national public policy priority, and has made a substantial contribution to the nation's energy supply, thereby "lightening the load" on our electric generation, transmission, and distribution systems.

End-use energy efficiency programs can make a very substantial, cost-effective contribution to electric system reliability over the next decade by reducing both the national base load and regional and local peak loads. These load reductions are achieved less expensively than the same amount of generation capacity could be built. Energy efficiency cannot completely obviate the need for any new generation capacity or enhancements to the transmission and distribution network, but it can cost-effectively and significantly reduce the need for both while providing a much-needed margin of insurance against the uncertainties inherent in the utility industry's transition to competitive markets.

Evaluation of energy efficiency program costs on the basis of the average cost per kWh of energy saved can dramatically understate the value of the peak demand reductions delivered by both energy efficiency and demand response programs. Demand reductions avoid the monetary and environmental costs of generation on the margin. An individual customer that reduces demand receives the private benefit of reduced energy bills, but also seems benefit in that the market-clearing price for delivered energy at any time is a function of overall system demand. Individual load reductions reduce this price, providing monetary benefits to all.

The New York State Governor has called for a 15% energy efficiency improvement initiative throughout the state by the year 2015.

LIPA has over a dozen energy efficiency programs aimed at helping to reduce power supply needs, at maintaining electric reliability for LIPA customers, and at reducing environmental emissions. In addition, LIPA has concluded that capital investment in a series of T&D energy savings scenarios with special

emphasis on system loss reductions could provide significant efficiency improvements. LIPA's 10-year, $355-million dollar Clean Energy Initiative (CEI) has been one of the most ambitious and comprehensive programs of its kind in the United States. These programs include the demand reduction program LIPAedge, and a volunteer program called "Watts Going Down," which has recruited over 20,000 volunteer residential and commercial customers who agree to reduce consumption on high demand days. Combined, these programs can save about 111 MWs of electricity when activated and can help reduce peak demand. LIPA is replacing CEI with a much more extensive initiative starting in 2009 that will invest up to $1 billion in energy efficiency with a 10th year goal of reducing the LIPA system peak load by 567 MW and achieving an annual reduction in energy use of 1,600,000 MWh.

4.8 Deregulation and Restructuring of the Electric Power Industry

The Federal Power Act of 1935 (FPA) established a regulated electric utility industry in the United States comprised of: investor-owned utilities; state, federal, and local municipal utilities; and cooperative utilities. These utilities were vertically integrated; owning generation, transmission, and distribution facilities necessary to provide service to the customer. Each type of utility was regulated in some fashion by a state or federal government, citizen or member-based board or commission.

The Public Utilities Regulatory Policy Act of 1978 (PURPA) was the first of several federal actions to deregulate the electric industry. PURPA, for the first time, allowed electric generation to be owned and operated by independent entities that were not regulated electric utilities. It was followed by the Energy Policy Act (EPA) of 1992 that, among other things, allowed for the establishment of Independent System Operators (ISO) to facilitate open and fair access to regional transmission systems and coordinate efficient dispatch of generating resources. In New York an ISO was established in 1999; LIPA helped form and participates in that ISO as well as the ISO in New England and the RTO in the mid-Atlantic region (PJM).

In 1996 FERC issued two sweeping decisions, Orders #888 and #889, mandating all regulated owners of electrical transmission to offer for sale transmission services under a standardized contract arrangement known as an Open Access Transmission Tariff. FERC's Order #2000, issued in 1999, pushed the electric industry to establish Regional Transmission Organizations, a voluntary organization of transmission owners, transmission users, and other entities approved by FERC to efficiently coordinate transmission planning and expansion, operation, and use on a regional and interregional basis. RTO's were expected but not required to be geographically larger than a single ISO.

Description of the Electric Markets

In the restructured electricity industry services may be provided by separate business entities. A Generation Supplier is the party that manufactures the electric supply. This provider includes formerly integrated utilities, non-utility players, such as so called "merchant" plant owners, and industrial entities owning co-generation. A Marketer or ESCO is a party that purchases or otherwise obtains title to generation output and then resells it to retail customers or other wholesale entities.

A Transmission Owner, such as LIPA, owns the facilities that transmit the power over the high voltage transmission grid. Typically a transmission owner is federally regulated and offers transmission service as required by FERC regulation through an Open Access Transmission Tariff which sets the rules by which customers may purchase service details the rate the customer will pay. Potential customers can purchase transmission service through an on-line electronic "bulletin board" called an Open Access

Same-time Information system. The Distribution Provider, Local Distribution Company, or Wires Company owns the facilities that deliver power over the local electrical delivery grid to the consumer, as LIPA also does. This business typically remains locally – state, local commission, or local board – regulated. An Independent System Operator is a FERC regulated entity operates an integrated transmission system or region made up of many transmission owners and that administers wholesale power markets. LIPA is a member of the New York, New England and PJM ISOs, the entities that manages the electric system and ensures reliability of system operation, as well as administers the wholesale power market in the New York and surrounding regions.

Impact of Competition on LIPA Resource Planning

After more than 10 years of development and operation, there is still much uncertainty regarding the wholesale markets that will hopefully be resolved over time. For LIPA, its role clearly remains that of the central planner for much of Long Island.

The new marketplace creates uncertainty in resource energy planning. In theory, the electricity market will send the proper price signals and suppliers will build new generators in response to increasing demand and corresponding increasing market prices. It remains unclear whether this process will ever actually work in broad markets. On Long Island, transmission import constraints and the concentration of generation with one supplier has created significant impediments to market driven supply development. To-date, market based generation has not emerged as a significant part of meeting Long Island's reliability needs. As a result, LIPA has assumed a leadership role in assuring Long Island reliability by contracting for development of the resources required to meet Long Island's needs. Over time, the energy market may mature to a point where LIPA will no longer need to take the lead on generation development. This end result can be facilitated by LIPA continuing to encourage third party development of generation and transmission interconnections in combination with improvements to the transmission infrastructure.

Implementing these steps will require substantial third party capital investment with associated contractual obligations by LIPA. Facilitating competition will require balancing this objective with LIPA's need to both manage risks and keep customer costs to a minimum. The Caithness Long Island Energy Center project, which will be capable of generating up to 326 MW of power, was selected by LIPA as the on-Island component of a diverse portfolio of resources providing the greatest long-term benefits for Long Island. LIPA has a power purchase Agreement for approximately 286 MW of the plant's output which will leave approximately 40 MWs available for merchant transactions.

4.9 Federal Initiatives

4.9.1 National Energy Policy Act of 2005

The Energy Policy Act of 2005, the first such Federal legislation in 13 years, is a comprehensive energy legislation package that authorizes and encourages, through incentives and grants, energy production and energy conservation, and streamlines permitting of new energy facilities.

It also encourages the development and use of new and alternative energy sources and fuels, and .authorized $2.7 billion to extend the renewable electricity production credit and additionally authorized loan guarantees for "innovative technologies" that avoid greenhouse gases, which can include renewable

energy. It also authorized subsidies for wind energy and other alternative energy producers and required the U.S. Department of Energy to study and report on existing natural energy resources including wind, solar, waves and tides.

The EPACT 2005 authorized $50 million annually over the life of the bill for a biomass grant program, added ocean energy sources including wave power and tidal power for the first time as separately identified renewable technologies and contained several provisions aimed at making geothermal energy more competitive with fossil fuels in generating electricity. It also provided authorization for research into hydrogen-based fuel technology.

The law requires that FERC establish mandatory national electric transmission reliability standards and revise its rules for transmission service, construction and siting of critically needed transmission facilities, including interstate projects.

The Act repealed PUHCA, a 1935 law which limited the merger of electric utilities and their holding companies and subjected holding companies to perceived onerous SEC regulation. Two key elements of PUHCA repeal are the removal of certain registration requirements and on-going regulation of holding companies by the SEC, and removal of the requirement applicable to holding companies that they could only acquire or merge with interconnected utilities that would operate as a single integrated system. Since the repeal of PUHCA constraints several major mergers have been implemented or announced. The National Grid acquisition of KeySpan Corporation is of most significance to LIPA's business interests.

The Energy Policy Act of 2005 requires a national assessment of oil and gas resources and reserves. It also provides incentives and grants in many areas to encourage development of fuel resources in the U.S. For example, the Act:

- Provides financial incentives for expanding and developing refineries,
- Provides royalty incentives to promote enhanced oil production through injection of carbon dioxide,
- Establishes a demonstration program to increase sequestration of carbon dioxide in enhanced oil recovery projects, and
- Extends the productive life of declining oil fields through financial incentives, technical assistance, and incentives for enhanced oil recovery to prevent the early abandonment of producible reserves.

