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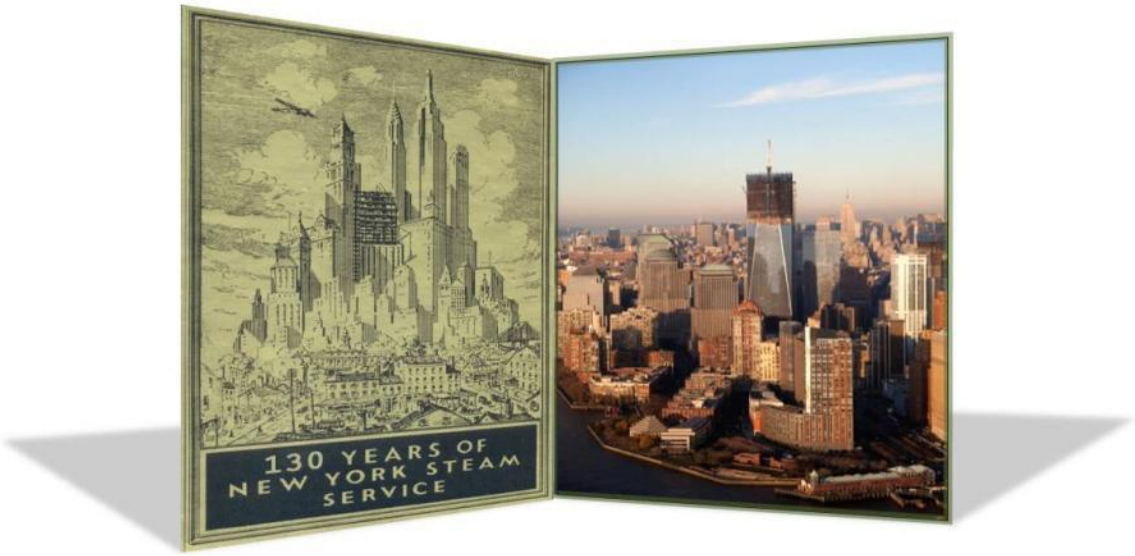

conEdison

Building on Steam

History

Our Steam System – Over 130 Years in the Making

In 2012, New York's Steam System celebrated its 130th birthday.

Although the first steam company in New York began in 1879, it wasn't until 1882 that steam was first supplied to customers. It took years to obtain capital and construct the first steam system. At the time, the New York Steam Company had 62 customers, three miles of steam mains, and the system operated at 80 psig.

In 1886, steam extended uptown and there were five miles of steam mains and 350 customers added. In addition, a boiler plant was built at Madison Avenue and 58th Street, which served the area of Madison Avenue to Fifth Avenue between 53rd Street to 67th Street.

In 1936, Con Edison purchased the New York Steam Company. During this time, there were 65 miles of steam mains, six generating stations, and the steam system served approximately 2,500 buildings. Con Edison also owned Waterside Generating Station, East River Generating Station, and Hudson Avenue Generating Station.

In 1957, Con Edison purchased 59th Street Generating Station and 74th Street Generating station from the City of New York. During the late 1960's and early 1970's, Con Edison converted all its generating stations that were burning coal to stations that burned low-sulfur oil in order to meet new clean-air standards.

During the 1980's and into the early 1990's, Con Edison modified most of its boiler fuel systems in the generating stations to include gas-firing capability.

Today, Con Edison maintains the largest district steam system in the U.S. There are about 1,720 customer accounts representing 3.5 million New York City residents. Our service territory runs from 96th Street on the west side to 89th Street on the east side, down to the Battery.

East River Generating Station

The East River Generating Complex is a group of steam-producing facilities, which includes the East River Generating Station and the South Steam Generating Station.

The station has an electric generating capacity of almost 700 MW. The East River Generating Station consists of the following units: East River 1 and 2, East River 6, East River 7 and five steam only boilers at the East River South Steam Generating Station.

