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Memorandum

To: Riverkeeper, Inc., and Pace Law School Energy Project

From: David Schlissel

Date: February 24, 2003

Subject: Revised Indian Point Retirement Reliability Assessment

Synapse Energy Economics' ("Synapse") May 2002 assessment of the Impact of Retiring Indian Point on Electric System Reliability found that electric power system reliability in New York City, Westchester County and New York State, as a whole, would be adequate even if both Indian Point units were permanently retired. This conclusion remains the same, even though a number of the planned power plants scheduled to be completed in New York State have been delayed and one project has been cancelled since Synapse issued its May 2002 assessment.

This new report updates Synapse's May 2002 analyses to reflect these changes. This updated report also addresses comments regarding the reliability and economic impacts of retiring Indian Point Units 2 and 3 that have been made by the New York Independent System Operator ("NYISO") and by the Business Council of New York State, Inc. ("Business Council").

The New York State Electric System

New York State has an integrated electric power system that includes hundreds of generating facilities and thousands of miles of transmission lines. An important feature of this electric system is the ability to instantaneously meet varying loads of customer demand through the operation of power plants scattered throughout the state and/or by importing power from neighboring systems. The New York State Independent System Operator ("NYISO") monitors and controls the daily operation of the power system and coordinates longer-term system planning.

Electric power systems are planned to meet projected peak customer loads while maintaining adequate levels of reserve generating capacity that could be used if needed. In New York State, the peak customer demands generally occur on the hottest weekdays during the summer. However, unexpected events such as transmission line or generating unit outages can stress the system at any time.

The integrated New York State system also is interconnected at a number of locations with neighboring power systems in Pennsylvania, New Jersey, Canada, and New England. These interconnections allow neighboring power systems to exchange power under both normal and emergency conditions.

Although there are important limitations, the physical design of the integrated New York State electric system allows the transmission of large amounts of power throughout the state and into the state from neighboring systems. Therefore, power consumed by customers in New York City may have been generated either at in-City facilities or imported from power plants located in upstate New York, New Jersey, Pennsylvania, New England or Canada. For this reason, when evaluating the potential impact of closing Indian Point on electric system reliability, it is important to consider not only how much generating capacity will be left in New York City but also the capability of the transmission system to import power generated at plants outside the City.

Reliability Requirements

The NYISO and the New York State Reliability Council have established three requirements to ensure that the integrated New York State electric system has enough capacity to provide reliable power without experiencing a system interruption more frequently than one day in ten years.[1]

- There must be a statewide 18 percent capacity reserve margin where the reserve margin is calculated as the amount of reserve capacity divided by the projected system peak load.
- There must be enough generating capacity within New York City to serve 80 percent of the projected in-city peak load. (NYISO's "80 percent in-city" requirement).
- There must be enough generating capacity on Long Island to serve 93 percent of the projected peak load on Long Island.

Indian Point is located in Westchester County, outside of both the Long Island and New York City transmission constrained areas. Therefore, the permanent retirement of both Indian Point nuclear units will not affect the amount of generating capacity either in New York City or on Long Island. Consequently, the capability of the electric system to meet both the NYISO's 80 percent in-city requirement and the requirement that there be enough generating capacity on Long Island to serve 93 percent of the expected peak load would not be adversely affected by the closing of both Indian Point units.

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[1] *New York Control Area Installed Capacity Requirement for the Period May 2002-April 2003*, New York State Reliability Council, December 14, 2001, and *Locational Installed Capacity Requirements Study*, New York Independent System Operator, Revised March 14, 2002.

Updated Synapse Analysis

When evaluating the economic and reliability impacts of closing Indian Point Units 2 and 3 it is important to examine projected generating capacity and system peak loads for 2003 and future years. The fact that the electric system has been close to not having enough capacity in recent years does not mean that closing Indian Point would automatically increase the danger of black-outs, brown-outs and dramatically higher costs. Approximately 900 MW of new generating capacity has been added in downstate New York since January 1, 2001, another 200 MW will be added during 2003, at least five new generating facilities (totaling nearly 3,000 MW) are currently being built in New York State and will be available by 2005, and, finally, four other facilities have been approved by the New York State Board on Electric Generation Siting and the Environment ("the Siting Board"). In addition, the NYISO has developed and is implementing several demand response programs that can help to improve system reliability by reducing peak system demands.

Table 1 below compares the currently announced schedules for each of the plants approved by the Siting Board with their expected in-service dates listed in the original May 2002 Synapse report. Table 1 also includes three projects (NYPA Poletti Expansion, Wawayanda, and Brookhaven) that have been approved by the Siting Board since May 2002.

