



Energy Guide:

2017 Long Island
Integrated Resource Plan
and Repowering Studies



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Acknowledgements

Valuable contributions were provided by:

- PSEG Long Island**
- Long Island Power Authority**
- The Brattle Group**
- RCM Technologies**
- National Grid**
- Department Of Public Service**
- NYSERDA**

The electric utility industry is evolving with changing customer expectations, advances in technology, lower natural gas prices, and New York’s own goals for a cleaner and more efficient energy future.

The following pages demonstrate this evolution in several ways, including the effect of more efficient appliances and technology on future electric demand and the impact of a growing base of renewables on the amount and types of resources needed to balance Long Island’s electric grid.

The Energy Guide reflects the preliminary findings of a comprehensive study to identify the needs for Long Island’s future energy grid.

Sources Of Electricity


Three large legacy generation plants (PSA steam units) represent 40% of LIPA's maximum electric production capability while only generating 21% of its energy

An independent third party, called the NYISO, determines which generation units run to provide the lowest cost to consumers

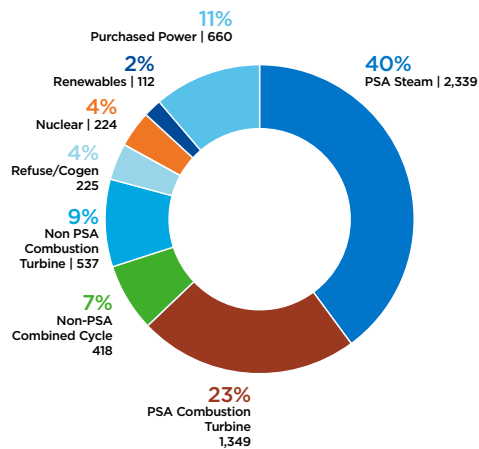
Peak Load Forecast

Recent peak load forecasts show dramatic reductions driven by greater adoption of energy efficiency and rooftop solar. The decline is consistent with state and national trends

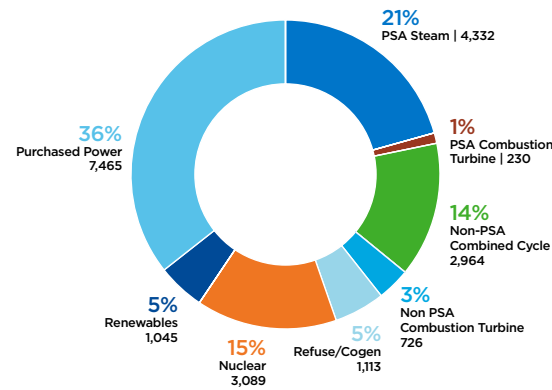
The forecasted need for power plants in 2030 on Long Island has declined by -1,700 megawatts (MW) since 2013, the equivalent of 3-5 large baseload central station power plants

