Survey of National Grid Generation Formerly Owned By LILCO

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Introduction

The Long Island Power Authority (LIPA) has contracted for the capacity and energy from approximately 3,690 MW of generation owned by National Grid Generation LLC (National Grid) on Long Island that was formerly owned by the Long Island Lighting Company (LILCO). Approximately 2,320 MW of this generation are steam plants and the remaining approximately 1,370 MW are peaking gas turbines and diesel generation. Nearly all of this generation was installed in the 1960s and 1970s, with the oldest dating to the 1950s. A list of these National Grid generating units, and their capacity, year in service and type of facility (technology) is set forth on Table 1.

Given the age of this generating fleet, unit reliability is a significant concern. As discussed in this report, there is limited availability of replacement parts, particularly for the peaking units, and there has been a substantial loss of in-house knowledge of how to operate and maintain these old generating units in a safe and reliable manner. Moreover, the equipment in these generating units has aged to the point that the original equipment manufacturers (OEM) have very few personnel trained in this old technology.

As discussed herein, the majority of this former LILCO generation should be retired as soon as their generating capacity can be replaced. In addition to substantial concerns regarding their reliability, these generating units are grossly inefficient by today's standards and are environmentally unfriendly, both in terms of air emissions and water usage. These units need to be replaced by new, modern, highly efficient clean gas-fired combined cycle generation. Replacement of the old, former LILCO generating units with new combined cycle generation would improve significantly Long Island's economy and environment, as well as greatly improve the reliability of Long Island's electric grid.

Table 1: Former LILCO Generating Units Now Owned by National Grid and Operated Under Contract to LIPA

Site	Unit Number	MW	Year In Service	Type
E. F. Barrett	Unit 1	192.5	1956	Steam
E. F. Barrett	Unit 2	192.5	1963	Steam
E. F. Barrett	GT 1	15	1970	GE Frame 5
E. F. Barrett	GT 2	15	1970	GE Frame 5
E. F. Barrett	GT 3	15	1970	GE Frame 5
E. F. Barrett	GT 4	15	1970	GE Frame 5
E. F. Barrett	GT 5	15	1970	GE Frame 5
E. F. Barrett	GT 6	15	1970	GE Frame 5
E. F. Barrett	GT 7	15	1970	GE Frame 5
E. F. Barrett	GT 8	15	1970	GE Frame 5
E. F. Barrett	GT 9	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 10	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 11	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 12	46.3	1971	Pratt and Whitney GG4 Twin Pack
East Hampton	GT 1	18	1970	Pratt and Whitney GG4
East Hampton	No. 2	2	1962	Diesel
East Hampton	No. 3	2	1962	Diesel
East Hampton	No. 4	2	1962	Diesel
Glenwood	GT 1	15	1967	GE Frame 5
Glenwood	GT 2	50	1972	GE Frame 7C
Glenwood	GT 3	50	1972	GE Frame 7C
Holtsville	Unit 1	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack

Site	Unit Number	MW	Year In Service	Type
Holtsville	Unit 2	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 3	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 4	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 5	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 6	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 7	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 8	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 9	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 10	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Northport	Unit 1	388	1967	Steam
Northport	Unit 2	388	1968	Steam
Northport	Unit 3	388	1972	Steam
Northport	Unit 4	388	1977	Steam
Northport	GT 1	13	1967	GE Frame 5
Port Jefferson	Unit 3	191.5	1958	Steam
Port Jefferson	Unit 4	191.5	1960	Steam
Port Jefferson	GT 1	12	1966	GE Frame 5
Shoreham	GT 1	49	1971	GE Frame 7C
Shoreham	GT 2	15	1966	Pratt and Whitney GG 4
Wading River	GT 1	79.5	1989	GE Frame 7EA
Wading River	GT 2	79.5	1989	GE Frame 7EA
Wading River	GT 3	79.5	1989	GE Frame 7EA
Southampton	GT 1	11	1963	GE Frame 5
Southold	GT 1	12	1964	GE Frame 5
West Babylon	GT 4	49	1971	GE Frame 7C