Table 1
Generating Projects Approved
by the New York State Board on Electric
Generation Siting and the Environment

Project	Capacity	Projected In-service Date As of May2002[2]	Currently Expected In-Service Date[3]
Astoria Energy	1,000 MW	3rd Quarter of 2005	Early 2006
Athens Generating Plant	1,080 MW	3rd Quarter of 2003	3rd Quarter of 2003
Bethlehem Energy Center	750 MW total 350 MW of new capacity	3rd Quarter of 2004	2nd Quarter of 2005
Bowline Unit 3	750 MW	2nd Quarter of 2005	2nd Quarter of 2006
East River Repowering	360 MW total 160 MW of new capacity	4th Quarter of 2004	4th Quarter of 2004
Heritage	800 MW	3rd Quarter of 2005	Cancelled
Ravenswood Cogeneration	250 MW	4th Quarter of 2003	1st Quarter of 2004
Brookhaven	580 MW		2005
Wawayanda	520 MW		2005
NYPA Poletti Expansion	500 MW		4th Quarter of 2004

[2] The projected in-service dates for these projects were published on the Siting Board's website, www.dps.state.ny.us/articlex.htm.

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One of these projects, Heritage, has been cancelled. The following graphs assume that only the remaining nine projects that have been approved will be built. These nine projects will add 4,410 MW of new capacity. We have not assumed that any of six other projects that are currently undergoing Siting Board review will be completed.

Figures 1 and 2 below show that there would be more than enough power available in New York City and New York State to serve projected customer demands during the years 2003 through 2007 even if Indian Point Units 2 and 3 were closed prior to the summer of 2003.

Figure 1
New York City
Projected Peak Loads and Capacity Supplies
2003-2007
without Indian Point Units 2 and 3

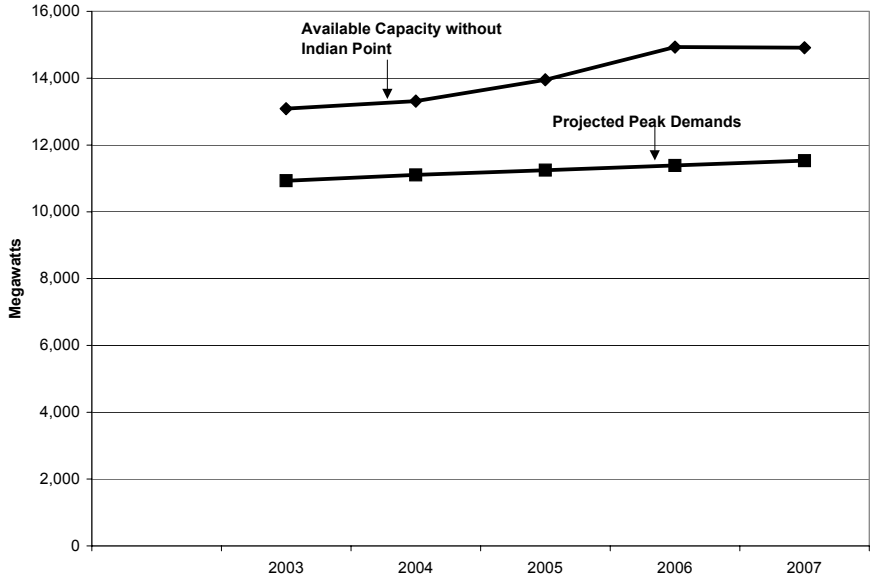
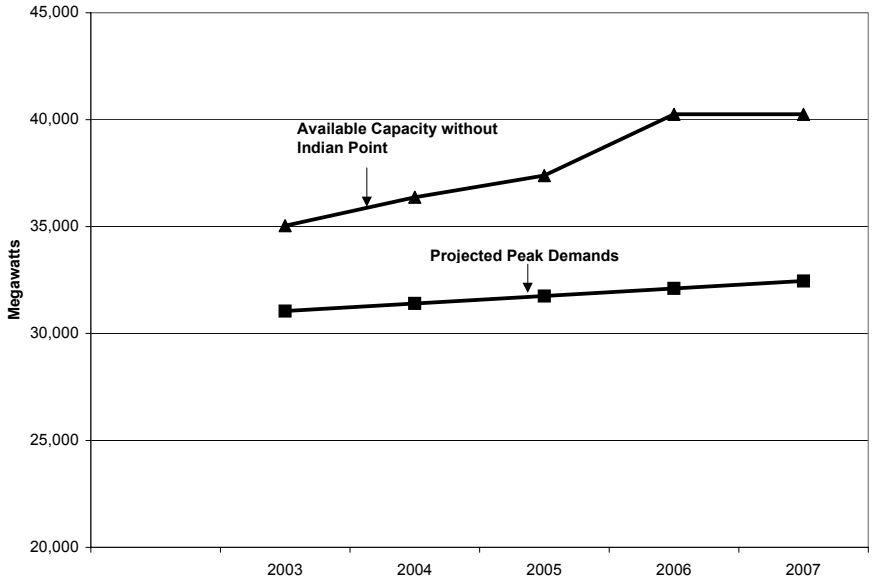


Figure 2
New York State
Projected Peak Loads and Capacity Supplies
2003-2007
without Indian Point Units 2 and 3



