



# CLOSING INDIAN POINT

## Implications For NYC Metro Energy Supply

### Introduction

Spurred by the events of 9/11, communities across the United States have re-examined points of possible vulnerability, including the potential risk posed by nuclear power plants. Only 20 miles north of New York City, the two operating nuclear reactors at Indian Point have received particular scrutiny.

The Westchester Public Issues Institute (WPII) has interviewed advocates and stakeholders on both sides of this vigorous debate and consulted sources deemed authoritative by both supporters and opponents of continued power production at Indian Point. The authors of this paper have assumed the role of *interested citizen*, asking questions that will help individuals assess the effects of closing these two plants on the price and reliability of electrical power in NYS.<sup>1</sup>

### Summary & Key Impressions

The events of 9/11 have driven security to the forefront of public awareness. The risk posed by the Indian Point nuclear power plants has led some to suggest that the plants be shut down.<sup>2</sup> Yet with a capacity to generate nearly 2,000 MW of electricity, Indian Point is a major supplier of inexpensive power in a market that has little power to spare.

New York metro residents pay the highest prices for electricity in the Continental United States, contributing to a high cost of living. While targeted programs can provide low cost power to attract new industrial firms, the high cost of living remains a deterrent to business expansion, particularly in Westchester County and NYC.

The suggestion that Westchester County and New York City can easily do without the power generated at Indian Point is simply untrue. While estimated average price increases may be modest, the loss of competition in the NYC metro energy market and decreased reliability will persist until the power is replaced by new generation, which cannot happen until 2005 at the earliest.

- ❖ The installed base supply of power in New York State would immediately fall to about 11%, well below the 18% level required for system reliability.
- ❖ The retail price of electricity would likely rise between 7.5% and 9% per year for residents in New York City and the Lower Hudson Valley.
- ❖ Conservation & renewable sources of power can and should play a role in supplying the needs of the NYC metropolitan area, but the magnitude of expected savings will be small in the near term.



- ❖ Additional imports of power are constrained by a transmission system that is already congested.
- ❖ The loss of generation at Indian Point will increase the region's dependence on natural gas and dramatically increase the consumption of fuel oil during the winter heating season (when available gas is needed for heating), leading to a substantial increase in air pollution.

In summary, the loss of 2,000 MW of baseload generation would significantly diminish the reliability of a system with existing supplies that are just adequate for current levels of need. The economy of metro NYC can ill afford a power grid without adequate reserves.

### **Limited Supply & Old Technology Means High Electricity Prices**

The terrorist attack on the World Trade Center in September 2001 has heightened awareness nationwide about a broad set of possible risks. The proximity of the Indian Point nuclear plants to New York City—and the fact that American Airlines Flight 11 flew near Indian Point on its deadly mission to Manhattan—has focused attention on the risk of keeping these plants operating. Unfortunately, there is risk on both sides of this difficult decision. Closing the plants may reduce the risk associated with plant operation but will also expose the NYC metro economy to a different set of risks.

The Indian Point nuclear plants are a very important component of the system supplying electricity to NYC and Westchester County—the Consolidated Edison service territory. Concentrated demand for power, natural barriers to the transmission of electricity and a statewide power supply network only recently freed from an unresponsive regulatory straitjacket combine to make the elimination of these plants highly problematic.

The goal of this paper is to explore the implications of closure for the power system of New York and describe the tangible and intangible implications of shutting down nearly 2,000 megawatts (MW) of capacity.

### **Indian Point Contributes to Integrated NYC Metro Economy**

Whether the Indian Point nuclear power plants continue to operate is a matter of concern to all residents of the metro area. Both Westchester County *and* the Indian Point nuclear facilities play an important role in the integrated NYC metropolitan economy: Electrical power from Indian Point 3 powers public facilities across New York City and Westchester County, including MTA's Metro North and subway trains; the refrigerators and lights at the NYC Housing Authority; the control tower, terminals and hangers at LaGuardia Airport; and Westchester County government facilities. Indian Point 2 is a major supplier of power to residential and business customers in Consolidated Edison's market area, including Westchester County.<sup>3</sup>

Westchester residents cannot secede from the metropolitan economy. More than 160,000 Westchester residents commute to jobs in other parts of the metro area every workday (79,000 to Manhattan alone) and bring home wages and salaries of more than **nine billion dollars** annually<sup>4</sup>.



## New York's Newly De-Regulated Power Markets

New York State residents and commercial businesses pay the highest electricity prices in the continental United States<sup>5</sup>. NYC metro residents pay the highest prices in the state. Con Ed's residential users consuming 500 kWh per month pay slightly more than 15¢ per kilowatt hour (kWh)<sup>6</sup>.

### *Deregulation Spurs New Investment*

High prices are a consequence of limited supply—few modern, efficient power plants plus a transmission system that is too congested to bring more power from outside the area. The NYS Public Service Commission (PSC) and the Federal Energy Regulatory Commission (FERC) deregulated the New York energy market to address these problems.

The tightly regulated system of power generation, transmission and distribution in place before 1999 clearly failed to encourage new construction, thus lower prices. Even with Indian Point excluded, half of generation located in the Con Edison service territory comes from plants built in 1965 or earlier. Only 14% of total capacity comes from plants that are less than 25 years old.<sup>7</sup> Without new sources of power, growth in demand for electricity means added reliance on the most costly sources of supply—plants long past their retirement age. This has pushed prices still higher, imposing hardship on residents and discouraging business expansion.

The New York Independent System Operator (NYISO), which operates both the physical dispatch of electrical power throughout NYS and manages the market for power, suggests that excess capacity of about 33% is needed to stimulate effective competition over price. Both excess capacity and the number of market participants play a role in price determination. By any standard, the downstate energy market is uncompetitive.

