

**ELECTRICITY
OUTLOOK**

POWERING NEW YORK CITY'S FUTURE

A REPORT BY THE ENERGY COMMITTEE
OF THE NEW YORK BUILDING CONGRESS



INTRODUCTION

New York City is facing a confluence of events that will impact the availability of an adequate supply of electricity for homes, businesses, and public facilities throughout the five boroughs by 2027, if not sooner. New York City's anticipated economic and population growth over the next decade, combined with the announced closure of Entergy's two Indian Point nuclear power plants by 2021 and the potential retirement of the city's aging electricity generating plants, presents significant risks to the city's electricity supply outlook that merit immediate action.

Consider that summer peak demand, the key criterion for planning and providing the supply of electricity to New York City, is forecast by the New York Independent System Operator (NYISO) to climb to 12,359 megawatts (MW) in 2021 and to 12,788 MW in 2027 from a summer peak of 10,990 MW in 2016.

While NYISO estimates that 726 MW of power can be saved through energy efficiency measures by 2027, now is the time for New York State to identify and secure additional sources of capacity and heightened efficiency measures so that they are in place in advance of Indian Point's scheduled closure.

This report provides an analysis of the electricity demand and supply forecast for New York City through 2027, while also identifying risks to the supply forecast and offering recommendations to address those risks.¹

EXECUTIVE SUMMARY

Despite the pressures imposed by summers that have become increasingly hotter year over year, New York City has reliably met the electricity demands of its growing economy, population, and built environment. Thanks to the introduction of more energy efficient products and other conservation measures, the city has actually experienced a slight decline in annual electricity consumption since 2011. Over the past six years, an estimated 350 MW have been saved through conservation measures.

The city's ability to meet peak summer



Indian Point's Two Nuclear Power Plants, Courtesy of Entergy

demand is also largely attributable to an increase in the overall electricity supply. During the first half of this decade, New York City has added 1,205 MW in generation and 660 MW in transmission capacity. Another 83 MW has been added via the increased use of solar energy. The supply of natural gas, which fuels nearly all of the city's electricity generation, has likewise increased through the introduction of new pipelines and investments that have boosted capacity on existing lines.

Even though these energy infrastructure investments have been substantial, more investment will be needed in order to continue to meet New York City's electricity demand in the coming years. NYISO is forecasting that summer peak demand will rise consistently through 2027, when it reaches 12,788 MW, or 1,798 MW above the actual 2016 peak.

Adding to the urgency of the situation is the announced closure of Indian Point's two nuclear power plants, which provide 2,069 MW for Westchester County and New York City, or approximately 25 percent of the region's energy supply.

Presently, there are no plans for additional generation plants within New York City. Nor are there firm plans for additional transmission capacity to the city.

The only near-term generation facilities

under construction or in planning stages are outside of New York City. A new 650 MW natural gas plant, CPV Valley in Orange County, is targeted for completion in 2018; and a recently announced 1,100 MW natural gas plant, Cricket Valley, in Dutchess County, is estimated for completion in mid-2019.

To benefit from these new sources of electricity supply, New York City will need new and improved transmission capacity. The same is true for the abundant supply of electricity – from hydropower, wind power, and utility-scale solar installations – that is and will be produced in Upstate and Western New York and in Canada. While NYISO recognizes the need for improved transmission connections from Upstate to Southeast New York, the Lower Hudson Valley, and New York City, firm plans for this investment are not yet in place.

Two major proposed transmission projects do offer promise of a significant increase of electricity to New York City by or before 2027. The Champlain Hudson Power Express project, a 330-mile HVDC cable submerged under Lake Champlain and the Hudson River, could begin construction in 2017 and deliver 1,000 MW of renewable energy from Québec to Astoria, Queens by late 2021. A second project that is in active planning and the early permitting stage, the Empire State Connector, would run a 260-

¹ This forecast for the years through 2027 is the time frame of NYISO's official forecast for electricity demand and supply; 2017 is the base year of NYISO's latest forecast. New York Independent System Operator (NYISO), *2017 Load & Capacity Data "Gold Book"* (April 2017).

mile HVDC submerged cable below the Erie Canal and the Hudson River. If built, it could deliver 1,000 MW from renewable sources to either Brooklyn or the Bronx.

These or similar transmission projects, along with plans for additional investment in existing transmission capacity, are essential to assuring that New York City has an ample supply of electricity throughout the next decade.

New natural gas pipeline capacity with direct connection to New York City and Westchester County also will be necessary to meet expected growth in demand. Almost all in-city electricity generation now comes from natural gas burning plants, which has led to a 25 percent increase in demand for natural gas in Con Edison's service territory over the past six years.

Four natural gas pipeline projects are currently at the final permitting or early proposal stage. Three of those projects - the Millennium Pipeline, PennEast Pipeline, and Mountain Valley Pipeline projects - would provide greater diversity of supply to the region as well as better price differentials as soon as 2018. The fourth, Transco's Northeast Supply Enhancement project, would bring added natural gas directly into New York City, where the demand exists and is growing.

The bottom line is that meeting New York City's electricity demand through 2027 will require a multipronged strategy incorporating energy efficiency and conservation measures, increased transmission and natural gas pipeline capacity, and enhanced investment in renewables, as well as new storage and supergrid technologies. As the recommendations in this report suggest, all stakeholders – government, utilities, and commercial and residential consumers – will play an important role in bringing that strategy to fruition.