Power is supplied to New York City from in-City generating facilities and from power plants in the Hudson River Valley, in Upstate New York, New England, and the Pennsylvania-New Jersey-Maryland system ("PJM"). The power from plants in the Hudson River Valley, Upstate New York and New England is carried to New York through transmission lines that come south through Westchester County. In addition, there is a transmission cable under the Hudson River that carries power to New York City from Northern New Jersey.[4]

Significant power surpluses are projected for both New England and the PJM system, which means that power should be available for import into both New York City and New York State. For example, the April 1, 2002 "Forecast of Capacity, Energy, Loads and Transmission – 2002-2011" by the New England Power Pool projected that New England would have reserve margins of 30 percent and higher starting in the summer of 2002. Forecasts for the PJM system similarly indicate that it will have significant excess capacity in the years after 2002.[5]

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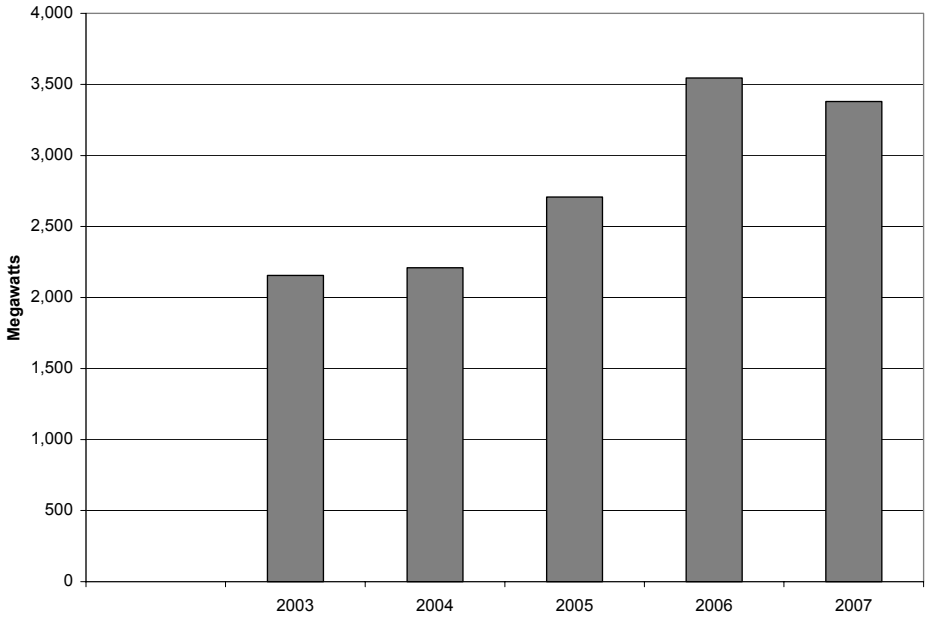
[4] Approximately 5,000 MW of power can be imported into New York City over existing transmission lines from New Jersey, Long Island, and the Hudson River Valley and Upstate New York. Nine hundred MWs of this can be imported directly into New York City through a transmission cable to Northern New Jersey.

[5] For example, the October 2002 "Reliability Assessment, 2002-2011," issued by the North American Electric Reliability Council, at pages 17 and 18, projects that PJM will have 30 percent

These sources of power would still remain even if Indian Point Units 2 and 3 were permanently retired. Figures 3 and 4 below show that the retirement of Indian Point Units 2 and 3 need not lead to reliability problems in New York City. There would still be enough power available from existing and new generating units inside New York City and through import over existing transmission lines to serve expected peak loads while providing substantial capacity reserves.

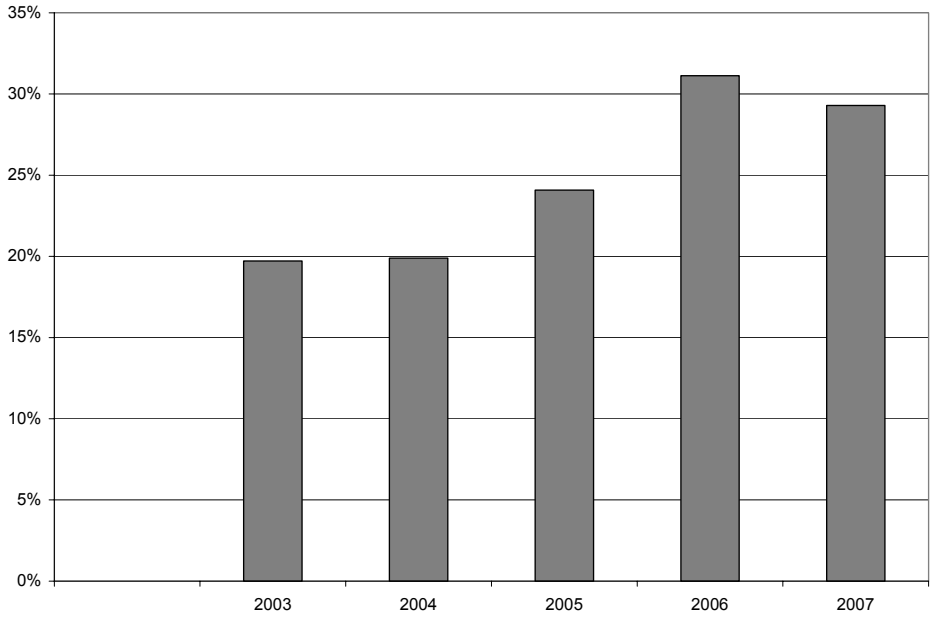
In addition, Indian Point Units 2 and 3 are located outside New York City. Consequently, the permanent retirement of Indian Point Units 2 and 3 would not affect the amount of in-city capacity that would be available to meet the NYISO requirement that there be enough generating capacity within New York City to serve at least 80 percent of expected peak loads.