The EPACT 2005 expanded federal jurisdiction over siting and infrastructure issues. The Act named the federal government as having the primary authority over the siting of Liquefied Natural Gas facilities effectively over-riding state jurisdiction. The implications of this new responsibility relative to state authority could result in some differences over federal decision. Interest in new LNG facilities has been increasing with many localities opposed to new facilities in their area. Access to new gas resources could have significant implications for the LIPA Electric Resource Plan.

Nuclear Power

The EPACT 2005 also encourages the investment in new nuclear based technologies by providing incentives for the early adoption of new and more efficient nuclear resources. EPACT 2005 provided

incentives for new nuclear facilities, in particular, electricity produced from a qualifying advanced nuclear power facility can claim a credit of 1.8 cents per kWh for the first eight years of operation, for up to the first 6,000 MW. Credit will be pro-rated to a lower value if more than 6,000 MW participate. The Secretary of Energy is authorized to provide a loan guarantee of up to 80% of the project cost of advanced nuclear energy facilities. Standby support is made available for nuclear plant delays beyond 180 days in the commencement of full operation due to litigation. The support is available for up to 6 new reactors.

Since the adoption of EPACT 2005 several nuclear utilities have expressed interest in these opportunities. In addition, on a national basis, the past few years have exhibited two primary trends that may be further encouraged by the EPACT 2005's adoption:

- A significant number of nuclear plants have been sold by their original owner, to operators dedicated to running these units efficiently as merchant generators, and
- Nuclear plants are having their operating lives extended for 20 years or more (beyond their original design lives of 40 years).

At least 12 of the 106 operating nuclear units in the U.S. have undergone these two evolutions or are in process. The industry leaders in this area include Exelon, Dominion, Entergy, Florida Power & Light, Constellation and Duke. To a lesser extent, some units have or are undergoing power uprating, typically resulting in a 10-20% increase in unit output. A request for approval of life extension for many units is anticipated.

Recent New York State actions mirror the above, to a very significant extent. Within the past six years, five of the six nuclear plants in the state, representing 15-20% of the state's electric capacity, have been sold to two merchant operators – Entergy and Constellation. In these cases, upwards of 90% of the output is being sold back to the former owners, for periods of up to 10 years, under "power purchase agreements". While LIPA has retained its ownership of an 18% share of the Nine Mile Point 2 Nuclear Station, the remaining 82% has been purchased and is operated by Constellation. In May 2004 Constellation Energy submitted a license renewal application for Nine Mile Point that would extend the life of the plant's two reactors for an extra 20 years. The Nuclear Regulatory Commission is currently considering this request. The reactors, which have licenses set to expire in 2009 and 2026, respectively, could obtain a license to operate until 2029 and 2046, respectively.

Given the life extension activities that Entergy has undertaken with other units it owns, it is possible that life extension will be explored for the New York State nuclear plants owned by Entergy. Power uprating is also a potential development for New York State plants, but case-by-case feasibility studies are required. Implications of these activities will afford opportunities for continued diversification of resources with the nuclear choice, but such changes must be considered explicitly as LIPA's Draft Electric Resource Plan is updated.

National Interest Electric Transmission Corridors

Section 1221(a) of the Energy Policy Act of 2005 amended the Federal Power Act (FPA) by adding a new section 216 to that Act. FPA section 216(a) directed the Secretary of Energy to conduct a nationwide study of electric transmission congestion by August 8, 2006. Based upon the congestion study, comments thereon, and considerations that include economics, reliability, fuel diversity, national energy policy, and national security, the Secretary may designate "any geographic area experiencing electric energy

transmission capacity constraints or congestion that adversely affects customers as a national interest electric transmission corridor."

The national congestion study is to be updated every three years. The cost of congestion varies in real time according to changes in the levels and patterns of customers' demand, including their response to price changes, the availability of output from various generation sources, the cost of generation fuels, and the availability of transmission capacity. Based on the fact that the LIPA Network has been identified as one of the congested areas within the United States where the increase in the required electric flows to Long Island will have to originate from other regions with a surplus, transmission constraints occur in most areas of the Nation, and the cost of the congestion they cause is included to some degree in virtually every customer's electricity bill. Although congestion has costs, in many locations those costs are not large enough to justify making the investments needed to alleviate the congestion. DOE anticipates that regional and inter-regional, where appropriate congestion solutions will be based on a thorough review of generation, transmission, distribution and demand-side options, and that such options will be evaluated against a range of scenarios concerning load growth, energy prices, and resource development patterns to ensure the robustness of the proposed solutions. Such analyses should be thorough, use sound analytical methods and publicly accessible data, and be made available to industry members, other stakeholders, and federal and state agencies.

4.9.2 Energy Independence and Security Act of 2007

The 2007 Energy Independence and Security Act (EISA) established efficiency standards for vehicles, substantially increases the renewable fuel requirements, and also of more direct impact to LIPA, phases out the use of inefficient incandescent lights and imposes improved energy efficiency standards on a wide variety of household appliances. The Act allows the Department of Energy to create a national standard for energy efficiency, and recognizing climate variations throughout the U.S., regional efficiency requirements for heating devices and two regional standards for cooling products. The 2007 EISA also establishes, but does not fund, research and development programs for solar, geothermal and ocean power technologies. The Act does provide a 17% budget increase for the DOE Office of Energy Efficiency and Renewable Energy.

4.9.3 Mandatory Reliability Compliance

The Energy Policy Act of 2005 also authorizes the creation of an electric reliability organization with the statutory authority to enforce compliance with reliability standards among all market participants. The North America Electric Reliability Council is working closely with industry stakeholders, the Federal Energy Regulatory Commission, and regulators in Canada to implement the provisions of the reliability legislation. The electric industry is adjusting to the change from a voluntary system of compliance with reliability standards to a new mandatory system of reliability standards and ERO enforcement that has the full authority in the United States of the FERC. The current situation is as described below:

- There are some 107 standards proposed for FERC approval
- These Standards define over 850 enforceable requirements and measures
- Maximum fine of up to $1 million per day per violation

From this situation, the current challenges will be as follows:

- Establish a compliance system
- Understand the complexity of standards
- Perform auditable compliant gap analysis
- Address gaps
- Keep up with new/revised standards

4.9.4 Federal Energy Regulatory Commission Initiatives

Under Part II of the Federal Power Act (FPA), "public utilities" are subject to regulation by FERC. A "public utility" includes any person or entity that owns, controls, or operates facilities used for the transmission of electric energy in interstate commerce or for the sale of electric energy at wholesale in interstate commerce. However, under Part II of the Federal Power Act a "public utility" does not include a state or any political subdivision of a state, or any agency, authority, or instrumentality of any one or more of the foregoing.

As a corporate municipal instrumentality and political subdivision of the State of New York, the Authority, and, indirectly, LIPA, is largely exempt from FERC regulation as "public utilities" under Part II of the Federal Power Act. Notwithstanding this exemption, the Authority and LIPA are subject to the authority of FERC to order interconnection of its facilities pursuant to Section 210 of the FPA, and the authority of FERC to order "transmitting utilities" to provide transmission services in accordance with sections 211 and 212 of the Federal Power Act as amended by the 1992 Energy Policy Act. LIPA fulfills most of these obligations through its membership in the NYISO.

On April 24, 1996, the FERC issued Orders 888/889, two rules that contain significant policy initiatives designed to open the market for generation of electricity to competition. The rules effect significant changes in the regulation of transmission services provided by "public utilities" – as defined in the Federal Power Act – that own, operate or control interstate transmission facilities used to transmit power in interstate commerce, or "jurisdictional utilities". Neither the Authority nor LIPA is a jurisdictional utility as so defined. Order No. 888 requires all public utilities to provide open access transmission service by implementing tariffs (Open Access Transmission Tariffs or "OATT") that offer non discriminatory service to all requesting entities. The standard for non discriminatory access is that the pricing and terms of service offered other parties must be the same as they provide themselves. The order also contains a reciprocity provision which requires that non jurisdictional entities, such as LIPA, that purchase transmission service and that own transmission facilities, also provide open access transmission service to other requesting entities under the terms required by Order 888. Order 889 requires utilities to share transmission-related information on a real-time basis. It also established standards of conduct to ensure that utilities separate their transmission and wholesale power merchant businesses to prevent self-dealing. LIPA's membership in the NYISO fulfills the FERC reciprocity requirements.

