Indian Point Contingency Plan

Final Generic Environmental Impact Statement

September 2013

Prepared for:

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List of Abbreviations and Acronyms

AC	alternating current
AGS	Astoria Generating Station
APA	Adirondack Park Agency
APE	area of potential effect
bgd	billion gallons per day
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CARM	Clean Air Mercury Rule
CCNG	combined-cycle natural gas
CEA	critical environmental area
CIA	controlled industrial area
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
DAM	(New York State) Department of Agriculture & Markets
DC	direct current
DOT	Department of Transportation
DPS	Department of Public Service
ECL	Environmental Conservation Law
EE/DR/CHP	Energy Efficiency/Demand Reduction/Combined Heat and Power
EEPS	Energy Efficiency Portfolio Standard
EIA	U.S. Energy Information administration
EIS	environmental impact statement
ELF	extremely low frequency (radiation)
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency

List of Abbreviations and Acronyms (cont.)

ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
GEIS	generic environmental impact statement
GHG	greenhouse gas
GWh	gigawatt hours
HEFPA	Home Energy Fair Practices Act
Hg	mercury
HTP	Hudson Transmission Partners
HUC	hydrologic unit code
HVDC-VSC	high voltage direct current - voltage source converter
IPEC	Indian Point Energy Center
IPP	independent power producers
kV	kilovolt
kV/m	kilovolt per meter
LIPA	Long Island Power Authority
LOLE	loss of load expectation
mG	milligauss
MSA	metropolitan statistical area
MSSC	Marcy South Series Compensation
MTA	Metropolitan Transportation Authority
MW	megawatt
MWh	megawatt hour
N_2O	nitrous oxides
NAAQS	National Ambient Air Quality Standards
NARUC	National Association of Regulatory Utility Commissions
NERC	North American Electric Reliability Corporation
NOx	nitrogen oxides
NOTR	northeast ozone transport region
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NYCDOHMH	New York City Department of Health and Mental Hygiene

List of Abbreviations and Acronyms (cont.)

NYCRR	New York Code of Rules and Regulations
NYISO	New York Independent System Operator
NYNHP	New York Natural Heritage Program
NYPA	New York Power Authority
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
NYSHPO	New York State Historic Preservation Office
O_3	ozone
OPRHP	Office of Parks, Recreation, and Historic Preservation
OSHA	Occupational Safety and Health Act
Pb	lead
PILOT	payment in lieu of taxes
PJM	Pennsylvania-New Jersey-Maryland
PM_{10}	particulate matter less than 10 microns in diameter
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PPA	power purchase agreement
PSC	Public Service Commission
PSL	Public Service Law
RFP	Request for Proposal
RNA	Reliability Needs Assessment
ROW	right-of-way
RPT	real property tax
SASS	scenic area of statewide significance
SCR	special case resource/selective catalytic reduction
SDWA	Safe Drinking Water Act
SEQRA	(New York) State Environmental Quality Review Act
SIP	State Implementation Plan
SIU	Staten Island Un-bottling
SO_2	sulfur dioxide
SOx	sulfur oxides
SPDES	State Pollutant Discharge Elimination System
TOTS	Transmission Owner Transmission Solutions

List of Abbreviations and Acronyms (cont.)

UCAP	unforced capacity
UPNY	upstate New York
USFWS	U.S. Fish and Wildlife Survey
USGS	U.S. Geological Survey
WWTP	waste water treatment plant

Executive Summary

In Case 12-E-0503, the New York State Public Service Commission (PSC or the Commission) required Consolidated Edison, in cooperation with the New York Power Authority (NYPA), to develop a contingency plan addressing the possible shutdown of the Indian Point Energy Center (IPEC). Consolidated Edison and NYPA submitted a conceptual IPEC Reliability Contingency Plan and proposed to pursue three types of solutions to the reliability deficiencies that would arise with the loss of the power plant: new transmission facilities, new generation supplies, and energy efficiency/demand response measures. The Commission directed staff to evaluate the proposed solutions and to recommend projects for implementation pursuant to the final Contingency Plan.[1]

The PSC also determined that action on the final Contingency Plan could have significant adverse impacts on the environment. As required by the State Environmental Quality Review Act (SEQRA), the PSC undertook to assess those potential impacts through the preparation of a generic environmental impact statement (GEIS). The PSC accepted and published a draft version of the GEIS for public comment on July 18, 2013.

This Final GEIS presents the results of the Commission's efforts to identify and evaluate the potential environmental impacts that may flow from the implementation of the IPEC Reliability Contingency Plan, and the mitigation measures that could be employed to reduce those impacts.[2] The study assumes that the IPEC contingency arises in the summer of 2016 and that the energy and capacity represented by the plant become unavailable at that point in time. Using that planning assumption, the Final GEIS identifies the potential environmental impacts of the action by comparing the conditions that would exist if IPEC became unavailable in 2016, without a Contingency Plan, with those that would exist if the Contingency Plan were implemented.[3]

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[1] Various parties offered additional solutions for evaluation, including battery storage. The FGEIS provides a generic assessment of the impacts of all of the proposed technologies.

[2] It is important to note that the contingency may not occur or may not occur in the time frame assumed for purposes of this study. The proposed plan recognizes this and provides for the cessation of work on any projects. Thus, the environmental impacts identified in the FGEIS may be completely or partially avoided.

[3] The planning exercise that is supported by the Final GEIS does not involve any determination as to whether the IPEC should or should not be shut down at the expiration of its licenses in 2015.

The analysis shows that impacts on a number of environmental resources are associated with the construction and operation of transmission and generation facilities such as those proposed for the Contingency Plan. The resources that may be affected, depending on the specific design of any individual project, include land use patterns, water resources, plants and animals, agricultural resources, aesthetic resources, historic and archaeological resources, open space and recreation, critical environmental areas, air quality, transportation, energy, noise and odor, public health, community character, and socioeconomics. Because the analysis is part of a planning effort, the Final GEIS identifies the resources of concern and the potential impacts at a generic level. The study also identifies a number of mitigation strategies that are available and applicable to transmission and generation projects generally. Finally, the Final GEIS evaluates the potential for cumulative impacts, irreversible commitment of resources, and secondary and growth-inducing impacts.

The Final GEIS contrasts the impacts potentially associated with the proposed solutions to the No Action alternative, which reflects the conditions that are expected to arise upon the occurrence of the contingency, in the absence of a plan. The No Action alternative would result in a significant reliability shortfall and deterioration in utilities' ability to manage other stresses on their systems. This would lead to both short-term and long-term responses, including maximum use of existing available generation during periods of high demand; maximizing imports; potentially higher electricity prices; and the possible implementation of New York Independent System Operator's (NYISO) emergency operations procedures, which could include load-shedding measures. The Final GEIS assesses the impacts of these responses on the same environmental resources.

The comparison of the Contingency Plan scenario with the No Action scenario indicates that some environmental resources may incur adverse impacts related to the construction of new facilities, as compared with the No Action scenario. Some of these impacts would be temporary and limited to the construction phase, such as construction traffic impacts, and others would be longer-term or even permanent. However, many of these impacts can be mitigated using well-established construction techniques and resource-management practices. The FGEIS recommends that detailed, site-specific analysis of such adverse impacts, as well as project-specific mitigation, be required for any projects that proceed to implementation following approval of the Contingency Plan, in order to ensure that actual impacts are avoided or minimized to the maximum extent practicable.

The study further finds that the addition of facilities pursuant to the Contingency Plan may alleviate some of the adverse environmental impacts that would arise with the loss of the IPEC generation. In particular, implementation of the Contingency Plan would likely eliminate the need to operate old, high-polluting energy sources and thus improve air quality and reduce public health risk as compared with No Action conditions. Maintaining system reliability would lessen the possibility of load shedding and avoid other potential human health

risks and socioeconomic disruptions. Implementation of the Contingency Plan projects would also tend to mitigate other socioeconomic impacts of the No Action scenario, in that the addition of efficient sources of supply could limit and stabilize the effects of an IPEC shutdown on energy market prices.

The Final GEIS also considers and evaluates the potential for cumulative impacts with other reasonably foreseeable projects, such as the transmission additions proposed in New York State's Energy Highway Blueprint. The report concludes that such impacts are unlikely, but in any event would be of the same character and subject to the same kinds of mitigation techniques as the types of transmission projects proposed for the Reliability Contingency Plan.

This Final GEIS includes as Appendix A the DPS staff's response to public comments on the Draft GEIS and, in Appendix B, a summary of changes to the Draft GEIS.

1 Compliance with the New York State Environmental Quality Review Act (SEQRA)

The purpose of SEQRA is to incorporate consideration of environmental factors into the planning, review, and decision-making processes of New York State, and regional and local government entities. SEQRA requires all government agencies to determine whether the actions they undertake, fund, or approve may have a significant impact on the environment. If it is determined that the action may have a significant adverse impact, then the government entity must prepare (or request to be prepared) an environmental impact statement (EIS). The intent of SEQRA is to give appropriate weight to the protection and enhancement of environmental, human, and community resources in determining public policy by incorporating into a government's planning and decision-making process a suitable balance of social, economic, and environmental factors. SEQRA does not, however, require that environmental factors be the sole consideration in decision-making.

1.1 Preparation of a Generic Environmental Impact Statement (GEIS)

In anticipation of the possibility that the Indian Point Energy Center (IPEC) facility would be retired upon expiration of its operating license at the end of 2015, the New York State Public Service Commission (PSC) instituted a proceeding to review contingency plans to ensure an adequate and reliable power supply if the IPEC facility is not available in the summer of 2016.[4]

As part of this proceeding the PSC directed Consolidated Edison Company of New York, Inc. (Con Edison), in consultation with the New York Power Authority (NYPA), Department of Public Service staff (DPS staff), and other appropriate agencies, to develop the IPEC Reliability Contingency Plan (Contingency Plan). A conceptual plan, which was subsequently approved by the PSC in its March and April Orders, was filed by the NYPA and Con Edison on February 1, 2013. That filing proposed to address the reliability contingency with

[4] Case 12-E-0503, Proceeding on Motion of the Commission to Review Generation Retirement Contingency Plans, Order Instituting Proceeding and Soliciting Indian Point Contingency Plan (issued November 30, 2012) ("November Order").

a combination of new generation and transmission resources as well as a demand response program targeted to address New York City's electric power demand.

The February 2013 filing included three components:

1. Con Edison and NYPA would pursue the initial development of three projects - Transmission Owner Transmission Solutions (TOTS).
2. NYPA would solicit generation and other transmission proposals through a request for proposal (RFP).
3. Con Edison would develop an Energy Efficiency/Demand Reduction/ Combined Heat and Power (EE/DR/CHP) set-aside program that would reduce the demand by at least 100 megawatts (MW).

Pursuant to an order issued on May 21, 2013, the PSC, acting as lead agency, determined that the act of approving a Contingency Plan to address the possibility that the IPEC facility would not be operational upon expiration of its operating license at the end of 2015 is an "unlisted action," as defined by SEQRA.[5]

The PSC also found that the approval of the Contingency Plan may lead to significant adverse impacts on the environment and that a generic environmental impact statement (GEIS)[6] should be prepared to assess the potential impacts associated with the approval of the Plan. SEQRA allows preparation of a GEIS in several circumstances, including when considering a plan that could restrict the range of future alternative projects.[7]

1.2 Purpose and Scope of a Generic Environmental Impact Statement

A GEIS may be broader and more general than a site- or project-specific EIS. The GEIS should include the logic and rationale of the choices advanced and may be based on conceptual information. The GEIS may also identify the important elements of the natural resource base, as well as existing and projected cultural features, patterns, and character. SEQRA requires that a Draft GEIS be made available for public comment; subsequently, the lead agency considers the comments and then prepares a final GEIS before reaching a decision on the action under consideration.

On May 16, 2013, the PSC considered an environmental assessment form prepared by its staff and concluded that the action may have a significant effect on the environment. Preparation of a GEIS would allow the Commission to analyze

[5] Case 12-E-0503, Generation Retirement Contingency Plans, Order Determining Significance and Requiring the Preparation of a Generic Environmental Impact Statement (issued May 21, 2013), at p.2.

[6] Id.

[7] The required contents of an EIS are listed in the regulations that implement SEQRA (6 NYCRR Part 617.9 and 617.10) and generally provide the structure for an EIS, including a GEIS.

and consider, in general and conceptual terms, hypothetical scenarios that are likely to occur as a result of the action, and to evaluate the impact of those scenarios. Notice of the PSC Declaration of Lead Agency Determination that the action may result in significant environmental impacts and the decision to prepare a GEIS was issued on May 21, 2013. By Order issued on July 18, 2013, the PSC determined that the Draft GEIS comported with the requirements of SEQRA and accepted it as complete. The notice was published in the New York State (NYS) Environmental Notice Bulletin on July 24, 2013. Comments on the Draft GEIS were requested to be filed by August 23, 2013.

Two comment letters were received in the case. Where appropriate, and as noted in the responses to the comments, revisions were made to the Draft GEIS in the preparation of the Final GEIS. These changes are described more fully in Appendix B and include modifications to all sections of the Draft GEIS.

2 Description of the Proposed Action

2.1 Background to the Proposed Action

A proceeding has been instituted by the PSC, in Case 12-E-0503, to develop a Contingency Plan to address reliability concerns arising from the potential unavailability of electricity-generation capacity of the IPEC upon the expiration of its operating license at the end of 2015. The PSC required Con Edison, in consultation with the NYPA, the DPS staff, and other appropriate agencies, to develop the IPEC Reliability Contingency Plan (Contingency Plan). The proposed Contingency Plan includes a combination of resources selected from among the following: 1) the TOTS; 2) new generation and transmission solutions; and 3) demand reduction of 100 MW through an EE/DR/CHP set-aside program.

The February 1, 2013 filing of the conceptual Contingency Plan, subsequently approved by PSC's April 19, 2013 Order, proposed certain threshold criteria for an initial screening of responses.[8] Submittals meeting these criteria were subject to a more complete evaluation process by DPS staff. Projects included in the Contingency Plan approved by the PSC will be required to obtain all appropriate regulatory approvals as part of a project-specific licensing process. Site-specific land use and regulatory impact evaluations, including compliance with existing zoning or other restrictions, will be completed during the project-specific licensing processes and are therefore not applicable to this evaluation.

This GEIS supports the PSC's action on the recommended portfolio of solutions included in the Contingency Plan. The action does not involve an evaluation of whether the IPEC should be closed or the amount of the projected capacity deficiency because these issues are not implicated in this analysis.[9]

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[8] The criteria included: 1) that the proposal was received on time and in the proper format; 2) the proposal is able to meet the summer 2016 deadline; 3) any power generation proposal would provide at least 75 MW (unforced capacity) of incremental capacity; 4) any generation and/or transmission proposal would be interconnected to New York Independent System Operator (NYISO) Load Zones G-K (see Figure 2-1); and 5) that the proposal includes a commitment on firm pricing through December 31, 2013.

[9] Case 12-E-0503, Generation Retirement Contingency Plans, Order Upon Review of Plan to Issue Request for Proposals (issued March 15, 2013).

2.2 Location Impacted by the Action

The projects considered for inclusion in the Contingency Plan for the Draft and Final GEIS are located throughout New York State, with the greatest concentration of proposed project facilities in the Hudson River corridor, New York City, and Nassau County.

2.3 Public Need and Benefits

Based on a deficiency analysis performed using the New York Independent System Operator (NYISO) Reliability Needs Assessment (RNA) by Con Edison, it was determined that retirement of the IPEC facility would result in an overall deficiency of 1,350 to 1,375 MW of power. This potential shortfall led to the October 2012 PSC proceeding to develop and review reliability contingency plans that address potential retirements of electricity-generating facilities and the possible closure of the nuclear generating facility at Indian Point.[10]

2.4 Proposed Projects

As described above, as a result of a process initiated by the PSC in October 2012, a number of projects have been proposed to address the potential unavailability of electric-generation capacity if the IPEC operating license is not renewed at the end of 2015. As part of that process, the development of three TOTS projects has been initiated, and proposals submitted by 15 parties for new generation and/or transmission projects have been determined to be responsive to the NYPA RFP.[11] These projects generally fall into three groupings—generation, transmission, and battery storage. The majority of the generation projects are natural gas-fueled combined-cycle facilities, although several of the proposed generation facilities would be capable of using fuel oil. The transmission projects can be further divided into land-based overhead alternating current (AC) transmission projects and in-water or underground direct current (DC) cable projects. One battery storage facility also is proposed. These projects are summarized in the next section. The potential impacts associated with each are presented in this GEIS. In addition, Con Edison and the New York State Energy Research and Development Authority (NYSERDA), in consultation with NYPA, submitted a plan for energy efficiency, demand reduction, and combined heat and power projects to respond to the PSC directive to design a program to achieve at least

[10] Case 12-E-0503, November Order.

[11] Two of the submissions were not considered responsive and are not carried forward in this GEIS. Ridgeline Energy submitted a project description that does not respond to the stringent requirements of the RFP. Their project does not meet the threshold for generation projects of 75 MW of unforced capacity (UCAP) and it is outside of NYISO Zones G-K, both requirements for the RFP. The other non-responsive proposal was from Entergy, the current operator of the IPEC, to continue operations at IPEC. Since the IPEC Reliability Contingency Plan would be implemented only if the IPEC were not re-licensed, the continuation of operations at the IPEC falls outside of the scope of the Contingency Plan.