Figure 3
New York City
Capacity Reserves
2003-2007
without Indian Point Units 2 and 3



capacity reserves during the summer 2006 peak period and 61 percent capacity reserves during the winter 2006/2007 period.

Figure 4
New York City
Capacity Reserve Margins
2003-2007
without Indian Point Units 2 and 3



Figures 3 and 4 reflect the more than 1,900 MW of new electric generating capacity that will be added when the new East River, Ravenswood Cogeneration, Astoria Energy and NYPA Astoria projects are completed. The addition of this more efficient, and environmentally cleaner, generating capacity will improve the reliability of the electric system and would help reduce power costs if Indian Point were retired.

Figures 5 and 6 below show that there would still be adequate generating and transmission capacity in New York State without Indian Point Units 2 and 3 to serve expected peak loads and provide reasonable capacity reserves. The fact that reserve margins might fall below NYISO's targeted levels in the years 2003 through 2005 does not mean that there would be a significant risk of blackouts and brownouts. New York has a number of transmission links with the PJM system, Canada and New England through which more than 5,000 MW of power can be imported under emergency conditions. If needed, excess capacity from these neighboring areas could be imported into New York State, even during peak load periods.

Figure 5
New York State
Capacity Reserves
2003-2007
without Indian Point Units 2 and 3