 Peak load is the highest demand for electricity in a year

2016
Maximum Capability by Generation Type
5,864 MW

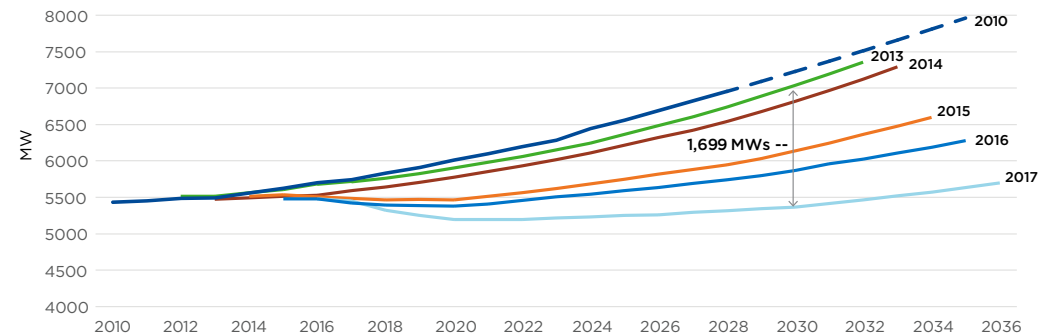


2016
Actual Energy Production by Resource
20,964 MW-hours



PSA refers to National Grid Power Supply Agreement

Long Island's Peak Load Forecast has Declined Since 2010



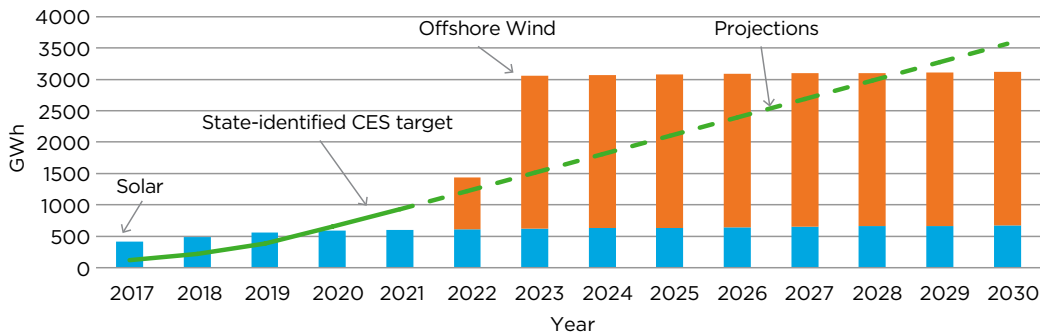
The Zone K peak load forecast for 2030 has declined by over 24% (i.e., 1,699 MWs) when comparing the 2013 forecast to the 2017 forecast.

Expanding Clean Energy

NY's 50 percent renewable by 2030 (50x30) Clean Energy Standard requires LIPA to add 800MW of new renewable generation, enough to power 350,000 more homes

Load is expected to be reduced by 950MW through 2030 as a result of energy efficiency, rooftop solar, and other 'behind the meter' initiatives

LIPA's New Renewable Energy Generation to Meet 50x30 Clean Energy Standard



Note: The proportion of OSW and solar reflected in the graphic represents a planning assumption. Actual project selection will be based on competitive solicitations

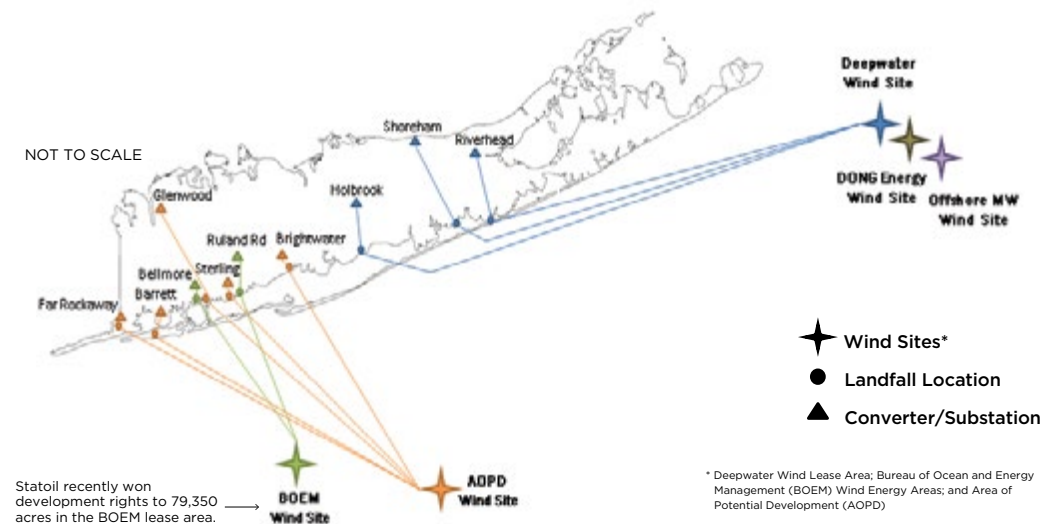
NY's Off-Shore Wind Goals

NY set a 2,400MW Off-Shore Wind (OSW) goal for 2030. There are a large number of potential OSW sites off of Long Island's coast

A significant portion of the State's offshore wind goal may connect to Long Island's electric grid, potentially in excess of the amount needed to meet LIPA's own CES needs

NYSERDA will issue an Off-Shore Wind Master Plan for the State by the end of 2017