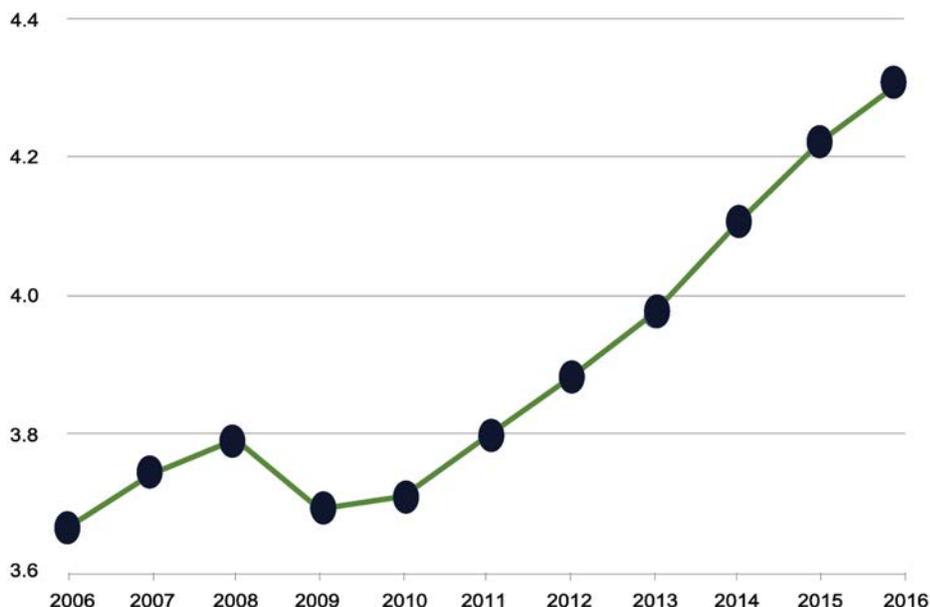
POWERING A GROWING ECONOMY

New York City has enjoyed a robust pace of economic expansion in the wake of the Great Recession of 2008-2009. Job levels in the city increased by 620,000 from the low months of 2009, for a gain of 17 percent through 2016, or over 2 percent per year.

The city's population increased to an estimated level of 8,537,673 residents by

NYC Employment, 2006–2016

(In Millions)



Source: New York Department of Labor

July 2016, a gain of more than 362,000 people since the 2010 Census. In addition, the city's daytime population, which includes tourists and workers commuting from surrounding regions, swells by over two million each day. New York City attracted a record 60 million visitors during 2016.

The first six years of this decade were also characterized by a surge in new construction in virtually every building sector, including office towers, residential buildings, hotels, stores, schools, and hospitals. This has led to the creation of a host of dynamic new business districts, including the rebuilt World Trade Center, Hudson Yards, and Pacific Park in Brooklyn, as well as the production of nearly 120,000 new housing units throughout the five boroughs.²

Electricity Demand: Planning for the Summer Peak

Despite New York City's strong economic recovery and construction boom, annual energy consumption in the city has actually

declined slightly. This is widely credited to increased energy efficiency, especially by residential and commercial consumers who have switched to energy-saving lighting and appliances. Con Edison estimates that these and other conservation measures over the past six years have shaved 350 MW, or 3 percent, from peak summer demand.

Summer peak demand is the vital criterion for planning and providing the supply of electricity to New York City, whether from locally-based generation facilities, transmission of power into the city, and/or a combination of conservation and demand management response measures.

The patterns of summer peak demand have been influenced by significant increases in summer temperatures, particularly in 2011, when demand peaked at 11,424 MW, and in 2013, when it reached 11,456 MW. While New York City experienced another hot summer in 2016, demand topped out at 10,990 MW on Thursday, August 11. Temperatures remained consistently high in the mid-90s for the following three days, but the overall need for power was tempered by demand management response measures

² New York Building Congress, *New York City Construction Outlook: 2016-2018* (New York City, 2016), p. 3.

implemented on Friday and by weekend office closures.

Electricity Supply

Since 2011, New York City's electricity supply has increased by a net of 1,665 MW through 1,205 MW in new generation and another 660 MW from added transmission capacity, less the retirement of 200 MW of aging plant.

As of today, the majority of the city's electricity comes from 24 in-city power plants with a combined capacity of about 10,000 MW, which meets a NYISO requirement that 81.5 percent of the city's electricity generation originate within the five boroughs. Almost all this generation is now fueled by natural gas via several pipelines to the city.³ The balance of electricity comes from imports, via transmission, including from the output of Indian Point.

Indian Point Energy Center

During the summer of 2016, Indian Point Energy Center's two nuclear power plants provided 2,069 MW for the entire Lower Hudson Valley, including New York City.

The license for Indian Point Unit 2 expired in September 2013 and the license for Indian Point Unit 3 expired in December 2015. Under federal law, nuclear power plants are allowed to continue to operate while awaiting a final decision from the Nuclear Regulatory Commission on their license renewal applications.