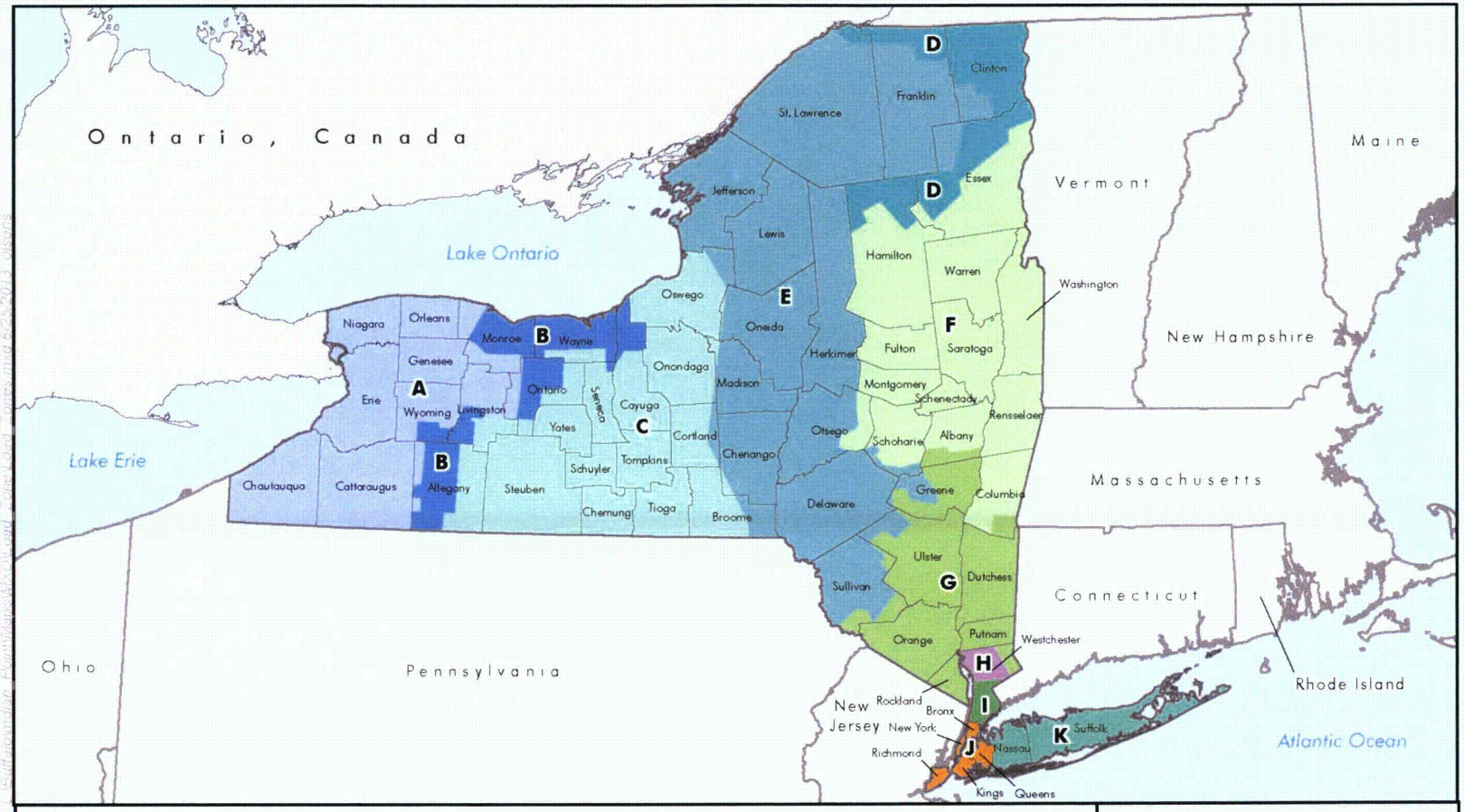


Figure 2-1
New York Control
Area Load Zones

Source: NYISO; ESRI, 2010.

100 MW of cost-effective peak demand reduction by summer 2016 within the ConEdison service territory. [12]

2.4.1 Responses to the RFP

2.4.1.1 Proposed TOTS Projects

Three projects were proposed:

- Development of a Second Ramapo to Rock Tavern 345kilovolt (kV) transmission line (RRT Line)
- Development of a Staten Island Un-bottling (SIU) project
- Development of the Marcy South Series Compensation (MSSC) and Fraser to Coopers Corners Re-Conductoring project.

2.4.1.2 Proposed Electricity Transmission Projects

- Boundless 1. This transmission project would upgrade existing transmission facilities in the capital region and the Hudson Valley, with interconnections at the New Scotland, Leeds, Roseton, Rock Tavern, Ramapo, and Bergen, New Jersey substations. The proposal would purportedly improve system reliability constraints and increase capacity by 1,097 MW. It would include the following four 345 kV transmission segments, plus one additional, optional component:

  1. Double circuit the existing overhead 345 kV circuits from the Leeds substation to the Hurley Avenue Substation, continuing to Roseton Substation, and finally to Rock Tavern Substation.
  2. Tap the existing 345 kV Alps–New Scotland circuit at the proposed Knickerbocker substation and install a new 345 kV line from Knickerbocker to Leeds substation. This new 345 kV overhead circuit would run in an existing right-of-way (ROW) from Knickerbocker to Hudson substation and then continue from Hudson underground and under the Hudson River to the Leeds substation.
  3. Tap the Empire Generating Plant's 345 kV generator lead south of the plant and east of the Hudson River and create a new 345 kV line (overhead line or underground cable) using existing utility ROWs from the interconnection point to the New Scotland substation. This segment, by combining a portion of the existing generator lead and the new 345 kV segment, creates a New Scotland to Reynolds Road 345 kV connection. This segment would purportedly improve the New York–New England interregional tie and allow the existing Alps–New Scotland 345 kV circuit to be tapped at the proposed Knickerbocker substation.

[12] Case 12-E-0503, Generation Retirement Contingency Plans, Revised Indian Point Energy Center Demand Management Plan of Consolidated Edison Company of New York, Inc., New York State Energy Research and Development Authority, and New York Power Authority. June 20, 2013.

4. Create a new 345 kV circuit from the Ramapo substation, underground to the South Mahwah, New Jersey, substation, and then to a substation in Bergen, New Jersey, ostensibly to allow New York State generation to access New York City through the new Hudson Transmission Partners, LLC (HTP) Project.

5. (Optional) Create a new 345 kV circuit from Roseton, under the Hudson River and then underground to a new West Fishkill substation, located just west of the existing East Fishkill substation. This would tap the third presently untapped 345 KV circuit running past the East Fishkill substation, strengthening this important North-South segment. This project would generally be sited in existing utility ROWs. No permits have been obtained for the project. The developer reports that the line would be operational in 2016.

- Boundless 2, Horace Greeley East-West. This project would involve extensive upgrades of existing transmission lines from Niagara County in the western part of New York State to the Rock Tavern substation in Orange County and would reportedly make available new supplies of wind and solar projects to southeast New York. Boundless proposes a combination of upgrading existing circuits, additional 345 kV circuits, and double-circuiting to provide additional capability between New York and New Jersey and to better use the recently completed HTP facility. The upgrades would reportedly result in a 900 MW increase in capacity. The project would generally use existing ROWs. In some cases, it would be possible to use the existing transmission facilities. No permits have been obtained for the project. The projected in-service date is 2017-2018.
- Boundless 3, North River Express. This project is proposed to address the upstate New York (UPNY) - Con Edison Interface Constraint using a 1,100 to 1,600 MW high voltage direct current voltage source converter (HVDC-VSC) circuit from an interconnection in the Hudson Valley running southward into New York City. This project would interconnect on the northern end to either the Bowline or Ramapo substation and on the southern end to the East 13th Street substation in Manhattan. It would purportedly permit the transmission of electric power from existing generating plants to New York City via underwater cables to be located in the Hudson River. No permits have been obtained for the project. The projected commercial operation date is 2018.
- Boundless 4, Convert Y Cables to HVDC. The proposed project is designed to address two aging 345 kV cable connections from Westchester County to Long Island by using the existing cables to carry HVDC current and controllable HVDC-VSC technology. It can connect to either Bowline or Indian Point from Sprainbrook and Dunwoodie substations. The developer expects that the project would provide an increase of at least 2,000 MW in capacity on a fully controllable basis. No permits have been obtained. The project would purportedly be in service in 2018.
- Iberdrola Connect NY HVDC. This is a proposed 53-mile 1,000 MW HVDC bulk transmission line connecting the New Scotland and Hurley substations. The line would use existing public utility corridors adjacent to the New York

State Thruway ROW, New York State Department of Transportation highway ROW, and small sections of private ROWs. The entire line would be located underground. No permits have been obtained. The project would purportedly be on-line by June 2016.

- Poseidon HVDC. The project is a proposed 82-mile, 500 MW HVDC transmission link between the Pennsylvania-New Jersey-Maryland (PJM) grid in New Jersey and the downstate New York grid in Long Island. Approximately 48 miles of the line would be installed in the Raritan River and Atlantic Ocean and 34 miles would be buried on land in existing transmission and roadway ROWs. No permits have been obtained. The project is proposed to be on-line by June 2016.
- West Point HVDC. The project is a proposed 80-mile, 1,000 MW HVDC link between upstate and southeastern New York. It would run from the existing National Grid Leeds substation in Greene County to the existing Con Edison Buchanan North substation adjacent to the Indian Point generating facility. Approximately 75 miles of the line would be buried beneath the bed of the Hudson River. The upland portion would include AC-DC converter stations near both interconnection substations and underground cables, proposed to generally be located in existing transmission or road ROWs. An application pursuant to Public Service Law (PSL) Article VII was filed in July, 2013, and docketed in Case 13-T-0292. No permits for siting or construction have been obtained. The project is proposed to be on-line by June 2016.

2.4.1.3 Proposed Electricity Generation Projects

- CCI Roseton CCNG. The proposed Roseton project is a 600 MW combined-cycle natural gas gas-fired generating (CCNG) facility to be located in Newburg, New York. It would be constructed on the existing Roseton generating station site. It has a target operation date of early 2018. The project would take advantage of existing ties into the municipal water supply and pre-existing on-site facilities for water treatment. The project would need to obtain a PSL Article 10 certificate and other major permits before construction.
- CPV Valley CCNG. The CPV project is a proposed 667 MW natural gas, combined-cycle power plant in Wawayanda, New York. The facility would use an air cooling system and use reclaimed and treated gray-water from the local municipal waste water treatment plant (WWTP); wastewater from facility operations would be discharged back to the municipal WWTP. The project has published a final EIS and is in the process of obtaining other permits and approvals. The developer expects the facility to be operational before June 2016.
- Cricket Valley CCNG. The proposed Cricket Valley project is a 1,000 MW gas-fired, combined-cycle power plant being developed in Dover, New York. A final EIS has been completed and the generation project has received all required permits. (The PSC issued a Certificate of Public Convenience and

Necessity pursuant to PSL §68 in Case 11-E-0593.). Additional permits would be required for electric transmission and natural gas tie-ins. A PSL Article VII certificate would be required for the major electric transmission facility that would interconnect the generating facility to the Pleasant Valley substation. The developer proposes that its facility be operational by June 2016.

- GE Energy Linden. The GE Energy Linden project is a proposed 200 MW expansion of an existing generating facility located in Linden, New Jersey. The facility would consist of two natural gas-fired simple cycle combustion turbines to be sited on a parcel within the Bayway refinery. The project would access all required infrastructure/services (water, gas, waste water) through the existing Linden Co- generation facility. The developer expects to obtain all required permits by February 2015 and be operational by June 2016. Note: GE also proposes to enter into a power purchase agreement (PPA) to provide NYPA with up to 255 MW of existing capacity from Linden 1.
- NRG Astoria. The NRG Astoria project is a proposed 520 MW repowering of the existing NRG Astoria facility located in Queens, New York. Seven oil-burning peaker units would be replaced with two natural gas-fired combined cycle turbines. The project completed SEQRA reviews and is fully permitted, and the developer expects the facilities to be in service by June 2016.
- NRG Bowline 2. The NRG Bowline project is a proposed 564 MW repowering of the NRG Bowline 2 facility, located in West Haverstraw, New York. NRG owns and operates two dual-fuel (No. 6 fuel oil and natural gas) utility boiler/steam turbine units located. The project would reduce existing nitrogen oxide (NOx) emissions by installing a selective catalytic reduction system (SCR) and reduce sulfur dioxide (SO_2) emissions by changing the oil backup fuel from No. 6 fuel oil to ultra-low sulfur diesel fuel. No new major permits are required for the project. Two minor modifications to the existing air permit would be obtained prior to construction. The project schedule projects the improved facilities to be in service by June 2016.
- NRG Bowline 3. NRG presented the Bowline 3 Project, a combined-cycle project with an approximate net plant output of 775 MW. NRG is not able to offer a conforming, binding bid featuring Bowline 3 at this time because of the requirement in the RFP to be operational by 2016. This project is subject to PSL Article 10 and is docketed at Case 12-F-0311.
- Selkirk CoGen. The proposal is to provide power from the existing 345 MW natural gas-fired co-generation facility located in Selkirk, Albany County. Three-quarters of the facility's current generation output is under contract with Con Edison. That contract would expire in August 2014. The rest of the power is currently being sold into the merchant market. The facility is fully permitted.
- US PowerGen. The Luyster Creek proposal has two options.
  - Option A. Starting June 2017, provide 430 MW of power from a new combined-cycle, natural gas-fired unit that would be located in the fuel

oil tank farm at the Astoria Generating Station (AGS) in Queens, New York; and from June 2016 until June 2017 provide power from the repowered 387 MW Astoria Unit 40, a dual-fueled (natural gas and No. 6 oil) unit that would be converted to ultra-low sulfur diesel by June 2017, also located at the AGS. (The proposed 430 MW Luyster Creek facility would not be on-line until June 2017.) The repowered Unit 40 is proposed to be on-line by June 2016.

- Option B. Provide 387 MW of power from the proposed Luyster Creek combined-cycle facility starting in June 2017.

- US PowerGen Unit 40 upgrade. This proposal is to provide the power from the repair and restoration of the 387 MW Astoria Unit 40, a dual-fueled (natural gas and No. 6 oil) unit that has been out of service since July 2011. (Under the Luyster Creek Option A proposal described above, Unit 40 would be converted to ultra-low sulfur diesel by 2017. That is not the case under this option.) The restoration of this unit would require the modification of its Title V air permit.
- US PowerGen South Pier Improvement Project. This project is permitted and purportedly capable of meeting the 2016 start date. It is a proposal for a new 100 MW natural gas-fired facility with a 30-day ultra-low sulfur diesel backup. The facility site is on a pier adjacent to the Gowanus generating units and the Con Edison Gowanus substation in Brooklyn.
- NYC Energy floating power plant. This proposal is to provide 79.9 MW of power from a combined-cycle natural gas facility that would be located on a floating barge adjacent to the Brooklyn Navy Yard in Brooklyn, New York. The facility is currently permitted to operate for up to 905 hours per year on low-sulfur oil. All regulatory approvals for the project have been obtained but additional property interest must be acquired for interconnections.

2.4.1.4 Proposed Battery Storage Projects

AES Long Island

This project would provide up to 300 MW of battery storage capacity (1,200 megawatt hours [MWh] total storage capacity) at a facility to be constructed at one of the following location(s):

- Site #1: Indian Head substation, Smithtown, Suffolk County (Zone K)
- Site #2: Hellgate/Bruckner substation, Bronx, Bronx (Zone J)
- Site #3: Vernon substation or Rainey substation, Long Island City, Queens (Zone J)
- Site #4: Eastview substation or Elmsford substation, Elmsford, Westchester County (Zone I)
- Site #5: Sprain Brook substation, Yonkers, Westchester County (Zone I).

The proposal offers a flexible configuration of 100 MW, 200 MW, or 300 MW capacities. The project would not use any gas or liquid fuels. Grid electricity would fuel the project. The facility would be powered by sealed battery energy storage devices and would have no emissions.

2.4.1.5 List of Projects in Both Indian Point Contingency and AC Transmission Proceedings

Several of the transmission project proposals to address the Indian Point Contingency are also under consideration in a separate Energy Highway proceeding under way in Case 12-T-0502[13]:

- Two of the TOTS projects:
  - Second Ramapo to Rock Tavern 345 kV transmission line
  - Marcy South Series Compensation and Fraser-Coopers Corners Re-conductoring.
- The following proposed transmission projects:
  - Boundless components:
    - Add Leeds-Rock Tavern 345 kV circuit
    - New 345 kV Knickerbocker-Leeds circuit
    - New 345 kV Roseton-West Fishkill circuit
    - New 345 kV Oakdale-Fraser circuit (component of Boundless 2, Horace Greely East-West package).

[13] Case 12-T-0502, Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades, Order Instituting Proceeding (issued November 30, 2012). The PSC has identified a need for additional transmission to address specific existing system congestion issues.

3 Alternatives

3.1 Introduction

The range of possible alternatives evaluated in this Final GEIS is limited by the October, March, and April Orders of the PSC, the three TOTS projects identified in the NYPA Con Edison filing, and the proposals for generation and transmission received by the May 20, 2013 deadline in response to the NYPA RFP (April 3, 2013). The PSC's April 19 Order directed DPS staff to evaluate the RFP proposals and the TOTS projects in a manner that will assist the PSC in determining what portfolio of resources will satisfy the 1,350 to1,375 MW electricity deficiency that is expected to occur if the IPEC is not relicensed at the end of 2016 and that will meet the New York State reliability objectives at the least cost and with the greatest benefit to ratepayers and to the public interest.

Because the Contingency Plan approved by the PSC will comprise only a portfolio of generation, storage, and transmission projects selected from those under consideration, the alternatives described in this Final GEIS are presented and analyzed only in general or conceptual terms. The scenarios that are likely to occur as a result of the approval of the Contingency Plan represent a sub-set of the potential impacts of each of these alternatives. Project-specific impacts of each of the individual development projects under consideration will be evaluated during the permitting of those projects.

In order to facilitate evaluation of the potential portfolio of projects that may be identified in the Contingency Plan that will be approved by the Commission in conceptual terms, the projects evaluated in this Final GEIS are grouped into the following technology alternatives and the No Action alternative:

- Projects that would meet all or portions of the needed capacity through transmission
- Projects that would meet all or portions of the needed capacity through generation
- Projects that would meet part of the needed capacity through battery storage.

The final Contingency Plan will draw upon a smaller portfolio of projects from one or more of the project alternatives listed above.

By analyzing the technologies as separate alternatives, the maximum potential impacts from each technology are described in this Final GEIS. This impact analysis by technology provides an outer envelope of potential impacts that will help inform the decision-making in selecting the components of the Contingency Plan. The Contingency Plan will result in potential impacts that will be of lower magnitude and duration than the potential impacts disclosed in this Final GEIS.

3.2 Electric Transmission Facilities

A portfolio of electric transmission projects proposed in response to the RFP could meet all or part of the 1,350 to 1,375 MW electricity deficiency that could occur if the IPEC facility were no longer on-line. Although the specific details of the projects differ, the submitted projects generally fall into the following categories:

- Upgrades to existing transmission lines and facilities that would provide additional capacity and reliability that are not associated with any particular source of generation
- New underwater or underground DC transmission lines
- New electric and gas transmission lines associated with generation facilities.