Long Island's OSW Development Areas



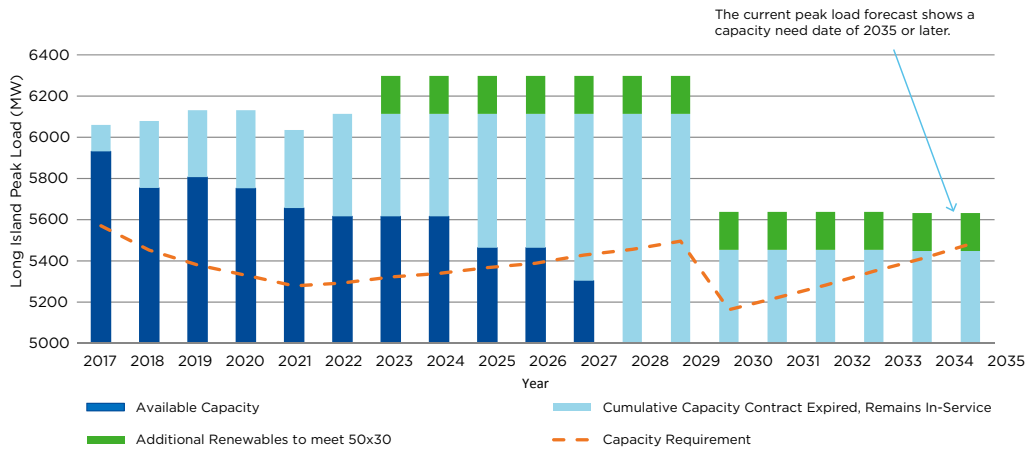
Generation Outlook

With flat load growth and the addition of renewable generation to meet CES, LIPA has excess generation capacity through 2035

Ninety nine percent (99%) of LIPA's generation contracts are up for renewal by 2030 providing flexibility to reposition LIPA's generation fleet in response to changing conditions

Excess generation provides reliability, redundancy and resiliency to meet the needs of the electric grid and our customers

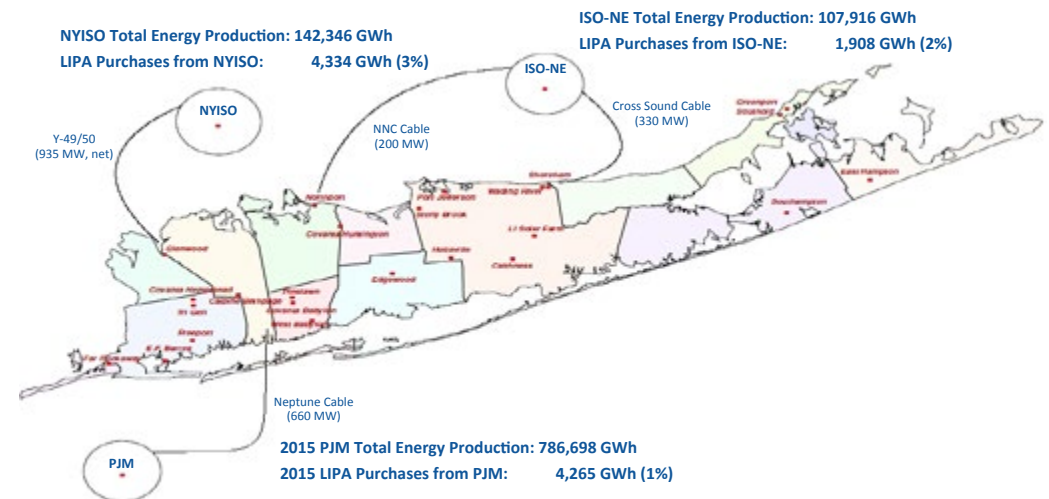
LIPA Has Surplus Generation Through 2035



Cables to Regional Power Markets

LIPA's annual purchases of approximately 10,500 GWh of energy across five transmission cables to the New York, New England, and PJM power markets provides diverse and robust supply, redundancy, and lower cost. LIPA's purchases are a fraction of the energy produced in those markets

Transmission: Cables to Regional Power Markets



Impact Of Renewables On Generation


The addition of OSW and other renewable resources into LIPA's system significantly reduces the run time of the PSA steam plants and increases the need for peaking units, batteries, demand response and other more flexible resources

Three scenarios for OSW on Long Island are shown below. The first is meeting LIPA's CES goals while the second and third meets LIPA's CES goals plus additional megawatts of OSW procured by other New York utilities to meet the State's 2,400MW OSW goal