Recent FERC rules have required updating the OATT to clarify rules for interconnection of both large (more than 20 MW) and small (20 MW or less) generators. These clarifications and the intentional establishment of different requirements for large and small generators in intended to help to streamline interconnections and clarify the rules. This is intended to help all generation by streamlining the process to encourage smaller, often renewable, generation.

The FERC Strategic Plan for 2005–2008 provides a Vision and Mission for the Commission as well as a number of strategic goals and objectives which coincide with the LIPA plans and actions to ensure secure and stable power supply and delivery. Goals of the FERC Plan include: Protect the Reliability, Security and Safety of the Energy Infrastructure; Encourage Investment in Energy Infrastructure; and Expedite Development of Energy Infrastructure Projects. More information can be found at FERC's Web site: http://www.ferc.gov/about/strat-docs/strat-plan.asp. LIPA's recent activities have included significant efforts in achieving, for Long Island, similar goals as those put forth by FERC for the U.S. as a whole.

4.10 New York Independent System Operator Initiatives

Comprehensive Reliability Planning Process

The New York Independent System Operator (NYISO) started the Comprehensive Reliability Planning Process (CRPP) - Reliability Needs Assessment (RNA) in August 2004. This initiative is intended to begin a process by which the NYISO would identify and resolve reliability issues affecting the New York electric system for the next decade. The NYISO gathers input from Transmission Owners, including LIPA, and other stakeholders in the New York electric industry, such as generators, developers of merchant transmission, and demand response resources and the New York State Public Service Commission. The planning process envisions development and continual update of a 10-year comprehensive plan. The ten year plan is intended to identify weaknesses in the New York grid and encourage investment in generation, demand side resources like energy efficiency and management of load, and new transmission in order to address any potential problems. This process positions the NYISO well as FERC has called on all independent system operators and regional transmission organizations to develop formal, long-range planning procedures.

The most recent NYISO Reliability Needs Assessment Report was issued on January 13, 2009, and provides a long term evaluation of the New York electric grid. This report represents the fourth cycle of the annual Comprehensive Reliability Planning Process (CRPP) designed to address the long-term reliability of the New York State bulk power system. The RNA consists of it and its supporting documents and appendices. Just as important as the electric system plan, is the process of planning itself. Electric system planning is an ongoing process of evaluating, monitoring and updating as conditions warrant. In addition to addressing reliability, the CRPP is also designed to provide information that is both informative and of value to the New York wholesale electricity marketplace. The NYISO 2009 RNA Report identifies a long term need for additional generation and/or transmission in the southeastern sections of New York State including Long Island and New York City.

The current New York ISO market rules recognize the need to have defined quantities of capacity specifically located on Long Island, within New York City, and available as dedicated resources to the New York Control Area as a whole so that the system can perform reliably. The NYISO has implemented a capacity market that is designed to procure and pay for at least the minimum requirements in each area. If these mechanisms work as intended and continue to require resources at the same levels as have existed in the past, they should result in the addition of new resources to meet most or all of the New York City and Long Island needs identified in this RNA. The control area wide requirement would result in additions that are needed to meet statewide reliability requirements.

LIPA initiatives to acquire new merchant generation, re-power existing plants, encourage significant efficiency enhancements in customer use, along with consideration of another new submarine cable interconnection to New Jersey in addition to the Neptune project, are all consistent with and validated by

the NYISO Assessment. The current LIPA Draft Electric Resource Plan documents an innovative, forward-looking effort on LIPA's part to anticipate future resource needs and identify a range of resources beyond the NYISO process to address Long Island's energy needs.

Power Trends 2007 Report

The Power Trends 2007 Report, issued by the New York ISO, cautions that the near-term outlook contains many challenges for the New York electric system. While the supply outlook is good through 2011 there is uncertainty associated with two important environmental initiatives that could change the picture rapidly. The annual Planning Process undertaken by the NYISO and its stakeholders has successfully identified resource needs for reliability purposes. The market has responded with project proposals to meet those needs. For the year ahead, the NYISO notes the following issues of interest and concern for New York:

- Circumstances have evolved which elevate the need for a streamlined power-plant siting law to one of utmost urgency. The Governor and the State Legislature should consider a technology-neutral approach to new legislation similar to Article X that will remain consistent with the state's ambitious environmental agenda.
- The extensive scope of the electric power sector's role in the implementation of various environmental initiatives requires a collaborative and coordinated effort among state and local government agencies, the NYISO and stakeholders throughout the electric industry so that environmental goals can be met in a manner consistent with the essential reliability requirements. The collaborative process recently established by the PSC in its order on electricity reliability and infrastructure planning is a timely and important venue that promises to make significant contributions in this regard.
- The NYISO's planning process and analytical capabilities can provide reliable, objective analyses to policy makers as they consider programs that will affect the state's electricity industry, environment, and economy.

More broadly, the intersection of global environmental and energy concerns will require enhanced energy efficiency as well as a greater emphasis on demand side resources. It will foster the deployment of new energy technologies and require a comprehensive approach to all sectors of the state's economy that rely on increasingly costly carbon fuels. The NYISO is prepared to commit its resources, in cooperation with its stakeholders and state and federal agencies, to the collective effort to successfully manage the continued transformation of the state's electricity industry.

4.11 New York State Initiatives

New York State Renewable Portfolio Standard

The State of New York established a Renewable Portfolio Standard (RPS) in 2004 as a program designed to increase the proportion of renewable energy that is consumed by retail customers in New York State.

The RPS is intended to help New York State meet its growing demand for electricity, increase fuel diversity for the state's generation portfolio, reduce exposure to fossil fuel price spikes and supply interruptions, increase economic development activity from a growing renewable energy industry, and improve the state's environment. According to Commission estimates, by 2013 the RPS Program is

expected to reduce statewide air emissions of nitrogen oxide (NO_x) by 6.8 percent, sulfur dioxide (SO_2) by 5.9 percent, and carbon dioxide (CO_2) by 7.7 percent, with the greatest proportion of emission reductions expected in New York City and Long Island

The overall RPS goal is to increase the proportion of NYS retail sales of electricity derived from renewable resources from the 2003 level of 19.3% to 25% by the end of 2013. The RPS was established on September 24, 2004 when the State of New York Public Service Commission (NYPSC) issued an "Order Regarding Retail Renewable Portfolio Standard" for case 03-E-0188. The New York State Energy Research and Development Corporation (NYSERDA) is administering this program. The Commission estimates that in order to meet the 25 percent target New York State will need to add approximately 3,700 MW of renewable resource generation capacity. A generator is eligible only if its energy is consumed in New York, but generators located out side of New York that sell their output into New York are eligible.

NYSERDA and Staff have conducted two Main Tier solicitations; the first was completed in January 2006 and the second in March 2007. These solicitations resulted in contracts for 26 renewable generation facilities totaling more than 800 MW with an expected output that will reach almost 2.9 million MWh in 2008. This accounts for about 28 percent of the 9 million MWh necessary to meet the 2013 goal.

The RPS program is intended to provide sufficient incentives to encourage development of a renewable generation industry in NYS. The RPS program is designed to coexist with the competitive retail energy market for renewables and encourage voluntary "green" marketing programs.

The impact of fossil fuel and electricity price increases, the desire to reduce air emissions, along with the EPACT 2005 and EISA 2007 Federal legislation has sparked renewed interest in the development of renewable energy resources. Efforts to develop wind, biomass and other renewable or "green" resources have increased substantially in recent years. Studies and analysis sponsored by New York State and by the NYISO suggest that significant amounts of renewable generation sources can be economically and reliably added to the New York grid in the coming years. Also, off-grid or small scale renewable energy resources such as solar and small wind systems, among others, may continue to benefit individual electric customers who choose to install systems and take advantage of financial and other support offered by LIPA, New York State and Federal programs. Additionally, the majority of LIPA's on-island generation reserves are fueled by natural gas or oil, which have price volatility that has substantially increased in the past two years. Renewable generation offers a means of hedging costs at fixed amounts for longer terms.

LIPA, as a non-profit municipal electric utility, is not regulated by the Commission and therefore is not required to participate in this RPS program; however, LIPA supports the efforts of the Commission in establishing the RPS for New York State and intends to fully meet the spirit of the goals of this initiative while carefully considering the rate impacts on customers. LIPA continues its historical role as an industry leader encouraging the development and use of generation from renewable energy resources. LIPA supports world-class programs encouraging the implementation of solar, fuel cell and wind energy projects on and near Long Island.

