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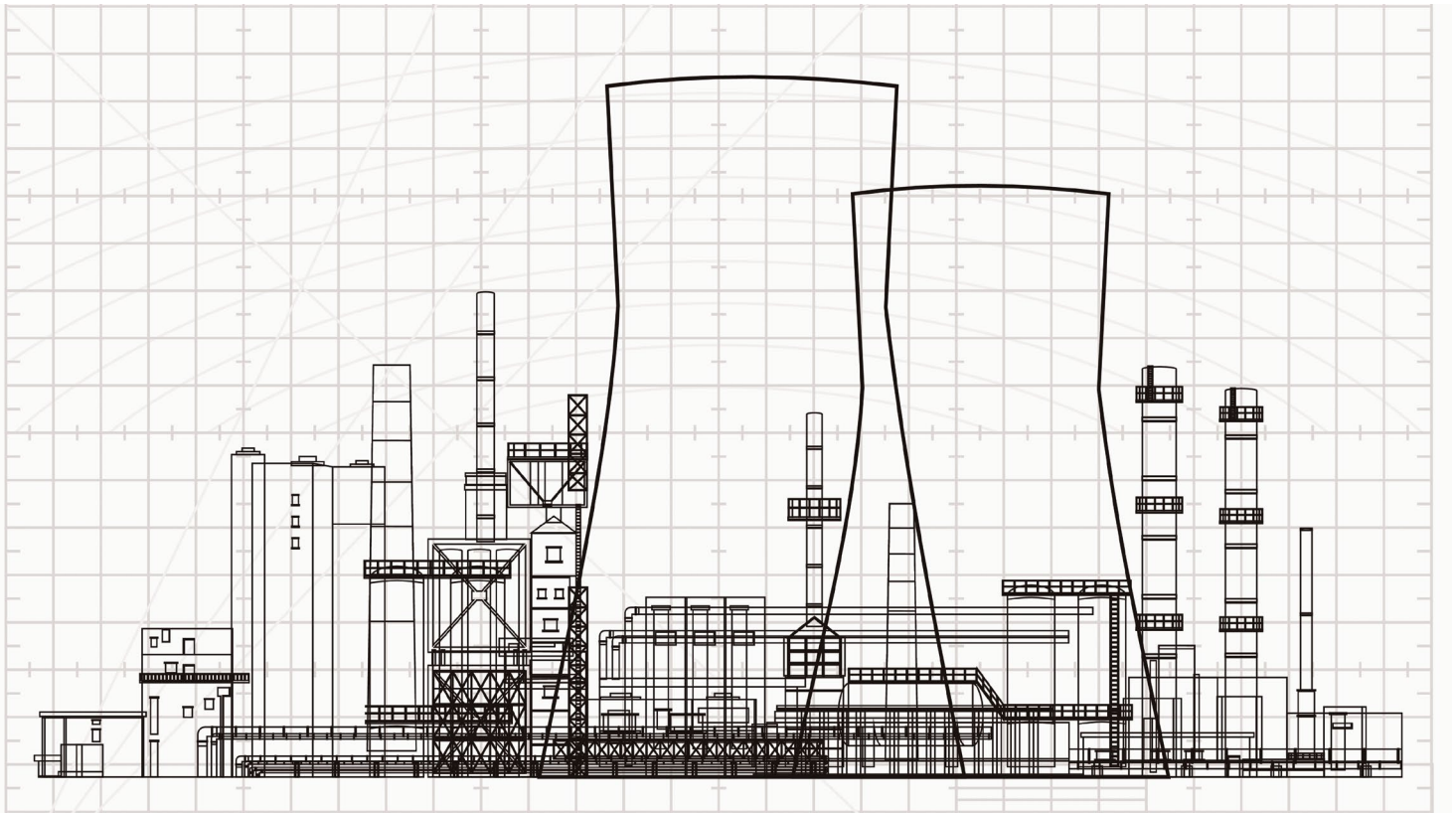
# AFTER INDIAN POINT: LIGHTS OUT FOR NEW YORK CITY?

Closing the Nuclear Plant Threatens the  
Reliability of the Electric Grid

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In his state of the state speech on January 11, Governor Andrew Cuomo repeated his pledge that New York should be getting half its electricity from renewable resources by 2030 (50 by 30). He added that 100% renewables are “what a sustainable New York is really all about” and directed state agencies to chart a pathway toward that goal.<sup>1</sup>

While the governor’s Clean Energy Standard may be politically popular, it will be dramatically expensive and will almost certainly drive the state’s already-high electricity prices still higher.<sup>2</sup> The overall cost of the governor’s clean energy mandates and their feasibility are the subjects of a separate Manhattan Institute report.<sup>3</sup> But cost is only one of several challenges.