East River Units 1 and 2: East River Units 1 and 2 are Gas Turbine electrical units which produce a total of 360 MW. The associated East River Units 10 and 20 Heat Recovery Steam Generators

(HRSG's) generate up to 700,000 pounds per hour of steam each. Also, the Gas Turbine exhaust and natural gas duct firing is used to generate an additional 900,000 pounds per hour of steam in each of the two units for a combined total steam capacity of 1,600,000 pounds per hour for each of the two gas turbine/HSRG systems or 3,200,000 pounds per hour for ER 1/10 and ER 2/20 together.

The East River Station has two boilers, Unit 6 and Unit 7, with a total of 1,975,000 pounds per hour of steam capacity.

East River Unit 6: Unit 6 utilizes an extraction turbine and is able to produce electricity alone or electricity and steam at the same time. The East River 6 turbine is 140 MW uses natural gas and low sulfur residual fuel oil.

East River Unit 7: Unit 7 is capable of switching between steam and electric production. The East River 7 turbine is 180 MW and uses natural gas and low sulfur residual fuel oil.

The East River South Steam Station generates only steam with its five package boilers which are capable of burning either natural gas or low sulfur residual fuel oil. They produce up to 650,000 pounds per hour of steam. In total, with all the units, East River's total steam capacity is 5,825,000 pounds per hour.

<u>Station History:</u>

- 1926: Built as a 25-cycle plant
- 1951: Units 5 and 6 put in service
- 1955: Unit 7 built and put in service
- 1995: Unit 5 retired
- 1996: Unit 7 modified to operate as steam send-out boiler
- 2005: Units 1 and 2 put in service

East River Generating Station Characteristics

	Unit 7	Unit 6	Units 1 & 2
Turbines	Westinghouse	GE	GE 7FA Combustion Turbine
Electric Capacity	180 MW	140 MW	360 MW
Steam Capacity	1,200 Mlb/hr	830 Mlb/hr	1,600 Mlb/hr each Total: 3,200 Mlb/hr

South Steam Station	Package Boilers #115-119
Main Fuel	- Natural Gas - No. 6 Fuel Oil
Steam Sendout Capability	650 Mlb/hr
2012 Heat Rate	Not Applicable
Manufacturer	Foster Wheeler
Circulation	Natural
Draft Condition	Balanced
Cycle Type	Package Boiler
Year Installed	1973

Water Treatment Plants Supply:	
• South Steam Station	Softener system 2,300 GPM
• High Pressure Boilers	Ion Exchange Demineralization system 2,800 GPM
• HRSG	Reverse Osmosis, EDI system 6,730 GPM
Fuel Supply:	
• Natural gas is delivered for all units, and Kerosene and No. 6 Fuel Oil are delivered as back up for the combustion turbines and boilers respectively.	

Brooklyn Navy Yard Cogeneration Plant (BNYCP)

The BNYCP cogeneration facility is located in Brooklyn, NY at the Brooklyn Navy Yard. In November 1996, it started selling electricity and steam to Con Edison. Both steam and electricity are produced and supplied as needed by Con Edison up to a maximum of 986 Mlb/hr.

74th Street Generating Station

The 74th Street Generating Station was built in 1900 and has a total steam capacity of 2,008,000 pounds per hour. The Interborough Rapid Transit Company, a private firm that built, owned, and operated the IRT Subway, also owned the 74th Street Generating Station.

Ownership of the plant passed to New York City in the early 1930's and was bought by Con Edison in 1957.

The 74th Street Generating Station has three high pressure boilers which can produce a combined capacity of 1,300,000 pounds per hour of steam. In addition, the station has six package boilers which can supply an additional 708,000 pounds per hour of steam for our customers. The station currently burns only low sulfur oil for steam production but is undergoing a conversion in 2013 to burn natural gas. The station also has two gas turbine electric generators with a capacity of about 40 MW.

The 60th Street and Ravenswood steam stations fall under the management of the 74th Street Generating Station and will be covered as part of this section.