NYSERDA Wind Study

In March 2005 The New York State Energy Research and Development Authority (NYSERDA) issued its Phase 2 report on electric generation with wind energy. This Report followed a Phase 1 report in early 2004 on the same topic of wind energy. The study, performed for NYSERDA by GE Energy Consulting evaluated the potential impacts of adding 3,300 MW of wind generation onto the New York electric grid,

and concluded that such an amount of generation could be added without causing significant problems on the grid or to the current planning and operating practices employed by the NY Independent System Operator. The study identified 101 proposed wind electric projects in New York with a total generation potential of over 10,000 MW. It also provided a review of world experience with wind generation, focusing on regions that have integrated significant amounts of wind resources into their power grids.

The study evaluated New York State in terms of the New York Control Area Load Zones that have been established for planning and operation purposes including assuming 600 MW of wind power projects electrically connected to the Long Island zone (Zone K). The study assumed the wind projects would be off shore but connected via a 115 KV transmission line to the Island grid. The 600 MW is approximately 11% of the LIPA peak electric load and no significant concerns for LIPA grid reliability or operations were identified in this study from adding that amount of new wind generation.

Other Sources of Renewable Energy

Generating three times more energy than any other renewable source, the United States' hydroelectric plants produce 300,000 MW, making the largest contribution to the country's renewable energy; however, wind power in the United States is a growing industry. Latest available figures, which are through the end of 2006, show that installed U.S. wind power capacity now exceeds 21,000 MW covering 35 states, which is enough to serve 5.7 million average households. While Western states lead the U.S. in installed wind power capacity, New York and the PJM region are currently experiencing significant wind development activity, with growing interest in New England. Wind power in all three of these regions could be accessible to LIPA through the existing transmission interconnections.

LIPA has encouraged solar electric development by its customers on Long Island and has provided over 1000 incentive rebate payments for such systems for homes, schools and businesses. However, the nature of the solar resource on Long Island lends itself to small scale development, unlike the several multiple megawatt solar thermal power stations which have been built in the U.S. southwest, including the new 64 MW Nevada Solar One, commissioned in June 2007. LIPA's popular rebate programs will continue to make a positive affect on individual customers but additional power resources will also have to be tapped to meet projected load growth on Long Island.

Geothermal energy use is undergoing expansion and the USA is a world leader in the generation of electricity from geothermal energy. According to an August 2008 report, nearly 3,000 MW of geothermal resources are in operation in the western US, with more than 2,500 MW in California alone. Four new plants came on line during 2008, on each in California, Nevada, Idaho and New Mexico. According to the Geothermal Energy Association, there are 97 new geothermal power projects underway in 12 states as of May 2007.

The geothermal resource on Long Island, like the solar energy resource, tends to lend itself to small scale heating and cooling applications and not large electric generation stations as in the western U.S. LIPA customers primarily can use ground-source heat pumps which use the relatively constant temperature of soil or surface water as a heat source and sink. They extract natural heat stored in the earth, circulating it through underground pipes to keep buildings comfortable year round. Such systems can provide valuable heating and cooling for buildings as well as domestic hot water, offsetting other energy sources used for these purposes, but is not well suited to electric generation.

Renewable Energy Task Force

LIPA is an active participant of the New York Governor's Renewable Energy Task Force. This task force is charged with identifying barriers to increased production of renewable energy, recommending policies and financial incentives to overcome those barriers, and identifying future market areas that need further investment in research and development.

Article X

Article X of the Public Service Law, governing power plant siting requirements, was enacted in 1992 and expired on January 1, 2003. In June 2005 new Article X legislation was proposed, intended to improve the review and siting process for electric generating facilities in the State and reauthorize a state-wide energy planning process to ensure an adequate, reliable and affordable supply of energy to meet New York's growing energy needs. Several bills are currently before the New York Legislature – one in the Senate and two in the Assembly – that would reinstate Article X. Each bill is described here.

The Senate bill proposes to establish a state energy planning board to create a state energy plan, and establishes a process for the siting of major electric generating facilities; it is substantially similar to the lapsed law.

One of the Assembly bills that propose to re-authorize Public Service Law (PSL) Article X has several new features, such as lowering the threshold size for a generator requiring Article X certification from 80 MW to 30 MW, increasing intervener funding, and adding a requirement for several new studies. Together, these new features could extend the time frame for power plant permitting. This bill also adds a feature regarding portfolio management services from utility companies in which it would require utilities to consider a range of alternatives to supply their customers` needs and to utilize a mix or "portfolio" of resources, including long- and short-term contracts with wholesale energy suppliers, and energy efficiency and alternate technologies, including renewables, to meet customer demand.

The other Assembly bill proposing to reauthorize Article X of the Public Service Law, like the Senate bill is very similar to the expired law, however it includes provisions to encourage the use of previous industrial properties and brownfields as generating sites.

4.12 Security and Safety Issues

The safety and security of its customers is one of LIPA's chief concerns. Since 1998, LIPA has been committed to serving electricity customers in a way that maintains a secure and reliable infrastructure in addition to providing a safe electric system.

4.12.1 Infrastructure Security

Protecting power plants and the electric grid from sabotage has long been a concern for the industry. The September 11, 2001 events have spawned new efforts to evaluate vulnerable areas, to take protective measures where possible, and to institute and develop a state of readiness to respond and remedy under emergency conditions, should an act of terrorism occur. LIPA, like many transmission and distribution companies, is well equipped to deal with emergencies because of their past experience in responding and recovering from natural disasters such as hurricanes, ice storms, tornadoes, etc. In some ways, having a reliable well-maintained system is the first step in providing security. LIPA has undertaken courses of

action to identify vulnerability, put in place security measures where possible, and instituted a state of preparedness to respond should an event occur.

4.12.2 Safety

Electromagnetic fields (EMF) are comprised of two invisible force fields: an electric field (electric voltage) and a magnetic field (electric current). EMF consists of electric and magnetic waves traveling together. Electric charges create electric fields, and create magnetic fields as they move. EMFs are generated by electricity moving over wires or powering electrical devices, and dissipate quickly.

Any device that is plugged into an electric outlet, and is therefore connected to a source of electricity, will have an associated electric field, even when the device is switched off. Electric fields are easily shielded even if the device is not switched on. When a device connected to an electric outlet is switched on and a current is flowing, it will also have an associated magnetic field. Magnetic fields only exist when the appliance is switched on and operating. Magnetic fields are not shielded by most common materials, including soil; therefore burying transmission lines below ground will not reduce EMF exposure. The electric current used for a multitude of household tasks produces certain kinds of electric and magnetic fields. Sources of exposure to EMF include all electric appliances including shavers and hair dryers, video display terminals and electric blankets. Additionally, outside the home, transmission and distribution power lines create EMF.

Electric and magnetic fields can cause small electric fields in humans. These fields are much weaker than the fields that occur naturally, but there is some evidence suggesting that they might affect cell function. There have been several studies conducted to determine whether exposure to magnetic fields causes disease in humans. Some of these investigations suggest that exposure to EMF may possibly be related to a number of health effects. However, these studies do not provide firm evidence that EMF exposure impacts human health. The research completed so far raises many unanswered questions, as there have been both positive and negative conclusions drawn in various studies. Extensive further research is needed to better understand any possible links between EMF exposure and health problems.

Currently, there are more than 230 research projects underway world-wide investigating EMF. Projects include research on any possible relationship between EMF and incidence of disease, laboratory studies on biological effects of EMF and exposure and measurement studies.

As research into EMF continues, the New York Public Service Commission has established interim safety standards to ensure that new power lines do not produce unnecessarily high electric or magnetic fields. New high voltage transmission lines in New York must be designed so that the maximum magnetic fields at the edge of the right-of-way will not exceed the maximum magnetic field levels produced by the average high voltage (345 kV) lines now in operation.

Currently, there are no health-based standards for long-term human exposure to EMF in the United States. Until more scientific data becomes available, it is difficult to establish safety standards for exposure to EMF. While data indicates that locating near a power line or a substation can increase an individual's overall exposure to EMF, the evidence is not clear enough to determine whether or not this presents any health problems. For more information on EMF, visit LIPA's Web site http://www.lipower.org.

4.13 Aging Infrastructure

As LIPA's infrastructure ages, it is important to maintain all of the pieces along the electric supply chain. Generation needs increase over time to serve a growing number of customers demands, therefore LIPA must remain flexibly and creative to accompany all of those demands. Transmission improvements, as well, are necessary to ensure the grid's reliability. Finally, distribution is an integral part of the electrical supply chain and its system metrics must also be monitored combat aging and stay current with new technologies.