### *The Unique Challenge of Power Markets*

The production and distribution of electricity presents a unique challenge to both producers and consumers. Electricity is the original “just in time” production input as it cannot be easily stored. It is not practical to build a warehouse to store electricity for the next week or, for that matter, for the next hour. Most users—whether residential, commercial or industrial—demand electricity just when they need it and not a minute sooner (or later).

Nor is electricity easy to transport. When transmission lines into Westchester are congested or a major source of power (e.g. one of the Indian Point plants) is off-line, Con Edison cannot simply load a few hundred megawatt hours on a truck, barge or rail car. New transmission lines—whether overhead or underground—are very difficult to site and expensive to build. The challenge of expanding transmission is dramatically increased in a congested urban area like the NYC metro.

The power needs of a community vary considerably from hour to hour and from day to day.<sup>8</sup> Widespread use of air conditioning drives peak demand into the summer months. The difference of a few degrees can have important consequences for power demand. As customers expect power of constant quality yet variable quantity, the managers of New York's electric grid (the NYS Independent System Operator) must have the ability to vary power generated at a moment's notice.



As a consequence, electricity prices vary more by geography and by time than any other commodity. Although the prices of lettuce or gasoline may vary seasonally, they don't change routinely within a single day. Nor do prices vary by significant amounts within a distance of a few hundred miles. Yet 500 kWh to a Central Hudson Gas & Electric residential customer costs 2/3 what the same commodity costs in the Con Edison service territory.<sup>9</sup>

Finally, power plants take a very long time to site and build. Even the supply of agricultural commodities can be adjusted over the span of a growing season. A major new power plant can only be built after many years of regulatory review and construction.

## Doing Without Indian Point Power

Electricity from Indian Point cannot be eliminated without significant economic consequences. The market for power in NYS is already troubled, particularly in Con Edison's service territory. While New York's market deregulation is beginning to stimulate important changes statewide and in the NYC metro area, the deregulated marketplace has yet to celebrate its third birthday. NYS does not yet have sufficient supply for an efficient and competitive market for electric power.

### *Hard Choices*

New Yorkers have three choices if Indian Point is closed.

- ❖ Develop a plan for closure in tandem with replacement power from new generation or increased transmission. Siting and construction of new generation and transmission, particularly in congested urban areas, takes time.
- ❖ Close the plants immediately and risk the consequences. The price of power will surely rise; until new plants are operating the reliability of the system will be significantly reduced; the benefits of deregulation will be delayed.
- ❖ Do without IP power. Create dramatic incentives for conservation to minimize shortages during periods of peak power demand.

## Planning Closure & Replacement Power

Those who perceive the threat of these plants to be immediate and severe urge immediate closure. Another approach would be to leave them operating while new sources of power are planned and built or to make necessary investments to enable the import of more power from outside the region.

### *New Power Generation*

New York's newly deregulated energy market is spurring new investment in NYC-based power generation. A large number of projects are in the planning stages, although the time required to gain regulatory approval—even under the "expedited" process of Article X—is considerable. Once approved, a major power plant takes two to three years to build. The table below lists approved and pending projects, as updated by the Public Service Commission in late May 2002.

These plants were *not* intended to offset the loss of baseload generation from Indian Point. They are already justified by NYC's high prices and uncompetitive markets. As new plants are built,



## Planned New Generation in NYC & Westchester

### Certified Article X Projects

Source: PSC 5/30/02

Developer	Name of Project	MW Net New Generation	Location	Earliest In-service Date
SCS Energy	Astoria Energy	1,000	Queens	3Q 2005
Con Ed	East River Repowering	200	Manhattan	4Q 2004
KeySpan	Ravenswood Cogen	250	Queens	4Q 2003
<b>Total</b>		<b>1,450</b>		

### Filed Article X Applications

Developer	Name of Project	MW Net New Generation	Location	Earliest In-service Date
NYPA	Poletti Expansion	500	Queens	3Q 2004
Astoria Generating	Reliant Astoria Repowering	562	Queens	2007
SEF	Sunset Energy Fleet	520	Brooklyn	N/A
<b>Total</b>		<b>1,582</b>		

### Filed Preliminary Scoping Statements

Developer	Name of Project	MW Net New Generation	Location	Earliest In-service Date
Indian Point Peaking	Entergy	330	Westchester	2004
TransGas Energy	TransGas Energy Systems	1,100	Brooklyn	N/A
<b>Total</b>		<b>1,430</b>		

generators will reduce their dependence on older, less efficient plants. Some will close; others will only run during periods of peak demand. In time, increased supply will moderate prices.

As the table of pending projects demonstrates, it will be several years before substantial new generation is added to the NYC power grid. ***If planned construction continues according to schedule, only by the end of 2005 will generation equal to Indian Point's two plants be added to the downstate power grid.*** Unfortunately, Enron's collapse combined with the slowdown in the economy has made investors particularly cautious about putting money into new generation. Several projects planned in NYS have either been cancelled or significantly delayed in recent months—some of the projects noted below may be cancelled. Projects that are still officially in the development stages are on semi-permanent hold.

### Renewable Energy, Distributed Generation

New energy technology promises to eventually eliminate the need to build traditional centralized generating stations like those responsible for most of New York's power. Fuel cells, microturbines, biomass, windmills and other forms of power generation are increasingly viable. As an example, a \$3 million federal grant is spurring development of a heat-and-power gas turbine generator to supply 33 MW of 99.9999% ("six nines") reliable power to a new telecommunications/data center in Manhattan.<sup>10</sup>

Renewables (other than hydropower) account for about 340 MW of generation statewide. A study completed for NYS Energy Research & Development Authority (NYSERDA) forecasts growth of



about 350% from 2002 through 2011.<sup>11</sup> While significant growth, NYSERDA's forecast has non-hydro renewables still playing a small role in 2011.