The upgrades or new electric transmission facilities are generally AC overhead facilities that may require existing ROWs to be widened to meet national and state health and safety codes and standards.

The cables and pipelines for all of the DC and gas transmission projects would either be installed underwater or buried in existing transmission or transportation ROWs. The DC projects would each require the construction of two inverter stations that would involve a disturbance of approximately 5 acres. Additional land acquisition for switchyards and other facilities would be required on a project-specific basis.

3.3 Electric Generation Facilities

A portfolio of power generation projects were proposed in response to the RFP to meet all or part of the 1,350 to 1,375 MW electricity deficiency that could occur if the IPEC facility were no longer operational. Although the specific details of the projects differ, the submitted projects generally fall into the following categories:

- New combined-cycle natural gas facilities. All of these facilities except two (CPV Valley and Cricket Valley Energy Center) would be constructed at existing generation sites.
- Repair or repowering of existing generation facilities. These facilities operate either solely on natural gas or are dual-fired (fuel oil and natural gas).
- Operating combined-cycle natural gas facilities.
- Combined-cycle natural gas facilities located on a floating barge.

The potentially significant environmental impacts associated with all generation facilities include air emissions, water use and wastewater discharge. There is also a potential for transportation and noise impacts during construction and operation. Land use, aesthetic, archaeological, and biological impacts would vary depending on the existing use of the site, sensitivity of specific locations, and whether the project involves new construction and/or land disturbance.

3.4 Battery Storage Projects

One battery storage facility was submitted. The proposal offers a flexible configuration of 100 MW, 200 MW, or 300 MW (up to 1,200 MWh total storage capacity). The project would not use any gas or liquid fuels. Grid electricity would fuel the project. The facility would be powered by sealed battery energy storage devices and would have no emissions. According to the applicant, storage for a 100 MW module would require a building about 500 feet by 150 feet, or just less than 2 acres.

3.5 No Action

Under the No Action alternative, DPS would not develop a Contingency Plan to address reliability concerns arising from the potential unavailability of electric generation capacity at the IPEC upon the expiration of its operating license at the end of 2015. The absence of a Contingency Plan combined with IPEC actually shutting down would result in short-term and long-term impacts and responses, including maximum use of existing available generation; implementing NYISO's existing emergency operations procedures designed to address disturbances from the loss of generating equipment, loss of transmission facilities, or unexpected load changes that may be of, or develop into, a magnitude sufficient to affect the reliable operation of the electrical system (NYISO 2013); and market responses to provide additional electric generation capacity. In 2012, New York State's available resources represented approximately 5,000 MW of reserve margin, or installed capacity, above the forecasted summer peak electric consumption to meet resource-adequacy criteria. In the event of emergency conditions, the NYISO emergency operations plans include the following:

- Call for demand response through behind-the-fence generation (projects that require no new transmission connection, usually at an existing industrial load or generation site)
- Call for Special Case Resources (SCRs) enrolled at the NYISO to reduce consumption upon request
- Reduce load through voluntary public appeals
- Forced load shedding.

The emergency operations plan would also include importing electricity from nearby power grids to the extent possible and the use of temporary generation such as barge-mounted or truck-mounted turbines. This No Action alternative, which assumes an actual shutdown of IPEC, would result in using higher-priced

electricity, potentially more air pollutant emissions from generation facilities (e.g., more use of diesel generators, which are high in particulate emissions), and, in an emergency situation on peak demand days, the potential for disruptions of service. For the purpose of the GEIS it is assumed that the impacts on reliability and availability of supply for the No Action alternative occur for one year, and after that time the potential unavailability of electric generation capacity of the IPEC loss would be corrected by the energy market over a period of a few years. Potential increases in price and air emissions would continue beyond a year from the sources that would come on-line to meet the demand.

4 Environmental Setting

4.1 Land Use

The topography of New York State is generally hilly or mountainous except in New York City, Long Island, the relatively level Great Lakes Plains areas adjacent to Lake Erie and Lake Ontario, and the Mohawk River Valley. The highlands of eastern New York (the Adirondacks in the northeast, the Allegheny Plateau/Catskills to the south, and the Taconic Mountains/Hudson Highlands on the eastern border) form natural barriers to transportation and settlement. Most New Yorkers live in the lowlands in between, including the Lake Champlain/ Hudson River Valleys, and south of the Hudson Highlands, where the topography slopes down to sea level in New York City and Long Island.

General societal and economic trends such as urban sprawl have influenced land use on a large scale, but the existing land use types in a particular place are largely a function of the topography as well as past uses and existing and past transportation networks. The concentration of population and associated land development range from urban and suburban to rural and natural areas and includes highly valued scenic areas, recreational uses, and wildlife settings, along with important transportation (waterborne, railroad, and highway) corridors. A variety of land uses are concentrated in a narrow corridor along the Hudson River in a unique region of New York State.

New York State constitution "home rule" provisions mean that land use in New York State is primarily controlled at the municipal level. In addition, there are numerous state-wide land use plans and resource management plans (including the Open Space Conservation Plan [see Section 4.7]). Because many of the proposed alternatives are located near coastlines, the regulated coastal area would be affected, and consistency with the New York State Department of State (NYSDOS)-administered New York State Coastal Management Program would be required.

All the cities in New York State and more than 70% of the townships (including nearly all the townships in the Hudson Valley area) have adopted comprehensive land use plans (New York State Legislative Commission on Rural Resources 2008). These planning documents typically address land use planning, conservation, zoning, and related regulatory requirements.

4.2 Water Resources

Watersheds

The primary classification of water resources is the watershed. Watersheds, or drainage regions, include the lakes, rivers, streams, and wetlands with an area that convey or store water, and the surfaces from which water runs off. Two of the 21 primary United States drainage regions (2-digit hydrologic unit code [HUC] as defined by the U.S. Geological Survey [USGS]) cover portions of New York State—the Mid-Atlantic region and the Great Lakes region. Watersheds within the state are divided into 17 sub-regional watersheds. These sub-regional watersheds are used by the New York State Department of Environmental Conservation (NYSDEC) as the basis for watershed management, monitoring, and assessment activities in New York State.

Watersheds that provide source water for drinking water supplies are protected under the 1974 Safe Drinking Water Act (SDWA) from many types of development. There are 9,000 public water supplies in New York State (New York State Department of Health 1999). This protection would effectively exclude power plant development and restrict transmission lines in these areas. The largest of these Source Water Protection and Wellhead Protection Program areas under the SDWA is the New York City watershed, which includes large areas of the Catskill and Delaware watersheds west of the Hudson River and parts of Westchester and Putnam counties for the Croton supply east of the Hudson River.

Lakes and Rivers

New York State contains 7,600 freshwater lakes, ponds, and reservoirs, including portions of two of the five Great Lakes. Lakes, ponds, and reservoirs provide habitat for aquatic plant and animal life and offer recreational opportunities such as swimming, fishing, and boating. They also serve as drinking water supplies for some large cities and small towns throughout the state and support various sectors of our economy such as recreation, tourism, agriculture, fishing, power generation, and manufacturing. The largest lake resources in the state include the Great Lakes of Lake Ontario and Lake Erie, Lake Champlain, and the numerous Finger Lakes of central New York State. Surface waters also provide a source of water that recharges groundwater resources.

More than 70,000 miles of rivers and streams cross the state. The most notable rivers in New York include the following:

- The Hudson River, designated an American Heritage River
- The Susquehanna River, a large interstate river that empties into Chesapeake Bay
- The Delaware River, designated a National Wild and Scenic River
- The Saint Lawrence River, the gateway between the Great Lakes and the Atlantic Ocean

- The Niagara River, which connects New York's two Great Lakes, Lake Erie and Lake Ontario (NYSDEC n.d.).

Wetlands

Wetlands in New York State include the tidal wetlands surrounding Long Island, New York City, and the Hudson River (up to the Troy Dam), and freshwater wetlands that can be found in the floodplains of the state's lakes and rivers. Wetlands serve as a habitat for a number of plant and animal species and can provide a buffer for flooding and tidal erosion.

Water Use

USGS 2005 data show that New York State withdraws approximately 15 billion gallons per day (bgd) for a variety of uses, including drinking water, irrigation, industry, and power (USGS 2005). Approximately 94% of annual state withdrawals are from surface water sources, and just 6% from groundwater. As of 2005, all water withdrawals for thermoelectric use in the state were from surface water sources. Approximately 40% of these were from saline surface waters and 60% from fresh waters. Water withdrawals for power generation in the state are significant, making up approximately 80% of total annual water withdrawals (12 bgd).

The primary water need during power generation occurs with the cooling cycle, where the steam used to run turbines is cooled (traditionally by water), and the condensed steam is returned as water to the plant's boiler. Most plants built in the U.S. before 1970 operate with an open-loop cooling system (also called once-through cooling). In these systems, large volumes of water are withdrawn by the facility from an adjacent water body and returned to the source at a higher temperature. Both the extraction and return of water can result in environmental impacts. The intake of water is associated with fish impingement and entrainment, i.e., when fish are taken into the plant and are caught on the plant's intake screens. The return of heated water may result in lower oxygen levels, increased aquatic plant and algal growth, and loss of aquatic life. Following passage of the Clean Water Act (CWA), greater restrictions were placed on once-through cooling systems (U.S. Department of Energy December 2006).

After 1970, cooling towers, or closed-loop systems became the more predominant cooling system for power generation. These systems operate by condensing generated turbine steam into hot water and then air-cooling the hot water in tower (mechanically or by draft). The cooled water is collected and returned to the plant's boiler. Although cooling tower systems withdraw significantly less water than once-through systems, water consumption from these systems is greater. The difference between water withdrawal and water consumption is that consumed water is "used up" and not returned to its source. Consumed water is evaporated in the cooling tower rather than being returned to the source watershed.

Dry cooling mechanisms are also available as a technology; however, they require higher energy usage and are more expensive than wet cooling systems.

4.3 Plants and Animals

According to NYSDEC (April 2010), there are approximately 32 species of amphibians, 39 reptiles, 375 birds, 92 mammals, and countless invertebrates (insects and mollusks) across New York State. Additionally, more than 165 fish species inhabit the state's 7,600 lakes and ponds and 52,000 miles of rivers and streams. New York State has one of the richest fish fauna in the United States (NYSDEC 2013a).

The New York Natural Heritage Program (NYNHP) maintains New York State's most comprehensive database on the status and location of rare species and natural communities. There are currently 174 natural community types, 727 rare plant species, and 432 rare animal species throughout New York State (NYSDEC 2013b). Animal species include mollusks, fish, insects, mammals, amphibians, reptiles, and birds. Of the rare animal species, 53 are state-listed as endangered, 35 are state-listed as threatened, and 58 are state-listed as species of special concern (i.e., any native species for which a welfare concern or risk of endangerment has been documented in New York State). Of the rare plant species, 352 are state-listed as endangered, 155 are state-listed as threatened, 86 are state-listed as rare, and 149 are state-listed as vulnerable (NYSDEC 2013b).

According to the USFWS database, there are 18 federally listed threatened and endangered animal species and 7 federally listed threatened and endangered plant species. Of the 18 federally listed animal species, 13 are endangered and 5 are threatened. Of the 7 federally listed plant species, 2 are endangered and 5 are threatened (U.S. Fish and Wildlife Service n.d.).

Federally listed species are regulated by the U.S. Fish and Wildlife Service (USFWS) in accordance with the 1973 Endangered Species Act (ESA). State-listed species are regulated by NYSDEC in accordance with 6 New York Code of Rules and Regulations (NYCRR) Part 182, pursuant to Article 11 of the Environmental Conservation Law (ECL).

4.4 Agricultural Land Resources

Farming, which is primarily carried out by small family businesses in New York State, is a multibillion-dollar industry that provides thousands of jobs that extend beyond the farm itself. Based on 2007 census data, New York State had more than 36,000 farms operating on more than 7 million acres of land, which is 20% of the state's land area. The average size of a farm was 194 acres. Total cropland consisted of more than 4.3 million acres, of which more than 3.7 million acres were harvested cropland and 68,000 acres were irrigated land. The market value of agricultural products sold at more than $4 billion, with an average of $98,000 per farm (U.S. Department of Agriculture 2009, 2013).

Farmers play an important role in protecting ecosystems, developing new technologies that help conserve water, reducing carbon footprints, preventing soil erosion, and maintaining the productive quality of their land (Office of the State

Comptroller 2010, 2012). In 2007, the top six commodity groups in the state were the following:

- Milk and dairy products (sales totaled $2.3 billion, which account for more than half the state's total farm sales), greenhouse, nursery, and floricultural products
- Fruits, tree nuts, and berries
- Vegetables, melons, and potatoes
- Cattle and calves
- Grains, oil seeds, dry beans, and dry peas (Office of the State Comptroller 2012).

In 2010, New York State was the second largest producer of wine in the country next to California, the second-largest producer of maple syrup and cabbage, and the third-largest producer of corn for silage (Office of the State Comptroller 2010, 2012).

As of January 1, 2011, New York State had 242 state-certified agricultural districts in 53 counties, containing approximately 23,360 farms and 8.6 million acres (about 30% of the state's total land area[14]) (New York State Department of Agriculture and Markets [NYS DAM] 2013). Agricultural districts are regulated by the NYS DAM (New York State Department of Agriculture and Markets 2013) under Article 25-AA of the Agriculture and Markets Law. This law authorizes the creation of local agricultural districts pursuant to landowner initiative, preliminary county review, state certification, and county adoption. This program provides protection and incentives for landowners in order to help prevent the conversion of farmland to other land use types not related to agriculture. The agricultural district boundaries are often determined by the NYS DAM based on the presence of prime farmland and soils of statewide importance. Soils identified as prime farmland or soils of statewide importance are recognized as having the greatest productivity for crop growth. Prime farmlands and soils of statewide importance are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.

4.5 Aesthetic Resources

Aesthetic resources and scenic quality are typically defined by a combination of landscape characteristics and viewer activity/sensitivity. Some of these resources enjoy official designation, while others are simply perceived as attractive or sensitive to visual change. Existing aesthetic quality is often described by considering landscape character types, the expectations of different viewer groups, and official designations (typically assigned by some governmental body)

[14] The 2011 statistics in this sentence differ from the 2007 census data discussed in the first paragraph. Agricultural census data from 2012 will be released in 2013 with updated information.

recognizing a resource or site as having aesthetic value or sensitivity. These aspects of the affected environment are described in the following section.

4.5.1 Landscape Similarity Zones

The landscape of New York State is extremely varied, ranging from mountainous forests to level farmland and from small rural hamlets to major metropolitan cities. Within this varied landscape, areas of similar landscape character (often referred to as landscape similarity zones) can be defined. Landscape similarity zones in New York State include the following:

- Undeveloped coastlines
- Developed coastlines
- Wooded hills
- Forested mountains
- Undeveloped lakeshores
- Developed lakeshores
- River valleys
- River gorges
- Rural agricultural land
- Rural hamlets
- Villages
- Suburban residential areas
- Suburban commercial areas
- Urban downtowns
- Urban residential areas
- Urban commercial areas
- Industrial areas
- Highway corridors.

Each of these landscape similarity zones has a distinct combination of vegetation, landform (topography), water, and land use that defines its aesthetic quality and can be affected by proposed development projects.

4.5.2 Viewer Groups

The importance of scenic resources may be affected by their accessibility and the sensitivity of those who view them. A resource may be more valuable if it is readily available and viewed by many people, or if those who view it have an expectation of scenic quality or are sensitive to visual change. The five general types of viewer groups that occur within the state include the following:

- Local Residents. Local residents generally view the landscape from their yards, homes, and local roads. Except when involved in local travel, these viewers are likely to be stationary and have frequent or prolonged views of certain landscape features. Local residents may view the landscape from ground level or elevations (typically upper floors/stories of homes and apartment buildings). Residents' sensitivity to visual quality is variable and may be tempered by the aesthetic character/setting of their neighborhoods.
- Business Employees. Business employees work primarily in commercial, industrial, and urban landscape settings. Except while traveling to and from their places of employment, business employees generally work indoors and are focused on their job responsibilities. They typically experience limited views of the surrounding landscape and have relatively low sensitivity to visual change.
- Through-Travelers/Commuters. Through-travelers and commuters view the landscape from trains or automobiles on their way to work or other destinations. Most views will be from street level, although travelers on bridges and overpasses are afforded elevated views of the surrounding area. Commuters and through-travelers are typically moving, have a relatively narrow visual field, and for the most part are preoccupied with traffic and the roadway. Their perception and sensitivity to visual change is therefore relatively low.
- Recreational Users. Recreational users include local residents involved in outdoor recreational activities at parks, playgrounds, recreational facilities and in undeveloped natural settings such as forests, fields, and water bodies. This group includes those involved in competitive sports, snowmobilers, bicyclists, hikers, joggers, recreational boaters, hunters, fishermen and those involved in more passive recreational activities (e.g., picnicking or walking). Visual quality may or may not be an important part of the recreational experience for these viewers. However, scenery may be a very important part of their recreational experience, and recreational users will often have continuous views of landscape features over relatively long periods of time. Their perception and sensitivity to visual change is therefore relatively high.
- Tourists. Tourists come to certain areas of the state specifically to enjoy the cultural, recreational, and scenic resources. Tourists may view landscape features on their way to a destination or from the destination itself. Their sensitivity to visual quality and landscape character will be variable (depending on their reason for visiting an area), although this group is generally considered to have relatively high sensitivity to aesthetic quality. In many areas tourists will expect to see a variety of man-made features in the landscape, while in others, man-made features will be considered an intrusion into the natural landscape.

It is noted that these viewer groups are not mutually exclusive; many individuals frequently transition between the various groups.

4.5.3 Visually Sensitive Resources

Many places throughout New York State have been officially recognized for their beauty and aesthetic value. NYSDEC has a policy on assessing and mitigating visual impacts that defines several general categories of aesthetic resources that are considered "scenic resources of statewide significance" (NYSDEC July 31, 2000). These include the following:

- Sites listed on the National or State Register of Historic Places (or that are eligible for inclusion)
- State Parks
- State Heritage Areas (formerly known as Urban Cultural Parks)
- State Forest Preserves
- National Wildlife Refuges, State Game Refuges, and State Wildlife Management Areas
- National Natural Landmarks
- The National Park System, Recreation Areas, Seashores, Forests
- Rivers designated as National or State Wild, Scenic, or Recreational
- A site, area, lake, reservoir, or highway designated or eligible for designation as scenic
- Scenic Areas of Statewide Significance (SASS)[15]
- A state or federally designated trail, or one proposed for designation
- Adirondack Park Scenic Vistas
- State Nature and Historic Preserve Areas
- Palisades Park
- Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category.