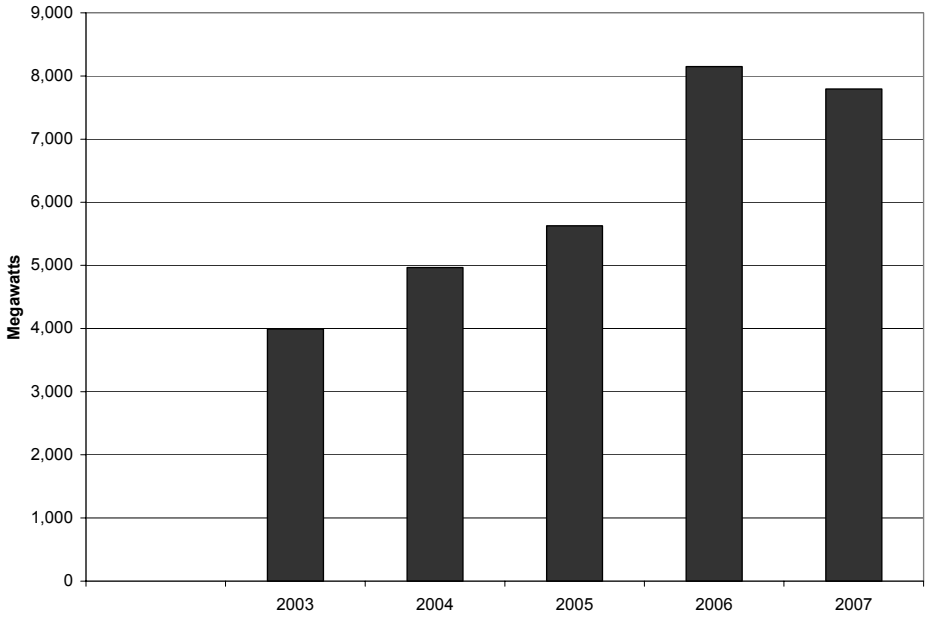
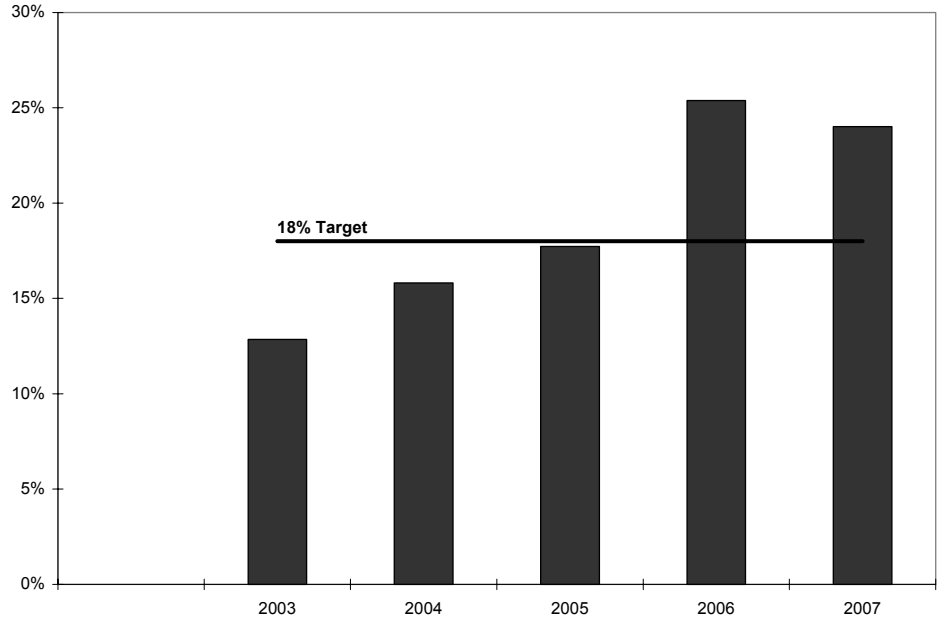
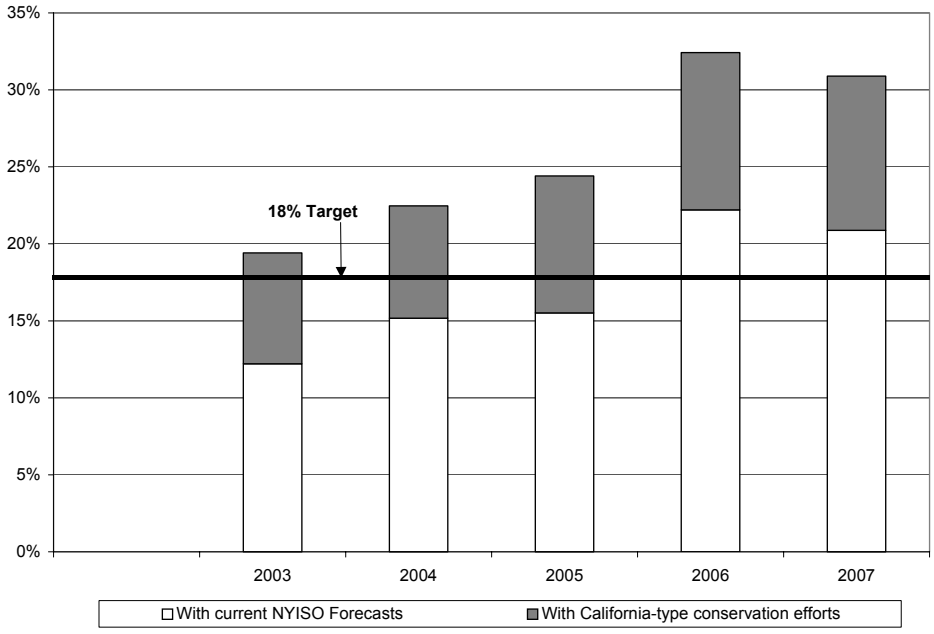


Figure 6
New York State
Capacity Reserve Margins
during the years 2003-2007
without Indian Point Units 2 and 3



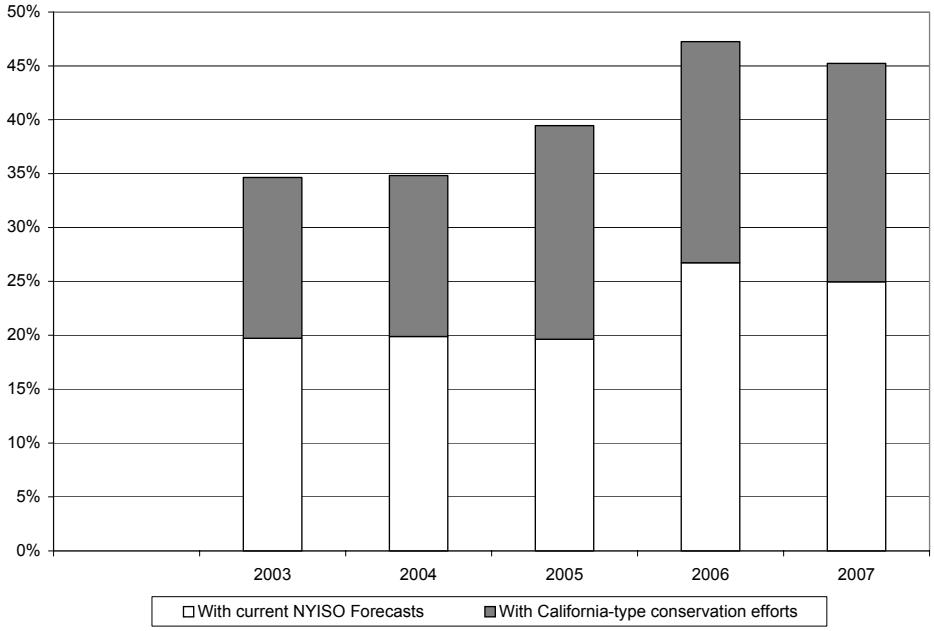
New York State also could implement an aggressive energy-efficiency program to reduce summer peak loads as part of a plan to mitigate the reliability and economic impacts of closing Indian Point. For example, Figure 7 shows the effect that a 9.7 percent reduction in the peak summer month electric loads in Southeastern New York State would have on statewide reserve margins. This 9.7 percent reduction represents the middle of the reasonable range of possible savings calculated by Komanoff Energy Associates in a May 2002 study.