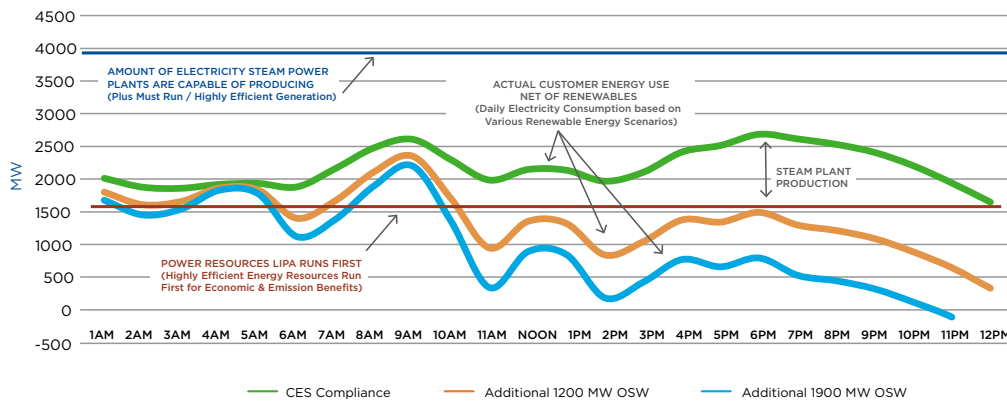
Forecast Steam Plant Use

The capacity factor of the PSA steam units has declined significantly since the 1990's

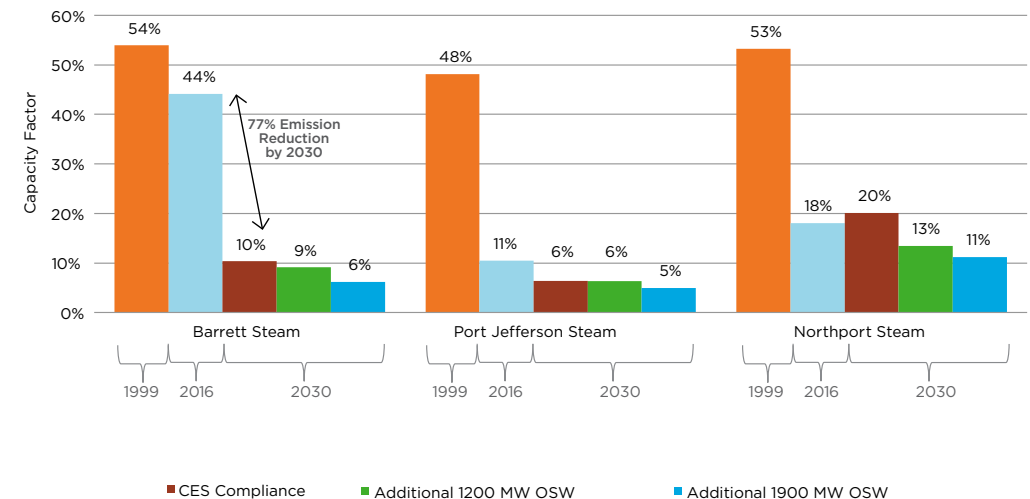
Renewables and other forecast changes to the electric grid dramatically reduce usage and emissions of the PSA steam plants by 2030

 *The capacity factor is the amount a power plant is used during a year relative to its maximum potential output*