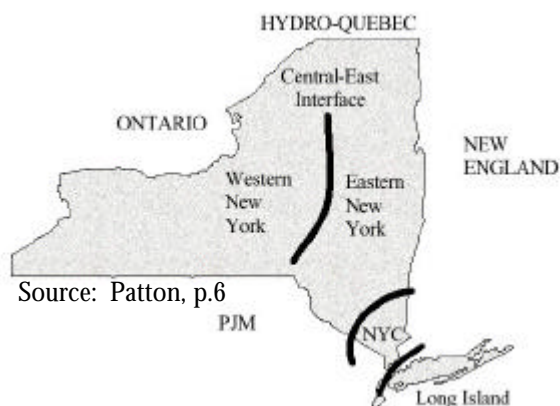
The potential for wind power is substantial in some parts of the state. A joint study by the Long Island Power Authority (LIPA) and NYSERDA concluded that the wind energy potential for Long Island could reach 5,200 MW, although this is more a theoretical "outer bound" than a practical expectation. LIPA is moving forward with a test of the idea and hopes to build 100 MW of generation three miles off Jones Beach. LIPA estimates the cost at six to nine cents per kWh, about two cents higher than fossil fuel generation.<sup>12</sup>

Use of renewables in NYS will be further spurred by Governor Pataki's Executive Order No. 111 requiring state agencies to purchase 20% of energy requirements from renewable sources by 2010.

Still, while new energy technology holds great potential for the future, **renewables cannot be expected to assume a large part of the burden of NYS's power needs within the next few years.**

### *Expanding Power Imports*

Imported power can come from either other locations in New York or from regions outside the state. Unfortunately, transmission bottlenecks exist at various points in the system. The adjacent figure illustrates the general location of major transmission constraints in the current system.



Power from Ontario Hydro and Hydro Quebec enters the system on the New York Power Authority's 765 kilovolt (kV) transmission line, which ends at Marcy, just north of Utica. Unfortunately, not only is there a bottleneck between Utica and Albany but system characteristics limit additional power that can be brought from either of these sources.

In addition, transmission constraints between Utica and Albany make it difficult to bring more power from Central New York. Additional generation in

Oswego, for example, would not have a significant impact on the energy situation downstate. This is one reason given for the cancellation of the already-approved 800 MW Sithe Energies' Heritage plant—without being able to sell into the NYC market, the new Oswego plant was only barely economic before Enron's collapse drove up the cost of capital for new generation projects.

PG&E is well along with construction of a new 1,080 MW gas-fired generator in Greene County. While of some help to the Hudson Valley, significant flows into Westchester and NYC will be hindered by transmission constraints near Poughkeepsie and Kingston.

Finally, transmission into NYC is limited to about 5,000 MW from two directions, one from Westchester County and the other from New Jersey.



A number of commercial proposals to develop new transmission lines have been proposed, including a connection from New Jersey and additional underwater cables. The local politics of siting new transmission lines can be extraordinarily difficult, however. TransÉnergie, a Hydro Quebec subsidiary, encountered significant opposition to its plan to cross the Long Island Sound with a HVDC underwater cable with 330 MW capacity, even after state and federal regulatory approvals were received. The Connecticut Legislature passed legislation imposing a one year moratorium on the project. Governor Rowland vetoed the bill, however, enabling the cable project—which will bring power from Connecticut to the Shoreham site on Long Island—to move forward.

Expanding the capacity of existing transmission corridors is more complicated than simply adding new wire—long distance transmission of high volumes of electricity is complex and expensive. There is little excess power east of Utica in any event. Additional transmission would only help if it were backed up by additional generation north of Indian Point.

***Replacing Indian Point power with imports from other regions may be feasible after new investments have been made in the transmission system. The system cannot now handle a substantial and immediate increase in power imports.***

## **Closing Indian Point Without a Replacement Plan**

Given the time required for permitting and construction of either new generation or transmission, a planned replacement of Indian Point power would take many years. The consequences of closing the plants in advance of any replacement are, to some degree, simply unknown. The cost of power will rise, but by how much? And how will the burden be shared across the state?

The reliability of the system providing power to the state and metro area would surely be compromised during much of the year. The risk to reliable delivery of power would be particularly evident during periods of extreme hot or cold and during shortages of fossil fuels.

### *Estimating Price Impacts*

It is not a simple matter to estimate the impact of eliminating IP power on the price of electricity. New York's competitive market for electricity—which changed all the procedures for price setting—was only put in place in November 1999.

### **Pricing in New York's Deregulated Energy Market**

Entergy, Indian Point's owner, cites on its web site a study by the Comptroller of the United States that estimates an economic loss of \$27 billion from the closure of the Indian Point plants. This General Accounting Office study is, frankly, of only historical interest. Completed in 1980, it is based on market conditions that were vastly different, though much simpler to analyze, from those now in place.

In 1980, New York's investor-owned utilities charged prices that were wholly regulated by the Public Service Commission. Utilities were allowed to charge their actual cost of power generation and distribution plus an approved rate of return for stockholders. In this case, the cost of replacing Indian Point power with electricity generated from another plant could be estimated by comparing published cost figures. According to the GAO report, the cost of generation at Indian Point 2 was



1.2 cents per kWh in 1979; IP3's cost of generation was under one cent per kWh. "These costs compare to oil-fired generation costs of 2.5 to 4 cents."<sup>13</sup>

In the deregulated market that began in November 1999, price-setting for electricity mimics conventional markets: Every generator receives the same price for electricity provided at the same time to the same location, regardless of production cost. Low cost providers are free to profit from their position in the marketplace and high cost providers are encouraged to replace or re-design existing plants.