Figure 7
New York State
System Capacity Reserve Margins
without Indian Point Units 2 and 3
Aggressive Conservation Scenario



The implementation of aggressive conservation programs also would improve the reliability of the electric system in New York City.

Figure 8
New York City
System Capacity Reserve Margins
without Indian Point Units 2 and 3
Aggressive Conservation Scenario



Finally, none of the plant delays and cancellations that have been announced since last May affects our conclusion that the permanent retirement of Indian Point Units 2 and 3 would not lead to any reliability problems in Westchester County. There would still be enough power available in Westchester County without Indian Point Units 2 and 3 to serve expected peak loads and provide needed capacity reserves.

Conservative Assumptions in Synapse Analyses

The results of Figures 1 through 8 are conservative in that they understate electric system reliability without Indian Point Units 2 and 3. This conservatism results from our decision to use the following assumptions:

1. We have assumed that only the nine projects that have been approved by the Siting Board will be completed. Therefore, we have ignored the six projects that are currently undergoing Siting Board review. The addition of any of these other projects would further enhance system capacity reserves, reserve margins and reliability. Although some of the eight specific projects that have been approved by Siting Board may not be built for financial reasons, it is possible that one or more of the projects that are currently under review by the Siting Board may be built in their place. It also is reasonable to expect that the retirement of Indian Point Units 2 and 3 would spur the construction of some new generating facilities that would otherwise not be built and/or accelerate the construction of other

facilities. For example, Westchester County is exploring the possibility of siting a new gas-fired plant at Indian Point in place of the two nuclear units.

2. Figures 1 through 8 do not reflect any of the proposals for new transmission cables between New York State and Connecticut, New Jersey and Nova Scotia that have been approved by the New York State Department of Public Service ("DPS") or that are currently being reviewed by the DPS. For example, two specific proposals to add cables between Northern New Jersey and New York City and Long Island are currently being reviewed by the DPS. These proposals would add 600 MW of new transmission import capacity into New York City and another 600 MW of new transmission import capacity into Long Island. The addition of one or more of these projects will increase the capability to import power into New York City and Long Island and will improve the reliability of the statewide electric system.

   Our analyses also do not reflect any of the announced projects such as the Empire Connection project which would add another 2,000 MW of transmission import into New York City from Upstate New York.

3. Repowering a generation facility means replacing the plant's old, inefficient and polluting equipment with a newer combined cycle unit. In practice, this can be done in at least two ways: 1) by actually rebuilding and replacing part or all of an existing power plant or 2) by closing down an existing power plant and building a new unit next to it. New capacity can be added as part of a Repowering project. Many power plants around the nation have been repowered.

   In general, repowering older power plants can provide a number of important environmental and electric system reliability benefits: improved plant availability, lower plant operating and maintenance costs; increased plant capacity and generation; reduced facility heat rates which lead to significantly more efficient fuel use; reuse of industrial sites; up to 98 percent reductions in water intake and related fish impacts; and large reductions in NO_x and SO_2 emissions both overall and in terms of emissions per MWH of electricity. The Governor and New York State Legislature have recognized the general benefits of repowering existing power plants by amending Article X to expedite the siting process for plant repowering applications. N.Y. Pub. Service Law § 165(4)(b).

   According to a recent study by the Center for Management Analysis at Long Island University, Long Island's electric supply could potentially be increased by as much as 4,700 MW if all of KeySpan's existing generating units on Long Island are converted to combined cycle.[6] Even if only a few of KeySpan's units are repowered, several thousand MW of new generating capacity would be added. LIPA and KeySpan are currently conducting detailed engineering and economic studies to determine which specific generating facilities should be repowered.

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[6] *The Feasibility of Re-Powering KeySpan's Long Island Electric Generating Plants to Meet Future Energy Needs*, Long Island University, Center for Management Analysis, August 6, 2002, at page 14. See Exhibit DAS-4.

Con Edison also is currently studying the engineering and economic feasibility of repowering its steam system plants. These repowerings could add hundreds of MW of new in-City generating capacity.