Additional Renewables Decrease the Run Time of Steam Plants



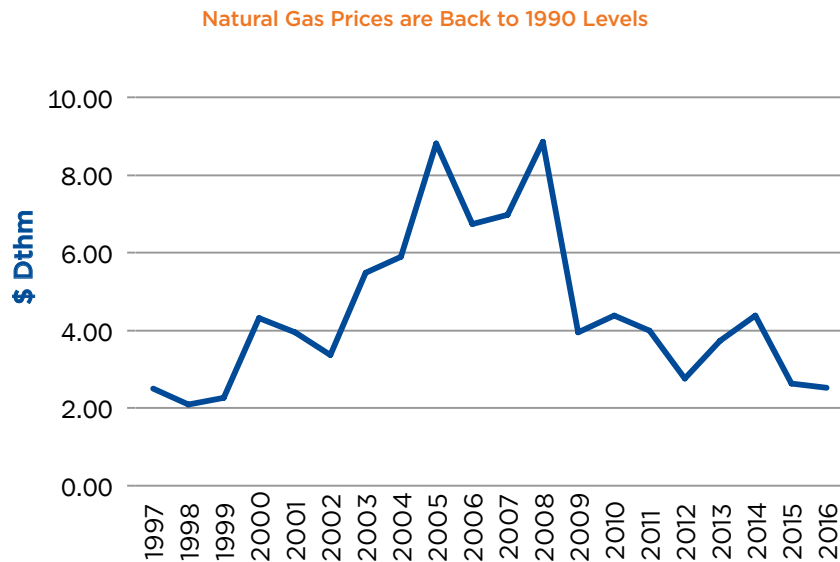
Run time of PSA Steam Plants Forecast to Decline



Natural Gas Prices

Natural gas prices have declined 72% since 2008 and are back to late 1990 levels

Lower natural gas prices reduces the value of the fuel savings from newer plants

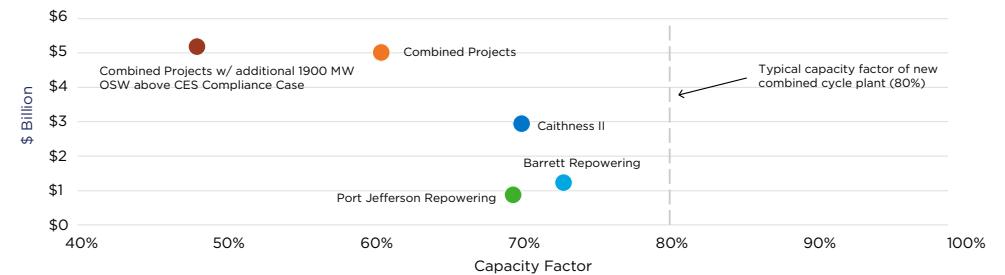


Economics of Steam Plant Modernization

The construction of proposed combined cycle plants to replace existing steam plants is technically feasible, but not required for reliability and will raise the net cost to customers by up to \$5 billion or \$2,210 for the average residential customer through 2030

The capacity factors of the proposed plants are lower than typical for new plants mainly due to the addition of renewable energy to the electric grid

Proposed Combined Cycle Plants Have a Net Cost of Up To \$5 Billion through 2030



	Barrett	Port Jefferson	Caithness II	All Three
Net Cost Through 2030	\$1.2 billion	\$0.9 billion	\$2.9 billion	\$5 billion
Increase in Average Residential Customer Bill Through 2030	\$536	\$378	\$1,297	\$2,210

Cost Comparisons

Due to lower than typical run time (capacity factor), the cost per kWh of the new repowered steam plants would be similar to today's costs for renewable energy

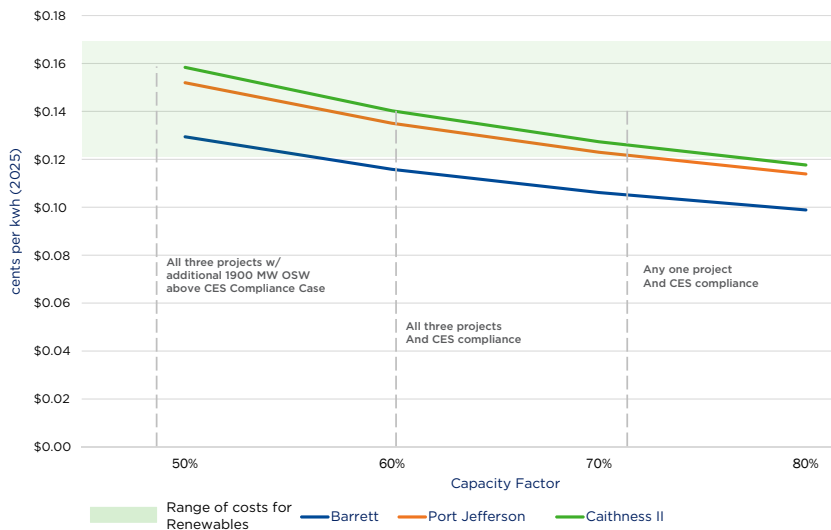
Advancing technology and economies of scale are expected to result in a decline in renewable energy costs