Generation

LIPA has added nearly 1,800 MWs of supply capability since 2001. In addition to the addition of power supply from 13 new on-Island generating stations and 2 submarine cables connecting Long Island to surrounding power markets, LIPA expects the 350 MW Caithness Long Island Energy Center to be completed and in operation in 2009. In addition, and partly as a response to the aging generation infrastructure it acquired from LILCO, LIPA conducted studies evaluating the engineering, environmental, and economic feasibility of developing repowering projects at older power plants owned by KeySpan/National Grid. These include the Barrett, Far Rockaway, Wading River, Shoreham, Port Jefferson, and Northport generating stations.

Transmission

Since acquiring the LILCO transmission system in 1998, LIPA has taken aggressive steps to upgrade and optimize its transmission and sub-transmission systems. These improvements have enhanced system reliability and provided greater access to competitive sources of energy both on and off Long Island. LIPA has developed a Transmission Plan that is focused on increasing the amount of interconnection capacity, minimizing power flow constraints, improving system reliability, increasing power transfer capability, and accommodating new on-Island merchant generation. LIPA has invested significantly in upgrading and expanding the aging infrastructure it acquired in 1998 and has diligently improved the transmission system function and dependability.

Distribution

Since acquiring the T&D system from LILCO in May 1998, LIPA has taken aggressive steps to upgrade and optimize its distribution system with projects that enhance system reliability and reinforce the distribution system infrastructure to make it more resistant to storm-caused damage. LIPA has formulated a Distribution Plan that is focused on ensuring system reliability and infrastructure adequacy to meet the needs of its customers. Guided by this Plan LIPA has taken aggressive steps to upgrade and optimize the existing distribution system to meet the growing and changing character of the Long Island electric load in a reliable manner. Some projects are undertaken to construct new or expand existing distribution substations and lines while others are designed to maintain or improve system reliability. Reliability improvement and programmed equipment replacement projects will continue to enhance system reliability and reinforce the distribution system infrastructure to help make it more resistant to storm-caused damage.

5 Public Communication Channels

Providing customers with timely information about energy issues has become increasingly important for utilities. The rapidly changing energy marketplace has provided customers with many more options regarding their energy supply. In order to make informed decisions, customers are demanding more frequent and comprehensive means of communications with their electric providers. The availability of information on the internet has raised customer expectations about the depth and breadth of communications. LIPA relies upon its Web site, http://www.lipower.org, to provide detailed and current news and information. LIPA also aims to include the public in its planning process by holding hearing and working to incorporate the opinions of various environmental, civic, and government groups. LIPA recognizes that consumers need to be better informed regarding energy issues, and has made customer communications a priority.

5.1 The LIPA Web site

The LIPA Web site, http://www.lipower.org, provides information about the Electric Resource Plan and many other topics of concern to LIPA customers. The Web site is the main collection of information for interested parties and is updated regularly by LIPA staff. The site provides customers with the most up-to-date information about LIPA, the Electric Resource Plan, conservation and energy programs, annual reports, a calendar of events and many other topics of interest. LIPA has recognized the importance of its Web site as a communication tool and has invested significant resources in its development to keep customers up-to-date and informed. The LIPA Web site was rated by ESOURCE as one of the top 2007 Web sites in the Eastern Region out of over 100 gas and electric Web sites considered. It provides current LIPA news, events, project updates, residential and commercial program information, rebates and promotions, outage reports, energy efficiency and electric/storm safety information, customer service and account information. Customers can use the Web site to access utility call centers for billing inquiries, customer connection issues and to report outages or check on the status of service restorations. In addition, bill inserts and messages included directly on the bill itself are available online, as are periodic newsletters such as LIPA E-News and LIPA Business News. Even past E-News issues are available in online archives.

Through LIPA's Web site we now offer RSS (Really Simple Syndication) feeds of all press releases and Web site updates. This allows customers, media representatives and other interested parties the ability to read the latest news at their convenience without searching for it. RSS feeds automatically and constantly deliver the latest LIPA news and information right to an internet browser, not to email. It offers a smart and easy way to stay up-to-date with the latest information LIPA has to offer including Webcasts of LIPA Board Meetings and LIPA Finance and Audit Committee Meetings, complete with meeting agendas and closed captioning. LIPA also uses its Web site to podcast the latest LIPA news directly to interested parties as an MP3 file, which can be played in any portable media player such as an iPod or a computer. The LIPA Web site also allows streaming and downloading of audio and high resolution photos from LIPA Events. Online outage reports and detailed interactive maps during unusual events are available as are educational videos and radio spots on saving energy and storm preparation. Customers can now view their electric usage and account history online. While LIPA will continue using the local newspapers to

advertise meetings or special events, it has also begun advertising online through the use of banner ads and press release links on local Web sites.

5.2 Alternative Information Sources

Alternative lines of customer communications, outside of the Web site, include bill inserts and messages included directly on bills themselves. These are supplemented with the availability of utility call centers for billing inquiries, customer connection issues, reporting outages and checking on the status of service restorations. LIPA intends on maintaining these channels, while supplementing them with additional ways to provide customers with timely information.

To better inform their customers, LIPA will continue using the local newspapers to advertise meetings or special events that affect the LIPA service territory. The information will be as detailed as possible and will provide alternative means of obtaining information from the LIPA Web site or service centers.

In 2005, LIPA initiated LIPA E-News and LIPA Business E-News. Two versions of an on-line energy newsletter are prepared and distributed via e-mail, one specifically for residential customers and one targeted to commercial and industrial customers. As LIPA continues to develop its email lists, it will develop topical lists of information so customers can choose only to receive information on issues of interest to them.

Service centers, town halls, and libraries will be used by LIPA on occasion to distribute information about upcoming events or to educate the public on conservation or energy efficiency. These forums are used to communicate with the customer individually or in small groups. These face-to-face meetings will bring the personal side of LIPA to its customers.

Enhancing communications with customers to promote dissemination of energy related information is an important goal for LIPA. Communication plans will be continually updated and expanded as technology evolves and as customer needs for energy information change over time.

5.3 Responding to Public Comments

LIPA strongly supports a public planning process including public hearings in addition to collaboration with Long Island citizens, environmental organizations, civic groups, and government agencies. Programs that impact the public sector, such as new transmission lines, storm hardening programs, and substation expansions/modification, are always addressed publically. Outreach with public officials is conducted on a village, town, or county basis. In parallel, community groups, civic associations and other interested parties receive associated outreach materials. When required, additional informational meetings are held as needed. LIPA seeks to exceed any regulatory requirement in order to better inform the customer base. As part of its efforts in creating the Electric Resource Plan, public hearings were held in April and May of 2008 in recognition of the Energy Master Plan Outline, now renamed as the Electric Resource Plan Outline. A list of the comments received, along with associated responses from LIPA can be found in Appendix C, Response to Comments.

6 Utility Terms and Definitions

Provided below are definitions for the most commonly used energy terminology in the Electric Resource Plan report and its appendices. The definitions are based on New York State rules and regulations, meaning may vary in other jurisdictions.

"15 x 15" Campaign: (also "15 by 15"): A New York State initiative with the intent to effect a 15% reduction of energy usage in the state by the year 2015.

"15 by 15": see "15 x 15" Campaign

Acid Deposition Reduction Program (ADRP): A New York State initiative designed to reduce emissions that contribute to acid rain, and to protect certain sensitive areas of the state from acid deposition.

AC: see Alternating Current

ADRP: see Acid Deposition Reduction Program

Aggregate: Individuals who unite for a particular reason or cause. In the electric industry, individuals, small businesses and other users may aggregate or join together in a large group to pool their power needs and negotiate for discounts on their power bills based on purchasing a higher volume of electricity.

Alternating Current (AC): Flow of electricity that constantly changes direction between positive and negative sides. Almost all power produced by electric utilities in the United States moves in current that shifts direction at a rate of 60 times per second.

Avoided Costs: Costs a utility avoids by purchasing power from an independent producer rather than generating the power themselves, purchasing from another source, or constructing new power plants.

Base Load: The minimum amount of electric power delivered or required over a given period of time at a steady rate. Also, the minimum energy level a company must provide to its customers on a constant basis to meet average daily demand. For utilities, base load power is supplied 24 hours a day by large, efficient generating stations designed for long-term operation. When demand for energy rises, additional peaking units are brought on line.