While setting price equal to cost may seem fair to consumers, it does not encourage firms to eagerly assume the financial risk of building new plants. ***Only when producers can be assured of profiting from the lower operating cost of a new plant is the risk of new plant construction deemed justified.***

A more detailed discussion of price setting in New York's new market for electricity is included in the Appendix.

Due to complicated bidding rules, producers who believe that their bid may set the price have an incentive to adjust their bid accordingly. In a market with few producers—such as New York City—economists would expect generators to employ very sophisticated bidding strategies as they attempt to earn the highest rate of return possible for their owners. While the 1980 analysis only required looking at the difference in cost between the nuclear plants and their likely substitutes, now the analysis has to consider differences in cost *and* change in pricing behavior. ***The impact of closing Indian Point's two nuclear plants would make the wholesale market for electricity in metropolitan NYC even less competitive than it is already.***

### **IP2 Shutdown in 2000 Helps Closure Impact Estimate**

The shutdown of IP2 during 2000 provides some guidance for this challenging task, although the IP2 outage occurred when the market was very young: Changes in procedures, particularly in terms of mitigating "price spikes" in NYC, have altered the structure of the market since the summer of 2000.

In his analysis of the NYS electric market for calendar year 2000, the NYISO Market Advisor, David Patton, discusses the pricing impact of the IP2 outage. During periods when the transmission system was uncongested and allowed power to flow back and forth across the state, the loss of IP2 increased prices statewide. Patton estimated that the impact on wholesale prices ranged from 3% to 13% statewide in the off-peak months.

In the summer months, the eastern part of the state is a major importer of power, effectively insulating the western market from the price effects of the IP2 outage. Patton estimated that for June and August, prices in the eastern market were as much as 30% higher than they would have been had IP2 been running. While market mitigation rules<sup>14</sup> put into place by summer of 2001 would have reduced this impact, the consequences of eliminating not one, but two, nuclear plants would clearly be substantial.





## Wholesale v. Retail Prices

To enable consumers to buy electricity from competitive suppliers of power (but not have every seller stringing its own wire along every street in the state), New York allowed the utilities to keep a monopoly on the *delivery* of power within their franchise territory.

While a consumer in the Con Edison franchise area may purchase electricity from KeySpan or Orion, the power is still *delivered* by Con Edison on wires it owns and maintains. Keyspan charges for the electricity and Con Ed charges to deliver it. The cost of delivery is still regulated by the Public Service Commission (PSC).

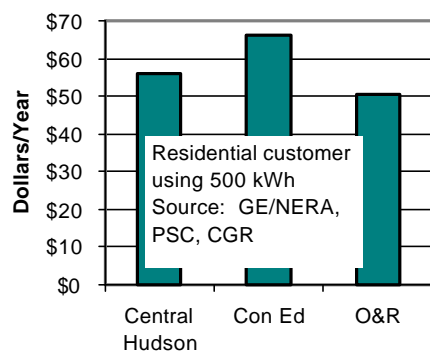
The PSC reports that a Con Edison customer purchasing 500 kWh of electricity can expect to pay about \$42 to Con Edison for delivery of the electricity and \$35 for the electricity itself—just under half of the customer’s bill actually goes to purchase the electricity.<sup>15</sup> So a 20% increase in the cost of the electricity alone would increase the customer’s bill (power plus delivery charge) by about 9%, provided that the delivery charge stays the same. Similarly, a 50% increase in the cost of electricity alone would increase the customer’s bill (power plus delivery charge) by about 22%.

### PSC Estimates Cost Increase of \$350 Million for Con Edison Customers; \$750 Million Statewide

Staff of the NYS Public Service Commission (PSC) have modeled the impact of closing the Indian Point plants. They estimate that the statewide impact of closure would be about \$750 million, \$350 million of which would be paid by Con Edison customers. This amounts to an increase in average Con Ed utility bills of about 7.5% and an increase in the average utility bills for the rest of the state of about 4%. The impact on annual electric bills is depicted in the adjacent chart.

The computer model used by PSC staff to estimate the impact of closure on pricing (GE-MAPS) assumes that generation owners will bid to sell power at a price that is close to their cost of production. Very limited competition in the NYC power market makes this a very conservative

**Impact of IP Closure on Annual Electric Bill**



assumption, particularly when power supplies are limited. Strategic behavior on the part of the relatively small group of NYC generators could easily drive prices far higher than the model predicts. In a tight and uncompetitive market, the number of “price spikes” could increase dramatically. When the margin of surplus power is nearly exhausted, prices can rise tenfold or more from one day to the next.

The PSC suggests that the impact on industrial customers may be more severe as the share of total price paid as a delivery charge is less. In addition, they are not protected by utility’s supply cost hedging programs. Alternatively, industrial customers have more bargaining leverage with potential suppliers.

Entergy contracted with General Electric (GE) and National Economic Research Associates (NERA) to study the impact of IP closure on prices and reliability. Built on the same modeling software as that used by the PSC, the GE/NERA study reports similar findings on the price impacts. GE/NERA report that Central Hudson Gas & Electric customers would face the greatest

relative retail price increase, about 9%. The percentage increase faced by Orange & Rockland customers would be slightly higher than that of Con Ed customers.