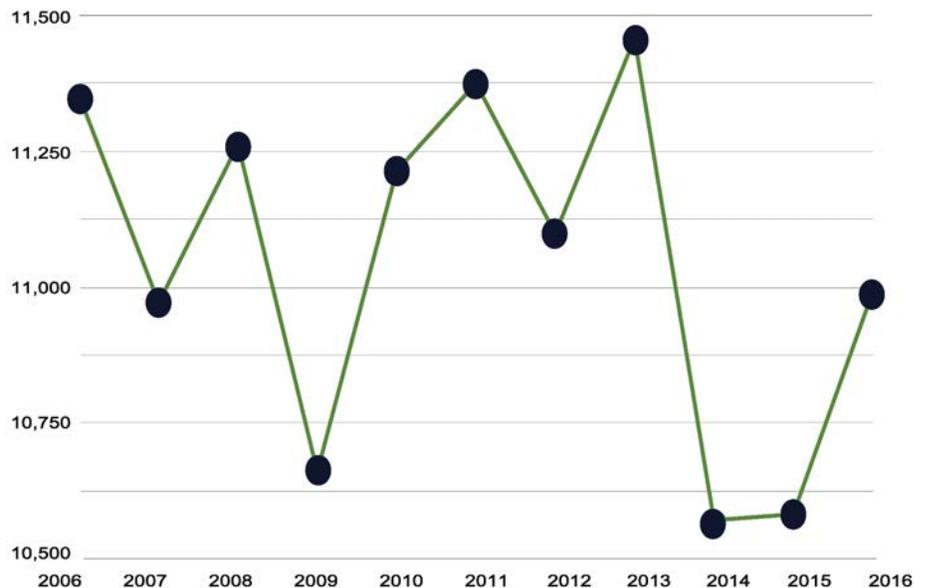
On January 9, 2017, Entergy and the State of New York announced they had entered into an agreement to permanently cease operations at Indian Point Unit 2 by April 30, 2020, and Indian Point Unit 3 by 2021.

Governor Andrew M. Cuomo's announcement on the settlement indicated that replacement power from "transmission upgrades and efficiency measures totaling over 700 MW are already in-service," and at least one generation resource (the CPV Valley project), which is permitted and under construction, would provide 650 MW of power in the Lower Hudson River Valley starting in 2018.⁴

According to NYISO's Comprehensive Reliability Plan (CRP) issued on April 11, 2017, New York's bulk power system will meet all applicable reliability criteria through

Summer Peak Demand in NYC, 2006–2016

(In Megawatts)



Source: NYISO's 2016 Load & Capacity Data "Gold Book"

2026. The CRP does state that recent developments, including the announcement by Entergy and Governor Cuomo to close Indian Point Unit 2 by April 2020 and Unit 3 by April 2021, could impact system resources.

The announced closure of Indian Point's two nuclear power plants by 2021, which in 2016 provided 2,069 MW, will reduce the local energy supply to Westchester County and New York City by 25 percent.

Natural Gas

Ample supplies of natural gas are critical, as almost all in-city electricity generation comes from natural gas burning plants. Demand for natural gas, which has increased by 25 percent in Con Edison's service territory since 2011, has been largely driven by New York City's Clean Heat Program, which has produced a shift from heavy oil to natural gas in over 3,000 buildings. In addition, household demand for natural gas has continued to increase along with the overall population.

Three significant expansions to natural gas pipelines since 2010 have helped offset this increased demand.

- Spectra's 200-mile long project, bringing 800,000 DT/day to the New Jersey-New York area with connections to Con Edison's system in Lower Manhattan, was brought into service in 2013. Con Edison has contracted for 170,000 DT/day of this volume.
- The Transco Rockaway Delivery Lateral, sized to transport up to 647,000 DT/day, coupled with the Northeast

³ NYC Mayor's Office of Sustainability, *New York City's Roadmap to 80x50* (New York City, 2016).

⁴ Office of Governor Andrew M. Cuomo, Pressroom. (Jan. 9, 2017). *Governor Announces 10th Proposal of the 2017 State of the State: Closure of the Indian Point Nuclear Plant by 2021* [Press release].

Connector Project bringing the first increment of 100,000 DT/day to National Grid's system, was brought into service in mid-May 2015.

- Transco's New York Bay Expansion project, which will bring an additional 115,000 DT/day to National Grid, is due into service in November 2017.

Shale Gas

Vast quantities of natural gas are locked in the Marcellus Shale, a deposit submerged between the Appalachian Range that extends from Tennessee, West Virginia, Pennsylvania, and into New York State, which contains an estimated 15 percent of the total shale gas reserve. Considerable volumes of shale gas from Pennsylvania are currently supplying natural gas to New York City (Con Edison received 81 percent of its gas supply from shale gas in 2015). Vertical wells in seven Upstate New York counties have also been producing natural gas from the Marcellus Shale for the past five decades. In December 2014, however, Governor Cuomo announced a ban on hydraulic fracking in New York State, the method currently used to extract shale gas, over concerns for health risks.⁵

Transmission

The transmission issue for Downstate New York is stark. The region known as Southeast New York, which comprises New York City, Long Island, and the Lower Hudson Valley, uses 58 percent of statewide electricity, but generates only 40 percent of its electricity supply. The gap must be filled by transmission lines to the city and the metro area.

Since 2011, there have been two significant investments in transmission to New York City:

- the 660 MW High Voltage Direct Current (HVDC) line between Ridgefield, New Jersey and New York City; and
- the Transmission Owners Transmission Solutions (TOTS) investment by Con Edison and the New York Power Authority (NYPA), as part of a plan to solve reliability needs under the Indian Point Contingency Plan. The Marcy South Series Compensation project, a component of TOTS, went into service

in June of 2016 and contributes about 400 MW of additional electricity resources.

A CHANGING ELECTRICITY MARKET

An important element in the forecast, particularly for New York State overall, is the ramp up in both public policy initiatives and the emergence of technologies aimed at encouraging and enabling the use of alternative generating sources, primarily wind and solar.

Public Policy Initiatives

Governor Cuomo's comprehensive energy strategy for New York, Reforming the Energy Vision (REV), launched in 2014, sets forth a range of policy objectives and "a new business model" to modernize the sources of supply for electricity. The new business model envisions a future "in which a distributed energy resource (DER) becomes a primary tool in the planning and operation of electricity systems. Utilities would be encouraged to invest in DER that mitigate or lessen the need for traditional distribution system investments." DER includes solar, micro-grids, and combined heat and power (CHP, also known as "Co-Gen"). This would require changes in existing tariffs, and, according to NYISO's *Power Trends* report, "The wholesale electricity markets will need to adjust to address the challenges of DER. . . ."