In addition to those resources identified in the DEC policy, aesthetic resources include designated "Areas of Exceptional Beauty," designated or nominated Scenic Byways; designated tourism routes; Coastal Zone areas; Greenway corridors, Blue Way and other Water Trails; State Bicycle Routes; and properties granted conservation easements for preservation of "scenic, open, historic, archeological, architectural, or natural condition, character, significance or amenities of the real property" pursuant to ECL Section 49.

Recognition of aesthetic quality also occurs at the local level. Counties, towns and villages may also consider local parks and recreation facilities, heavily used

[15] As designated by the New York State Department of State Coastal Management Program. See also: New York State Department of State (NYSDOS). 2006. New York State Coastal Management Program and Final Environmental Impact Statement. http://www.dos.ny.gov/communitieswaterfronts/pdfs/NY%20CMP%20.pdf. Accessed June 21, 2013.

roads, local scenic overlooks/corridors, water bodies, and public gathering places as visually sensitive resources and may officially designate them as such in local planning documents.

Depending on the specific location, aesthetic resources within the state could be a combination of any of the landscape similarity zones, viewer groups, and/or designated areas as described above.

4.6 Historic and Archaeological Resources

New York State is home to a wide range of historic and archaeological resources, spanning prehistory through the modern era and featuring elements of both the built and natural environments. These include, but are not limited to historic buildings, archaeological sites, burial grounds, Native American sacred sites, and other significant cultural resources.

4.6.1 National and State Registers of Historic Places

The National and State Registers of Historic Places (NRHP/SRHP) serve to document the historic significance of various buildings, sites, structures, objects (e.g., sculptures, statuary, etc.), and districts throughout New York State. Eligibility for both registers is determined by the New York State Historic Preservation Office (SHPO) and is based on the property's age and levels of historic significance, integrity, and context. The 5,000 SRHP/NRHP-listed places in New York State feature approximately 90,000 contributing properties; more properties are nominated for the registers on an ongoing basis. In addition, there are more than 30,000 properties that the SHPO has determined are eligible for listing on the SRHP/NRHP (New York State Office of Parks, Recreation, and Historic Preservation 2009). Although these NRHP-eligible properties have not been formally nominated for listing, they receive the same protections and consideration as SRHP/NRHP-listed properties.

The unique historic character of New York City requires consideration for project components located within the city. The New York City Landmarks Preservation Commission has been delegated the authority by the SHPO to evaluate potential impacts on cultural and historic resources within New York City.

4.6.2 National Historic Landmarks

The National Historic Landmarks Program, administered by the National Park Service (NPS), recognizes more than 260 places within New York State for their contribution to American history and culture (National Park Service, National Historic Landmarks Program 2012). Like the properties on the National and State Registers, National Historic Landmarks can include buildings, sites, objects, or districts; however, eligibility for the latter program requires a greater threshold of historic significance. National Historic Landmarks may include the following:

- Properties with the strongest association with a given historical event

- The properties that best interpret the story of a given individual who played a significant role in the nation's history
- Exceptional representations of a particular building or engineering technique or method, or building type
- Archaeological sites that may yield new and innovative information about the past.

4.6.3 Locally Designated Historic Properties

Many municipalities throughout the state also recognize buildings and sites that are historically significant at the local level. Local governments in New York State may establish historic preservation committees, designate local landmarks, and establish protections for historic and cultural resources throughout their communities. Approximately 70 local governments within New York State have adopted historic preservation ordinances that have been formally approved by the New York State Historic Preservation Office (NYSHPO) (National Park Service, National Historic Landmarks Program 2012).

4.6.4 Archaeological Resources

Archaeological sites in New York State include both prehistoric Native American sites, which span the period from approximately 12,000 years ago through 1500 AD, and historic-period resources related to the settlement and development of the state since the arrival of European colonists and settlers. The New York SHPO files include records for approximately 18,000 archaeological sites, and the New York State Museum files (consolidated with the New York SHPO files) include approximately 12,000 sites, although many sites are included in both inventories. Of these, approximately 560 sites have been listed on the National Register of Historic Places (NRHP), and an additional 1,100 sites have been determined by NYSHPO to be National Register eligible (National Park Service, National Historic Landmarks Program 2012).

4.6.5 The New York State Heritage Area Program

The purpose of NYSHPO's Heritage Area Program is to preserve and develop areas of special historical significance in New York State. The program currently features 20 Heritage Areas. These areas, formerly managed under the Urban Cultural Park system, have been recognized for their significant contributions to the history, development, and culture of New York State (New York State Office of Parks, Recreation, and Historic Preservation 2007). Each Heritage Area celebrates unique regional contributions to important historical themes, such as industry, agriculture, national defense, transportation, the natural environment, or civil society. The boundaries of each Heritage Area are designated through enabling legislation.

4.7 Open Space and Recreation

New York State's open space and recreational landscape is broad and varied, and siting projects in undeveloped areas would by definition reduce the open space inventory and recreational benefits that go hand-in-hand.

New York State has a formal open space conservation program that was designed to ensure citizen input into state land acquisition decisions. Since the program began in 1990, NYSDEC and the state Office of Parks, Recreation, and Historic Preservation (OPRHP) have developed a comprehensive statewide Open Space Conservation Plan that covers conservation actions, tools, and programs of other participating state agencies: the Department of State (DOS), the APA, the Department of Agriculture & Markets (DAM), and the Department of Transportation (DOT). Updated every three years, the most recent plan was completed in 2009.

New York State has one of the largest and oldest public land bases in the country. Lands that are held for New York State citizens represent a legacy of more than 100 years of land conservation and stewardship (New York State Department of Environmental Conservation June 2009). The state-wide park system administered by NYSDEC and OPRHP currently contains more than 200 state parks and historic sites, the state constitutionally chartered Adirondack and Catskills Parks, and numerous other recreation areas (NYS OPRHP 2013).

Other public open spaces and recreational resources include state forests and wildlife management units. Also important are waterways, water bodies, and wetlands, especially those with public access, including the public shorelines and waters of two Great Lakes and other major lakes, major rivers, including the Hudson River, and the Atlantic sea coast. County and local governments hold another significant portion of the publicly available open space and recreational resources, including a wide variety of facilities, forests, beaches, reservoirs, and playing fields. Privately held farms, forests, and undeveloped areas also contribute to open space protection, particularly those of local and national not-for-profit land conservancy organizations. However, public parklands, forests, shorelines and waterways constitute the vast majority of New York State's publicly accessible open space and recreational resources.

The value of open space and parks is well-established. For example, one study (Trust for Public Lands 2010) documented $2.74 billion in added annual benefits in Suffolk and Nassau counties on Long Island. These benefits result from added tax revenues from increased land values near open space; reduction in governmental services on open space, recreation and tourism; agricultural revenues; source water protection; storm water treatment; and pollution reduction, among others.

Besides economic benefits, the quality of life of nearby residents is improved, and this translates to health benefits. It is well known that physical activity promotes health, and open space provides access to walking, riding, and hiking trails. In the largest study of its kind, a study in England compared mortality in 360,000 deaths from a population of 41 million people. The study showed that mortality was related to many factors, including income, but even correcting for wealth, access

to public open space was a significant factor in reduced mortality rates (Mitchell and Popham 2008).

The open space conservation program has broad public support throughout the state, which is a testament to the many environmental and economic benefits the program delivers. In addition to providing outdoor recreational activities, goals of the open space conservation program include protecting plant and animal diversity to ensure viable ecosystems; protecting the drinking water supply and the water quality for aquatic ecosystems; improving the quality of life for the state's citizens; maintaining natural resource industries including farming, forestry, fishing, and tourism; and combating global climate change and its many different effects. The program provides vast benefits for the environment as well as for the health and safety of our state's citizens.

In addition to the existing open spaces currently protected, the 2009 plan identified numerous "priority conservation projects." The 135 new and ongoing projects listed in the 2009 Plan comprise the following:

- 7 on Long Island
- 16 in the five boroughs of New York City
- 19 in the Lower Hudson Valley region
- 13 in the Capital Region (mid-Hudson Valley and Lower Mohawk Valley)
- 34 in the North Country (Upper Hudson, Adirondacks, and St. Lawrence River)
- 46 in Central and Western New York.

Each priority conservation project is actually a series of targeted acquisitions (or other measures) seeking to protect major resources such as aquifers, waterbodies, and waterways; wetlands and shorelines; endangered species habitat areas and fragile ecosystems; unique geological features; parks and overland and water trails; recreational and educational opportunities in under-served areas; wild lands and other large intact areas.

4.8 Critical Environmental Areas

Critical environmental areas (CEAs) are specific geographic areas designated by local agencies, authorized by SEQRA, to preserve or protect critical environmental benefits or to protect against a threat to human health. The boundaries of each CEA are shown on individual maps, which reside with the designating agency as well as with NYSDEC. Any action by a governmental agency that could impact a designated CEA must be evaluated with special attention to the environmental characteristics for which it was designated. There are approximately 196 CEAs designated by 57 local agencies across New York State (New York State Department of Environmental Conservation 2013c).

To be designated as a CEA, an area must have an exceptional or unique character with respect to one or more of the following:

- A benefit or threat to human health
- A natural setting (e.g., fish and wildlife habitat, forest and vegetation, open space and areas of important aesthetic or scenic quality)
- Agricultural, social, cultural, historic, archaeological, recreational, or educational values
- An inherent ecological, geological, or hydrological sensitivity to change that may be adversely affected by any change.

Thirty-four CEAs are located in Westchester County. Many of these specify a single park, reservoir, or creek, but many of the designations encompass numerous locations or a resource type. A few examples of CEAs with multiple sites include Westchester County and state park lands (county), freshwater wetlands, floodplains, slopes of 40% or more, and hilltops at or above 400 feet elevation (four CEAs in Town of Greenburgh).

Kings, Queens, and Nassau counties on Long Island each have designated Jamaica Bay as a CEA within their respective boundaries. There are no CEAs in the remaining boroughs of New York City. Suffolk County has at least 72 CEAs, many of which are single sites such as wetlands, creeks, and inlets, but many of which encompass multiple locations such as the water recharge overlay district in the town of Easthampton. The reasons cited most often for designating a CEA are to benefit human health and protect drinking water; to protect wetlands; and to protect significant coastal habitats.

Upstate from Westchester County there are 43 CEAs in the five other counties in the Lower Hudson region (34 of the 43 are in Dutchess County); 15 CEAs in the counties of the Mid-Hudson, Lower Mohawk, and Upper Hudson regions; and 29 CEAs in the remainder of New York State.

4.9 Air Resources

Air quality is regulated through implementation of the Clean Air Act (CAA) of 1970, 42 U.S.C. 7401 et seq., amended in 1977 and 1990. Air quality is defined by ambient air concentrations of specific pollutants that are widespread across the United States and that have been determined by the U.S. Environmental Protection Agency (EPA) and NYSDEC to be of concern regarding the health and welfare of the general public and the environment. The CAA, which is the primary federal statute governing air pollution, designates standards for the following criteria pollutants: particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). National Ambient Air Quality Standards (NAAQS) for these criteria pollutants have been promulgated to protect public health and welfare (see Table 4-1).

Table 4-1 National Ambient Air Quality Standards

Pollutant [final rule citation]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO) [76 FR 54294, August 31, 2011]		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb) [73 FR 66964, November 12, 2008]		Primary and Secondary	Rolling 3-month average	0.15 $\mu g/m^3$(1)	Not to be exceeded
Nitrogen Dioxide (NO_2) [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		Primary	1 hour	100 ppb	98th percentile, averaged over 3 years
		Primary and Secondary	Annual	53 ppb(2)	Annual Mean
Ozone (O_3) [73 FR 16436, Mar 27, 2008]		Primary and Secondary	8 hour	0.075 ppm(3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Pollution [78 FR 3086, January 15, 2013](4)	$PM_{2.5}$	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
		Secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
		Primary and Secondary	24 hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2) [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		Primary	1 hour	75 ppb(5)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hour	0.5 ppm	Not to be exceeded more than once per year

Source: U.S. Environmental Protection Agency 2013a.

Notes:

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.

(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, the EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.

(4) The EPA is revising the annual primary $PM_{2.5}$ standard by lowering the level to 12.0 micrograms per cubic meter ($\mu g/m^3$), and maintaining the 15.0 ($\mu g/m^3$) $PM_{2.5}$ standard as a secondary standard. The final rule is effective on March 18, 2013.

(5) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Key:

$\mu g/m^3$ = Micrograms per cubic meter.
PM_{10} = Particulate matter less than 10 microns in diameter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
ppb = Parts per billion.
ppm = Parts per million.

Areas that do not meet the NAAQS are designated as "nonattainment" for the specific criteria pollutant standard(s). Nonattainment status is further defined by the extent the standard is exceeded. There are six classifications of ozone nonattainment status—transitional, marginal, moderate, serious, severe, and extreme—and two classifications of CO and PM_{10} nonattainment status—moderate and serious. The remaining criteria pollutants have designations of either attainment, nonattainment, or unclassifiable. Areas redesignated from nonattainment to attainment are commonly referred to as maintenance areas, indicating the area is in attainment but subject to an EPA-approved maintenance plan for a specific pollutant. In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP). The SIP is not a single document, but a series of documents, plans, and programs to maintain compliance with the NAAQS or bring regions back into compliance.

NYSDEC is responsible for the implementation of air quality programs in New York, including preparation of a SIP. To address ozone and $PM_{2.5}$ New York is also developing state plans for the requirements of the Clean Air Interstate Rule (CAIR), the Clean Air Mercury Rule (CAMR), new source review (NSR), and regional haze (NYSDEC 2013d).

Air quality in New York has continued to improve since the promulgation of the CAA through implementation of stationary source-control requirements and improvements in mobile source emissions and efficiency. Despite the tightening of the NAAQS by the EPA in the previous decade, most regions in New York have demonstrated attainment of the old and new standards, and NYSDEC implements maintenance programs to ensure that attainment continues. Only two regions are designated 2008 ozone NAAQS nonattainment areas—Chautauqua County and the New York, Northern New Jersey, Long Island, NY-NJ-PA (partial) metropolitan statistical area (NYMA MSA), and only the New York-New Jersey-Long Island NY-NJ-CT region remains in nonattainment for the 2006 $PM_{2.5}$ standard (EPA 2013b). All of New York State is considered part of the northeast ozone transport region (NOTR) and is treated as moderate ozone nonattainment for air quality planning purposes.

The EPA and NYSDEC have also developed regulations for greenhouse gases (GHGs). The EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule on September 22, 2009. Under the rule, suppliers of fossil fuels or industrial GHGs, manufactures of mobile sources and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions (as CO_2 equivalents) are required to submit annual reports to the EPA. NYSDEC has issued guidance for assessing GHG and energy use in a SEQRA EIS (NYSDEC 2009), which identifies the methods and boundaries for the assessment of energy use, GHG emissions, and mitigation measures for an EIS.

Energy use in general provides the majority of manmade air quality pollution, and most of the largest individual emission sources in the state are electricity

generation facilities, although control technologies required on new generating facilities and the use of natural gas instead of oil or coal as a primary energy source result in significantly lower emissions per kilowatt-hour than older plants.

NYSDEC implements federal and state requirements for stationary air emission sources through the air permitting program defined in 6 NYCRR 201. New facilities are subject to New Source Performance Standards (NSPS) or other specific standards based on the type of source or emissions and are also subject to control, monitoring, and reporting requirements as applicable, based on the type and size of the source (NYSDEC 2013d).

4.10 Transportation

The following transportation modes and facilities are found throughout New York State and in the southeastern portion of the state, in particular:

- Highway infrastructure and motor vehicle traffic
- Rail shipping and travel
- Recreational boating and commercial shipping
- Air travel and shipping
- New York City subway and other public transit modes
- Pedestrian and bicycle travel.

The Hudson Valley forms a critical transportation corridor between the NYC-Long Island area and the rest of the state. This corridor has a high concentration of north-south oriented highways and rail lines, in addition to the Hudson River waterway.

Highways

The transportation network used on a regular basis by most New Yorkers is the existing road network of interstate highways, urban expressways, rural highways, and local streets. The southeastern part of the state, and particularly New York City, does not have excess highway capacity, and vehicular traffic frequently experiences inadequate levels of service on all parts of the highway network. Ongoing traffic problems arising from the existing level of maintenance and reconstruction needed for the aging highways include severe delays.

Major routes in the Hudson Valley corridor that funnel vehicular traffic on the east side of the Hudson River directly to New York City include New York State Routes 9 and 9A and several limited access highways: the New York State Mainline Thruway (I-87), which crosses the Hudson at the Tappan Zee Bridge and continues to I-278 in the Bronx; Sawmill River Parkway; Bronx River Parkway; Hutchinson Parkway (I-68); and I-95.

The existing highway infrastructure has varying capacity to bear extra loads (such as for construction vehicles or fuel deliveries). The network of roads and, in

particular bridges, in New York State consists of federal, state, county, local, and private roads. The New York State Thruway is maintained by the New York State Thruway Authority and Canal Corporation. The remaining federal and state highways are under the jurisdiction of the NYS DOT. Counties and municipalities are responsible for local roads and bridges, and they frequently require federal funds from the FHWA to maintain them. The bridge inventory in New York State includes many state and local bridges that currently require rehabilitation or replacement due to age and increased loads beyond their originally intended capacity.

Transit

The MTA (Metropolitan Transportation Authority) is the agency that owns/operates the public transit network of New York City, including the subways, buses, and the Metro-North and Long Island commuter railroads, which serve a population of more than 15 million people throughout New York City, Long Island and southeastern New York. In addition, most of the bridges in and out of New York City are maintained by the MTA (MTA n.d.). The Port Authority of New York and New Jersey operates commuter rail service (Path trains) to and from Manhattan and New Jersey via tunnels under New York harbor.

Rail and Air Services

New York State is served by an extensive system of rail lines for passengers and freight. Amtrak provides passenger service operating primarily over rail lines owned by freight railroads and is the sole provider of intercity rail passenger service in New York State. Amtrak links downstate with upstate cities that include Albany, Utica, Syracuse, Rochester, Buffalo, and many other intermediate points. The owners and operators of freight corridors in the state include CSX Transportation, Canadian Pacific Railway, and Norfolk Southern Railway.