### **Is There Enough Natural Gas?**

There is one other problem with the closure of Indian Point—increased dependence on conventional generation will exacerbate an existing shortage of natural gas. During the heating season (when heating customers have priority access to natural gas), some gas-fired generators either do not run at all or use fuel oil instead. The Iroquois Gas Pipeline expansion into Eastchester is expected to deliver an additional 230,000 decatherms (Dth) per day to NYC. Assuming a 7,100 Btu/kWh heat rate for new combined cycle turbine powerplants, this is enough gas for approximately 1,350 MW. The Millennium Gas Pipeline (though on hold pending discussions with NYS over the Hudson River crossing) will deliver approximately 350,000 Dth per day to NYC. (While the pipeline is sized to flow 700,000 Dth/day only 350,000 Dth/day will be delivered into Con Ed in NYC). Assuming the same 7,100 Btu/kWh heat rate 350,000 Dth/day is enough gas to supply approximately 2,050 MW.

Taking the Iroquois expansion and planned new gas-fired generation into account, the PSC estimates that natural gas shortages would occur during the winter, were power from Indian Point unavailable.<sup>16</sup>

### **Dependence on Natural Gas Will Increase Energy Price Volatility**

The state is becoming even more dependent on natural gas for power generation, a pattern shown during 2000 to be risky. Monthly average energy prices in the Eastern part of NYS were 25% to 70% higher as a result of natural gas prices that rose by as much as 400% during the year and fuel oil prices that rose about 50% through the same period.<sup>17</sup> As natural gas is a cleaner, more efficient fuel, most new generation is designed to use it. Even without the closure of Indian Point, the state is becoming more dependent on a single fuel and the consequent price volatility. ***The loss of Indian Point would make NYS's electrical power system even more dependent on a single fuel, natural gas.***

### *Consequences for System Reliability*

Supporters of closure believe that New Yorkers would find the additional cost of electricity a modest price to pay for the “insurance” of having the nuclear risk diminished. Less tangible—but more important—is the impact of closure on the reliability of the power grid in New York State and in the NYC area.

- ❖ Current supplies of power are adequate to meet the needs of New York's economy but provide only the slimmest margin during periods of peak demand.
- ❖ Planned replacement power is already needed to improve system reliability and lower prices by increasing reserves.

### **How Much Power Do We Need?**

The operator of New York's electricity market and dispatch system, the NYS Independent System Operator (NYISO), forecasts that NYS's peak power demand will reach 30,475 MW this coming summer.<sup>18</sup> Figuring in a reserve of 18%, total system needs are forecast to be 34,961 MW, only 92



MW less than total available generation within the New York control area. NYC's power needs are about 35% of the total with Long Island demanding another 15%.

Installed reserves of 18% recognize that at any point in time, some part of the system—whether transmission or generation—will be unavailable. Based on a statistical calculation, an 18% margin of power assumes that service is likely to be interrupted once each 10 years.

### **Testing the Limits: August 2001 Heat Wave**

New York came uncomfortably close to rolling blackouts in summer 2001. While generally a cool summer, a heat wave in early August pushed the capacity of the generation system to its limit. Record peak demand of 30,983 MW was recorded on August 9, 2001, forcing the NYISO into a state of emergency. On that afternoon, every available source of power was called into service. To reduce power demand, NYISO cut voltage by 5% across the system, paid selected customers to voluntarily reduce power consumption or run on-site generators and Governor Pataki closed state offices. The New York Power Authority's crash program to add 400 MW in small combustion turbines in NYC proved its value that week.

Nor was help available from outside New York; in fact, at one point in the emergency NYISO was able to provide some assistance to the PJM Interconnection as New Jersey faced the same weather conditions. While PJM usually has sufficient sources of power in other parts of its region, its transmission system cannot deliver enough power into Northern New Jersey when demand is at its peak.

***The IP closure would force NYS reserves down to only 11%.*** Without power from Indian Point, NYISO will have to take steps to reduce power demand—like those actions taken on August 9—several times each year. This includes disconnection of “interruptible” customers, public appeals to all customers to shut off appliances and air conditioning, payments to customers who can reduce load or run their own sources of generation and systemwide voltage reductions (or “brownouts”). ***With reserves of 11%, we could expect some form of involuntary interruption in service as often as every other year*** instead of every 10 years, as is expected under current reliability design guidelines.

A study of capacity and system reliability commissioned from Synapse Energy Economics by Riverkeeper agrees that excess capacity would fall below the 18% design threshold in the event that the Indian Point plants were closed. Synapse's David Schlissel disagrees, however, that this would “lead to a significant risk of blackouts and brownouts in New York State.”<sup>19</sup>

### **How Many Days of Power Emergency?**

The GE/NERA study attempts to forecast the consequences for reliability of closing the Indian Point plants. Recourse to emergency operating procedures—like those imposed on August 9—would be far more likely without the base load generation provided by Indian Point. In an average summer, the GE/NERA study forecasts ten days of emergency operating procedures.

The loss of generation at Indian Point would leave NYS vulnerable to significant hardship in the event of a prolonged heat wave. Again, the Synapse study contends that the GE/NERA study has underestimated total capacity and overestimated the risk of hardship.



### **Vulnerability is NOT Limited to Summer**

**Capacity constraints now faced by New York are not limited to summer.** All power plants must be shut down regularly for maintenance. Given the average age of New York's power plants, these maintenance periods are essential. Outages are scheduled for the "shoulder" seasons when power demand is at its lowest, reducing system capacity at these times. Prices spiked during the unusual April 2002 heat wave, partly because KeySpan had generation totaling 648 MW down for maintenance.<sup>20</sup>

The underlying causes of California's power crisis are complex—and, in most instances, do not apply to New York. That state's crisis did *not* occur during the traditional peak demand months of summer, however. Maintenance-related outages at aging major generating facilities were an important factor triggering California's power crisis.