In 2015, 23 percent of all New York State electricity was produced from renewables, primarily from hydropower, but including 3 percent from wind power installations and an even smaller percentage from solar.

In August 2016, Governor Cuomo announced the Clean Energy Standard (CES), which requires that "utilities and other energy providers . . . procure and phase in new renewable power resources," with the goal of renewable power resources supplying 30 percent of the state's total electricity load by 2021 and 50 percent of total load by 2030.⁶ These goals would be achieved by utilities and other energy providers obtaining a targeted amount of Renewable Energy Credits (RECs) each year. These credits would be paid to developers of renewable energy to finance their new investments.

New York City has proposed its own aggressive goals for carbon reduction and adoption of new technologies for energy generation and for local distribution. These proposed goals began with Mayor Bloomberg's PlaNYC report in 2007, and continued through to Mayor de Blasio's OneNYC plan. In September 2016, the Mayor's Office of Sustainability released *New York City's Roadmap to 80x50*, a plan to achieve an 80 percent reduction in greenhouse gas emissions by 2050. One strategy in meeting this goal is "electrification", which involves removing customers from gas heat and onto electric heat, while meeting that increased electricity demand with renewables. The *Roadmap* sets out long-term targets for achieving significant emissions reductions for the city's buildings, transportation, and waste management through scaled up DER "at both the building and community levels," that are "contingent upon a transition towards a renewable energy-based electric grid."

For the city to benefit from the Upstate New York investments in alternative energies, and as the NYISO notes in their *Power Trends* report of 2016, "Upgraded transmission capacity is vital to efficiently moving power to address regional power needs."

Renewables and Emerging Technology

In 2015, 23 percent of all New York State electricity was produced by renewables, primarily from hydropower, but including 3 percent from wind power installations and an even smaller percentage from solar. Most of these renewable sources are and will continue to be located in Upstate and Western New York.

⁵ Thomas Kaplan, "Citing Health Risks, Cuomo Bans Fracking in New York State," *New York Times*, Dec. 17, 2014, New York Edition, NY/Region sec.

⁶ Office of Governor Andrew M. Cuomo, Pressroom. (Aug. 1, 2016). *Governor Cuomo Announces Establishment of Clean Energy Standard That Mandates 50 Percent Renewables by 2030* [Press release].

Wind Power

There are presently no large-scale wind facilities in New York City, nor are any expected within the forecast period to 2027.

However, the CES plan requires NYSERDA, New York State's agency for energy research, to prepare a blueprint for developing offshore wind projects in the New York Bight. NYSERDA expects to complete its Master Plan for offshore wind in 2017.

In January 2017, the Long Island Power Authority (LIPA) approved a 20-year power purchase agreement with Deepwater Wind for the output from its proposed 90 MW South Fork offshore wind farm, to be located approximately 30 miles east of Montauk. The project, which must seek permitting approval from state and federal agencies, would provide enough power for 50,000 homes in the Hamptons when it is anticipated to be completed at the end of 2022.

In a new measure of long-term planning for offshore wind, the Norwegian firm Statoil pledged \$42 million in a federal auction held in mid-December 2016 for the development of 79,000 acres of off-shore wind in the New York Bight south of Long Island.⁷

Distributed Energy Resources (DER)

In this emerging new world of energy production and delivery, DER includes an array of technologies such as solar PV, CHP or Co-Gen systems, back-up generators, wind turbines, micro grids, fuel cells, and storage systems.

These new technologies require a new regulatory environment, which is still evolving, to handle behind-the-meter production (BTM) as well as two-way connections to the grid.

In October 2016, the New York State Department of Public Service (NYS PSC) recommended "a more accurate, market-based approach to compensate consumers for the value of their distributed clean energy investments . . . by compensating homeowners, energy developers and utilities for the full and accurate value of these resources to the power grid."⁸



Brooklyn Navy Yard Solar Installation, Courtesy of Con Edison

In February 2017, NYISO released a roadmap to integrate DER into the state's wholesale markets by improving data measurements for accurate load forecasts encompassing DER as well as developing incentives and compensation for DER resources.⁹

New York City's stated goal of pursuing community-level self-sufficiency in electricity supply and distribution could involve most or all these technologies within a city neighborhood, but would also require major changes in regulations.

Combined Heat and Power (CHP) in New York City

Within New York City, there are several existing CHP plants, including at the Brooklyn Navy Yard and at New York University's main Manhattan campus. Several other major CHP plants with generating capacity as large as 13 MW per plant are now under construction in the city. Con Edison expects that, by 2026, 135 MW of CHP capacity could come online, and together with approximately 130 MW of CHP that is already connected to the electric distribution system, will add almost 2 percent to New York's overall capacity for summer

peak demand. New York City anticipates that CHP can play "an important role in establishing district heating and cooling networks" for community-based energy systems.¹⁰

One important issue that has emerged with the increased number of large CHP projects is that of "stand-by charges," which are paid to the utilities to remain connected to the electricity distribution system. NYISO's proposed tariff changes would "help promote distributed generation and provide developers with the opportunity to gain additional revenue through the sale of extra energy and capacity."¹¹

Con Edison's Energy Efficiency Investments

Con Edison has made or has underway several REV-related investments. The Brooklyn Queens Demand Management program (BQDM) has used a series of energy efficiency demand response and distributed energy resources, sufficient to save enough power to defer an otherwise \$1 billion investment in a substation.