Cuomo has also negotiated the early retirement of the Indian Point Energy Center, the nuclear plant that supplies about 25% of New York City’s electricity. Shutting this 2,083-megawatt zero-emission facility is inconsistent with the governor’s efforts to reduce the state’s greenhouse gas emissions. Indeed, in both California and New England, immediately after nuclear plants were shuttered, carbon dioxide emissions increased.<sup>4</sup> More important, closing Indian Point threatens the reliability of New York City’s electric grid.

Indian Point, along with three upstate nuclear plants, provides about 28% of the state’s electricity supplies. The importance of these facilities is often overlooked amid public enthusiasms for wind and solar power, but they are vital. The New York Independent System Operator (NYISO)—the independent, nonprofit organization that operates the state’s electric grid—noted in its comments to the Public Service Commission on the 50 by 30 mandate over a year ago: “Retaining all existing nuclear generators is critical to the State’s carbon emission reduction requirements *as well as maintaining electric system reliability.*”<sup>5</sup>

Despite the grid operator’s warning, Cuomo negotiated the early closure of the Indian Point Energy Center in Westchester County in January. Under the terms of the deal, Unit 2 will be shuttered in 2020 and Unit 3 will be retired in 2021.<sup>6</sup>



The closure of Indian Point raises the threat of blackouts in the New York City area because the electric grid runs on narrow tolerances of voltage, which is akin to water pressure in a pipeline. The grid must be continually tuned so that electricity production and electricity usage match. Doing so helps ensure that voltage on the grid stays at near-constant levels. If voltage fluctuates too much, it causes swings in frequency, and blackouts can occur.

New York City experienced blackouts in 1965, 1977, and 2003. In each case, the city was crippled and economic losses were measured in billions of dollars. Given the need to exactly match generation and demand while maintaining proper voltage and frequency, large electric loads (like cities and aluminum smelters) are usually located near big generation units.

There is another challenge: any major change in the mix of generation sources can affect voltage. The combination of the 50 by 30 mandate, the accelerated closure of Indian Point and the Cuomo administration's refusal to permit new natural gas pipelines will challenge the reliability of the New York grid. Not only must there be sufficient electricity generation to replace the electrons now coming from Indian Point; adding more intermittent and variable renewable electricity will make tuning the grid more difficult and will therefore increase the likelihood of blackouts. This threat is not idle theory: in September 2016, a sudden loss of several hundred megawatts of wind generation contributed to a blackout of the entire grid in South Australia.<sup>7</sup>

On several occasions, NYISO has stated that the Indian Point nuclear plant is needed to ensure reliability. In 2011, NYISO commented directly on the possibility of shuttering the plant, stating that “under stress conditions, the voltage performance on the system without the Indian Point plant would be degraded.”<sup>8</sup> Also in 2011, the NYISO said that “without the development of adequate replacement generation in Southeastern New York to ensure adequate resources and transmission security, impacts would include loss of power supply and transmission voltage support affecting the metropolitan New York region.”<sup>9</sup> In 2014, the NYISO again underscored the importance of the nuclear plant, saying, “Significant violations of transmission security and resource adequacy criteria would occur in 2016 if the Indian Point Plant were to be retired as of that time.”<sup>10</sup> In a 2015 report, NYISO reiterated its concerns about the premature shuttering of Indian Point: “To meet electric system reliability requirements, replace-

ment resources have to be in place prior to a closure of the Indian Point Energy Center.”<sup>11</sup>

A key attribute of Indian Point is its location: 44 miles north of Times Square. On a grid with massive loads—during summer peaks, power demand in the New York City area can exceed 13,000 megawatts—that proximity matters.<sup>12</sup> Importing power into southeastern New York from upstate renewable-energy projects will, according to NYISO, require the construction of about 1,000 miles of new high-voltage transmission lines. That capacity is needed because New York's grid has long been constrained by insufficient high-voltage transmission capacity between the northern and southern parts of the state.<sup>13</sup>

Canadian hydropower has frequently been mentioned as a way for New York to increase its utilization of renewable energy. In fact, that idea has been discussed on and off since the 1980s.<sup>14</sup> One proposed project, the Champlain Hudson Power Express, could bring up to 1,000 megawatts of Canadian hydropower to New York. The proposed line would extend the entire north-south expanse of the state—333 miles—and cost about \$2.2 billion.<sup>15</sup> If the project gets all the required approvals, construction is expected to take about three and a half years. Thus, even if New York policymakers decided to use Canadian hydropower, it appears doubtful that the transmission line will be in place by 2021, when Unit 3 at Indian Point is slated for closure. Furthermore, even if the Champlain Hudson transmission line is built, that imported electricity may not be adequate to ensure voltage support during periods of peak demands in the five-borough area. Nor would it satisfy NYISO's reliability requirement that new generation sources be located near New York City.