Condition of PSA Steam Units

The PSA steam units operate reliably with equivalent availability (summer) averaging well above 90%, in line with contractual guarantees for new combined cycle facilities

An independent condition assessment by RCM Technologies concluded that with reasonable capital and O&M expenditures the steam units should operate reliably through the study period

Cost of Proposed Combined Cycle Plants Per Kilowatt-hour



Steam Plants 2016

Plant	Equivalent Availability: Summer (%)
Barrett Steam Units	92
Northport Steam Units	94
Port Jefferson Steam Units	98
New Combined Cycle Plant Contractual Guarantee (typical)	95 - 97

Alternatives to Modernize Generation

The proposed combined cycle plants are more fuel efficient and have operating characteristics that are more flexible than the PSA steam units but less flexible than peaking units

New peaking units, batteries, demand response, or other distributed energy resources may better support renewable resources than existing steam units or new combined cycle plants

Steam Plant Modernization: Operating Characteristics

Characteristic	Existing PSA Units		New Units			
	Steam Units	Combustion Turbines	Combined Cycle	Peaking Units (Simple Cycle)		
				Large Frame	Small Frame	Area
Cold Start Time	26 - 30 hours	10-30 minutes	3 - 4 hours	10 min	10 min	≤ 10 min
Time (hours)	16	1	4	No technical minimum limit		
Ramp Rate (MWs/min)	2 - 4	NA	15 - 40	50 - 100+	25	25
Heat rate (Btu/kWh)	10,000 - 11,300	13,000-16,500	6,600 - 6,800	8,000 - 8,200	9,700	8,900 - 9,500

Independent Second Opinion

LIPA retained the Brattle Group to provide an independent second opinion on PSEG Long Island's reliability planning criteria and analyses of proposals for Caithness II and the repowered steam plants.

“ We do not find a compelling reason for LIPA to proceed with Caithness II or the repowering projects. None of the plants are needed for reliability or economic purposes. For all the options the plant costs exceed their benefits for at least the next decade. ”

— The Brattle Group



The Brattle Group is an independent economic and financial consulting firm that provides evaluations and researched-based answers to complex challenges facing the energy, financial and government sectors around the world.

The Department of Public Service staff also participated in the Brattle Group's review.

“ The DPS reviewed the Brattle Report and concludes that adoption of NYSRC/NYISO planning criteria in 2014 and the analysis with respect to the need for Caithness II are reasonable. ”

— Department of Public Service



The mission of the New York State Department of Public Service is to ensure affordable, safe, secure and reliable access to electric and gas service for New York State's residential and business consumers



LIPA Staff Recommendation

Monitor

- Long Island energy and peak demand growth each year
- The operating performance and budgets of generation plants relative to expectations

Evaluate

- Opportunities for economies of scale in offshore wind by partnering with NYSERDA and other local utilities in procurement and interconnection to the electric grid

Maintain

- Energy efficiency programs to reduce load by 950 megawatts through 2030
- Efforts for fair property tax reductions on existing plants that reflect their past and forecasted decline in use

Study

- The peaking generation fleet and its ability to accommodate the flexible operating profile required by greater amounts of renewable generation
- Selected retirements and modernization of peaking units

Cancel

- The 2010 Generation RFP with no award
- Further study of the combined cycle repowering proposals for the Barrett and Port Jefferson steam plants

Conduct

- Technology neutral competitive procurements (e.g. peaking plants, batteries, demand response, etc.) to meet future identified needs, including utilizing rights to the National Grid brownfield power plant sites to obtain bids by multiple developers
- A repowering study of the Northport steam plant commencing October 2018, as required by law



Supporting Documents

* *2017 Integrated Resource Plan:*

PSEG Long Island Summary Analysis

* *LIPA Generation Planning Review of*

Caithness Long Island II, and E.F. Barrett and

Port Jefferson Repowering by the Brattle Group

* *Letter from New York State Department*

of Public Service regarding Brattle Group review

* *Repowering Feasibility Study of*

Port Jefferson Power Station

* *Repowering Feasibility Study of*

E.F. Barrett Power Station

* *Condition Assessment of National Grid Electric*

Generation Assets by RCM Technologies

For more information, visit PSEGLINY.com or LIPOWER.org