Con Edison is currently deploying Advanced Metering Infrastructure (AMI) throughout its service territory to enable more accurate monitoring of customer load. As part of AMI, Con Edison will

⁷ Diane Cardwell, "Now Testing the Waters: Wind Power," *New York Times*, Jan. 22, 2017.

⁸ New York State Department of Public Service. (Oct. 28, 2016). *Report Recommends New Approaches to Determine the Full Value of Renewable Power & Money-Saving Technologies* [Press release].

⁹ NYISO. (Feb. 2, 2017). *NYISO Charts Course for an Integrated Grid* [Press release].

¹⁰ NYC Mayor's Office of Sustainability, *Roadmap to 80x50*, pp. 41 and 44.

¹¹ NYISO, *Power Trends 2016*, pp. 52-58.

be implementing Conservation Voltage Optimization (CVO), which will allow the company to operate the grid at optimum voltage levels. The company will roll out CVO in a phased deployment across its territory and anticipates that CVO will reduce customer energy consumption by approximately 1.5 percent when the project is completed in 2022.

Storage

One of the remaining challenges in providing electricity from intermittent sources, such as solar or wind, is the issue of storage, which allows power to be made available during off-hours. To date, there is minimal storage capacity (less than 1 MW) available in New York City. While the price of batteries for fuel cells at the household level has been falling significantly in recent years, it is only recently that the applications of major technological breakthroughs in large-scale storage have been introduced in several new projects, primarily in California.

These include a 30 MW energy storage facility by the AES Corporation, which opened in Escondido, California in February 2017. This installation of lithium ion battery-based energy storage is capable of powering 20,000 homes for four peak evening hours. AES had previously opened a 7.5 MW battery storage facility in El Cajon, southern California.

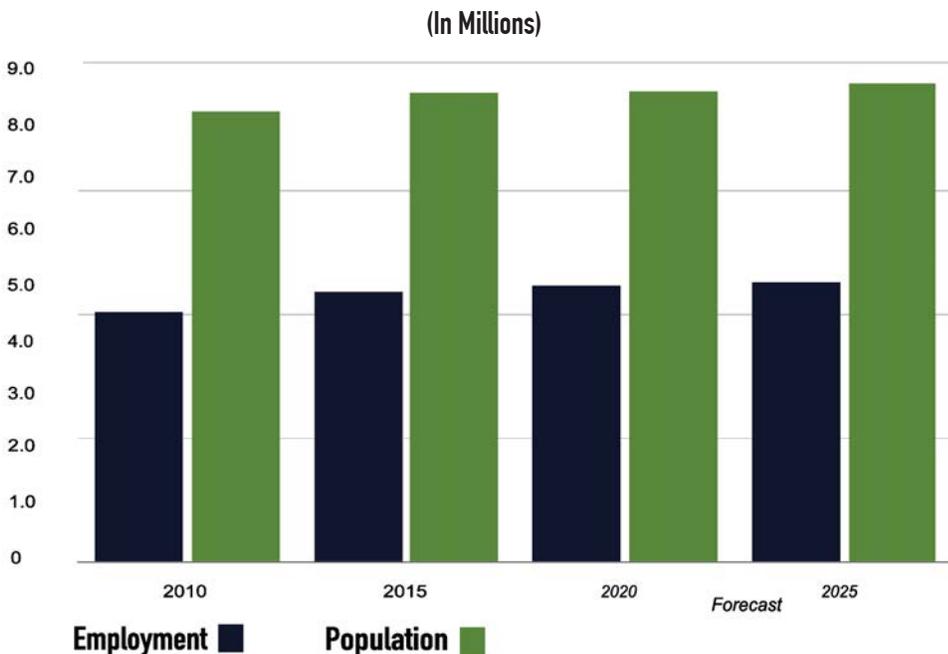
Tesla's 20 MW Mira Loma installation of 19,000 lithium ion battery modules made by Samsung came online January 30, 2017.¹² Tesla's smaller battery storage facility, built in conjunction with SolarCity's 15,000 solar panels in Norwich, Connecticut, which can power 5,000 homes in the evening peak, was due for completion in the first quarter of 2017.

AltaGas built a 20 MW battery storage project in Pomona, California for Southern California Edison, which came online in December 2016.

THE ELECTRICITY OUTLOOK TO 2027

In March 2015, the New York Metropolitan Transportation Council (NYMTC) forecast that New York City's population will reach 8.7 million by 2025, an increase of 160,000

NYC Employment vs. Population, 2010-2025



Source: New York Metropolitan Transportation Council, 2050 Socioeconomic & Demographic Forecasts, March 12, 2015

from the Census Bureau's estimate for 2016. NYMTC expects that employment in the city will continue to grow through 2025, adding 166,000 total jobs, including self-employed workers. The rate of job growth in the 2015-2020 period is forecast to be 0.5 percent per year, well under the rate of growth during the 2009-2016 recovery period. NYMTC predicts that employment growth will slow further – to 0.2 percent per year – between 2020 and 2025.

According to the New York Building Congress' three-year forecast for the years 2016 through 2018, total construction spending will remain strong in 2017 and 2018. The Building Congress estimates that 11.6 million square feet of office space will be constructed within 22 ground-up office development projects in Manhattan alone over the 2016-2018 period, and the forecast calls for 27,000 new residential units in 2017 and 25,000 new residential units in 2018.

Forecast of Electricity Demand and Supply

Annual energy consumption in New York City is expected to decline from 52.5 Terawatt-hours in 2016 to 50.6

Terawatt-hours by 2027, a decrease of just under 0.4 percent per year over the forecast period. This forecast reflects ongoing and expected changes in achieved levels of energy efficiency and includes estimates of the future contributions to supply from alternative sources, such as behind-the-meter solar PV and distributed generation.