The southeastern portion of New York State is served by the following airports that have regular scheduled passenger service:

- Long Island MacArthur Airport
- John F. Kennedy International Airport
- LaGuardia Airport
- Newark Airport (NJ)
- Stewart International Airport
- Westchester County Airport.

4.11 Energy

For the purposes of this Final GEIS, the energy setting is defined to include both generation and transmission resources in New York.

4.11.1 Electric Transmission System

NYISO took over operation of New York State's electricity grid in 1999. NYISO's main responsibilities are to operate the electricity grid, administer the state's wholesale electricity markets, and provide comprehensive long-term planning for the state's bulk power transmission system. For purposes of pricing and assessment of loads and supply, NYISO has subdivided New York into 11 zones (see Section 2, Figure 2-1). Zones G-K are the downstate areas that are the focus of this Final GEIS.

The existing New York State electric transmission system is predominantly owned by six investor-owned utilities (Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., Orange & Rockland Utilities, Inc., National Grid, Rochester Gas and Electric Corporation, and New York State Electric & Gas Corporation) and the Long Island Power Authority (LIPA) and NYPA, who are collectively known as transmission owners (TOs). The statewide system includes more than 11,600 miles of high voltage transmission lines and more than 600 underground circuit miles, and interties with neighboring states and Canada (New York State Transmission Assessment and Reliability Study [NY STARS] 2012).

In addition to the lines themselves, substations, switching stations, riser stations, and other such ancillary facilities are located throughout the systems. Lower voltage, sub-transmission facilities (generally in the 34.5 kV to 69 kV range) traverse most parts of the state and disperse the bulk electricity supplies to the distribution systems, where it may be carried to most of the end-users (even though some customers take service at the transmission and sub-transmission levels). While no exact figure has been determined, it can be estimated that the transmission system, including the sub-transmission and substation facilities, occupies an extensive amount of land area on the order of 250,000 acres or more (New York State Department of Public Service August 2004).

New York State's transmission system is extensively interconnected with surrounding states and Canada. Power flows continuously between New York State and these areas, depending on system needs and energy prices.

The amount of power that might actually flow between the areas depends on system needs, physical constraints, and market conditions. Generally, more power flows into New York State for consumption than is exported. However, New York State often supports the New England and PJM systems at peak times and during emergency situations.

4.11.2 Existing Electric Generation

Electric generation is described by the capacity, in MW, of existing units, as well as how this capacity is actually used to supply electricity. In 2012, almost half (48%) of New York State's energy generation was supplied from fossil fuels. Nuclear fuel accounted for 29%, while hydro supplied approximately 19%. Wind and other renewable sources supplied approximately 4% to New York's

generation mix (see Figure 4-1) (NYISO April 2013). The generating capacity, or capability, may be different than the electricity supplied. For example, as shown in Figure 4-2, in 2012 the generating capacity of fossil fuel units represents 66% of the actual energy output of existing units in New York, although fossil fuel units represented 48% of the nameplate capacity in that year.

As a result of regulatory initiatives, the majority of former utility-owned generation capacity is now owned by more than two dozen independent power producers (IPPs). Generators sell energy directly to wholesale customers through bilateral contracts or on the wholesale markets operated by NYISO.

4.11.3 Electricity Prices

Although much of New York's electric energy is generated by baseload hydroelectric, coal, and nuclear units, natural gas and oil-fired units are usually the units that set the market clearing prices. Generation owners bid their marginal costs of production, and since most of those costs are fuel costs, the price of fuel directly affects the price of electricity (State Energy Planning Board December 2009). The NYISO dispatches generators in the region starting from the lowest-priced bids progressing to higher-priced bids. The bid price of the last generator used to satisfy the total demand for electricity therefore determines the wholesale price of electricity. The average cost of wholesale electricity in New York closely correlates with the price of natural gas, as shown in Figure 4-3 (NYISO 2012). The cost of electricity in New York State is high compared with neighboring states and varies throughout the state's load zones, primarily due to physical limitations of the transmission systems to move power from upstate to downstate regions of New York State (U.S. Bureau of Labor Statistics May 2013).

4.11.4 State Energy Plan

The New York State Energy Plan is mandated in §6.104 of the New York State Energy Law. The Energy Law (2009) created the State Energy Planning Board and charged this board with developing an energy plan. The Energy Plan covers a ten-year planning period. According to statute, the Plan will seek the following:

- Improve the reliability of the state's energy systems
- Insulate consumers from volatility in market prices
- Reduce the overall cost of energy in the state
- Minimize public health and environmental impacts, particularly those related to climate change
- Identify policies and programs designed to maximize cost-effective energy efficiency and conservation activities to meet projected demand growth.

The New York State Transmission and Distribution Systems Reliability Study and Report (New York State Energy Planning Board 2012) provided an update of the transmission and generation systems, described the reliability of the system, and set forth standards and criteria for measuring reliability. This report and study

informs the PSC in identifying the purpose and need for this Indian Point Contingency Plan.

4.11.5 Energy Customers with Special Needs

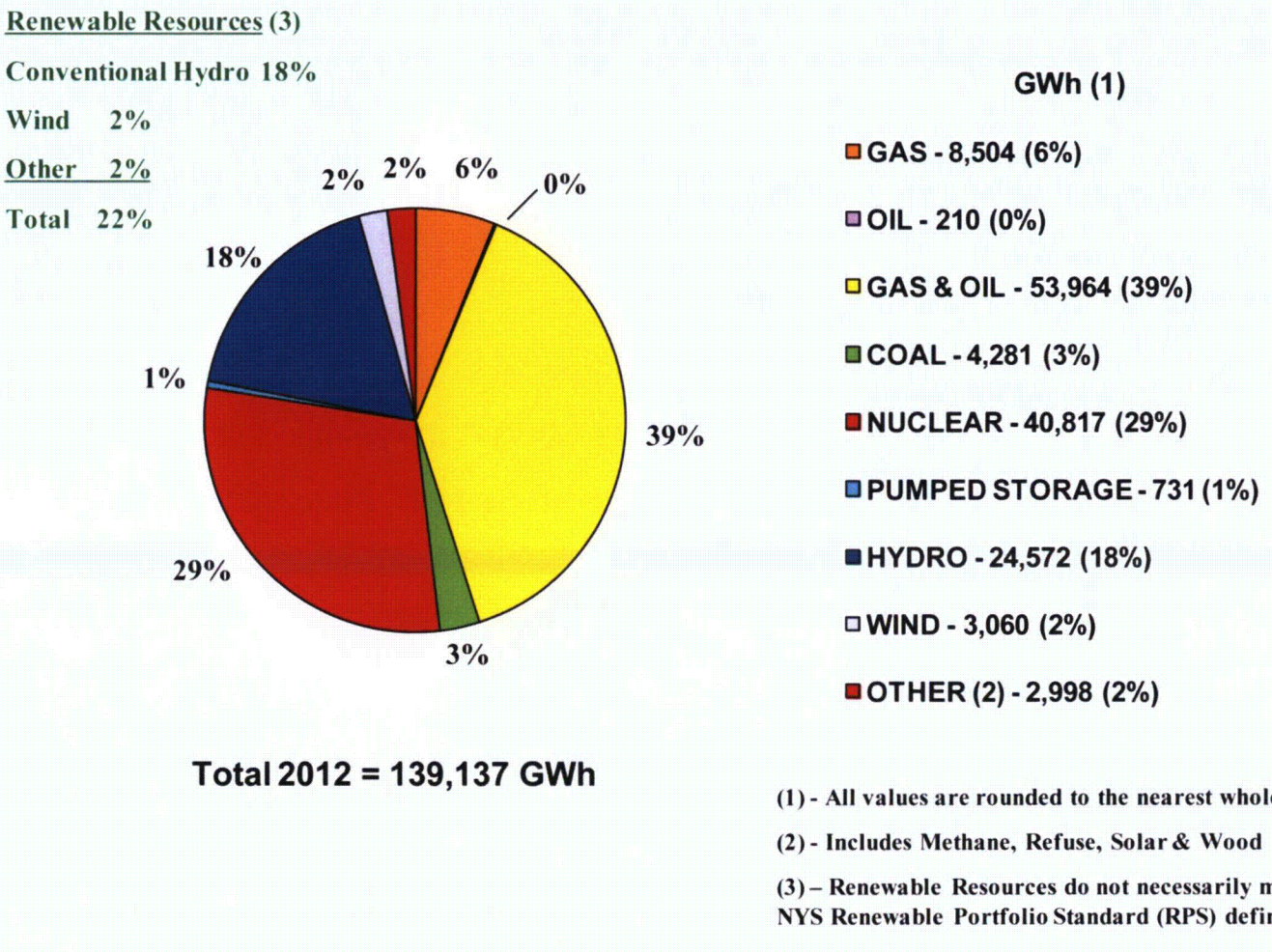
The 1981 Home Energy Fair Practices Act (HEFPA) established a state policy that the continued provision of gas, electric, and steam service to residential customers without unreasonable qualifications or lengthy delays is necessary for the preservation of the health and general welfare and is in the public interest. Subsequent to the restructured energy market, the New York State Legislature enacted the Energy Consumer Protection Act in 2002 that amended HEFPA to include energy service companies and any other entity that provides gas and electric service to residential customers. The HEFPA requires utility providers to maintain a file of customers who require utility services in order to maintain life support equipment. Utility companies all have public outreach material available to encourage life support customers to identify themselves, notify the company of their needs, and to update those needs over time. Additional files of elderly or disabled customers with special needs are to be maintained. Services to these customers may not be intentionally disconnected for non-payment of a bill. The utility must make a "diligent effort" to contact customers prior to curtailment of service. If service must be reduced for maintenance or safety purposes, customers with special needs must be contacted and given time for other arrangements to be made.

4.12 Noise and Odor

4.12.1 Noise

NYSDEC defines noise as any loud, discordant, or disagreeable sound or sounds (NYSDEC February 2001). In an environmental context, noise is more generally defined as unwanted sound. Project-related complaints of noise impacts generally arise from such unwanted sound. Noise sources from power plant operation typically include steam generators, steam turbine generators, air intakes, air compressors, cooling towers, rooftop ventilation fans, major electrical transformers and switchgear, transmission facilities, and transportation of fuels and waste (e.g., automobiles, trucks, and trains).

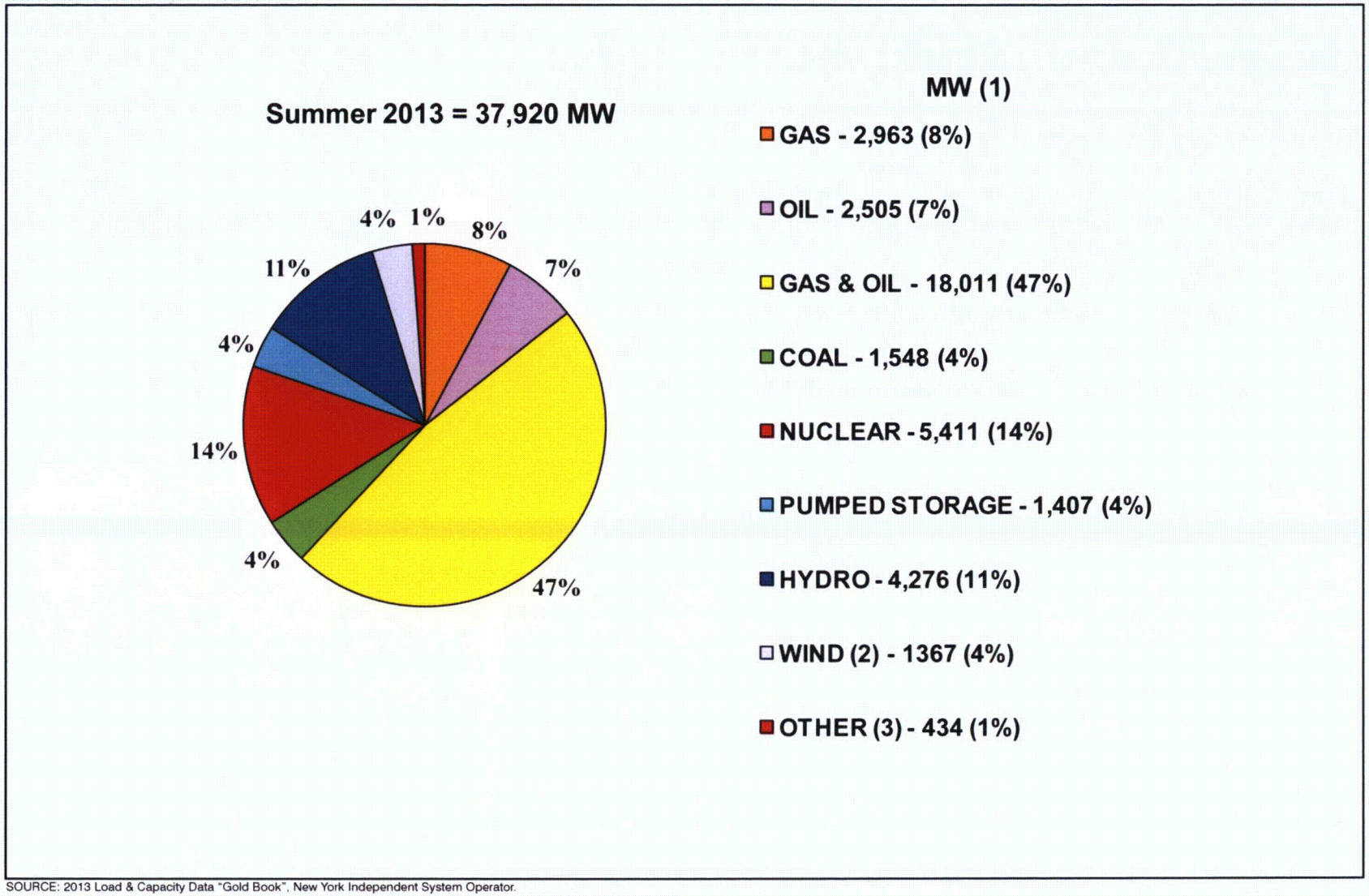
Noise impacts are based on a complex relationship between a noise source and a receptor. The level of noise perceived at the receptor depends on numerous variables, including the noise level at the source, the distance from the noise source to the receptor (sound levels decrease with the square root of the distance from the source), barriers that may attenuate or block the noise from reaching the receptor, characteristics of the noise, and the sensitivity of the receptor.



SOURCE: 2013 Load & Capacity Data "Gold Book", New York Independent System Operator.

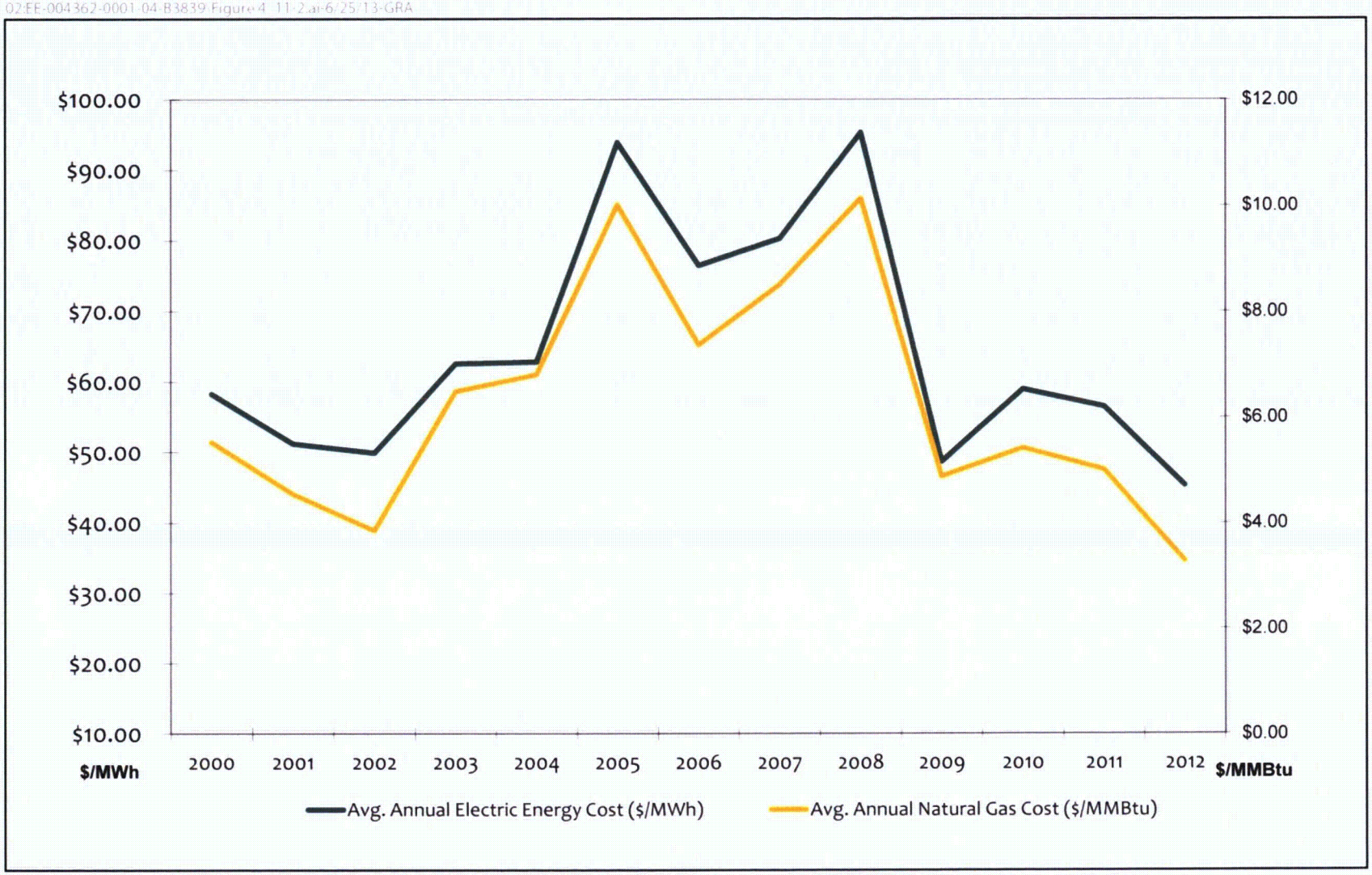
Note: Available baseline data include nuclear power, which is not included in the No Action alternative

Figure 4-1 New York Control Area Generation by Fuel Type



SOURCE: 2013 Load & Capacity Data "Gold Book", New York Independent System Operator.
Note: Available baseline data include nuclear power, which is not included in the No Action alternative

Figure 4-2 2013 New York Control Area Capability (or Capacity) by Fuel Type



SOURCE: Power Trends 2013 —Alternating Currents, New York Independent System Operator.