### **Other Financial Consequences of Indian Point Operation or Closure**

Were the plants closed, the owner is obligated to pay the cost of decommissioning the plants and for the storage of spent fuel. The Nuclear Regulatory Commission estimates the cost per plant at about \$290 million, although current estimates for Maine Yankee (now in the process of being decommissioned) are about \$375 million. The NRC requires all operating nuclear power plants to set aside funds for decommissioning. Funds set aside by the NY Power Authority and by Con Ed for the Indian Point plants are available to Entergy when the plants' licenses expire. The burden of decommissioning should not fall on the public.

Continued operation of the plants, particularly in light of recent publicity, also has economic consequences. Some speculate that concern about the safety of the plants has depressed real estate prices and would deter prospective residential or business buyers. Real estate brokers active in the region do not believe that they have detected any impact on demand for property, however. The market remains exceptionally strong.

### **Doing Without Indian Point: Reducing Use of Power**

Conservation could certainly contribute to closing the gap in energy supply created by closing the Indian Point plants, although the magnitude of the shortfall is daunting. The OPEC oil embargos of the 1970s demonstrated the potential efficiency gains from changes in behavior and consumer demand. The impact of the embargo on consumer demand for gasoline surprised nearly everyone.

#### *California's Experience*

Advocates of Indian Point's closure point to the experience of California. In response to the rolling blackouts and price spikes of 2000, Californians reduced peak energy demand by an average of 10% during the June-August 2001 period. As stated by Charles Komanoff, author of a study of conservation potential commissioned by Riverkeeper, "There is no precedent in recent American history for electric power savings of this magnitude on such a large scale."<sup>21</sup> While acknowledging that the stimulus for action (repeated rolling blackouts in substantial portions of the state) was also unprecedented in California, Komanoff asserts that a "crash program" in conservation could achieve similar savings in New York.



### *New York's Experience*

NYPA and NYSERDA have been active in encouraging conservation, as have all of New York's investor-owned utilities. The *Draft NYS Energy Plan* reports that total spending on energy efficiency in 2000 was just over two hundred million dollars. Here are some examples of programs put in place and the results achieved:

- ❖ In partnership with the NYC Housing Authority, NYPA is in the process of replacing 181,000 refrigerators with new, energy efficient models. Begun in 1996, the project will be finished next year. The Housing Authority will save more than \$7 million in electricity cost each year as a result. Total savings in energy will be substantial—about 105 million kWh over the year. On an hourly basis through the year the NYC area can expect to reduce electricity “load” by about 13 MW.
- ❖ Working with the MTA, NYPA replaced incandescent lighting in 80 miles of subway tunnels with efficient fluorescent lighting. The project is saving the MTA \$630,000 per year and reducing the demand for power by about 9.3 million kWh. Load has declined by about one megawatt as a result.
- ❖ NYSERDA's recently released report on the first three years of its “New York Energy Smart<sup>SM</sup>” program. Since inception the program reduced statewide demand for electricity by about 521 MW at a cost of \$182 million. Thus NYS's expected peak demand of 30,500 MW is almost 2% less than it would have been without the NYSERDA program.
- ❖ The *Draft NYS Energy Plan* reports that the cumulative impact of utility-sponsored demand-side management programs from 1990 to 2000 reduced peak summer demand for electricity by about 1,400 MW at a cost of about \$1.6 billion (\$2000).

As these examples show, energy efficiency is not costless and significant gains are achieved with difficulty. Suppose the loss of power from the Indian Point nuclear power plants were to be offset by replacing inefficient incandescent lights with fluorescents. Compact fluorescent bulbs save about 75% of the energy consumed by incandescent bulbs of similar brightness. Replacing a 100 watt incandescent bulb with a compact fluorescent would save about 650 kWh of electricity over a year's time (assuming the light were never turned off). While these are impressive savings for a single household, almost 27 million 100 watt light bulbs would have to be exchanged for their energy-efficient cousins to reduce peak demand for electricity by 2,000 MW. Were only one quarter of the lights turned on at any particular time, ***more than 100 million incandescent light bulbs in downstate NY would have to be replaced with fluorescent bulbs to save 2,000 MW of power.***

In summary, energy efficiency is (and certainly should be) part of the state's energy program. Savings come from two sources, changes in behavior and investments in more energy-efficient appliances. Both are encouraged by higher prices.

- ❖ ***High prices encourage more efficient behavior.*** Economists believe that it was high prices—not Jimmy Carter's fireside chats or the 55 mph speed limit—that drove down American's use of gasoline in the 1970s. Con Edison's customers already face the highest prices in the country. Were the price of electricity to be driven yet higher, consumers would respond accordingly.



- ❖ **Residents and business owners can exchange older refrigerators, light bulbs, water heaters and other appliances with more efficient models.** But this is not costless. And the gains that are achievable are modest in comparison with the loss of 2,000 MW of generation.

While conservation will play a role in NYS's energy future, **the large amount of electricity produced at Indian Point would be very difficult to replace through conservation.**

California proves, however, that consumers can and will respond when confronted with a crisis. Properly motivated, New Yorkers would respond as did Californians. Rather than making do with unreliable power, New Yorkers would choose to consume less and keep the lights on. Yet as the examples above demonstrate, savings of a sufficient magnitude to offset the closure of Indian Point would require massive incentives, either positive financial incentives or the negative incentives faced by California.

### **The Tradeoff Between Environmental Quality & Nuclear Security**

One goal of market deregulation is the improvement of environmental quality. More sophisticated combustion technology increases the heat output of the plant while reducing pollution. Cleaner fuels (such as natural gas) are naturally less polluting.