Bioenergy: see Biomass

Biomass: Plant materials and animal waste used as a source of fuel for generating electricity.

CAIDI: see Customer Average Interruption Duration Index

CAIR: see Clean Air Interstate Rule

CAMR: see Clean Air Mercury Rule

Capacity: The amount of electric power delivered or required for which a generator, turbine, transformer, transmission circuit, station, or system is rated by the manufacturer.

CHP: see Combine Heat and Power

Clean Air Interstate Rule (CAIR): A 2005 U.S. Environmental Protection Agency rule meant to reduce emissions from power plants, especially sulfur dioxides and nitrogen oxides**.**

Clean Air Mercury Rule (CAMR): A 2005 U.S. Environmental Protection Agency rule meant to reduce mercury emissions from power plants**.**

CL&P: see Connecticut Light and Power

Cogeneration (also known as Combined Heat and Power): Production of heat energy and electrical or mechanical power from the same fuel in the same facility. A typical cogeneration facility produces electricity and steam for industrial process use.

Combined Cycle Plant: An electric generating station that uses waste heat from its gas turbines to produce steam for conventional steam turbines.

Combined Heat and Power (CHP): An electricity generation technology that involves the recovery of waste heat from the electric generation process to produce other forms of useful energy simultaneously, such as useable heat or steam (formerly known as cogeneration)

Combustion Turbine: A fossil-fuel-fired power plant that uses the conversion process known as the Brayton cycle. The fuel, oil or gas is combusted (burned) and drives a turbine generator. Jet engine technology

Commission: The public entity that oversees the utility. At the Federal level this is the Federal Energy Regulatory Commission (FERC) and at the New York State level this is the New York Public Service Commission (NYPSC).

Competitive Retail Electric Service: Competition in the generation portion of electric service.

Comprehensive Reliability Planning Process – Reliability Needs Assessment (CRPP-RNA): This effort was started in August 2004 and is intended to begin a process by which the NYISO will identify and resolve reliability issues affecting the New York electric system through development and continual update of a 10-year comprehensive plan. The plan is intended to identify weaknesses in the New York electric grid and encourage investment in generation, demand response resources (conservation and management of load) and new transmission to fix the potential problems.

Connecticut Light & Power (CL&P): An electric utility in Connecticut that owns the northern terminus of the two transmission cables (CSC and 1385 line) that cross Long Island Sound.

Cross-Sound Cable (CSC): A 25 mile long high-voltage direct current (HVDC) cable between New Haven, Connecticut and Shoreham, Long Island that can transmit a maximum power of 330 MW at a voltage of +/- 150 kV.

Cross-subsidization: This refers to one rate class (such as industrial customers) subsidizing the rates paid by another class (such as residential customers). Also, cross-subsidization can refer to the transfer or use of assets or services from a regulated portion of an electric utility to its unregulated affiliates, producing an unfair competitive advantage.

CRPP-RNA: see Comprehensive Reliability Planning Process – Reliability Needs Assessment

CSC: see Cross-Sound Cable

Customer Average Interruption Duration Index (CAIDI): A measure of reliability for an electric utility, it provides a means to quantify of the average length of outages of electric service due to unplanned interruptions.

Customer Class: A distinction between users of electric energy. Usage patterns, usage levels and conditions of service usually define customer class. Typically defined by customer activity, examples of customer classes include Residential and Commercial.

Customer Service Charge: A portion of a customer's bill that remains the same from month to month sometimes called the basic service charge. The charge is determined separately from the amount of energy used. It is based on the cost associated with connecting a customer to the company's distribution system, including the service connection and metering equipment. This charge also recovers expenses such as meter reading, billing, accounting records and collection, and a portion of general plant items such as office space for customer service personnel.

DC: see Direct Current

Default Service: The concept that assures that electricity will be available to customers who, for whatever reason, are "between" suppliers for a short period of time or have been unable to secure power from a competitive supplier.

Demand: The amount of electricity that consumers use at any given moment or averaged over any certain period of time. It is a measure of the rate at which customers are using electricity.

Demand Side Management (DSM): Technology or programs that encourage customers to use electricity differently and avoid paying costly charges for usage peaks. DSM helps customers understand their usage patterns and adjust them to flatten the usage curve and lower their bills.

Department of Energy (DOE): The DOE manages programs of research, development and commercialization for various energy technologies and associated environmental, regulatory and defense programs. DOE announces energy policies and acts as a principal advisor to the President on energy matters.

Deregulation: Removal or relaxation of regulations or controls governing a business or service operation such as utilities. In the electric industry, restructuring is considered the better term since changing the electricity market may require new or additional regulations that the term "deregulation" doesn't address. (See Restructuring)

DG: see Distributed Generation

Direct Current (DC): Electricity that flows continuously in the same direction. DC is used infrequently to move electric power from one region to another. Typically DC technology is used to connect two neighboring power systems as is in the case of the Cross-Sound Cable between Long Island and the New England power system.

DISCO: see Distribution Utility

Distributed Generation (DG): Small amounts of generation located on a utility's distribution system or at the customer's facilities. Distributed generation can help meet local peak loads and displace the need to build additional (or upgrade) local distribution lines.

Distribution: The part of the electricity delivery system where electricity is taken from the power grid and delivered to a customer's home or business, typically at voltage levels lower than 69,000 volts. A distribution system steps down or reduces power from high-voltage transmission lines using substations and transformers. The wires and poles used to deliver that power to end-use customers are typically called distribution lines.

Distribution Utility (DISCO): In a restructured market, a regulated electric utility operation that constructs and maintains the distribution lines connecting the transmission grid to the final customer. Discos could also perform other services such as aggregating customers, purchasing power supply and transmission services for customers, billing customers and reimbursing suppliers, and offering other regulated or non-regulated energy services to retail customers. The "wires" and "customer service" functions provided by a distribution utility could be split so that two separate entities are used to supply these two types of services.

Divestiture: Stripping off one utility function from the others by selling (spinning off) or in some way changing ownership of the assets involved, used as a means to eliminate market power. The idea behind divestiture is to ensure that shareholders that own generation assets do not also control the transmission and distribution assets to avoid favoritism in power delivery.

DOE: see Department of Energy

DSM: see Demand Side Management

EERE: see Energy Efficiency and Renewable Energy

Electric Reliability Organization (ERO): (see also North American Reliability Corporation): The entity authorized by the EPACT 2005 to set and enforce U.S. reliability standards.

EISA 2007: see National Energy Independence and Security Act of 2007

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks. Electrical energy is usually measured in kilowatt-hours, while heat energy is usually measured in British thermal units.

Energy Conservation: Any effort to reduce or manage energy consumption in a cost-effective and cost-efficient manner. Some energy conservation measures include load management and interruptible supply.

Energy Efficiency: Any effort to reduce or manage energy consumption in a cost-effective and cost-efficient manner, while not requiring the foregoing of the product or services tied to the electrical consumption

Energy Efficiency and Renewable Energy (EERE): A branch of the U.S. Department of Energy charged with promoting efficiency, conservation and renewable energy.

Energy Efficiency Portfolio (EPS): A program that will establish targets for, and encourage investment in, energy efficiency measures as a way of reducing energy use by consumers.

Energy Policy Act of 2005 (EPACT 2005): see National Energy Policy Act of 2005

Energy Independence and Security Act of 2007 (EISA 2007): see National Energy Independence and Security Act of 2007

Energy Services Company (ESCO): An outgrowth of restructuring legislation, Energy Services Companies offer previously unavailable, bundled or customized electricity products and services. ESCOs would profit through charges for advice, electric appliance maintenance and retail energy products that help customers improve efficiency, reduce energy consumption and lower bills.

EPACT 2005: see National Energy Policy Act of 2005

EPS: see Energy Efficiency Portfolio

ERO: see Electric Reliability Organization

ESCO: see Energy Services Company

Federal Energy Regulatory Commission (FERC): A quasi-independent regulatory agency within the Department of Energy having jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas pricing, oil pipeline rates, and gas pipeline certification.

FERC: see Federal Energy Regulatory Commission

Fuel Cell: An advanced energy conversion device that converts fuels to power and with minimal environmental impact.

Generation Company (GENCO): A regulated or non-regulated entity (depending on the industry structure) that operates and maintains existing generating plants. The Genco may own the generation plants or interact with the short-term market on behalf of plant owners. In a restructured market, Genco may be used to describe a specialized marketer of the output from the generating plants formerly owned by a vertically-integrated utility.