Figure 4-3 Natural Gas Costs and Electricity Prices: 2000-2012

Noise ordinances defining noise impacts and appropriate noise levels are in place for many municipalities in New York State. The general purpose of these noise ordinances is to define acceptable and unacceptable noise levels where and when a person or place (the receptor) is exposed to noise. Acceptable noise levels generally take into account the permitted land uses. Most ordinances include different thresholds for day and night and for construction noise and noise during operations.

Table 4-2 presents basic land use compatibility guidelines that identify generally acceptable and unacceptable noise levels by land use categories. The compatibility guidelines identified in the table indicate a range of the noise levels that are expected to be found for each identified land use. While this table is informative of typical noise levels in various settings, the PSC has generally considered predicted response from the potentially affected community to inform decisions regarding acceptable noise levels in requiring appropriate controls for major facilities siting determinations.

Table 4-2 Land Use Compatibility Guidelines

Land Use Category	Land Use Interpretation for L_{dn} Noise Values (dBA)* 55	65	75	85
Residential – Single Family, Duplex, Mobile Homes				
Residential – Multiple Family, Dormitories, etc.				
Transient Lodging				
School Classrooms, Libraries, Churches				
Hospitals, Nursing Homes				
Auditoriums, Concert Halls, Music Shells				
Sports Arena, Outdoor Spectator Sports				
Playgrounds, Neighborhood Parks				
Golf Courses, Riding Stables, Water Rec., Cemeteries				
Office Buildings, Personal, Business and Professional				
Commercial – Retail, Movie Theaters, Restaurants				
Commercial – Wholesale, Some Retails, Ind., Mfg., Util.				
Manufacturing, Communication (Noise Sensitive)				
Livestock Farming, Animal Breeding				
Agriculture (except Livestock), Mining, Fishing				
Public Right-of-Way				
Extensive Natural Recreation Areas				

Source: U.S. Department of Housing and Urban Development n.d.

*Notes:

No shading = Clearly acceptable noise levels; Light Shading = Normally acceptable noise levels; Medium Shading = Normally unacceptable noise levels; Dark Shading = Clearly unacceptable noise levels. L_{dn} is the average noise level over a 24-hour period.

The noise level between 10:00 p.m. and 7:00 a.m.is artificially raised 10 decibels (dB) to account for normal reductions in background noise at night. The dBA is "A-weighted" sound pressure levels, weighted to accounted for the range of frequencies to which humans are sensitive.

4.12.2 Odor

With the exception of complaints, there are no commonly accepted means of quantifying the objectionable nature of an odor. Whether an odor is objectionable is innately subjective and there is a wide variation in how people perceive odors. Variables that contribute to odor impacts include type of odor, proximity to the source, wind and other weather, time of day, personal preference, health-related impacts, and perceptions of health-related impacts, among others.

Many municipalities in New York State have ordinances that address nuisances such as odor; however, regardless of ordinances, project-related odor problems can arise. Odor-producing facilities that commonly produce complaints include coal-fired plants, manufacturing facilities, landfills, farms, and diesel-related transportation facilities. The majority of odor complaints generally come from new odor sources (i.e., new facilities) due to the often rapid change in conditions for the odor receptor.

4.13 Public Health

Public health issues relevant to implementation of the Contingency Plan include asthma and air quality-related health concerns; exposure of the public to electric and magnetic fields (EMFs), including extremely low frequency (ELF) radiation; and rodents.

4.13.1 Asthma

Asthma is a chronic lung disease caused by restriction of the airways that can result from a variety of genetic and environmental factors. Chronic asthma is usually controllable with drugs that relax the constricted airways or block the inflammation that is caused by allergens and irritants. Triggers for acute attacks include tobacco smoke, dust mites, cockroach allergen, pets, molds, smoke (particulate pollution) and outdoor air pollution, which may come from power plant emissions (Centers for Disease Control and Prevention April 2013). Air quality is described in Section 4.9 of this GEIS.

Nationally, nearly one in 13 school-age children have asthma, and that rate is rising more rapidly in preschool-aged children and those living in urban inner cities than in any other group. Urban populations, such as those in New York City, have higher asthma rates than non-urban populations. In 2008, an estimated 1.3 million adults and 475,000 children in New York State had asthma. Current asthma prevalence among adults increased from 6.3% in 1999 to 8.7% in 2008. Asthma prevalence in New York State has been higher than the national average since 2002 (New York State Department of Health April 2009).

In New York State, asthma emergency department visits and hospitalization rates were higher than the national rates for all age groups and exceeded the Healthy People 2010 objectives, an initiative by the U.S. Department of Health and Human Services defining the nation's 10-year goals and objectives for health promotion and disease prevention. For 2005 to 2007, an average of 255 deaths

due to asthma occurred per year in New York State, an age-adjusted asthma mortality rate of 12.5 per one million residents. New York State children missed more than 1.9 million days of daycare, pre-school, or school due to asthma each year (NYSDOH April 2009). Adults with asthma reported approximately 7.6 million days within the past year when they were unable to work or carry out usual activities because of asthma (NYSDOH April 2009); 30% of New Yorkers have an asthma self-management plan to help control their asthma (NYSDOH April 2009). The total cost of asthma hospitalizations in New York State in 2007 was approximately $535 million.

4.13.2 Electric and Magnetic Fields

Electric and magnetic fields (EMFs) are generated by all electric currents including kitchen appliances and cellular telephones as well as power transmission lines. The health effects of EMF and, specifically, extremely low frequency (ELF) fields, which are generated when the direction of current flow in an AC line switches, have been studied since the 1970s. Some studies have shown a correlation between exposures to magnetic fields and childhood leukemia, brain tumors, and breast cancer. Because many other factors correlate with houses that are located closer to transmission lines, no relationship between EMF exposure and cancer has been verified. There are no national or New York State standards for occupational exposures, but the New York State PSC has set forth electric field strength standards in Opinion 78-13 issued June 19, 1978, and it provided additional Interim Policy guidelines September 11, 1990. The 1978 Opinion set forth a limit for electric fields of 1.6 kV/m at the edge of a right-of-way at three feet above ground level for electric transmission lines. The 1990 guidelines limit magnetic fields at the edge of an ROW at 3 feet above ground level to 200 milligauss (mG).

In addition to public exposures, international and industrial guidelines for worker safety are available and summarized by the Occupational Health and Safety Administration (OHSA) U.S. Department of Labor, Occupational Health and Safety Administration n.d.).

Public exposures would be many thousands of times less than worker exposures because the strength of an EMF diminishes with the square root of the distance from a power line and the cube root of the distance from a point source. A magnetic field measuring 57.5 mG immediately beside a 230 kV transmission line measures just 7.1 mG at a distance of 100 feet, and 1.8 mG at a distance of 200 feet (National Institute of Environmental Health Sciences. May 26, 2013).

Information from a scientific review of the health literature related to power line exposures sponsored by the National Institute of Health and the National Institute of Environmental Health is available (June 2002). The consensus of scientists who worked on this review of more than two decades of studies concluded that there is a weak statistical link between EMF exposure and cancer, but no confirmation of a causal link between EMF exposure and cancers can be made.

This conclusion argues that exposures should be minimized to the extent that is feasible.

Currently, populations in urban areas are exposed to EMF from home and workplace appliances and from power cables, many of which are belowground and shielded. Rural populations are exposed at very low levels from overhead transmission lines, in addition to their household and workplace exposures.

4.13.3 Rodents

Rodents are known to carry serious diseases. They host fleas and ticks that can carry other diseases and cause nuisance bites that may become infected. They also produce dander that exacerbates asthma and prevention (Centers for Disease Control n.d.). The movement of rodents resulting from habitat dislocations resulting during construction in urban areas is an issue for other large projects in New York City and is considered here.

Rats and mice are found in both urban and rural settings. Rats live in small territories, and construction activity can force them to move, which has been reported as an impact from construction in urban settings. Experts believe that most of the sightings of rats during construction are due to the increased availability of food and habitat from poor job site hygiene, piles of equipment, debris and supplies, and garbage (New York City Department of Health and Mental Hygiene).

4.14 Growth and Character of Communities

Through the mid-twentieth century, New York State was the most populated of all of the United States. With the exception of 1940 to1945, when New York and many states experienced population decline, its population was steadily increasing until the mid-1970s, when it began to taper; it is now the third most populous state, behind California and Texas (U.S. Census Bureau 2013). Population shifts and regional economic patterns have had a large influence on the character of communities within the state.

A community's character is defined by a combination of elements, including local natural features, land uses, and development patterns (see Section 4.1), population growth and density, and regional socioeconomic patterns (see Section 4.15). Municipalities typically define their character through comprehensive plans or master plans, which are implemented through local land use regulations, including zoning; whereas residents may define community character as a sense of place characterized by quality of life issues such as visual landscape, recreational amenities, noise, air quality, and traffic patterns/volume. Aesthetic resources and open space and recreation are described in Sections 4.5 and 4.7, respectively. Noise, air resources, and transportation are described in Sections 4.12, 4.9, and 4.10, respectively.

Population

As of 2010, New York State was home to approximately 19.4 million residents distributed throughout 62 counties (U.S. Census Bureau 2013). Population levels, growth, and density vary substantially across the state. The five counties that comprise New York City (Bronx, King, New York, Queens, and Richmond) are home to approximately 8.2 million residents and feature a population density of 27,012 per square mile; the remainder of the state contains 11.2 million residents at a density of 239 per square mile (New York State Department of Health 2012).

The state's population centers include the five major metropolitan areas of New York City, Buffalo (approximately 1.1 million residents), Rochester (1 million), Albany (870,000), and Syracuse (662,000). These areas have featured a range of population growth and decline (by percentage) in the previous decade, from more than 5% growth in the Albany area to a 3% decline in the Buffalo area (U.S. Census Bureau 2013).

Community Types

New York State's populated areas feature a broad range of community types. The most populated areas in the state can be described by the following community types:

- Rural Agricultural. The dominant land use in this community type is agriculture, and farm structures/equipment, livestock, and open fields are significant components of this landscape. Rural residences are typically scattered along a network of country roads. The topography in this setting will vary from hilly to flat, with a mix of open fields (crops and pastureland), woodlots and hedgerows.
- Rural Hamlet. The dominant feature in this community type is a cluster of residential structures in a largely rural setting. These areas may have a small commercial center that is usually located at an intersection of two rural roadways. Historic structures of varying significance are often present.
- Village. These communities typically consist of a concentration of residential structures with a commercial business core. Historic structures and/or historic districts are often present. The structures may be of a vernacular material or style but typically include a mix of new and old architecture. Vegetation consists of large street trees, landscaped yards, and parks. The streets are often organized in a traditional grid pattern, and the more modern commercial and industrial facilities are typically located on the village periphery.
- Suburban. Suburban residential areas consist of mostly residential structures along existing road frontage, as well as residential subdivisions with curvilinear roads and cul-de-sacs. These moderate- to high-density residential developments include larger yards and relatively modern homes of varying architectural styles and materials. Commercial portions of suburbs generally consist of strip development along a highway, including retail stores, automobile dealers, shopping centers, and malls; residential uses are limited. Suburban commercial character is typically dominated by highways,

buildings, automobiles, and pavement (roads and parking lots). This type of setting usually surrounds a village or urban area; the surrounding landscape can vary from suburban residential, to farmland, to forested hills.

- Urban. Urban residential settings are typically dominated by 2- to 4-story masonry apartment blocks and single family and multiple family homes, although some urban residential areas (e.g., portions of New York City) feature structures much larger than this. The streets are generally organized in a grid pattern and lined by narrow sidewalks and street trees. Urban commercial areas generally feature buildings that are at least 2 to 4 stories in height, with retail storefronts along the sidewalks and upper floors that are used as offices and apartments. Urban downtowns typically occur in the center of a city and are characterized by high-rise buildings and gridded street patterns. Both urban commercial and downtown areas usually feature gridded street patterns, which are busy with traffic, and frequently accommodate on-street parking. In general, views along urban streets are framed/screened by adjacent buildings, and vegetation is typically limited to street trees, planters, pocket parks, or larger public parks.
- Industrial. Industrial areas are dominated by an often haphazard mix of buildings and structures associated with manufacturing, warehousing, utility, and transportation-related activities. An industrial setting often occurs along the outskirts of urban and village areas. The topography is generally flat and vegetation is limited or nonexistent. Pedestrian activity is generally insignificant, as most activity typically occurs within the industrial facilities in such areas, although some industrial settings (typically older manufacturing districts) feature limited residential uses that may contribute a degree of community character.
- Developed Shoreline. Along New York State's coastlines (e.g., Long Island Sound, New York Harbor, Hudson River), open water is the dominant feature but is frequently interrupted by docks, piers, and/or boats. The shoreline may include natural beach or may be bulkheaded or otherwise structurally reinforced. A developed coastline will include ports, marinas, and shorefront commercial, residential, and recreational facilities. Along lakeshores other than those of the Great Lakes, the dominant natural feature is water, with surrounding hills and mountains typically in the background. However, the natural shoreline in these settings is interrupted by man-made features such as seasonal homes/camps, boathouses, and docks. The foreground that frames the water views includes both man-made and natural features.

While community character can appear to be relatively constant, it is always evolving to some degree due to shifting demographics, changes in the local and regional economy, or the passage of time. Regardless of size, development projects have the potential to affect community character over both the short- and long-term. Although often difficult for residents or visitors to define, elements of community character can be highly influential in individuals' decisions to migrate to, start a business in, or travel to a given location. These elements can work in

either positive or negative manners, by either attracting or deterring new residents, businesses, or visitors.

4.15 Socioeconomics and Environmental Justice

The socioeconomic setting that may be affected by the approval of the Contingency Plan comprises several factors: employment levels, short-term housing requirements, municipal revenues, and electric rates. Employment and municipal revenues are important to the communities and municipalities in which utility facilities are located, and electric rates are the concern of all New York State residents and businesses: the construction of utility facilities could create short-term job growth and tax benefits; utility facilities also employ workers and pay local taxes; and changes in employment and property taxes may have local consequences. Higher or lower electric rates could also have indirect environmental effects and environmental justice concerns may also appear, depending on the location of the facilities and changes in electricity rates.

4.15.1 General Demographics

As noted in Section 4.14, Growth and Character of Community, New York State's population was approximately 19.4 million in 2010, an increase of approximately 986,000 (or 5.5%) since 1990. Approximately two-thirds of this population is clustered in the southeastern portion of the state in the New York City metropolitan areas and Long Island, and population density and socioeconomic conditions vary substantially across the state.

4.15.2 Employment Characteristics

In New York State, 8,851,500 people were employed in non-farm positions in the month of May 2012. This number grew to 8,937,200 by May 2013, a 0.1% change in employment. Total private sector jobs, a category that includes construction, equaled 7,365,300 and 7,469,500 in the same time period, according to the New York State Department of Labor, Current Employment Statistics (New York State Department of Labor n.d.[a]). This equates to a 1.4% increase over the year.

During the 12-month period ending May 2013, private sector jobs, specifically in the 10-county downstate region, increased by 2.0%, with the most rapid growth occurring in Nassau-Suffolk (+2.7%) (New York State Department of Labor May 2013).

In the 52-county upstate region, private sector jobs grew by 0.8% over the past year. Job growth in the upstate region occurred in metro areas (+0.9%) and in counties outside of metro areas (+0.4%) (New York State Department of Labor May 2013).

Job growth in the upstate region trailed behind the downstate region between April 2012 and May 2013 by 1.8%.

4.15.3 Income and Wages Characteristics

The projected average wage for an employed person in New York State for 2012 was $62,703 (New York State Department of Labor n.d. [b]), an increase of 1.5% from 2011. Wages have continued to rise at a modest pace since 2009. Between 2008 and 2009 wages dropped by 4.3%.

4.15.4 Housing Characteristics

From 2002 to 2010, housing vacancy rates across New York State ranged between been 10% and 12% (Cresce 2012). The housing market in New York State is subject to variation based on the local community. During the same period, New York City's vacancy rate ranged from 7% to 10%, whereas the housing market in upstate New York fared much better during the 2008 recession. According to the Federal Reserve Bank of New York, the housing boom and bust largely bypassed upstate New York, where construction activity is a relatively small part of the overall economy. Home prices have generally stabilized across upstate New York, with some parts, such as Buffalo, Rochester, and Syracuse, even experiencing price increases by 2010 (Federal Reserve Bank of New York October 19, 2010). Local housing impacts of the Indian Point Contingency Plan would depend upon the location of selected facilities.

4.15.5 Municipal Revenue

Real estate property taxes are the primary revenue source for most cities, towns, and villages in the state, with the exception of certain cities such as Yonkers and New York City, which have their own income tax. Real property tax (RPT) is the primary source of local government revenues. In Fiscal Year 2009, real estate property taxes accounted for 78% of local government tax revenues and 41% of total local government revenues, with the exception of New York City. New York City is excluded because its revenue structure differs significantly from that of all other jurisdictions in the state. In addition to the RPT, New York City is the one local government in the state that is authorized to levy a personal income tax, business income taxes, and several other taxes. The city of Yonkers also levies an individual income tax. Certain other local governments, including cities, counties, and school districts, are authorized to impose sales/use taxes, taxes on hotels and motels, real estate transfer taxes, mortgage recording taxes, and utility taxes. The RPT is levied in more than 4,700 taxing jurisdictions in New York State based on the value of residential and non-residential real properties, with certain exceptions. Reliance on the RPT varies by type of government. In Fiscal Year 2009, counties across New York State received 23% of their revenue from the RPT, cities 25%, towns/villages 53% and school districts 53%" (Rubin February 2011).

4.15.6 Electric Rates

In 2012, the average New York State electricity rates ranged from a low of $0.183/kWh in December to a high of $0.203 in June (U.S. Department of Labor May 2013). According to the U.S. Energy Information Administration, in 2011, New York had the fourth highest average electricity prices in the United States. In 2010, New York was ranked the eighth largest energy consumer in the United

States, but, due in part to its widely used mass transportation systems, it had the second lowest energy consumption per capita after Rhode Island (U.S. Energy Information Administration July 2012a).