Steam Plants

National Grid owns and operates three major base load power plants which incorporate steam turbines as the prime movers to generate electricity. The Northport station is comprised of four similar units rated 388 MW each, which went into service between 1967 and 1977. The E.F. Barrett station and the Port Jefferson station each consist of two units. The E.F. Barrett and Port Jefferson units are similar and have ratings of approximately 190 MW each. The E.F. Barrett units were commissioned in 1956 and 1963. The Port Jefferson units entered service in 1958 and 1960. Details of each site are found in Appendix A. The three steam plants operate on natural gas, #1, #2 or #6 fuel oil.
The specific steam units are listed in Table 2, below:

Table 2: Former LILCO Steam Units Owned by National Grid and Operated Under Contract to LIPA

Site	Unit Number	MW	Year In Service	Type
E. F. Barrett	Unit 1	192.5	1956	Steam
E. F. Barrett	Unit 2	192.5	1963	Steam
Northport	Unit 1	388	1967	Steam
Northport	Unit 2	388	1968	Steam
Northport	Unit 3	388	1972	Steam
Northport	Unit 4	388	1977	Steam
Port Jefferson	Unit 3	191.5	1958	Steam
Port Jefferson	Unit 4	191.5	1960	Steam

The long term viability of the steam plants as reliable sources of capacity for Long Island is doubtful due to concerns common to all three of the National Grid steam plants.

Environmental Impacts

Environmental Impacts o Once Through Cooling Systems

All three of the steam plants use salt water from local bodies of water for plant cooling in "once through cooling systems."

Once through cooling involves the withdrawal of very large quantities of water from the local water body, passing that water through heat exchangers in the plant, and returning the heated water to the water body. Once through cooling systems impact the environment in two significant ways. First, they result in thermal pollution whereby the body of water is heated causing changes to the naturally occurring ecosystem. Second, these cooling systems result in significant damage to local fisheries through the entrapment of large numbers of fish eggs and larvae within the systems and the fish mortality from the impingement of fish on the grates of the screens installed to keep foreign objects out of the plant cooling systems. Once through cooling systems have come under attack in many jurisdictions including New York due to significant concerns

about the impacts of such systems on aquatic organisms. The long term permitability of these systems is uncertain.

Port Jefferson Plant

The environmental concerns regarding once through cooling systems are so acute that, for example, in 2011, as part of the renewal of the Port Jefferson plant's State Pollution Discharge Eliminate System ("SPDES") permit, the major permit relating to use of water from Port Jefferson Harbor, the Port Jefferson plant has been limited to a maximum annual capacity factor of only 15%, has been required to install new cooling water pump controls and new cooling water screens that are more "fish friendly," and have accepted a new limitation of no more than a 30 degree differential between the cold water removed from the harbor and the heated water discharged back to it.

New York State Department of Environmental Conservation Report

The New York State Department of Environmental Protection summarized these impacts to the environment in a 2010 report. Selected data from that report for the Long Island plants is summarized in Table 3 below.

Table 3: Annual Entrainment and Impingement Data for Long Island Generating Plants using once through cooling. (Source: NYSDEC Policy Document on Best Technology Available for Cooling Water Intake Structures, 2010)

Station	Capacity (MW)	Cooling Water Flow (MGD)[1]	Waterbody	Entrainment in Cooling System[2]	Impingement on Screens[3]
E.F. Barrett	384	294	Barnum's Cove (Western Bays)	906,259,233	176,044
Northport	1522	939	LI Sound	8,430,608,238	127,118
Port Jefferson	385	399	Pt. Jeff Harbor	1,014,950,951	76,104

[1] Millions of Gallons per Day
[2] Entrainment figures reflect the number of all life stages of fish which pass through the intake screening devices of a cooling system. 100% mortality is assumed for entrained organisms.
[3] Impingement figures reflect the number of fish that are trapped by the inlet screens, whether returned alive to the waterbody or not.

The data is from the latest data available to DEC at the time of its report.

Water use at newer plants is a fraction of that used in plants with once through cooling. In contrast with the volume of water used at the National Grid Steam plants with once through cooling, the air cooled, 350MW Caithness Long Island plant uses on average less than 17 gallons of water per minute or 0.02 million gallons per day.

Air Emissions

Due to the age and technology of the steam plants, the National Grid steam plants are significant sources of air pollution, emitting orders of magnitude more air pollutants than a modern base load, combined cycle power plant.