Natural gas-fired generation could provide a relatively low-cost replacement for the electricity now being produced at Indian Point. It will also be needed to offset the intermittency of several gigawatts of wind and solar capacity that may be added to the grid to meet Cuomo's mandate. James Manwell, director of the Wind Energy Center at the University of Massachusetts, recently analyzed the likely output from the proposed 90-megawatt South Fork wind project that has been proposed to be built off the eastern edge of Long Island. Manwell, who did the analysis for *Newsday*, found that the production from the wind project would lag during hours of peak summer demand.<sup>16</sup> That is not uncommon; onshore wind-energy production usually lags, or even hits zero, during summer months when

electricity demand is highest. This means that the grid on Long Island will need gas-fired generation units—or large banks of batteries—to meet demand during peak times.

Despite the apparent need for more natural gas, the Cuomo administration has repeatedly blocked the expansion of the state's pipeline network. In April, the Department of Environmental Conservation refused to grant a water-quality permit to the Northern Access Pipeline, which would have allowed natural gas from Pennsylvania to come into New York. The same department refused to act for over a year on a water-quality permit for the Millennium Pipeline Company that would allow the company to extend a gas pipeline to a 650-megawatt gas plant called CPV Valley. In June, the U.S. Court of Appeals dismissed a court challenge by Millennium, reasoning that the Federal Energy Regulatory Commission (FERC) is the final arbiter of Millennium's receiving a waiver to proceed with construction.<sup>17</sup> That plant, now under construction near Wawayanda, is viewed as one of the likely replacements for some of the electricity now being produced by Indian Point.<sup>18</sup>

Another gas-fired plant, the 1,100-megawatt Cricket Valley plant, which will be built near Dover, could also replace a significant portion of the electricity now being produced by Indian Point. The Cricket Valley project, scheduled to come online in 2020, needs gas from the Iroquois Pipeline. But the Iroquois Pipeline lacks spare capacity, which means that the state will have to approve an expansion of the pipeline.<sup>19</sup> Given the state's refusal to provide permits to other gas pipelines, the future of that project, too, appears doubtful.

If gas-fired generation cannot be used to offset the intermittency of renewables, the state will have to deploy large-scale electricity-storage systems. While improvements have been made in batteries, they are expensive, and the long-term reliability of large-scale storage systems are unknown.

On October 25, 2016, two analysts—one from General Electric and another from the consulting firm ICF—provided a presentation to NYISO that discusses the Clean Energy Standard and the effects that it is likely to have on the state's electric grid. The presentation, which is available on NYISO's website but has not been discussed publicly, shows that if the state pursues the Clean Energy Standard and closes Indian Point, the

energy from the nuclear plant will most likely be replaced by electricity generated from gas-fired power plants. Further, the presentation, which is marked "Draft—for Discussion Only,"<sup>20</sup> shows that the reliability of the grid in the New York City area will be reduced if Indian Point is shuttered. NYISO and the other transmission-grid operators must meet a reliability standard known as "loss of load expectation," or LOLE, an event in which electricity demand exceeds available generation capacity. That reliability standard for grid operators in the U.S. allows for a LOLE of one day every 10 years, or 0.1 days per year. The result of a LOLE is likely to be brownouts or blackouts.

By 2030, the GE presentation estimates that closing Indian Point will result in the doubling of LOLE to 0.2 days per year.<sup>21</sup> Further, the document reiterates the same point made by NYISO in its comments on the possible closure of Indian Point: if the nuclear plant is closed, new generation plants will need to be located in close proximity to New York City. By blocking new natural gas pipelines, the Cuomo administration may be precluding that option.

In short, the GE report, as well as numerous warnings from NYISO itself, show that the state's grid faces serious reliability challenges if Indian Point is closed prematurely.