New York State is one of 12 states since the 1990s that have restructured their electric industries for competition by divestiture of generation from transmission and distribution facilities and introducing wholesale and retail competition in electricity supply. According to the U.S. Energy Information Administration, in May 2013, New York State residential electricity prices were 57% higher than the U.S. average and commercial electricity prices were 47% higher (U.S. Energy Information Administration July 2012b).

The New York State PSC is responsible for setting electricity rates within New York State and oversees the rate-setting process. However, costs associated with electricity generation in New York State are driven by the wholesale energy market administered by the NYISO. According to the NYISO website, "New York's wholesale electricity markets . . . averages $7.5 billion annually and engages over 300 market participants in daily and hourly auctions that match the buyers and sellers of electricity" (NYISO n.d.).

In addition to the wholesale energy market, there is also a market for the installed capacity of generation and other resources to provide electric service to loads. The Northeast Power Coordinating Council and the New York State Reliability Council require the NYISO to maintain adequate resources to serve all forecasted loads plus a reserve margin. In order to facilitate this, the NYISO administers a capacity market. This market matches buyers and sellers of capacity using the clearing price methodology. Given the constrained nature of the transmission system, the capacity market has locational features, which reflect system reliability requirements that mandate loads in New York City and Long Island to buy a certain percentage of their capacity from suppliers in those areas (NYISO April 2013). More recently, the Federal Energy Regulatory Commission (FERC) has approved a new local capacity zone covering NYISO Zones G-J (FERC, 2013). This change is intended to un-bottle existing upstate supplies.

Finally, the NYISO also administers markets for operating reserves and procures voltage support and black start service through cost-based rates set by FERC.

4.15.7 Environmental Justice

The EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

NYSDEC has adopted regulations in 6 NYCRR Part 487 to establish a regulatory framework for undertaking an analysis of environmental justice issues associated with the siting of power plants pursuant to Article 10 of the Public Service Law (http://www.dec.ny.gov/public/333.html).

As established in DEC Commissioner Policy 29 on Environmental Justice and Permitting (CP-29), potential environmental justice areas are U.S. Census block groups of 250 to 500 households each, that, in the 2000 census, had populations that met or exceeded at least one of the following statistical thresholds:

1. At least 51.1% of the population in an urban area reporting themselves to be members of minority groups; or
2. At least 33.8% of the population in a rural area reporting themselves to be members of minority groups; or
3. At least 23.59% of the population in an urban or rural area with household incomes below the federal poverty level (NYSDEC 2013g).

5 Potential Impacts

This section discusses the potential adverse impacts that could arise from actions subsequent to the approval of the Contingency Plan. Potential impacts are considered for each of the alternatives, which include transmission facilities, generation facilities, battery storage, and No Action. The topic areas described in Chapter 4 are evaluated for each of these alternatives.

5.1 Transmission Facilities

5.1.1 Land Use

The construction of new electric transmission facilities may require changes in land use and other interference with existing land uses. Permanent disturbances of large tracts of land would likely result from the clearing, grading, installation, and maintenance of the ROW corridors for those projects that would use new ROWs. Projects could minimize impacts by utilizing existing corridors.

New overhead transmission projects are land-intensive, linearly extending miles, or hundreds of miles, across portions of New York State, depending on the proposed transmission project. The footprint for each new transmission tower would be relatively small, typically occupying a few square feet for a typical mono-pole wooden structure up to 6,000 square feet for some large steel towers. Spacing between towers along the transmission corridor are typically 400 to 600 feet apart; however, permanent land clearing may include forested and other vegetated areas required for overhead transmission lines. The total area required for a new transmission line project would vary depending upon the distance between the power generation source and the demand location, but it would also vary according to the width of the corridor necessary to accommodate the proposed power load capacity. Smaller lines (115 kV capacity, for example) could require clearance widths of 100 feet, while larger lines (345 kV capacity) may require up to 200 feet, plus tree clearing rights (North American Electric Reliability Corporation [NERC] 2009). Apart from other facility components such as access roads and substations, a large (345 kV) transmission line corridor can use up to 25 acres per linear mile of ROW. Access roads would vary in length and frequency along the corridor depending on the topography, surrounding land uses, and vegetative cover.

Based on the above, land requirements for a new transmission corridor would have to be quite substantial in order to support the power capacity needed to meet the demand. The magnitude and importance of the permanent impacts on affected

corridors would depend on the types of land use and vegetative cover in the transmission corridor. Overhead transmission lines would be compatible with most industrial and commercial land uses, but these facilities generally are less compatible with residential areas.

Aside from permanent loss of land due to a project's footprint, overhead transmission lines and access roads can bisect forested lands and other natural habitats. Temporary disturbances during construction can result in further disruption and temporary or permanent damage to the adjacent ecological habitats. Agricultural lands would be less affected; however, crop damage from equipment and vehicle movement, damage to farm infrastructure such as fences and subsurface drainage systems, and reduced access to adjacent fields are potential impacts.

New buried transmission lines are less land-intensive than overhead transmission lines of the same length and capacity. However, the construction of buried conduit would likely cause a much greater temporary disturbance of the ground surface, with increased potential for soil erosion, and of the aquatic environment at water crossings. Nevertheless, the width of excavation would be relatively narrow, and use of the land over buried lines would be less restricted than for overhead lines. As with overhead lines, buried utility ROWs typically require clearing the entire corridor to provide permanent access for maintenance purposes; however, the width of permanent land clearing along the corridor might be narrower than required for high-capacity overhead lines. Access roads and the associated impacts would be similar to those of overhead transmission lines, which would vary in length and frequency along the corridor. Also, underground cables in metropolitan areas may require refrigeration units for cooling and special substations that conform to local land use regulations.

The extent of the site-specific construction impacts associated with the construction of any new power transmission facility would vary according to the length and alignment of the proposed corridor.

Using existing ROWs for additional transmission lines would not be land-use intensive. In cases where capacity can be added to existing lines, a change in land use would not generally be expected. Temporary construction impacts would be minimal, as well.

5.1.2 Water Resources

5.1.2.1 Water Quantity

Transmission lines are not generally associated with high volumes of water use. However, transmission line impacts on water quantity could occur from interrupting stream or river flow resulting from or during construction activities such as moving soil, placing fill material, or using heavy equipment.

5.1.2.2 Water Quality and Habitat

Transmission line construction could have impacts on water quality such as increased sediment, nutrient, or other pollutant loading to adjacent water bodies. Removing vegetation, which could occur during construction, could lead to erosion and reduce stream bank shading, thereby increasing water temperatures and contributing to lower oxygen levels, increased aquatic plant and algal growth, and resultant adverse impacts on native aquatic plants and animals. Heavy equipment could also damage vegetation in and around water bodies or create rutting within streams and rivers or in moist ground. Long-term maintenance for transmission line ROWs could have similar impacts if best management practices are not used.

The construction of a transmission line through a water body, such as under a large lake, bay, or wetland area, could impact water quality and habitat, depending on the construction methods employed. These could include damage to aquatic vegetation, re-suspension of sediment, including nutrients or pollutants that could be contained in the sediment, and the destruction of habitat for aquatic animals. HVDC lines have been proposed that involve underwater placement of lines. The proposed construction technique includes water jetting to dig trenches in river and sea beds. This technique would raise turbidity and disrupt the inhabitants of the seabed. The construction of a transmission line beneath a water body has the benefit of eliminating the need for an overland corridor that could damage or remove vegetation and habitat in the ROW.

5.1.3 Plants and Animals

Transmission lines could be constructed primarily along existing transmission line routes and through water bodies. Some alternatives would require short ROWs through new areas for interconnections. Terrestrial vegetation and wildlife habitat located on the disturbed landscapes of existing transmission lines would most likely be minimally affected. These disturbed landscapes would most likely not have significant residence or shelter, nesting, or cover habitat. Direct permanent impacts on wildlife and wildlife habitat would primarily occur through the clearing of undisturbed vegetation associated with the project (i.e., if small communities of plants and animals intersect the ROW, the construction and maintenance of transmission lines might destroy habitat so that it becomes unsuitable for survival). For example, trees and shrubs used by rare birds for nesting might be cut down or soil erosion may degrade rivers and wetlands that provide required habitat.

Potential indirect impacts on birds and some bats associated with the aboveground transmission could include injury and mortality from collisions and/or electrocutions. Rare, threatened, and/or endangered species may also be exposed to collisions and/or electrocutions and may require an "Incidental Take" permit from NYSDEC and special mitigation measures.

Construction of power line poles and new cables could adversely impact aquatic habitats. Maintenance of these corridors requires periodic mowing and tree

removal. Additionally, aquatic habitat could be temporarily disturbed during the construction phase of in-water DC cable projects. Disturbance of the substrate and loss of bottom-dwelling species, increased turbidity, elevated levels of nutrients and other pollutants, and reduced oxygen concentrations as a result of in-water construction could temporarily negatively affect aquatic organisms.

Noise and other disruptions such as light used at night during construction and operation could temporarily disturb normal wildlife movements.

5.1.4 Agricultural Land Resources

Transmission ROWs, access roads, and overhead transmission line construction would cause permanent loss of agricultural land and temporarily suspend crop production activities. Most of the transmission projects follow an existing transmission line that could produce temporary and permanent impacts on agricultural resources. Potential impacts could include construction activities that bisect agricultural fields into smaller parcels, making it difficult to farm. Heavy construction equipment and maintenance vehicles could compact and/or erode soil on farms that could lead to lower crop production. Construction vehicles could also cause temporary impacts, damaging farm infrastructure such as fences, crops, and subsurface drainage systems as they are driven through the fields. Excavation of pole foundations could increase the chances of subsoils mixing with topsoils.

Following construction activities, most of the land beneath transmission lines can be used for farming; thus, permanent impacts are expected to be minimal However, the presence of overhead transmission lines could hinder the movement of field machinery and irrigation equipment, planes, or helicopters, requiring farmers to alter their fieldwork patterns.

5.1.5 Aesthetic Resources

The degree to which transmission alternatives may impact aesthetic resources in New York State is largely contingent on four primary factors: physical characteristics of the projects; viewpoint sensitivity and viewer sensitivity; existing landscape character; and the visual contrast posed by the introduction or expansion of project facilities to the existing landscape.

5.1.5.1 Physical Characteristics

The physical characteristics of electrical transmission facilities can be described in terms of scale, form, density, and materials/color.

- Scale: Transmission towers are sized according to a number of factors, including but not limited to the capacity of the transmission line (e.g., 115 kV versus 345 kV), the number of conductors carried (e.g., three versus six), and distance between towers. Typically, transmission towers in New York State range from 75 to 180 feet in height. The footprint of these facilities varies widely, from single wood pole structures 1 to 2 feet in diameter to multi-

legged steel lattice structures. The scale of these structures is generally perceived as large or small relative to nearby trees and buildings.

- Form: The form (or shape) of electrical transmission infrastructure is defined by the arrangement of poles, girders, arms, insulators, and other structural components of the tower. Transmission towers may feature a wide variety of forms, including but not limited to steel lattice, single or multiple poles, and a number of designs that may be described as H-, X-, Y-, or A-frames. Form depends on several factors, including layout, position of the tower along the length of the line, and structural requirements. The forms of underground or underwater transmission facilities are generally not visible to the public.
- Density/mass: The density or mass of transmission facilities may range from the least dense (e.g., a single transmission line strung between narrow and widely spread towers) to the most dense (e.g., multiple lines strung between bulkier and/or closely spaced towers).
- Materials/color: Typically, transmission towers in New York State are constructed of steel lattice, steel poles, or wooden poles. Steel towers may be painted, galvanized, or self-weathering. Colors of steel structures can thus vary widely, from light gray to dark brown. Wooden poles are typically unpainted but are treated to withstand the elements. These structures are typically brown in color, but often lighten with age. Dark-colored structures tend to blend better with background vegetation, while light-colored structures blend better with the sky.

A fifth factor that contributes to the visual character of transmission facilities is the width of the cleared ROW which, in particular, can amount to a subsequent disruption of the visual continuity of forested areas. The width of the cleared area is influenced by the width of the easement, capacity of the transmission lines and the subsequent size of transmission towers, and the management of surrounding vegetation. ROWs that feature wide clearances and straight vegetative edges through otherwise forested settings typically result in a greater impact on aesthetic resources.

The transmission alternatives proposed as part of the Contingency Plan feature projects that may result in changes to the physical characteristics of existing transmission facilities, the addition of new transmission towers within existing corridors, and/or the addition of support facilities in new corridors or land areas. Transmission facilities that are of larger scale, complex form, greater density, and higher-contrast materials are typically those that can have the largest impact on aesthetic resources, mitigation measures notwithstanding.

5.1.5.2 Viewer and Viewpoint Sensitivity

Viewer and viewpoint sensitivity is based on existing scenic quality, the degree of viewer exposure (in terms of both frequency and duration), viewer perspective (i.e., their distance and elevation relative to the line), and viewer sensitivity/attitude (i.e., the degree of tolerance to a given visual change or type of visual change). As described in Section 4.5 of this Final GEIS, NYSDEC has

determined that a number of aesthetic resources throughout the state are scenic resources of statewide significance and are therefore considered particularly sensitive to visual changes (e.g., state parks, historic sites). Local recreational and historic resources, as well as areas of more intensive land use (e.g., neighborhoods and village centers) are also considered potentially sensitive to visual impact. In general, transmission facilities that are visible from designated sensitive/significant resources, or are viewed by a greater number of people, or that are viewed with more regularity or for longer periods of time may have a more pronounced impact on aesthetic resources.

Viewer position in the landscape can also have an effect on the type and degree of visual impact presented by a transmission line. In general, proximity to the line will increase project visibility and accentuate any perceived contrast in scale, form, color, land use, etc. These visual impacts tend to decrease in more distant views. When viewed from an inferior (lower) position, transmission lines will often be seen against the sky. When viewed from a superior (higher) position, transmission lines are more often viewed against background vegetation. Depending on the height, color, and form of the transmission structures, contrast with their surroundings could be either high or low depending on viewer position.

The sensitivity or attitude of individual viewers can also influence the degree of perceived visual impact. Some viewers (e.g., homeowners, sight-seers, nature photographers) are sensitive to visual impact almost by definition. Others (e.g., drivers, those involved in active recreation) are much less likely to be aware of the surrounding landscape. However, viewer sensitivity/attitude is often subject to some variation over time. Energy infrastructure projects (such as wind generation facilities and "smart grid" improvements) are often welcomed by the public when discussed in concept. However, this support often drops when such projects are actually planned and built in areas close to where these individuals live. Once the facilities are operational, public acceptance tends to rebound, when impacts are found to be less detrimental than feared (Firestone et al. 2009). Many of the concerns noted in studies of public support for wind facilities are similar to those related to the aesthetic impacts of transmission facilities.

Visibility of a project does not necessarily indicate that an adverse impact will occur. NYSDEC guidance concerning visual impacts on aesthetic resources of statewide significance defines significant aesthetic impacts as those "that may cause a diminishment of the public enjoyment and appreciation of an inventoried resource, or one that impairs the character or quality of such a place. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision making."

5.1.5.3 Existing Landscape Character

In addition to sites that are formally designated as scenic resources, many other landscapes may be considered visually sensitive due to their perceived scenic quality. These are often undeveloped areas with a high degree of diversity relative to vegetation, topography, water resources, and other environmental

features. Such characteristics may combine to create particularly attractive or otherwise unique settings, where the introduction of man-made features such as transmission infrastructure will present a greater contrast and conflict with the surrounding landscape.

5.1.5.4 Visual Contrast

Visual contrast occurs between elements of transmission facilities and the components of a given landscape, specifically its landform, vegetation, and land use. The level of contrast between facilities and the surrounding landscape is influenced by whether or not the facilities are compatible or incompatible with these existing components of the landscape. Where there is a high degree of compatibility between the project and the existing landscape, visual impact is generally low. Examples might be where the height of transmission towers closely follows topography, where ROW clearings are unobtrusive or minimized, where adjacent land uses are not in conflict with electrical transmission, or where new lines are co-located with existing lines. Where there is a low degree of compatibility, a stronger contrast may be noted by viewers. Examples may include towers and lines that do not follow topography (e.g., basin crossings), poorly screened ROW clearings, or transmission corridors within or adjacent to conflicting land uses (e.g., residential development or undeveloped forest).

5.1.6 Historic and Archaeological Resources

Review of any alternative's potential impacts on historic and archaeological resources will likely be required under Section 14.09 of the New York State Parks, Recreation, and Historic Preservation Law and/or Section 106 of the National Historic Preservation Act as part of environmental reviews for the SEQRA process, DPS Article VII process for the siting of transmission lines, and/or DPS Article 10 for major electric generating facilities. The federal regulations entitled "Protection of Historic Resources" (36 CFR 800) include in Section 800.5(2) a discussion of potential adverse effects on historic resources, several of which would be applicable to transmission projects. These regulations define potential adverse effects on historic properties as follows:

i. Physical destruction of or damage to all or part of the property

ii. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines

iii. Removal of the property from its historic location

iv. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance

v. Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features

vi. Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization

vii. Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (CFR 2004a).

Transmission facilities could potentially result in the destruction, alteration, or removal/relocation of a historic property if a proposed transmission line intersects or is located immediately adjacent to a historic property. However, in most instances the potential effect of transmission alternatives on a given historic property would typically be a change (resulting from the introduction of transmission infrastructure) in the property's visual setting. As it pertains to historic properties, setting is defined as "the physical environment of a historic property" and is one of seven aspects of a property's integrity, which refers to the "ability of a property to convey its significance" (NPS 1990). The other aspects of integrity include location, design, materials, workmanship, feeling, and association (NPS 1990). The potential effect of the introduction of transmission infrastructure into the visual setting for any historic or architecturally significant property depends on a number of factors such as distance, visual dominance, orientation of views, viewer context and activity, and the types and density of modern features in the existing view (e.g., buildings/residences, other electrical transmission lines, cellular towers, billboards, highways, and silos).