Station History:

- 1907: Built by the Interborough Rapid Transit Company
- 1930's: Ownership of the plant passed to the City of New York
- 1957: 74th Street Generating Station purchased from the City

74th Street Generating Station Characteristics

	3 High Pressure Boilers (120-122)	**6 Package Boilers (1-6)**	**2 Gas Turbine Units**
Main Fuel	No. 6 Fuel Oil igniter fuel – kerosene	No. 6 Fuel Oil igniters – high energy spark	Kerosene
Boiler Steam Output Conditions	800 psig, 875° F	400 psig, 500° F	Not Applicable
Maximum Output	1,300 Mlb/hr Total	708 Mlb/hr Total	Maximum Electrical Output approximately 20 megawatts each
Maximum Fuel Consumption	4,500 gallons/hr per boiler	1,200 gallons/hr per boiler	1,800 gallons/hr per gas turbine
2005 Heat Rate	1,466 BTU/lb (Live)	1,485 BTU/lb (Topper)	Not Applicable
Manufacturer	Combustion Engineering	Foster Wheeler	Pratt & Whitney
Circulation	Natural	Natural	
Draft Condition	Balanced	Balanced	
Cycle Type	Non-Reheat	Package Boiler	
Year Installed	1948	1978-79	

Water Supply:	
High Pressure Boilers	Ion Exchange Demineralization system 3,400 GPM
Package Boilers	Softener system 1,800 GPM

Fuel Supply:
• No. 6 Fuel Oil is delivered for the boilers and Kerosene is delivered for the Gas Turbine Units. Natural Gas delivery will be added to the boilers in late 2013.

The 60th Street Generating Station is part of the 74th Street Complex and has six package boilers which are fueled by natural gas and produce 726,000 pounds per hour of steam.

60th Street Generating Station Characteristics

	Package Boilers #1 – 6
Main Fuel	- Natural Gas - Kerosene
Steam Sendout Capability	726 Mlb/hr Total
2005 Heat Rate	Not Applicable
Manufactuer	Foster Wheeler
Circulation	Natural
Draft Condition	Balanced
Cycle Type	Package Boiler
Year Installed	1973

In addition:

- City makeup water is utilized

The Ravenswood A house, which is also part of the 74th Street Complex, is located in Queens, New York and supplies steam to our Manhattan customers via a tunnel. The station has four boilers which are fueled by a mixture of low sulfur fuel and natural gas and produce up to 750,000 pounds per hour of steam.

Ravenswood (Ravenswood A House) Generating Station Charcteristics

	Package Boilers #1, 2, and 4
Main Fuel	- #6 Fuel Oil - Natural Gas (ignition)
Steam Sendout Capability	750 Mlb/hr Total
2005 Heat Rate	Not Applicable
Manufacturer	Babcock and Wilcox
Circulation	Natural
Draft Condition	Balanced
Cycle Type	Non Reheat
Year Installed	1948

In addition:

- Steam auxiliaries drive balance of plant equipment
- City makeup water is utilized

59th Street Generating Station

Rich in history, the 59th Street Generating Station has been proposed by the Landmarks Preservation Commission to be designated a New York City landmark. In fact, the station has been called "an architectural treasure" by the Hudson River Powerhouse Group, a not-for-profit group championing to see the structure landmarked. Con Edison is honored to have the 59th Street Generating Station considered a landmark structure; however maintaining the privacy and location of the station for security purposes is of utmost importance.

Today, the station has two high pressure boilers and three package boilers capable of producing up to 1,380,000 pounds per hour of steam for our customers. These units currently burn a mixture of the predominant fuel, low sulfur oil, and natural gas. A conversion is currently underway in 2013 to upgrade these units to burn natural gas exclusively or a combination of oil and gas.

The station also has a gas turbine capable of generating 20 MW of electricity.

Station History:

- 1905: The plant started operating
- 1930's: Ownership was passed on to the City of New York
- 1959: Con Edison purchased the station

59th Street Generating Station Characteristics

	Boilers 114 & 115	Boiler 116 - 118	Gas Turbine
Primary Fuel	#6 Fuel Oil Natural Gas Igniters	Natural Gas	(Kerosene
Sendout Capability	500 Mlb/hr	127 Mlb/hr	15 MW
Heat Rate (Btu/lb)	1,400	1,450	N/A
Manufacturer	Combustion Engineering	Foster Wheeler	Pratt & Whitney
Circulation	Natural	Natural	N/A
Cycle type	Non-reheat	Package Boilers	
Secondary Fuel	Natural Gas	#6 Fuel Oil	N/A
Commissioned	1968	1972	1967

Water Supply:	
All Boilers	Ion Exchange Demineralization system 3,200 GPM

Fuel Supply:
• Natural Gas, Kerosene, and No. 6 Fuel Oil are delivered to the site for use as indicated in the table above. Boilers 114 and 115, and the Gas Turbine will have Natural Gas as their primary fuel in 2013.