## Conclusion

While other states have mandated large increases in renewable energy, no other state may face a more complex set of challenges than New York. The combination of the 50 by 30 mandate, the closure of Indian Point, as well as the self-imposed restrictions on new natural gas pipelines and therefore, new gas-fired generation, has created a series of potential pitfalls that New York policymakers may not fully understand. The New York Independent System Operator has repeatedly underscored possible threats to the reliability of the state's grid if Indian Point is shuttered before sufficient replacement generation is in place near New York City. If New York is to avoid an electricity-related crisis, policymakers need to begin a serious analysis of the implications of 50 by 30, as well as the closure of Indian Point, today.

## Endnotes

- <sup>1</sup> Governor's Press Office, "ICYMI: Governor Cuomo Proposes Sweeping Set of Environmental Initiatives to Lead the Nation in the Fight to Combat Climate Change," Jan. 11, 2017.
- <sup>2</sup> The average price of electricity in New York in 2015 was about 15.3 cents per kilowatt-hour (18.5 cents for residential consumers), roughly 47% more than the average retail price in the United States. See Energy Information Administration, "State Electricity Profiles," Jan. 17, 2017.
- <sup>3</sup> Jonathan Lesser, "New York's Clean Energy Programs: The High Cost of Symbolic Environmentalism," Manhattan Institute, Aug. 2017. Based on a detailed analysis, Lesser estimates that the overall cost to meet the Clean Energy Standard's mandate to reduce greenhouse gas emissions 80% below 2005 levels by 2050 (80 by 50) will exceed \$1 trillion.
- <sup>4</sup> In early 2017, the New England Independent System Operator reported that greenhouse gas emissions in New England increased 2.9% in the year following the closure of the 604-megawatt Vermont Yankee plant in 2014. In the year following the plant's closure, gas-fired generation increased from 43% of New England's electricity to nearly 49%. See Mary C. Serreze, "Closure of Vermont Yankee Nuclear Plant Boosted Greenhouse Gas Emissions in New England," MassLive.com, Feb. 18, 2017. Lucas Davis, a professor at UC Berkeley's Energy Institute at Haas, found that California's carbon dioxide emissions rose by 9 million tons in the first year after the 2,254-megawatt San Onofre nuclear plant closed in 2013. See *San Diego Union-Tribune*, "U.S. Nuclear Retirements Challenge Clean-Energy Dream," Nov. 9, 2015.
- <sup>5</sup> New York Independent System Operator (NYISO), "Supplemental Comments of the New York Independent System Operator, Inc.," July 8, 2016. Emphasis added.
- <sup>6</sup> Unit 1 at Indian Point was shut down in 1974.
- <sup>7</sup> Nick Harmsen, "AEMO Releases Final Report into SA Blackout, Blames Wind Farm Settings for State-Wide Power Failure," ABC News, Mar. 28, 2017. See also Australian Energy Market Operator, "Black System, South Australia, 28 September 2016," Mar. 2017.
- <sup>8</sup> NYISO, "2010 Comprehensive Reliability Plan," Jan. 11, 2011.
- <sup>9</sup> NYISO, "NYISO Issues Comprehensive Reliability Plan," Jan. 11, 2011.
- <sup>10</sup> NYISO, "2014 Reliability Needs Assessment," Sept. 16, 2014.
- <sup>11</sup> NYISO, "Power Trends 2015."
- <sup>12</sup> Scott DiSavino, "New York Breaks Peak Power Usage Record in Heat Wave," Reuters, July 19, 2013.
- <sup>13</sup> NYISO, "Supplemental Comments of the New York Independent System Operator, Inc.," July 8, 2016.
- <sup>14</sup> E. J. Dionne, Jr., "Quebec's Profit May Be New York's Gain," *New York Times*, Aug. 15, 1982.
- <sup>15</sup> Transmission Developers Inc., "Champlain Hudson Power Express," undated.
- <sup>16</sup> Mark Harrington, "Offshore Project May Not Meet Peak Summer Demand on South Fork," *Newsday*, Apr. 16, 2017.
- <sup>17</sup> *Millennium v. Segos*, no. 16-1415 (D.C. Circuit, 2017). The problem is that there is currently only one FERC commissioner. Three commissioners are required for a quorum.
- <sup>18</sup> Jonathan A. Lesser, "Cuomo's Pipeline Policy Could Leave New York in the Dark," *New York Post*, Apr. 13, 2017.
- <sup>19</sup> *Ibid.*
- <sup>20</sup> Jeff Archibald and Wes Hall, "Presentation to the NYISO's Electric System Planning Working Group, NYISO, Oct. 25, 2016.
- <sup>21</sup> *Ibid.*