Thus the paradox: Achieving one environmental goal (the closure of the nuclear plants) would delay achievement of another, since older, dirtier plants would have to be kept running longer to meet needs before additional capacity can come on line. And while alternative fuels may one day replace the combustion of fossil fuels, traditional oil or gas-fired plants are the likely source of replacement energy if the Indian Point nuclear plants were to be shut down. In addition, many in the nuclear industry argue that nuclear plants are environmentally friendly; that 2,000 MW of nuclear power is far cleaner than alternative generation based on oil or natural gas.<sup>22</sup>

#### *Poletti Power Project*

A case in point is the 825 MW Charles Poletti Power Project in Astoria, Queens. Owned by the New York Power Authority (NYPA), use of the Poletti plant is expected to be significantly curtailed when NYPA's new 500 MW combined cycle, gas-fired plant comes on line in 2004<sup>23</sup>. The chief obstacle to continued use of the Poletti plant is some contribution to air pollution but particularly the number of fish killed as the plant draws water from the East River for cooling.

Although power from the Poletti Power Project is more expensive than Indian Point's, its 825 MW of in-city generation is very valuable to the overall reliability of the NYC power grid.

#### *Millennium Gas Pipeline*

The Millennium Gas Pipeline highlights this conflict yet again. Some environmental groups have opposed the construction of the natural gas pipeline, yet the loss of Indian Point's 2,000 MW of baseload generation will increase dependence on new sources of power, most of which will burn natural gas. Approved by the Federal Energy Regulatory Commission, the developer (Columbia Gas) and Mount Vernon reached agreement on the location of the pipeline terminus only to have the project stalled again by Pataki Administration decision to deny approval of Columbia Gas's planned Hudson River crossing at Haverstraw Bay.



Public Service Commission staff used the GE-MAPS modeling program to estimate the impact of shifting from Indian Point power to in-city fossil fuel generation. Given the demand for natural gas for winter heating, fuel use would shift toward oil during the winter, increasing SO<sub>2</sub> emissions by 65%, NO<sub>x</sub> emissions by nearly 40% and CO<sub>2</sub> emissions by 30%.<sup>24</sup>

## Conclusion

Despite concerns about the risk associated with nuclear power, the suggestion that Westchester County and New York City can easily do without the power generated at Indian Point is simply untrue. The loss of baseload generation totaling nearly 2,000 MW will reduce system reliability and delay New York's attempt to develop less costly, more competitive supplies of electrical power.

- ❖ The installed base supply of power in New York State would immediately fall to about 11%, well below the 18% level required for system reliability. Involuntary interruptions of power—blackouts—may occur every other year; other “load shedding” activities (e.g. voltage reductions, public appeals for conservation, payments to large customers to reduce usage and generate power on site) would become a summer routine.
- ❖ Assuming current approval and construction timetables are met, this shortage of supply in metro NYC will persist until 2005.
- ❖ The retail price of electricity would likely rise a minimum of 7.5% and 9% per year for residents in New York City and the Lower Hudson Valley.
- ❖ Conservation & renewable sources of power can and should play a role in supplying the needs of the NYC metropolitan area, but in the absence of significant incentives, the magnitude of expected savings will be small in the near term—smaller than would be required to eliminate disruption from closing down Indian Point.
- ❖ Additional imports of power are constrained by a transmission system that is already congested.
- ❖ The loss of generation at Indian Point will increase the region's dependence on natural gas and dramatically increase the consumption of fuel oil during the winter heating season (when available gas is needed for heating), leading to a substantial increase in air pollution.

In summary, the loss of 2,000 MW of baseload generation would significantly diminish the reliability of a system in which existing supplies are only just adequate for current levels of need. The economy of metro NYC can ill afford a power grid without adequate reserves. In the newly-deregulated market for power, new sources of generation will be available in a few years—but closing Indian Point immediately would put the NYC metro economy at risk.

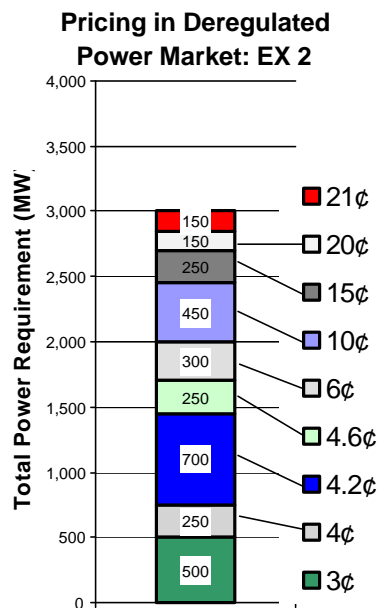
**NOTE: Full text of report plus sources, endnotes and appendix can be downloaded from the Westchester Public Issues Institute website at [http://www.westchester.org/wpii\\_frame.htm](http://www.westchester.org/wpii_frame.htm).**



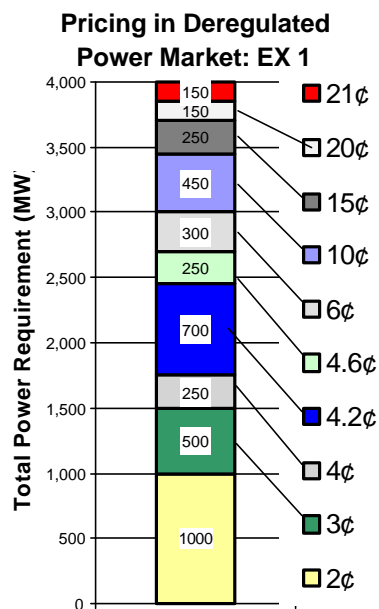
## APPENDIX

### Price Setting in New York's Competitive Power Markets

In New York's new electricity market, power producers bid today for the right to sell power at a particular time tomorrow. A plant whose cost of production is high—say, 15 cents per kWh—will bid at 15 cents or higher. If hourly prices set for the next day never exceed 15 cents per kWh, the bid is rejected and this plant will remain idle. If, however, the market demands enough power to exhaust all sources of power offered at a lower price, then this bid is accepted and *all suppliers receive the higher price*. The price for all suppliers is set by the price that is required to entice the last generator to sell to the market.