NYISO's forecast for summer peak demand in New York City from 2016 through 2027 suggests an increase of 1,798 MW in summer peak demand usage by 2027, before energy efficiency and other measures, for an annual growth rate of .48 percent. Including the estimates for energy efficiency, solar PV, and distributed generation (DG) and other behind-the-meter measures, summer peak demand would be 12,040 MW, an increase of 0.33 percent per year over the forecast period.

NYISO estimates that 726 MW can be deducted from the unconstrained forecast of summer peak demand of 12,788 MW in 2027, based on achievements by that year in energy efficiency measures, such as improved energy appliances, which will contribute savings of 283 MW; increases in solar PV, which will contribute 192 MW of electricity to the city's system;

¹² Diane Cardwell, "Moving Beyond Cars, Tesla Uses Batteries to Bolster Power Grid," *New York Times*, Jan. 31, 2017, New York Edition, Business sec.

and distributed generation and other behind-the-meter measures, which will contribute 247 MW of power.

If fully achieved, these energy savings could help address, but would not entirely offset, the expected increases in electricity demand and the supply gap resulting from the scheduled closure of Indian Point in 2021. To close that gap and meet expected demand, additional electricity supply is also needed.

Other than 24 MW of upgrades by Con Edison to their existing plant in New York City, there are no new generating facilities or new transmission systems planned for New York City during this 2017-2027 period.

The only near-term generation facilities in construction or in planning are outside of New York City. A new 650 MW natural gas plant, CPV Valley in Orange County, is under construction and targeted for completion in 2018; and a recently announced 1,100 MW natural gas plant, Cricket Valley in Dutchess County, is estimated for completion in mid-2019.

Forecast of Natural Gas Demand and Supply

National Grid forecasts that demand for natural gas for its Brooklyn Union territory will increase by 0.84 percent per year in the

2015-2020 period, and by 0.86 percent per year in its subsequent five-year forecast period.

In its March 2016 Gas Long Range Plan, Con Edison forecasts that demand for natural gas throughout its territory will increase by 2.3 percent per year in the 2015-2020 period, and by 1.5 percent per year to 2035. Much of the increase is stimulated by continued oil-to-gas conversions in large buildings, by demand for new CHP projects, and increased consumption from new residential and commercial projects. As a result, Con Edison states that new pipeline capacity will be necessary.

One request for upgrade and three major new projects for natural gas pipelines are at the final permitting or early proposal stage.

- Millennium Pipeline has filed with FERC for an upgrade to its Eastern System, which would add about eight miles of pipeline in Orange County, New York, and supply an additional 233,000 DT/day to the New York area by the fall of 2018.
- The PennEast Pipeline, a 114-mile, 36-inch diameter project, will bring Marcellus shale gas in Eastern Pennsylvania to an interconnection with Transco in Mercer County in New Jersey. This will supply one billion cubic feet/day for many shippers,

including Con Edison. Service is expected to begin in the second half of 2018.

- The Mountain Valley Pipeline (MVP) is a proposed 300-mile, 42-inch diameter capacity line from West Virginia to the mid-Atlantic region. Although this pipeline does not directly connect into New York City, it allows access to different supply points, including for Con Edison. If fully permitted, the MVP is expected to be in service by late 2018.
- Transco filed an application for its Northeast Supply Enhancement project with FERC on March 27, 2017. This project will deliver an additional 400,000 DT/day to National Grid's distribution system at Floyd Bennett Field via the Rockaway Lateral. The project is expected to be in service in late 2019.

While the first three of these projects would provide greater diversity of supply as well as better price differentials, only the most recent Transco project would bring added natural gas into New York City, where the demand exists and is growing. As a result, Con Edison believes that new gas pipeline capacity into New York City and Westchester County will still be necessary within the 2017-2027 forecast period.

Forecast of Summer Peak Demand in NYC, 2017-2027
(In Megawatts)

	Before Energy Efficiency	After Energy Efficiency	Energy Efficiency	Solar PV	Distributed Generation/ Behind-the-Meter
2017:	11,973	11,648	111	38	154
2018:	12,078	11,686	152	52	165
2019:	12,184	11,736	172	68	184
2020:	12,276	11,767	204	87	195
2021:	12,359	11,798	226	109	202
2022:	12,417	11,816	236	129	211
2023:	12,480	11,847	246	146	216
2024:	12,548	11,882	254	160	226
2025:	12,629	11,937	264	172	231
2026:	12,730	12,005	274	183	242
2027:	12,788	12,040	283	192	247

Source: NYISO's 2017 Load & Capacity Data "Gold Book"

Con Edison forecasts that demand for natural gas throughout its territory will increase by 2.3 percent per year in the 2015–2020 period, and by 1.5 percent per year to 2035.