The table below summarizes the emissions of various pollutants per unit of electrical output for the National Grid steam plants. The data is derived from filings of emissions data with the NYSDEC and production data filed with the U.S. Department of Energy. Data for the Caithness Long Island plant was calculated as an example of a modern gas-fired, base load combined cycle power plant.

Table 4: Average Annual Air Emissions of National Grid Steam Power Plants 2010-2013

Facility	CO (lb/MWh)	NOx (lb/MWh)	PM10 (lb/MWh)	SO2 (lb/MWh)
E.F. Barrett	1.7	1.5	0.11	0.03
Northport	0.92	0.88	0.13	0.64
Port Jefferson	1.03	0.86	0.14	0.88

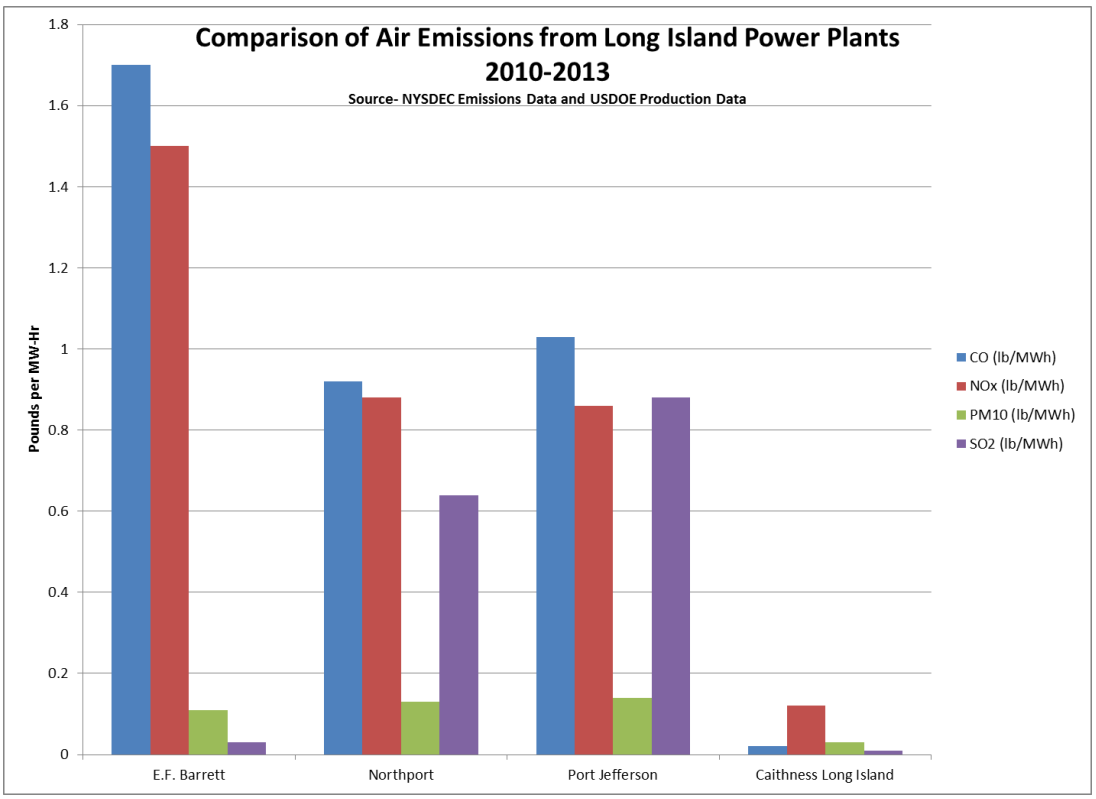
(CO=Carbon Monoxide, NOx=Nitrogen Oxides, PM10=Particulate Matter, SO2=Sulfur Dioxide, , lb/MWh= pounds per megawatt-hour)

In sharp contrast, the approximately 350 MW Caithness Long Island plant, which went into commercial operation in 2009, has much lower emissions as shown in the table below:

Table 4A: Average Air Emissions of Caithness Long Island 2010-2013

Facility	CO (lb/MWh)	NOx (lb/MWh)	PM10 (lb/MWh)	SO2 (lb/MWh)
Caithness Long Island	0.02	0.12	0.03	0.01

The chart below compares the air emissions from the steam plants with that of a new combined cycle plant.