Only if 3,500 MW are required at a particular hour of a particular day does the price rise to 15 cents/kWh. But *all* producers of power during that hour on that day receive 15 cents/kWh. This



kind of pricing scheme enables the market to reward the low cost producers and encourage high cost producers to either improve their efficiency or leave the market.<sup>25</sup>

The chart labeled “EX 2” illustrates the price impact of eliminating the low cost generator from the market. In this example the bottom 1,000 MW has been removed, driving the market price for 1,000 MW up to 4.2 cents/kWh. If 1,500 MW is required, the price is 4.6 cents/kWh. A price of 15 cents/kWh is reached when demand hits 2,500 MW.

The bidding behavior of remaining generators is probably not going to remain unchanged by the loss of the low cost producer, of course. In a deregulated market the producers prepare their bids by looking at more than just their cost of producing an additional kW of power. ***In the case of nuclear plants, for example, the company's bid may actually be below its cost*** as shutting the plant down is very costly—nuclear plant operators want their plants operating all the time.



## SOURCES

### Interviews

Interviews were conducted with various representatives of the following organizations.

Entergy Nuclear  
 New York Independent System Operator  
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 Nuclear Regulatory Commission, Region I  
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#### Reports

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Schlissel, David A., *The Impact of Retiring Indian Point on Electric System Reliability*, (testimony before New York City Council Environmental Protection Committee, May 7, 2002).

### *Newspaper Articles*

Numerous articles from the following publications were used in preparing this report

*The Journal News*  
*New York Times*  
*New York Post*  
*New York Observer*  
*Westchester County Business Journal*

## ENDNOTES

<sup>1</sup> WPII has also completed a study of the physical threat posed by keeping the plants open and operating.

<sup>2</sup> WPII addresses the physical risk in a companion paper.

<sup>3</sup> There is an "Indian Point 1." IP1 began operating in 1965 and was shut down in 1974.

<sup>4</sup> Commutation estimates for 2000 from NY Metropolitan Transportation Council and Westchester County Department of Planning; nonresident wage & salary estimates for 1999 from US Department of Commerce, Bureau of Economic Analysis.

<sup>5</sup> 2000 average revenue per kilowatt-hour. With help from inexpensive hydro power and negotiated prices between major firms and energy suppliers, NYS ranks #14 in industrial power costs. Source: Energy Information Administration.

<sup>6</sup> Rates current as of January 1, 2002. Source: NYS Public Service Commission.

<sup>7</sup> New York Independent System Operator: Existing NYCA generation as of 1/1/2001, <http://www.nyiso.org/markets/index.html#NYCAInfo>.

<sup>8</sup> NYPA operates two "pumped storage" facilities. The Blenheim-Gilboa facility in the Catskills pumps water up to a mountain reservoir at night when power is plentiful—thus inexpensive. The stored water flows back down in order to generate power during high demand periods during the day. Variation in daily price is great enough to justify using one and one-half times the power to pump the water up as the plant can generate when the same water flows back down.

<sup>9</sup> State of NY Department of Public Service, Monthly Residential Bills for Major Electric Companies, January 1, 2002.

<sup>10</sup> Engineering News-Record, 4/22/02, p. 18.

<sup>11</sup> NYS Draft Energy Plan, p.3-46

<sup>12</sup> Newsday, 4/23/02.

<sup>13</sup> General Accounting Office, *Economic Impact of Closing the Indian Point Nuclear Facility*, Report #EMD-81-3, 11/7/80.



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<sup>14</sup> The NYISO has been refining procedures for mitigating the impact of temporary power shortages on pricing.

<sup>15</sup> This includes NYS gross receipts tax and taxes imposed by other jurisdictions.

<sup>16</sup> Public Service Commission, letter dated 5/16/02.

<sup>17</sup> Patton, p. 13.

<sup>18</sup> This adjusts for the loss of the World Trade Center load, the economic slowdown and the transfer of Rockland Electric to the Pennsylvania-New Jersey-Maryland (PJM) control area. Source: NYISO *Power Alert II: NY's Persisting Energy Crisis* <http://www.nyiso.org/>

<sup>19</sup> David Schlissel, "The Impact of Retiring Indian Point on Electric System Reliability." Testimony before the NYC Council Environmental Protection Committee, May 7, 2002.

<sup>20</sup> Newsday "Early Heat Wave Tests Power Grid," 4/18/02, p.8.

<sup>21</sup> Charles Komanoff, "Securing Power Through Energy Conservation and Efficiency in New York." Riverkeeper, Pace Law School Energy Project, Natural Resources Defense Council, May 2002.

<sup>22</sup> Riverkeeper responds that the process of mining and refining uranium is not environmentally friendly. We've not assessed how pollution from mining might be balanced against pollution from fossil fuel combustion. Nonetheless, the environmental impact of pollution is partly determined by where the pollution occurs. Despite the fact that NYC was declared in 2001 to have attained carbon monoxide standards established under the 1990 Clean Air Act, the issue of air pollution in a congested metropolitan area is a continual concern.

<sup>23</sup> NYPA's web site indicates that use of the Poletti plant will be reduced by 70% once the new plant is operating.

<sup>24</sup> Public Service Commission letter of May 16, 2002.

<sup>25</sup> This example is, of course, highly simplified. For example, in practice it is the bid of the *next* generator to enter the market that sets the price.



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