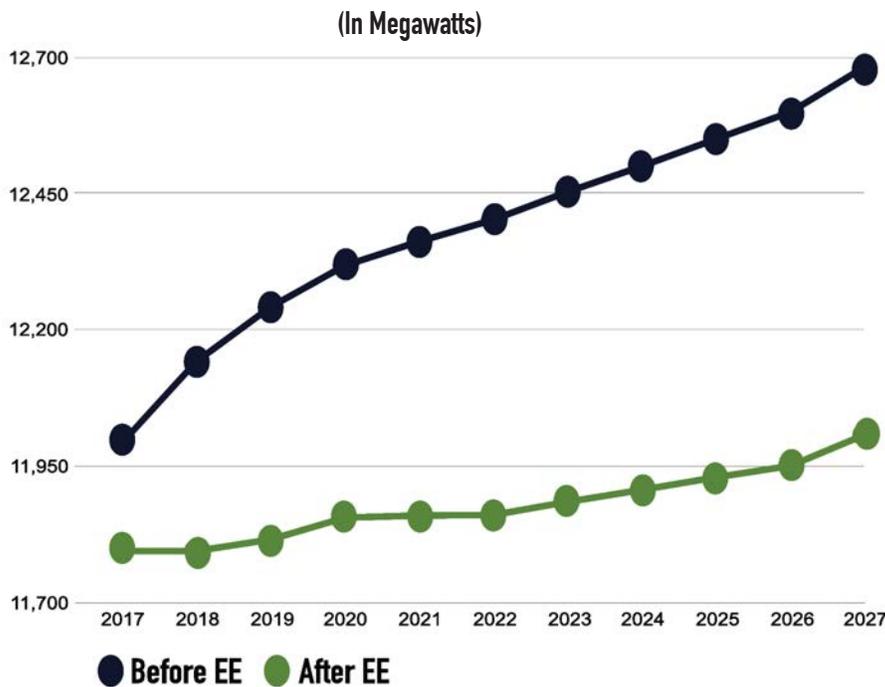
Transmission Forecast

There are no plans for substantial new investments in transmission to bring electricity into New York City. Without improvements designed to alleviate congestion in existing sources of downstate transmission and new investments in transmission capacity, Downstate New York and New York City will not be able to access any of the new investments in hydropower and solar and wind power emanating from Upstate and Western New York.

In its October 2016 Long Range Transmission Plan, Con Edison notes that “The uncertainty of proposed developer projects [new transmission and generation] reaching commercial operation would make planning the future system topology a challenging and evolving task”.¹³

The NYC Mayor’s Office of Sustainability, in a public letter to NYISO on September 30, 2016, makes a persuasive case for new transmission lines to New York City so that the city can participate in renewable wind, solar and hydro resources in Upstate New York and in Canada. This is considered vital for the city’s long-term electricity needs as well as for achieving its goals of using renewable energy to reduce carbon emissions.¹⁴

Forecast of Summer Peak Demand in NYC, 2017–2027



Source: NYISO’s 2017 Load & Capacity Data “Gold Book”

The need for new transmission capacity in Western New York and across New York State was recognized by the NYS PSC in a press release of October 13, 2016, and “directed [NYISO] to move forward with evaluating and selecting the most efficient or cost-effective transmission project to make it easier for renewable energy such as hydro power, to flow across New York State.”

NYISO, through its Public Policy Transmission Planning process, is examining potential transmission upgrades to address transmission chokepoints in the mid-Hudson Valley, but it has not yet announced any firm plans for new investment or a determination on the additional megawatts that would be made available through improved transmission.

Two major proposals for transmission investment into New York City offer promise of a substantial increase of electricity to New York City by or before 2027.

- The Champlain Hudson Power Express is a 330-mile HVDC submerged cable project below Lake Champlain and the Hudson River that could deliver 1,000 MW of renewable energy from Québec to Astoria, Queens. This project has been fully permitted and is currently finalizing engineering details. Construction could start in 2017 and the transmission line could be in service by late 2021.¹⁵
- The proposed Empire State Connector, a 260-mile HVDC submerged cable project below the Erie Canal and the Hudson River and terminating in either Brooklyn or the Bronx, would deliver 1,000 MW from renewable sources. This proposal is in active planning with final permitting still in progress. oneGRID, the developer, plans to file Article VII with the NYS PSC in the autumn of 2017.¹⁶

¹³ Con Edison, Long-Range Transmission Plan (2016), p. 2.

¹⁴ Kevin Lang, Couch White LLP, and Anthony J. Fiore, Energy Regulatory Affairs, NYC Mayor’s Office of Sustainability, letter to Zachary Smith, NYISO, Sept. 30, 2016.

¹⁵ NYS PSC, Case 10-7-0139, Order Granting Champlain Hudson Express Inc. a Certificate of Environmental Compatibility and Public Need to Construct and Operate a Transmission Project (April 18, 2013).

¹⁶ oneGRID. (July 5, 2016). Empire State Connector “HVDC” Transmission Project Receives FERC Approval to Charge Negotiated Rates [Press release]. oneGRID project update to New York Building Congress, Feb. 28, 2017.

If completed, these two projects would supply 2,000 MW of electricity directly to New York City and count as “in-city generation” because each uses direct current (DC), rather than alternating current (AC), for transmission. Importantly, they also would enable the city to benefit from investments in renewables being made to the north of its borders.

Major Technological Breakthroughs in Transmission Outside of New York State

New York State and City are lagging other areas in terms of planning for transmission facilities.

For example, the proposed Plains and Eastern Line in the Southwest would carry 4,000 MW of wind power electricity from the Oklahoma panhandle to the Tennessee Valley Authority. This transmission system would use direct current (DC) with enough energy to power more than one million homes in the mid-south and southeastern United States.

Several such “supergrids” carrying DC power with the capacity of 6,400 to 7,200 MW have already been built in China. Several other major projects in China are already underway or in planning, including a 3,400 km grid carrying 12,000 MW of DC power from Xinjiang to Anhui province. Similar large scale grids are under construction or in planning in India, Brazil, and in Germany.¹⁷

One of the remaining challenges in providing electricity from intermittent sources, such as solar or wind, is the issue of storage, which allows power to be made available during off-hours.