Other Environmental Impacts

Asbestos-Based Insulation and Lead Based Paints at National Grid Steam Plants

Due to the age of the facilities and the fuels which have been used and stored at the three steam plant sites, they all share – to varying degrees – concerns of ongoing environmental contamination. All of these plants contain asbestos-based insulation and lead based paints, which result in the need to remediate equipment prior to some maintenance work. All of the sites contain facilities to store and transport heavy fuel oil and have experienced leaks and spills over the history of the plants.

Susceptibility t Coastal Storms

All three of the National Grid steam plants are located on the shores of Long Island due to their need of large volumes of water for their once through cooling systems. Typically, the ground floor of coastal plants is located slightly above the fifty or one hundred-year historical flood level. As Long Island experienced in 2011 (Hurricanes Irene and Lee) and 2012 (Superstorm Sandy), flooding more severe than those levels has recently been associated with tropical storms and hurricanes, which seem to be more and more prevalent as the impacts of global climate change are seen. The redrawing of federal flood maps, modification of building codes in coastal areas to include higher structural elevation requirements and other changes in the time since Superstorm Sandy raise serious concerns about the resiliency of these facilities during a several coastal flooding event.

Many power plants in the metropolitan area saw significant damage and extended outages as a result of these storms. The NYISO report on Superstorm Sandy reported these outages having consisted of the Cross Sound Cable connection between Connecticut and Long Island tripping off line followed by eleven 138 kV Long Island transmission lines, the DC Neptune cable (660 MW) between Long Island and New Jersey, followed by the second Long Island intertie to Connecticut, the Northport-Norwalk Cable (300 MW) as well as the loss of 570 MW of Long Island's generation capacity. For the remainder of the storm Long Island was electrically connected to the Eastern Interconnection only through the four ties to Con Edison: the 138 kV 901 & 903 and the 345 kV Y49, and Y50 lines. Of approximately 2500MW of transmission interties that cross the Atlantic Ocean or Long Island Sound to reach Long Island, approximately 1300MW were out of service during Sandy.

Obsolescence

Due to the age of the equipment at all three of the steam plants, continued reliability is a concern. Parts are increasingly hard to get for older equipment, which raises the costs of repairs or dictates that plant equipment must be replaced rather than be repaired in certain cases, which increases the cost of operation. The plants have had some upgrades to the control systems including upgrades to computer based operator interfaces, but many of the field instruments that drive that interface are still as old as the plant. Port Jefferson and E.F. Barrett, being the older of the plants, obviously are most at risk of obsolescence. As an example of the older technology at these two plants, the process of raising and lowering load when burning oil requires the operators to physically move from burner to burner to insert "fuel guns" into the boiler and manually manipulate steam and oil valves. Compared to the automated fuel control at a modern plant, this method requires significant physical effort by people, is slower, more prone to fuel leaks and provides a less consistent ramping rate to the grid.

Peaking Plants - Gas Turbines and Diesels

LIPA has contracted for the capacity and energy from 39 oil-fired peaking units totaling approximately 1370 MW, which are owned by National Grid (the units were formerly owned by LILCO). These units are located at eleven sites ranging from western Nassau County to the twin forks of eastern Suffolk County. All but three of the units were installed between 1962 and 1975, forty to fifty-three years ago.

There are several types of peaking generating units included in the fleet of former LILCO generating units still in service, with several variations of some types: Diesels (3 units), General Electric Frame 5 gas turbines (13 units), Pratt and Whitney GG4 gas turbines (2 units comprised of one turbine and 14 units comprised of 2 turbines each), General Electric Frame 7C gas turbines (4 units) and General Electric Frame 7EA gas turbines (3 units). The peaking units are listed in the table below.

Table 5: Former LILCO Peaking Plants Owned by National Grid and Operated Under Contract to LIPA