Production

The Con Edison Steam System supply is designed to meet the forecasted peak load and also be able to sustain lost of the largest production unit. For the purpose of this report 1 Mlb = 1,000 lb. The total steam system capacity as of 2012 is 11,668 Mlb/hr. This capacity consists of steam-electric plants, steam-only plants, and capacity supplied under the Company's long-term contract with the Brooklyn Navy Yard Cogeneration Partners (BNYCP). Four of our largest steam supply units are also cogeneration and are capable of generating over 700 MW of electricity. In 2012, more than 63% of the steam produced came from cogeneration.

Distribution Network

The Con Edison Steam System's distribution grid can be broken down into four main areas: the midtown area, which receives approximately 60% of production, 20% to downtown, and 20% to the upper east and west sides.

The steam is transported by pressure differences from the plants through high pressure (approximately 400 psig) transmission mains. The transmission mains are connected to lower pressure (approximately 200 psig) distribution mains, which provide steam service through connections to the Company's customers. The distribution grid varies in dimension, temperature, and nominal pressure.

Transmission mains are rated for higher pressures and temperatures than distribution mains and service lines.

The geographic configurations of the piping systems are the result of customer locations and demands, as well as the location and capability of the production sources.

The entire distribution network (both the 400 psig and 200 psig mains) contains the following components:

- 105 miles of pipes varying from 2" to 36" in diameter
- 594 main valves which can isolate the network into numerous sections for maintenance and outages
- 1,880 customer service valves
- 3,369 steam main anchors
- 1,619 bellow expansion joints
- 2,964 underground structures
- 81 pumps along the main to remove groundwater sources adjacent to the steam mains

Square Footage of Customers

Our customers represent 509,117,031 square feet of space. They comprise various facilities in Manhattan such as condominiums, elevator apartments, one- and two-family dwellings, loft buildings, dry cleaners, educational facilities, firehouses, government facilities, hospital and health facilities, hotels and clubs, museums and galleries, office buildings, religions facilities, restaurants, and theaters.

In 2012, the total amount of sales to our customers was **19,741 MMlb**. This was exceptionally low due to warmer than normal weather, as well as the impact of Superstorm Sandy on steam customers.

Average Age of Production and Distribution System

The weighted average age of our production system is 36 years old and the weighted average age of our distribution system is 60 years old.

Criteria for Submittal – Environmental Benefits

The Steam System provides several environmental benefits. Through the use of cogeneration, the release of approximately 1.33 million tons of CO_2 per year is avoided (equivalent to 235,730 cars), when compared to individual electric and steam production methods.

An in-house analysis showed that if customers install their own distributed generation with on-site individual boilers and/or combined heat and power plant, the result would be a city-wide increase in NOx, CO, and CO_2 emissions compared to the Company's central station generating plants. This is due to the following reasons:

- For efficient cogeneration, steam and electricity need to be generated simultaneously. Customer sited CHP cogeneration has inherent seasonal inefficiency because individual buildings typically do not have simultaneous demand for steam and electricity. Most of their steam demand occurs in winter and electric demand in summer.
- Con Edison is able to utilize the benefits of cogeneration throughout the year because there is adequate demand for steam in all seasons from a large diverse customer base.
- The East River Cogeneration units and Brooklyn Navy Yard units provide about 57% of steam and these cogeneration units are equipped with environmental control equipment (selective catalytic reactor and oxidation catalyst) that remove most of NOx and CO emissions from the exhaust. Most of the customer sited boilers and CHPs are not equipped with such environmental controls.

Please see the calculations below used from the Ecoheat4cities calculation tool. Please do not disclose these calculations without prior consent. Thank You.

excel tool based on fuel inputs and outputs