Transco Pipeline Facilities in New Jersey, Courtesy of Williams

RISKS TO THE FORECAST

There are several risks to the NYISO forecast of resource adequacy for New York City's electrical supply through 2027.

- The scheduled retirement of the two energy generating units at the Indian Point Energy Center by 2021 suggest the immediate need for the State of New York to plan for new transmission and/or new generation to provide sufficient electricity capacity for New York City by 2021.
 - The lack of final permitting for additional transmission lines to New York City poses a significant threat to the city's electricity supply by 2021.
 - While an estimated 726 MW can be saved through 2027 from energy efficiency, solar PV, and other behind-the-meter measures, issues concerning storage and behind-the-meter tariffs will impact the extent to which those savings will be realized. Improvements in storage and metering technologies, as well as regulatory changes, are needed to address these issues.
- It has recently become evident that new pipeline capacity for natural gas supply into New York City will be needed within the forecast period to 2027.
 - There is no provision for addressing the potential retirement of any of the city's aging fleet of in-city generators in the 2017-2027 period. More than 50 percent, or approximately 5,500 MW, of in-city generation is produced by plants that are more than 40 years old.

There are no new generating facilities or new transmission systems planned for New York City during this 2017–2027 forecast period.

¹⁷ “Rise of the Supergrid,” *The Economist* (Jan. 14, 2017), pp. 71-72.

RECOMMENDATIONS

To meet New York City's expected electricity demand over the next decade and address the challenges brought about by the scheduled closure of Indian Point by 2021, all stakeholders – government, utilities, and commercial and residential consumers – have important roles to play. The Building Congress offers the following recommendations and urges immediate action on them.

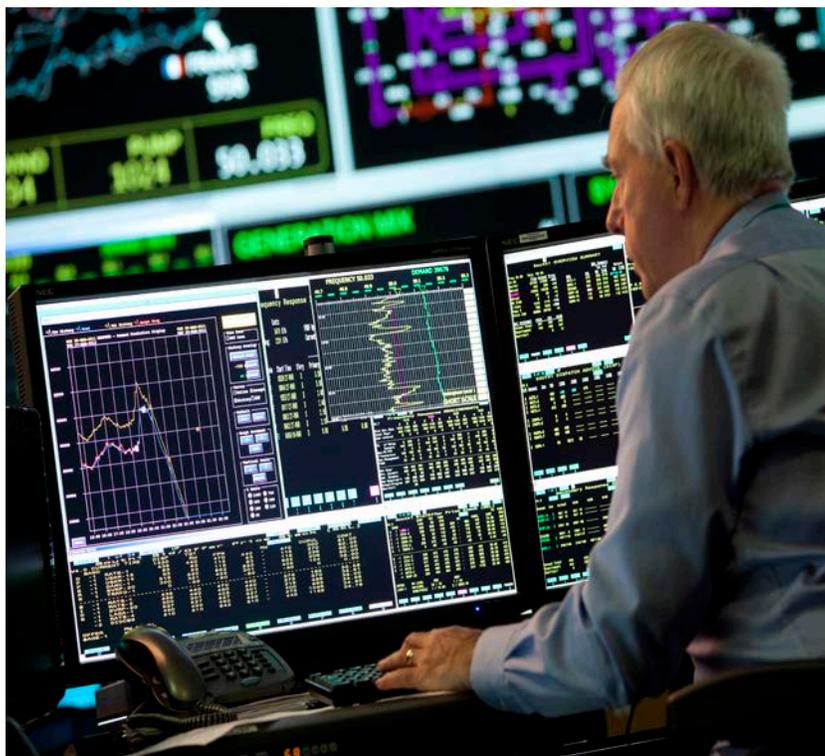
- **New transmission capacity** is vital to assure that New York City has an ample supply of electricity throughout the next decade. Governor Cuomo should direct the NYS PSC and NYISO to initiate immediate plans for transmission investment so that adequate supply is available when the Indian Point nuclear power plants close in 2021.
- **New pipeline capacity for natural gas** with direct connection to New York City and Westchester County will be

necessary to provide sufficient gas supplies to meet the expected growth in demand. FERC should promptly approve the recent application for Transco's Northeast Supply Enhancement project. In addition, the State and City should work together to convene a working group of key stakeholders, including utilities and natural gas suppliers, to develop a strategy for the planning and approval of new natural gas pipelines directly into New York City.

- To help achieve the forecast of 726 MW in conservation measures by 2027, the NYS PSC – working with NYISO, NYSERDA, utilities, and other key stakeholders - should develop and approve regulations to:
 - » **resolve net-metering issues** to encourage increased household use of solar PV and other behind-the-meter measures;

- » **initiate smart metering at the household level** to smooth demand for electricity during the daytime and evening peaks; and
- » **provide adequate incentives for large corporate and building owners to invest** in new technologies for controlling energy and electricity demand.

- The NYS PSC and NYISO should pay increased attention to the number of **aging generation plants** in New York City and develop a plan for the retirement and replacement of them.
- The New York State agencies responsible for the state's energy system should investigate new storage technologies for **large-scale wind and solar installations** as well as the state-wide application of new technologies for **supergrid transmission systems**.



Gas and Electricity Network Management, Courtesy of National Grid

New transmission capacity is vital to assure that New York City has an ample supply of electricity throughout the next decade.

New pipeline capacity for natural gas with direct connection to New York City and Westchester County will be necessary...to meet the expected growth in demand.

ELECTRICITY OUTLOOK

POWERING NEW YORK CITY'S FUTURE

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New York Power Authority
Rudin Management Company, Inc.

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National Grid

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The New York Building Congress is a membership coalition of business, labor, association and government organizations promoting the design, construction and real estate industry in New York City.

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