Site	Unit Number	MW	Year In Service	Type
E. F. Barrett	GT 1	15	1970	GE Frame 5
E. F. Barrett	GT 2	15	1970	GE Frame 5
E. F. Barrett	GT 3	15	1970	GE Frame 5
E. F. Barrett	GT 4	15	1970	GE Frame 5
E. F. Barrett	GT 5	15	1970	GE Frame 5
E. F. Barrett	GT 6	15	1970	GE Frame 5
E. F. Barrett	GT 7	15	1970	GE Frame 5
E. F. Barrett	GT 8	15	1970	GE Frame 5
E. F. Barrett	GT 9	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 10	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 11	46.3	1971	Pratt and Whitney GG4 Twin Pack
E. F. Barrett	GT 12	46.3	1971	Pratt and Whitney GG4 Twin Pack
East Hampton	GT 1	18	1970	Pratt and Whitney GG4
East Hampton	No. 2	2	1962	Diesel
East Hampton	No. 3	2	1962	Diesel
East Hampton	No. 4	2	1962	Diesel
Glenwood	GT 1	15	1967	GE Frame 5
Glenwood	GT 2	50	1972	GE Frame 7C
Glenwood	GT 3	50	1972	GE Frame 7C
Holtsville	Unit 1	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 2	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 3	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 4	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 5	52.4	1974	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 6	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 7	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 8	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 9	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Holtsville	Unit 10	52.4	1975	Pratt and Whitney GG 4C1/C1D Twin Pack
Northport	GT 1	13	1967	GE Frame 5
Port Jefferson	GT 1	12	1966	GE Frame 5
Shoreham	GT 1	49	1971	GE Frame 7C
Shoreham	GT 2	15	1966	Pratt and Whitney GG 4
Wading River	GT 1	79.5	1989	GE Frame 7EA
Wading River	GT 2	79.5	1989	GE Frame 7EA
Wading River	GT 3	79.5	1989	GE Frame 7EA
Southampton	GT 1	11	1963	GE Frame 5
Southold	GT 1	12	1964	GE Frame 5
West Babylon	GT 4	49	1971	GE Frame 7C

There are several serious issues common to all of the peaking units:

Obsolescence

Due to the age of the peaking units, continued reliability is a concern. The newest of these units were installed in 1989 and many are over forty years old. Parts are increasingly hard to get for older equipment which raises the costs of repairs or dictates that plant equipment must be replaced rather than repaired in certain cases which increases the cost of operation.

Control systems are especially vulnerable to obsolescence. In particular, many of the General Electric Frame 5 and all the Frame 7C units are operating with very old control systems that date to the original installation of the units. These systems are no longer well supported by the original equipment manufacturer ("OEM"). Parts and expertise to repair these systems are growing scarce in the marketplace. The control systems on most of the Pratt and Whitney units have been replaced with third party, non-OEM systems. The diesels at East Hampton are particularly old and have had their control systems modified by LILCO and National Grid personnel to resolve issues that have arisen. While third party and in-house modifications may function well, such non-standard installations rely on the expertise and knowledge of the particular individuals with history on the units. Such history and expertise lies with an aging National Grid workforce and it is unclear how successfully such history is passed on to current personnel as the workforce turns over.

Due to the high temperatures and high stresses experienced by the rotating components of a gas turbine, these components have a finite life – referred to as "rotor life". Many of the Frame 5 engines in service on Long Island are approaching the end of their rotor lives. In order to continue to operate a gas turbine past its rotor life, either a new or refurbished rotor must be installed. As an alternative to replacing the rotor, a program of life assessments can be undertaken where the remaining useful life of the rotor and recommended assessment interval is periodically determined. The unit can then be run until the next assessment. New rotors for these older units are scarce in the market. Anecdotally, there are used rotors available for approximately $350,000 each. These would need to be inspected and partially refurbished at additional cost before being installed. An existing rotor may cost up to $500,000 to refurbish and the life assessments inspections costs are around $80,000 plus the cost of any repairs identified.

Environmental Impacts

Generally, the peaking plants on Long Island continue to operate with few or no air emissions controls. Since these units were installed before the requirements for low emission generation and before many of the current emissions control technologies were developed, they were not originally installed with air pollution controls and with only a few exceptions have not been upgraded since installation. Due to complaints from neighbors of the facility, the Holbrook units have had some upgrades to control NOx and the Wading River units were installed with an early generation of emissions controls.

Fuel Supply

The peaking units burn various light distillate liquid fuels from kerosene to diesel fuel to #2 fuel oil (similar to home heating oil). Other than the Holbrook gas turbines, all of the peaking plants on Long Island rely on tanker trucks transporting the oil from terminal facilities to the tanks located on the plant sites. Such transportation has inherent risks to the reliable operation of the plants including:

- The cost and effort of continuous tank monitoring/testing to comply with fuel specifications,
- Availability of fuel; many distillate fuels have seasonal availability that may not coincide with the electric demand on the units,
- Availability of trucks for delivery on peak demand days
- Many of the site tanks, such as those at Barrett are close to bodies of water which magnifies the risk in the case of spill during loading or operation,
- Transit times from the fuel racks to some of the sites for deliveries and susceptibility to traffic delays and congestion at loading racks,
- Community sensitivity to truck deliveries.