Our analyses do not reflect any potential repowerings of the state's existing generating facilities beyond the East River Plant and Bethlehem Energy Project repowerings which are currently under construction. This specifically means that we have not included in Figures 1 through 8 the 562 MW of new capacity that would be added by Reliant Energy's proposed repowering of its Astoria Generating Station.

4. Our analyses have not considered the existing on-site generation in either New York City or New York State or the potential for new on-site generation. The existence of such small on-site generators could reduce the reliability impacts of retiring Indian Point.

   The New York State Public Service Commission has recently ordered the state's major natural gas utilities to file special delivery rates for those nonresidential customers who operate their own gas-fired distributed generation units. This action was taken to encourage "more development of efficient small power production facilities," according to new Commission Chairman Flynn. The Commission also voted to implement a similar system for residential distributed generation units by January 1, 2004.

5. The NYISO peak load forecasts that we have used do not appear to reflect the nearly 500 MW of peak load reductions that can be expected by the year 2008 from the energy efficiency programs that are funded by NYSERDA through funds collected through utility system benefits charges.

6. New York Governor Pataki has announced plans for a statewide, 25 percent renewable energy portfolio standard ("RPS") to be in place within the next ten years. This standard will require that power sellers include 25 percent of green resources within their mix within ten years. However, our analyses have not reflected any of the additional power that should be available as a result of this RPS initiative.

Conclusion

Our conclusion remains the same from our May 2002 study: Despite some power plant delays and at least one cancellation, electric power system reliability would be adequate in New York City, Westchester County and New York State, as a whole, even if both Indian Point units were permanently retired. The implementation of aggressive conservation efforts could resolve any concerns that the NYISO or others may have about statewide electric system capacity reserve margins falling below targeted levels in any years.

It also is important to emphasize that our analyses show that the State does not need to rely solely on conservation to replace the 2,000 MW of power provided by Indian Point Units 2 and 3. A portfolio of options including the new generating facilities already approved by the Siting Board and energy conservation programs can ensure that the

electric systems in Westchester County, New York City, and New York State, as a whole, are adequate to ensure reliable service.

NYISO Studies

The New York ISO has made a number of statements about the potentially adverse reliability and cost consequences of closing Indian Point. These statements appear to be based on at least one study conducted by NYISO. However, NYISO has refused to provide the actual study or studies that it has conducted, claiming the information is confidential.[7] Therefore, we have been unable to evaluate or test the reasonableness of the methodology or the assumptions used by NYISO.

The only NYISO study about which we have any detail was described in the three page prepared testimony of William J. Museler, President and Chief Executive Officer of NYISO, before the New York City Council on May 7, 2002. In this brief testimony, Mr. Museler noted that NYISO had examined the reliability and economic effects of closing Indian Point by looking at the electric system as it existed in 2001. This means that this NYISO study did not include the 408 MW of new combustion turbine generating units that the Long Island Power Authority ("LIPA") had installed in early 2002 or the 200 MW of additional units that LIPA plans to have installed by the summer of 2003. Nor did the NYISO study include any of the new generating units that either are under construction or that have been approved by the Siting Board and are awaiting the start of construction. The inclusion of this capacity would mitigate the cost and reliability consequences of closing Indian Point.

The impact of retiring Indian Point in 2003 should be examined by looking at conditions as they exist in 2003 and can reasonably be projected for future years. Looking at conditions as they existed in August and December 2001 offers little insight into the economic and reliability impacts that closing the plant can be expected to have this year or in future years.

The Business Council of New York State

The Business Council also has claimed that closing Indian Point would have significant negative effects on the state and regional economy because it would drastically reduce New York's electric supply.[8] This claim is based on a 2002 study by the Public Policy Institute of New York State, the Business Council's research affiliate.

Our review of the Public Policy Institute's report, titled "The Power to Grow" reveals that the study is seriously flawed by a number of questionable assumptions and by mistakenly looking at all of New York State as a single electricity market instead of a number of locationally based markets.

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[7] This claim is suspect. Synapse has received and reviewed many similar production cost analyses as public documents through its involvement in a number of Article X proceedings before the Siting Board.

[8] News Release, dated February 5, 2003.

1. The study starts with the amount of generating capacity that was on-line in New York State in the year 2000 and ignores the approximately 900 MW of new combustion turbine capacity that was added in downstate New York by NYPA and LIPA in 2001 and 2002.

2. The Public Policy Institute study mentions, but then dismisses, the potential contribution that conservation and renewable energy resources could make to promoting greater electric system reliability and lower prices. It is solely focused on building new large central station generating capacity rather than promoting a balanced approach based on both conservation and the addition of new natural-gas fired or renewable energy central station and distributed facilities.

3. The study assumes that an additional 15 percent capacity reserve margin is needed to ensure competition and lower prices. This 15 percent reserve margin would be on top of the 18 percent capacity reserve margin that is needed to ensure adequate system reliability. As a result, the Public Policy Institute says that a 33 percent capacity reserve margin is needed.