GENCO: see Generation Company

Geothermal Plant: A power plant driven by the heat inherent in the earth. The turbine is driven either by steam produced from hot water or by natural steam that derives its energy from heat found in rocks or fluids at various depths beneath the surface of the earth. The energy is extracted by drilling and/or pumping.

Green Power: The term used to define power generated from renewable energy sources, such as wind and solar power, geothermal, hydropower and various forms of biomass. As more green power sources are developed, the overall environmental impacts associated with electricity generation can be reduced.

High Voltage Direct Current (HVDC): Used for electric power transmission as an alternative technology to conventional alternating-current (AC) systems. HVDC technology allows for the control of magnitude and direction of power flow, helps manage the AC grid and carries more power per conductor than AC systems. Typically DC technology is used to connect two neighboring power systems as is in the case of the Cross-Sound Cable between Long Island and the New England power system.

HVDC: see High Voltage Direct Current

Hydroelectric Plant: A plant in which the turbine generators that create electricity are driven by falling water.

Independent Power Producer (IPP): A private entity that operates a generation facility and sells power to electric utilities or power marketers.

Independent System Operator (ISO): A neutral operator responsible for maintaining balance and settling disputes among all parties using an interconnected transmission grid system. Responsibilities of an ISO include providing independent, open and fair access to regional transmission systems, efficient dispatch of generating resources, reliable management and operation of the bulk power system and administration of regional wholesale power markets.

Independent System Operator – New England (ISO-NE): The not-for-profit organization responsible for the reliable coordination and operation of New England's bulk power system and administration of it's wholesale power market.

Intelligent Grid (also Smart Grid and Smart Metering): Modern transmission facilities and related equipment that employs two way communication and control devices allowing management of generation, transmission, metering and load.

Interruptible Service: An agreement between the electric or gas company and the consumer that allows electric or gas service to be temporarily stopped or reduced on short notice during peak price periods, times of high demand or system emergencies when electricity is in short supply. An interruptible contract typically comes with discounted rates that account for the inconvenience. Interruptible service offers electricity or gas at a lower cost but also at a lower level of reliability.

Investor-Owned Utility (IOU): A utility company owned and operated by private investors and structured as a for-profit enterprise. While IOUs are typically owned by stockholders, most business decisions are made by a Board of Directors and company management; their objective is to supply consumers with electricity while making profits that can be returned to the investors.

IOU: see Investor-Owned Utility

IPP: see Independent Power Producer

ISO: see Independent System Operator

ISO-NE: see Independent System Operator – New England

Kilovolt (kV): Numerically equal 1000 volts. Volts are a measurement term for the electromotive force that causes electrons to flow that is also referred to as voltage.

Kilowatt (kW): A measure of the rate of power used during a preset time, minutes, hours, days months; equal to 1,000 watts. In the abbreviation, the W is capitalized because the unit was named to honor one of Scotland's great inventors, James Watt, who coined the term "horsepower". (See Watt)

Kilowatt-Hour (kWh): A common unit of electric energy; a kilowatt-hour is numerically equal to 1,000 watts used for one hour. For example, a kilowatt-hour is equivalent to the electricity ten 100 watt bulbs will use in an hour. In addition to the service charge for basic service, utilities charge consumers for electricity using a formula of cents per kilowatt-hour.

kV: see Kilovolt

kW: see Kilowatt

kWh: see Kilowatt-Hour

LILCO: see Long Island Lighting Company

LIPA Act: New York State legislation passed in 1986 that allowed the formation and operation of LIPA.

Load: The amount of electric power required to meet customers' use in a given time period.

Load Profile: Measurements of a customer's electricity usage over a period of time which shows how much and when a customer uses electricity. Load profiles can be used by suppliers and transmission system operators to forecast electricity supply requirements and to determine the cost of serving a customer.

Load Shape: A curve on a chart showing power (kW) supplied (on a horizontal axis) plotted against time of occurrence (on the vertical axis), and illustrating the varying magnitude of a utility's or consumers load during the charted period.

Long Island Lighting Company (LILCO): An investor owned utility that owned and operated the electric and gas system on Long Island prior to the formation of LIPA.

Losses: The general term applied to energy (kWh) and capacity (kW) lost in the normal operation of an electric system. Electricity delivery is not 100 percent efficient. Small losses occur principally as energy moves across the grid. Losses result as energy transforms from kWh to waste-heat in electrical conductors and apparatus. The power is expended (or lost before reaching any users) primarily during the transmission and distribution functions.

Megawatt (MW): A larger unit for measuring electricity equal to 1,000 kilowatts or one million watts. Utility companies, power generating plants, and very large users of electricity are the primary users of the term. Typical power plants generate in excess of 100 MW every day while one very large plant on Long Island with multiple generating units produces in excess of 1,500 MW. One megawatt would provide enough power to supply 330 homes for one hour on a hot summer afternoon.

Megawatt-Hour (MWh): A common unit of electric energy; a megawatt-hour is numerically equal to 1,000 kilowatts or one million watts used for one hour. On a hot afternoon, 330 homes would typically use one MWh in an hour.

MW: see Megawatt

MWh: see Megawatt-Hour

National Energy Policy Act 2005: (Public Law 109-58) was signed into law on August 8, 2005. The Act is intended to address a comprehensive list of energy issues in the U.S. and provides tax incentives and loan guarantees for energy production of various types.

National Energy Independence and Security Act of 2007: Public Law that sets efficiency standards for vehicles, lighting and numerous household appliances as well as space heating and cooling. It encourages renewable energy research and increases federal funding for energy efficiency.

National Interest Electric Transmission Corridors (NIETC): As authorized by the EPACT 2005, any area experiencing electric energy transmission capacity constraints or congestion that adversely affects customers.

Neptune: see Neptune Regional Transmission System

Neptune Regional Transmission System (Neptune): an underwater cable connecting Long Island with the electric grid in New Jersey.

NERC: see North American Reliability Corporation

New York Department of Environmental Conservation (NYDEC): Created to bring together in a single agency all state programs directed toward protecting and enhancing the environment.

New York Department of Public Service (NYDPS): Ensures that all New Yorkers have access to reliable and low-cost utility services. The Department regulates the state's electric, gas, steam, telecommunications, water utilities and the cable TV industry.

New York Independent System Operator (NYISO): The not-for-profit organization responsible for the reliable coordination and operation of New York bulk power system as well as the facilitator of the New York wholesale market.

New York Power Authority (NYPA): The statewide power authority chartered by the New York State Legislature which owns of a significant portion of New York's generation and bulk transmission assets.

New York State Reliability Council (NYSRC): A not-for-profit entity whose mission is to promote and preserve the reliability of electric service on the New York State Power System by developing, maintaining, and, from time-to-time, updating reliability standards.

New York State Research and Development Agency (NYSERDA): Administers programs designed to support certain public benefit programs during the transition to a more competitive electricity market. These programs provide energy efficiency services, including those directed at the low-income sector, research and development, and environmental protection activities.

NIETC: see National Interest Electric Transmission Corridors

North American Electric Reliability Corporation (NERC): Originally formed by electric utility industry in 1968 to promote the reliability and adequacy of bulk power supply in utility systems of North America, it is now, as per the authority if the EPACT 2005, the Electric Reliability Organization ("ERO") with the statutory authority to enforce compliance with reliability standards among all market participants

NERC works with eight regional reliability councils to improve the reliability of the bulk power system (NPCC is the regional reliability council that covers New York).

Northeast Power Coordinating Committee (NPCC): One of the eight NERC regions comprising of all of Connecticut, Maine, Massachusetts, New Brunswick, New Hampshire, New York, Nova Scotia, Ontario, Prince Edward Island, Quebec, Rhode Island, and Vermont.

NPCC: see Northeast Power Coordinating Committee

NRC: see Nuclear Regulatory Commission

Nuclear Regulatory Commission (NRC): The federal agency responsible for licensing of nuclear facilities. They oversee nuclear power plants and make sure regulations and standards are followed.

NYDEC: see New York Department of Environmental Conservation

NYDPS: see New York Department of Public Service

NYISO: see New York Independent System Operator

NYPA: see New York Power Authority

NYSERDA: see New York State Research and Development Agency

NYSRC: see New York State Reliability Council

Off-Peak/On-Peak: Blocks of time when energy demand and price is low (off-peak) or high (on-peak).

OASIS: see Open Access Same-time Information System

OATT: see Open Access Transmission Tariff

Open Access: Access to the electric transmission system by a legitimate participant, including utilities, independent power producers, cogenerators and power marketers.