Appendix A – Former LILCO Plant Descriptions

Base Load Stations (including peaking units co-located)

E.F. Barrett

The E. F. Barrett Power Station is a natural gas/oil-fired steam electric-generating facility located on Barnum's Channel in the Town of Hempstead, Nassau County. The site contains two steam units (Units 1 and 2), which became operational in 1956 (Unit 1) and 1963 (Unit 2), respectively. Each unit has a nominal generating capacity of 192.5 MW. An industrial steam boiler is maintained on site for building heat, heat tracing of piping, fuel oil tank farm heating and atomization of liquid fuels during liquid fuel operation. In addition to the two steam units, there are 12 gas turbine-generators (four of which Pratt and Whitney GG4 twin packs), which began operation between 1970 and 1971, and can produce up to a total of 305 MW to meet system load demands.

Originally, the E.F. Barrett site was planned to have four units. It was determined, however, that Barnum Channel provided insufficient cooling water for four generators and units 3 and 4 were instead developed at Port Jefferson.

The two (2) 192.5 MW turbine/generator boiler sets initially operated burning coal but have been converted to operate on natural gas, #1, #2 or #6 fuel oils. Coal is no longer used at any Long Island power plant. As energy recovery measures, the boilers can be fueled with waste oil generated on and off site as well as the natural gas liquids from the main gas scrubber. Finally they incinerate citrosolv, a boiler cleaning solution, following periodic boiler chemical cleaning.

Northport

The Northport Power Station is a 1,522 MW natural gas/oil fired steam electric generating facility, consisting of four (4) 388 MW nominal turbine/generator boiler sets on a 250 acre site. The site is located on the north shore of Long Island in the Village of Northport, Suffolk County. The four generating units became operational between 1967 and 1977. In addition, a nominal 13 MW GE Frame 5 black start gas turbine is maintained on site to meet load demand and emergency power requirements.

The Steam plant operates on pipeline natural gas, #1, #2, or #6 residual fuel oil. In addition, these boilers burn waste oil generated on site and at other company facilities for energy recovery, and incinerate citrosolv, a boiler cleaning solution, following boiler chemical cleaning.

Fuel oil for the steam plant is delivered from tankers via an offshore terminal in Long Island Sound that is approximately two miles from the site. This is a unique facility for Long Island. With 45 feet of water at mean low water very large tankers can be accommodated. There are five (5) main tanks on shore used for storing #6 fuel oil,

ranging from 13,524,000 to 27,035,000 gallons. Total storage at the site is 81.0 million gallons.

The Iroquois interstate gas pipeline line crosses onto Long Island at Northport. An Iroquois metering and emergency vent system is located onsite. A National Grid pressure regulator and gas heater facility supplies natural gas to each Northport unit via an individual unit meter and control station.

Port Jefferson

This facility consists of two active 191.5 MW steam electric boilers, Units 3 and 4, which operate on either natural gas or #6 residual fuel oil, and a 12 MW "black start" GE Frame 5 gas turbine, which provides emergency restart power in the event of a failure in the electric grid and also provides additional capacity to the grid during peak load days. The station is situated on 64-acre site on the southwestern shore of Port Jefferson Harbor, which is on the north shore of Long Island. Net generation for units 3 and 4 is 383 MW.

The steam plant Units 3 and 4 operate on pipeline natural gas, #1, #2, or #6 residual fuel oil. They were initially fueled by coal but the use of coal has been discontinued. In addition, these boilers burn waste oil generated on site for energy recovery, and incinerate citrosolv, a boiler cleaning solution, following boiler chemical cleaning.

A fuel unloading dock facilities located on Port Jefferson Harbor allow barges to unload fuel oil to an onsite fuel tank farm consisting of four tanks. The fuel storage tanks in the tank farm are equipped with odor eliminating equipment due to the odor impact on the residents of the Village of Poquott, which is immediately adjacent to the plant.