   Although the Public Policy Institute attributes this 15 percent reserve margin to a NYISO study, it acknowledges that the 15 percent figure is not found in the NYISO but is based on the projections in the NYISO's March 2001 report "Power Alert: New York's Energy Crossroads." However, the cited NYISO study only examined two cases: a Base Case in which no new generating capacity was added to New York State and an Additional Generation Case that assumed the addition of 8,600 MW of new capacity by 2005. This was an all-or-nothing approach in terms of considering how much new capacity would be added.

   The NYISO did not examine whether adding a substantial amount of new capacity, but not the full 8,600 MW it considered, also would result in significantly lower prices and greater competition than the build nothing base case. Therefore, it is not possible to determine from the NYISO study whether adding enough additional capacity to provide a total 33 percent reserve margin would promote substantially more competitive markets or lead to significantly lower prices than adding enough capacity to provide a total 20 or 25 percent reserve margin. In other words, the same, or almost the same, benefits of increased competition and lower prices could be obtained by adding new capacity but less than the Public Policy Institutes believes is necessary.

4. The Public Policy Institute also failed to explain that generators outside New York State also would compete to sell their power inside the State. This would increase the level of competition as approximately 1,400 MW of power can be imported into New York State through its transmission links with New England. Another 2,000 MW of power can be imported through transmission links with the PJM system to the south. Additional power also can be imported from Canada. These figures do not reflect proposed new transmission cables that would substantially increase the amounts of power than can be imported into New York City or the rest of the state.

5. The Public Policy Institute study only looked at New York State as a single electricity market. This was a serious mistake. New York actually has 11 separate electricity markets in which generators bid the output from their facilities. For example, New York City and Long Island have their own markets in which locational market prices are determined. Westchester is part of a separate market that includes the lower Hudson River Valley. It is vital to look at these individual markets in order to determine how much new capacity needs to be added, or how the closing of Indian Point would affect the relative level of competition and prices. But the Public Policy Institute study did not do this.

   As shown in Figure 4 above, as a result of the addition of new in-City generating facilities, capacity reserve margins in New York City can be expected to climb significantly above 20 percent starting in 2005 even if Indian Point were closed. These capacity reserve margins would be even higher if we considered the additional 600 MW of capacity that could be imported over the proposed new line between Northern New Jersey and New York City and/or the additional 562 MW of capacity that would be provided by Reliant's repowering of its Astoria Generating facility. Capacity reserve margins also would be higher if even modest conservation and energy efficiency programs were implemented or if more aggressive efforts were made to add renewable energy projects or clean small distributed facilities.

   Capacity reserve margins in Westchester County also would be significantly higher than 18 percent even if Indian Point were retired. In fact, the large amount of transmission capacity into Westchester County from further north in the Hudson River Valley would ensure that there would be more than twice as much power available in the County than would be needed to serve expected peak loads. Even more capacity would be available if new renewable or natural gas-fired capacity, such as Entergy's announced plan to add 330 MW of new capacity at Indian Point, are added.

The Public Policy Institute has said that "new generating capacity is needed in New York to avert serious dangers – significant electricity prices increases, power interruptions, …" We agree. However, we believe that the State of New York already has taken significant actions to address this need. Even if Indian Point Units 2 and 3 are permanently retired, the addition of the new generating facilities that have already been approved by the Siting Board, with some assistance from new transmission links, the implementation of aggressive conservation programs and the development of some renewable energy resources, will adequately protect the state against these dangers.

Entergy

We already have addressed the weaknesses in Entergy's study of the reliability and economic impacts of closing Indian Point Units 2 and 3 in our May 7, 2002 Memorandum. This study, "Electricity System Impacts of Nuclear Shutdown Alternatives" was prepared for Entergy by NERA Consulting Economics. As we noted in our Memorandum, the Entergy study assumed very high system loads while, at the same time, it understated by about 1,000 MW the amount of existing generating capacity

that will be available to serve projected loads. The Entergy study also ignores at least one of the new power plants under construction in New York State, i.e., the Bethlehem Energy Center Repowering Project which will add 350 MW of new efficient combined cycle capacity (750 MW total). Finally, the Entergy study assumed that approximately 500 MW of existing generating facilities would be retired in 2004 even if Indian Point were closed. Consequently, the Entergy study starves New York State's electric system of existing capacity and capacity under construction and reduces projected system reserve margins. For these same reasons, the Entergy study overstates the cost impacts of closing Indian Point.

Unfortunately, Entergy has refused to provide the computer print outs and other details and workpapers for its study of closing Indian Point. As we explained in our May 7, 2002 Memorandum, the production cost modeling analyses used to prepare the Entergy study depend on many assumptions. However, Entergy did not discuss or even identify most of those assumptions in its brief report. Without a detailed review of those assumptions and the study's workpapers, it is not possible to determine whether Entergy has used any other unreasonable and unrealistic assumptions in its study beyond those mentioned above.