Open Access Same-time Information System (OASIS): An internet based electronic bulletins board system used in the wholesale power market for reserving and allocating open access transmission service.

Open Access Transmission Tariff (OATT): A document on file with FERC which allows a contract and contains the rules for implementing the contract between an owner of electric transmission facilities and a legitimate participant that wishes to purchase transmission service

PACB: see Public Authorities Control Board

Peak: A period of relatively high system demand or load.

Peaking Unit: A power generator used to produce electricity primarily during periods of high demand.

Photovoltaic: A technology that directly converts light into electricity. The process uses modules, which are usually made up of cells (thin layers of semiconductors).

PILOT: Payment in lieu of taxes.

PJM: see PJM Interconnection

PJM Interconnection (PJM): The independent system operator for the transmission system in all or part of Pennsylvania, New Jersey, Maryland, Delaware, Virginia, and the District of Columbia and is subject to the jurisdiction of the FERC.

Power Grid: A network of power lines and associated equipment used to transmit and distribute electricity over a geographic area.

Public Authorities Control Board (PACB): A five member Board established by New York Public Authorities Law that must provide a resolution of approval before certain statewide public authorities may enter into any project-related financings.

Public Utility: A utility operated by a non-profit governmental or quasi-governmental entity. Public utilities include municipal utilities, cooperatives and power marketing authorities.

Public Utility Holding Company Act (PUHCA): Enacted in 1935 by the U.S. Congress to regulate the large interstate holding companies that monopolized the electric industry during the early 20th century.

Public Utility Regulatory Policies Act (PURPA): Enacted in 1978 to promote energy efficiency and increased use of alternative energy sources by encouraging companies to build cogeneration facilities and renewable energy projects using wind power, solar energy, geothermal energy, hydropower, biomass and waste fuels.

PUHCA: see Public Utility Holding Company Act

Purchased Power Adjustment: A clause in a rate schedule that provides for adjustments to the bill when energy from another electric system is acquired and it varies from a specified unit base amount.

PURPA: see Public Utility Regulatory Policies Act

QF: see Qualifying Facility

Qualifying Facility (QF): Under PURPA, QFs are allowed to sell their electric output to the local utility at avoided cost rates. To become a QF, the independent power supplier had to produce electricity with a specified fuel type (cogeneration or renewables), and meet certain ownership, size, and efficiency criteria established by the Federal Energy Regulatory Commission.

Rate Class: A group of customers identified by type or usage patterns such as residential, agricultural, commercial, and industrial. Most utilities charge different rates based on a consumer's usage classification (see also "Customer Class").

Regional Greenhouse Gas Initiative (RGGI): This Initiative is intended to focus on increasing implementation of energy efficiency measures and encourage development of clean energy resources as a way of helping to address the concerns of climate change and to stabilize and eventually reduce carbon dioxide emissions. The seven northeastern states of New York, Connecticut, Delaware, Maine, New Hampshire, New Jersey, and Vermont are all participating in this Initiative.

Regional Transmission Organization (RTO): A voluntary organization of transmission owners, transmission users, and other entities approved by the Federal Energy Regulatory Commission to efficiently coordinate transmission planning (and expansion), operation, and use on a regional (and interregional) basis. (Also known as a Regional Transmission Group)

RELI: see Renewable Energy Long Island

Reliability: Term used to describe the provision of adequate and dependable generation, transmission and distribution service to end-consumers. Reliability refers to a utility's record or plan for delivering a steady flow of power to customers. Outages and breakdowns can affect a company's reliability rating which is measured differently at the generation, transmission and distribution levels. Reliability measurements are often determined by the probability of a power outage or, alternatively, by averaging the length of any power interruptions and the customers affected against the entire customer base.

Reliability Needs Assessment (RNA): see Comprehensive Reliability Planning Process

Renewables: Resources used to generate electricity capable of being replaced naturally. Renewables are also called Green Power because they are considered to be a cleaner form of generating energy when compared with traditional sources like coal. The renewables label applies to fuels and technologies such as solar photovoltaic energy, solar thermal energy, wind power, hydropower, geothermal energy, recovery energy (using methane gas from sewage treatment plants or landfills), energy from waste (such as food or wood), and sustainable biomass energy.

Renewable Energy Long Island (RELI): A non-profit organization that promotes generation and use of clean and sustainable energy for Long Island

Renewable Portfolio Standard (RPS): A government policy that establishes renewable energy resource targets for electricity providers to obtain by a certain date

Repowering: The process of renovating an older electrical generating plant and installing newer, more advanced components to gain additional power output, use fuel more efficiently and reduce emissions.

Restructuring: For the electric industry it refers to separating or unbundling the operations and charges of traditional monopoly electric utility organizations, or in other words, the currently combined costs for generation, transmission and distribution of electricity.

RGGI: see Regional Greenhouse Gas Initiative

RNA: see Reliability Needs Assessment

RPS: see Renewable Portfolio Standard

RTO: see Regional Transmission Organization

SAIFI: see System Average Interruption Frequency Index

SCR: see Special Case Resources

Service Charge: Generally, a daily charge which is meant to recover the fixed costs associated with providing a customer access to the electrical system and monitoring and billing the customer's use of electricity.

Service Territory: The exclusive area which a utility is required or has the right to supply electric service to any customers located within.

Smart Grid: see Intelligent Grid

Smart Metering: See Intelligent Grid

Solar Thermal Electricity: A process that generates electricity by converting incoming solar radiation to thermal energy.

Special Case Resources (SCR): Load that is capable of being interrupted when required by NYISO, and distributed generators, rated 100 kW or higher, that are not dispatched by the NYISO as part of its wholesale power market operations. LIPA receives about 2 % of its total resources (about 125 MW) from SCR.

Storm Hardening: LIPA investments to improve the reliability of it's transmission and distribution system during severe storm events.

System Average Interruption Frequency Index (SAIFI): A measure of how often electric service is interrupted to customers

Tariff: A document, approved by the responsible regulatory agency, listing the terms and conditions, including a schedule or prices, under which utility services will be provided.

Terms of Service: Content of the agreement between a customer and a supplier. The Terms of Service typically detail a customer's specific rate for electricity and any variables affecting that rate, the length of the contract, options for recourse in the event of a dispute, and any additional charges attached to electric service.

TO: See Transmission Owner

Transco: A for-profit, non-utility company to manage electric transmission lines that are owned and operated independently. Transco's make their profits by charging fees for use of the system. In many cases, Transco's are generally part of a larger transmission organization such as an ISO or RTO.

Transformer: An electrical device for converting the voltage of alternating current from one voltage to another.

Transmission: The act or process of transporting high voltage electricity in bulk. The interconnected part of the electric delivery system that moves high voltage electricity from generating facilities, across the power grid, to substations or facilities of electric distribution companies. The transmission function ends when the energy is transformed for distribution to the end-use consumer.

Transmission Owner (TO): An entity that is in business to own, physically operate, modify, and maintain transmission facilities.

Unbundled: Following restructuring, this term refers to dividing up of the components of electricity delivery: generation, transmission, and distribution (which may include additional customer services and billing). Without restructuring, the rates for these separate functions are bundled to together to produce a single kWh rate. Following restructuring, the components are broken apart to show the associated costs and allow for each function to be billed separately. This allows customers a comparison price to shop for the electric generation provider they prefer.

Utility: A regulated entity that exhibits the characteristics of a natural monopoly. For the definitions in electric restructuring legislation, "utility" refers to a regulated, vertically-integrated electric company; "transmission utility" refers to a regulated owner/operator of a transmission system only. "Distribution Utility" refers to a regulated owner/operator of a distribution system that serves retail customers.

Volt: A unit of electrical pressure. It measures the force or push of electricity. A volt is the unit of electromotive force or electric pressure analogous to water pressure in pounds per square inch. It is the electromotive force that, if steadily applied to a circuit having a resistance of one ohm, will produce a current of one ampere.

Voltage: Measure of the force of moving energy such as the energy traveling across electric wires.

Watt: An electrical unit of power in the International System of Units; one horsepower is equivalent to approximately 746 watts. For a more common example, an average incandescent light bulb requires a constant supply of 60 watts of energy to illuminate. The unit was named to honor James Watt, who coined the term "horsepower".

Watt-Hour: One watt of power expended for one hour. A more common term is kilowatt hour.

Wheeling: The transmission of power that has been generated or purchased by one entity over lines owned or operated by another utility system.