Natural gas is supplied to the site by a National Grid Energy Delivery pipeline extension.

Peaking Plants

East Hampton

Description
East Hampton gas turbine Facility is located in the Town of East Hampton in the County of Suffolk. This facility consists of a single Pratt and Whitney GG4 gas turbine and three large diesel engine-generators. These units are intended to meet regional load demand and emergency power requirements. The facility is intended for unmanned operation. The site is periodically inspected by a roving regional operator.

Glenwood

Description
The Glenwood Gas Turbine Facility is located adjacent to the former steam plant in the Town of North Hempstead in the County of Nassau. The steam plant was retired in June 2012.

The Glenwood Gas Turbine Facility consists of two 50 MW General Electric Frame 7C engines designed to provide power to supply peak generation capacity, as required to support the Long Island electric distribution system. These two gas turbines were originally GE Frame 7Bs and were upgraded to GE Frame 7Cs.

Additionally on site there is a GE Frame 5 gas turbine with an output of 15MW nominal black start combustion turbine originally for the steam plant as well as load demand and emergency power requirements. Now it is strictly for load demand and emergency power requirements.

The units burn liquid fuel distillate. Fuel delivery is either by barge or truck. There is a barge unloading facility at the site.

Holtsville

The Holtsville Gas Turbine Facility is located in the Town of Brookhaven in the County of Suffolk. The site consists of ten gas turbine generators, each of which contains two engines per generator. The engines are Pratt and Whitney GG4C1 and GG4C1D engines. The exhaust gases from the engines expand and drive a Free Turbine. This turbine drives the electrical generator and mechanical pump.

The site operates on liquid fuel (kerosene). The fuel is is transferred directly to the combustion turbines by underground pipeline from the Northville off site tank farm.

Shoreham and Wading River

Description
The facility is located in the Town of Brookhaven in the County of Suffolk. This facility consists of a five (5) combustion turbines maintained on the site to meet load demand and emergency power requirements to support the Long Island distribution system.

The Shoreham portion of the site, which is adjacent to the former Shoreham Nuclear plant, has a GE Frame 7C machine and a Pratt and Whitney GG4.

The Wading River portion has 3 GE Frame 7EA machines.

The units operate on liquid fuel with storage on the site. Fuel is delivered via tanker truck to the facility.

Southampton

This unit is a black start GE Frame 5 gas turbine designed to supply peak generation capacity as required to support the Long Island electric distribution system. The facility is intended for unmanned operation. A roving regional operator periodically inspects it.

The units operate on liquid fuel with storage on site. Fuel is delivered via tanker truck to the facility.

Southold

This site consists of a single GE Frame 5 "Black-Start" gas turbine designed to supply peak generation capacity as required to support the Long Island electric distribution system. The facility is intended for unmanned operation. A roving regional operator periodically inspects it.

The units operate on liquid fuel with storage on site. Fuel is delivered via tanker truck to the facility.

West Babylon

The facility consists of a single GE Frame 7C gas turbine maintained on site to meet load demand and emergency power requirements to support the Long Island electric distribution system. The unit was originally installed as an area protection generator. The facility is intended for unmanned operation. A roving regional operator periodically inspects it.

The unit operates on liquid fuel with an onsite storage tank. Fuel is delivered via tanker truck to the facility.

This gas turbine was originally a GE Frame 7A that was upgraded to a 7C.

Glossary

DCS – Distributed Control System

GE – General Electric

HRSG – Heat Recovery Steam Generator

MK - Mark

MW – Megawatt

NOAA – National Oceanic and Atmospheric Administration

NYCRR – New York Code Rules and Regulation

NYDEC – New York Department of Environmental Conservation

OEM – Original Equipment Manufacturer

PSD – Prevention of Significant Deterioration - prevent significant environmental impacts on “attainment areas” from large industrial sources of air pollution.

USEPA – United States Environmental Protection Agency

SPDES – State Pollutant Discharge Elimination System

References

NYDEC
http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html

USEPA
http://www.epa.gov
http://ampd.epa.gov/ampd/

LIPA Electric Resource Plan 2010 – 2020

NYISO Report on Hurricane Sandy (Superstorm Sandy)
http://www.nysrc.org/pdf/MeetingMaterial/RCMSMeetingMaterial/RCMS%20Agenda%20159/Sandy_Report___3_27_133.pdf