However, the visual setting may not be an important factor contributing to a given property's historical significance. For instance, many historic properties in New York are determined NRHP-eligible under NRHP Criterion C (i.e., they "embody the distinctive characteristics of a type, period, or method of construction" [CFR 2004b]). These properties are typically determined NRHP-eligible because they are representative examples of vernacular nineteenth-century or early twentieth-century architectural styles that retain their overall integrity of design and materials. These properties would retain the characteristics that caused them to be recommended eligible after the introduction of transmission infrastructure into their visual settings.

Transmission alternatives associated with the Contingency Plan would require ground-disturbing activities that have the potential to impact historic and/or archaeological resources. The area of potential effect (APE) for archaeological resources includes all areas within the limits of disturbance for proposed construction activities. These areas include proposed pole/structure foundations and assembly areas, access roads, buried transmission lines, laydown and staging areas, operations and maintenance facilities, and other all other areas where soil-disturbing construction activities are proposed.

5.1.7 Open Space and Recreation

Transmission facilities associated with the Contingency Plan could use existing ROWs, which would limit any potential impacts during construction periods.

However, the siting and construction of new electric transmission facilities, if necessary, could result in the loss of open space and recreation acreage. Because New York State's open space and recreational landscape is so broad and varied, any permanent impacts of new transmission corridors crossing long distances would be varied.

New overhead transmission corridors that cross onto or are adjacent to open spaces valued for their viewsheds would introduce visually obtrusive structures into the landscape. Lower capacity overhead lines crossing shrub and forest cover types require a swath of clearing for the length of the corridor, and larger capacity lines could require clearance widths of 100 feet to 200 feet, plus tree clearing rights. Apart from other facility components such as access roads and substations, a large (345 kV) transmission line corridor can use up to 25 acres per linear mile of ROW. This can cause permanent disruption of both ecological and aesthetic values of the forest that depend on continuity of the canopy cover. Access roads and substations must be permanently sited at various intervals and would further disrupt forested and re-forestation areas used for recreation and other activities that rely on a natural setting, such as hiking, photography, and educational or research pursuits.

In addition to the temporary disruption during installation of transmission towers, further short-term disruptions would be caused by operation and maintenance activities, which could become permanent impacts. Overhead lines crossing water bodies would cause similar disruptions. In some water-related settings there could be a lesser effect on vegetative cover, but overhead transmission lines would be visible from much longer distances. Many waterbodies and waterways are critical resources for a large number of bird species, particularly for migration paths, and overhead transmission lines in these areas could affect bird flight patterns and bird-watching activities.

The introduction of utility corridors would have mostly adverse impacts on open space and recreational uses. While the human experience of natural areas may be diminished, newly cleared corridors, if left accessible, may create new areas for recreational activities such as snowmobiling, cross-country skiing, or hunting. Underground lines in new transmission corridors in open spaces would tend to be less obtrusive than overhead transmission lines but would still require acquiring land, clearing vegetation, and maintaining some aboveground facilities, and could result in the restriction of some uses and loss of open space values.

5.1.8 Critical Environmental Areas

The proponents of any new transmission line project would be required under Article VII or SEQRA to evaluate the proposed alignment with respect to the location of CEAs. Transmission lines of any alignment that intersect the boundaries of a CEA would require an environmental review specific to the environmental characteristics for which the affected CEA was designated. Siting transmission lines near a CEA may also cause indirect effects, depending on characteristics specific to that CEA.

If located within or near a CEA, permanent disturbances of CEAs would likely result from the clearing, grading, installation, and maintenance of the ROW corridors necessary to accommodate new transmission lines. Transmission line proposals that are sited on the east side of the Hudson River or through Westchester and Dutchess counties are more likely than other areas in New York State to intersect CEAs because CEAs cover a larger percentage of the counties' land areas than in any other counties in New York State.

Potential effects on CEAs from siting overhead transmission lines may include intrusion on vistas or other unique viewsheds, alteration of bird and other wildlife habitat, soil erosion and sedimentation of surface drinking water supplies and other critical waterways, and disturbance of wetlands or important coastal fish and wildlife habitats.

Potential effects, both temporary and permanent, on CEAs from siting buried transmission lines may include contamination of groundwater and surface water drinking supplies from the installation of utility cables, especially those that cross wetlands and waterways that intersect groundwater.

5.1.9 Air Resources

Construction of transmission lines would result in temporary emission impacts at the construction sites. Air emissions would result from delivery of equipment and materials, construction worker commutes, construction equipment usage, and ROW clearing and road construction. Criteria pollutant emissions from fuel combustion would result from increased on-road vehicle traffic and off-road construction equipment. Trucks and other mobile, fossil-fueled machinery would be required for clearing trees and brush, installing the new structures, and installing the new transmission line on the structures. Particulate matter emissions, mostly dust and PM_{10}, would result from grading, earth-moving, and disturbance of dirt on paved and unpaved roads. Potential impacts would depend on proximity of the project activities and truck travel routes to nearby receptors. The amount of activity and, therefore, emissions would depend on the specific size of the project and the extent of work required, which would be reduced by using existing ROWs and structures.

Construction emissions can be reduced through implementation of mitigation measures (see Section 7). Proper maintenance of construction equipment and vehicles would reduce criteria pollutant emissions. Using equipment to clean paved roads in the vicinity of the project and water trucks on unpaved roads and graded areas in the project area would reduce dust. Project-specific analyses and particulate matter control strategies would be established for each project, in consultation with state and local authorities, to assess and manage construction emissions, and therefore emissions would be expected to be minimal. Construction activities would not be a source of permanent air emissions and therefore no permanent impacts on air quality are anticipated.

The implementation of transmission alternatives under the Contingency Plan would affect the combination of electricity generation that is dispatched to meet demand and therefore affect air quality.

As discussed in Section 4.11.2, in 2012, almost half (48%) of New York State's energy generation was supplied from fossil fuels. Nuclear fuel accounted for 29%, while hydro supplied approximately 19%. Wind and other renewable sources supplied approximately 4% to New York's generation mix (NYISO April 2013). New York also imports electricity into the state. In 2012, New York imported electricity from Quebec, Ontario, New England, and PJM.[16] Both Hydro Quebec and Ontario Hydro are Canadian sources of energy produced using a large percentage of hydroelectric and nuclear power. Electricity from New England and PJM is produced using fossil fuels as the main component. Hydroelectric, nuclear, and wind electricity sources do not burn fossil fuels and thus the emissions from these sources are negligible.

The consumption of electricity in New York City results in higher average emissions per MWh compared with other load zones in New York, primarily due to limitations on the transmission systems to import electricity into New York City. While the NYISO imports some electricity from low-emission power production facilities in the upstate region (such as hydro, nuclear, and wind) to meet downstate loads, the existing configuration of the current transmission system requires the use of downstate fossil fuel plants, primarily gas-fired and oil-fired, to provide necessary electricity capacity (see Sections 5.1.11 and 5.2.11 for more details on New York's energy distribution). Implementation of the transmission alternatives would increase access to other power in other regions of the state.

It is difficult to predict precisely how the addition of the proposed transmission projects will affect the future emissions profile of New York's supply portfolio. New transmission could increase access to existing generating capacity and facilitate the entry of new supply. The flexibility obtained through the implementation of transmission alternatives could increase accessibility to low emission power production but might also increase accessibility to higher emission power production from coal plants in upstate New York and Pennsylvania. Alternatively, if the transmission projects selected provide primarily low-emission electricity to the region, this alternative would reduce emissions in New York compared with the No Action alternative. The actual air quality impacts will depend on both physical and economic factors.

5.1.10 Transportation

As mentioned in Section 4.1.10, New York's existing road network comprises interstate highways, urban expressways, rural highways, local streets, and bridges.

[16] PJM is a regional transmission organization that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.

Transportation modes also include railroad networks, shipping and recreational boating channels, and air traffic.

Construction of new transmission lines could temporarily affect the existing road network, especially along the Hudson corridor and in New York City. The southeastern part of the state, particularly New York City, does not have excess highway capacity, and existing levels of service are frequently considered inadequate. Ongoing traffic problems caused by commuters, existing road maintenance, and reconstruction would be exacerbated by additional construction-related traffic.

Installing buried cable within existing or expanded highway and rail ROWs or in or adjacent to the Hudson River and New York Harbor navigational channels could have temporary adverse impacts on these transportation modes. Overhead lines could interfere with air traffic, especially near airports, or with helicopters.

Construction activities also could impact local transportation infrastructure. Roads and bridges that are currently in need of repair or upgrades have varying capacity to accommodate oversized construction equipment or delivery of heavy components. Project developers would likely be responsible for road damage or repairs or would improve local roads in order to accommodate their needs.

Once operational, the permanent impacts of new transmission projects on local transportation networks would be negligible.

5.1.11 Energy

The electric transmission alternatives that would meet all or part of the potential 1,350 to 1,375 MW electricity deficiency would direct existing generating capacity to the areas most likely to be affected by the loss. This scenario assumes that in 2016, the transmission system would reflect changes that would occur as a result of existing plans and market conditions. For the transmission alternatives, the amount of electrical generating capacity would, on average, essentially stay the same. The impacts of potential transmission projects were considered as a result of removing constraints on the flow of electricity on the transmission grid. These constraints may be imposed either by the physical or electrical capacity of the line or by rules created and enforced to protect the security and reliability of the grid.

Increasing the number of high-voltage transmission lines and underground circuits in the statewide system could increase the reliability of the transmission infrastructure. A fundamental requirement of the reliable operation of an electric system is the availability of more supply than may be required by the largest anticipated level of demand for electricity, which typically occurs during the summer. This reliability requirement is generally known in the electric industry as "reserve margin." The installed reserve margin represents the percentage of capacity above 100% of the capacity needed to serve the forecasted peak, not including import and demand-response capabilities. Since 1999, the installed

reserve margin has ranged between 22% and 15%. The installed reserve margin for the 2013/2014 year (which runs from May 1, 2013 through April 30, 2014) is 17%. Since the projected peak demand for electricity in New York State during 2013 is 33,279 MW, the installed reserve margin required for New York's electric system would be 38,396 MW of generating capacity installed and available. NYISO reports that available in-state generating capacity for 2013 is 37,925 MW (NYISO 2012). Thus, the available capacity of generation resources in New York exceeds the projected peak demand for electricity in New York State during 2013 by 5,657 MW (NYISO 2012). However, the existing transmission system constrains the use of portions of this capacity based on its location. New transmission could increase access to existing generating capacity, which would increase the overall system reliability. Any proposed transmission alternatives would be reviewed by NYISO to ensure that all electrical reliability issues that could affect the state's overall bulk transmission system are addressed. Although NYISO does not "approve" or "require" facilities to be constructed for reliability purposes, NYISO evaluates and monitors the reliability of the system, assesses reliability needs, and solicits market solutions. The process includes evaluation of the adequacy (loss of load expectation [LOLE]) and security (unanticipated loss of system elements or contingencies) throughout the entire bulk power system against mandatory national standards, regional reliability standards, and additional standards specific to New York State to identify any reliability needs or potential reliability needs (FERC 2011).

New transmission facilities could have a beneficial impact of increasing the proportion of wind and solar generation in the overall generation supplied. Several studies have concluded that existing wind resources in New York State are partially undeliverable to the transmission system. Typically, NYISO cannot fully dispatch all low-priced power production facilities (such as wind) in the upstate region to meet downstate loads because electrical overloading of the transmission system would occur with the north-to south flows on the system (NYISO 2008). If new transmission alternatives are implemented, the studies predict that the constraint from congestion would be removed, increasing the distribution of electricity available from these resources (NY STARS 2012).

The transmission alternatives could improve power flows between New York State's transmission system and surrounding states and Canada, which could reduce the cost of electricity, as compared with the No Action alternative. Power flows continuously between these areas depending on system needs, energy prices, and the capacity of the interconnections to carry electricity. Depending on the location of the transmission alternatives, imports could increase by removing constraints on the flow of electricity. The electricity imported from other regions would reflect that region's generation resource mix and energy prices.

The cost of energy is determined by generation mix, fuel prices, and transmission costs. The cost of constraints on the transmission system, also referred to as congestion can be calculated based on the price difference on either side of the constraint and the additional cost to provide the energy that could not be imported

(FERC 2001). Studies of the optimal flow of electricity in the northeast indicate that freeing up capacity in adjacent regions reduced the average price of electricity in New York (Overbye et al. 2000). Because the cost of electricity in New York is high compared with neighboring states, removing limitations on the transmission systems to import electricity into New York City could lower electricity prices overall.

The transmission alternatives could have the benefit of relieving constraints on importing electricity into New York City and reduce the cost of electricity for downstate customers, compared with the No Action alternative. The cost of electricity in New York City is high compared with other load zones in New York, primarily due to limitations on the transmission systems to import electricity into New York City (Energy Information Administration [EIA] 2011; U.S. Bureau of Labor Statistics 2013). Typically, NYISO cannot fully dispatch all low-priced power production facilities in the upstate region to meet downstate loads because of electrical overloading of the transmission system that would occur with the north-to-south flows on the system. As a result, more expensive plants (gas-fired peaking plants, oil plants) located downstate are operated locally to maintain electric service in New York City and Long Island. As described above, relieving congestion would have the potential to decrease electricity prices in the areas downstream of where flow is currently constrained. Concomitantly, relieving congestion would increase electricity prices in areas above where the constraint is relieved. Generally speaking, downstate electricity prices would go down and upstate electricity prices would increase.

The transmission alternatives currently under consideration include the TOTS projects. The existing transmission system in New York includes both AC and HVDC lines. The region is connected with ISO NE and PJM via AC and DC lines, Ontario IESO via AC lines and with Hydro Quebec primarily via HVDC. Long Island is connected to eastern PJM through HVDC and with southern ISO-NE via both AC and HVDC and New York City is connected to eastern PJM via the Linden VFT cables (CRA 2011). Because AC is easier to convert to the voltage levels needed for homes and businesses, AC is most commonly used for electricity transmission and distribution (PJM 2013). DC does not induce currents in nearby conductors and thus it is more amenable to buried and submerged transmission lines, which may reduce visual impacts and simplify the acquisition of ROWs.

5.1.12 Noise and Odor

5.1.12.1 Noise Impacts

Construction activities associated with the installation of new transmission lines would result in temporary and intermittent noise impacts. Some activities may be noisier than others and would be mitigated using techniques described in Section 7.1. Construction activities are usually limited to the daylight hours when people are less sensitive to noise.

Operational noise generated from high-voltage transmission lines may include humming, buzzing, or crackling. This noise usually is caused by frequency vibrations, corona discharge/electrical arcing (electric field ionization), or wind-related noise/vibration off of the power lines. In some cases, operational noise can be minimized through line maintenance and vibration-dampening equipment. Operational noise associated with transmission lines would be minimal, especially where new projects are co-located with existing projects, and would be evaluated on a site-specific basis.

5.1.12.2 Odor Impacts

Construction and operation of the transmission alternatives could cause unpleasant odors. These impacts may be caused by diesel exhaust during construction of the facilities and, to a much less likely extent, ozone generation from the transmission of electricity. As indicated in subsection 5.1.12.1 above, electric transmission lines and substations are associated with a certain amount of electric field ionization of air or arcing, which produces ozone; however, ozone in the open air generally dissipates quickly and would not normally be expected to cause complaints about odor.

Construction of new transmission lines would require heavy machinery that normally runs on diesel engines, and odor is a common complaint related to diesel engine exhaust.

5.1.13 Public Health

5.1.13.1 Air Emissions

During construction of new transmission projects, construction equipment would generate particulate matter emissions from the combustion of fuel and construction related activities. Fuel combustion sources are the primary component of the pollutant $PM_{2.5}$. While particulate matter generated by construction-related transfer of materials and other fugitive dust sources tend to be larger size particulate matter that settles to the ground within a relatively short distance from the source, fuel combustion, especially from diesel combustion sources, generates particulate matter that mostly consists of $PM_{2.5}$. Heavy construction equipment would be dispersed at various locations throughout the project sites during the various phases of construction, and much of the time these sources would be located within the site, far from the project boundaries. However, construction-related truck traffic would travel on local truck routes within the community, which could create short-term adverse impacts.

Because the air emission impacts from construction would be short-term and consist of typical construction activities that would largely be mitigated (see Section 7), and operations would not create any emissions, impacts expected from the construction and operation of the proposed transmission projects would not be significant.

5.1.13.2 Electric and Magnetic Fields

Overhead transmission lines produce both electric fields and magnetic fields. Underground lines do not produce electric fields aboveground but may produce magnetic fields above ground.

At a distance of 300 feet and at times of average electricity demand, the magnetic fields from many lines can be similar to typical background levels found in most homes. The distance at which the magnetic field from the line becomes indistinguishable from typical background levels differs for different types of lines. Most people in the United States are exposed to magnetic fields that average less than 2 mG, although individual exposures vary.

Electric field levels directly beneath overhead distribution lines typically vary from 1 to 3 kilovolts per meter (kV/m). At the edge of the ROW, where the PSC Opinion 78-13 (1978) ordered a limit of 1.6 kV/m, the typical electric field strength is 0.07 to 2.2 kV/m. This higher value would be 15 meters (50 feet) from a 345 kV transmission line. This exposure is reduced by extending the ROW to 30 meters (100 feet) from the centerline of the high voltage (345 kV) lines, which attenuates the electric field to 0.7 kV/m. Magnetic fields directly beneath overhead distribution lines typically range from 28 to 60 mG. These values are reduced at the border of the ROWs to about 7 to 20 mG (NIH and NIEHS June 2002). Peak magnetic field levels as high as 40 mG have been measured above underground lines. All these values are below the 200 mG threshold recommended by the New York State PSC in 1990 to ensure public safety. Generally, the strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation.

The magnitude of the magnetic field is related to current flow, not line voltage. A 69 kV line can have a higher magnetic field than a 345 kV line. Magnetic fields quickly dissipate with distance from the transmission line. A common method of reducing EMF is to bring the lines closer together. This causes the magnetic fields created by each of the three conductors to interfere with each other and produce a reduced total magnetic field. Magnetic fields generated by double-circuit lines are less than those generated by single-circuit lines because the magnetic fields interact and produce a lower total magnetic field. In addition, double circuit poles are often taller, resulting in less of a magnetic field at ground level.

Permits for any new transmission lines would be required to comply with the electric field strength limit of 1.6 kV/m set forth in Opinion 78-13, issued June 19, 1978, and the magnetic field strength of 200 mG described in the 1990 Guidelines from the PSC (New York State PSC 1990). Compliance with these guidance documents would conservatively protect the public from significant exposures. Exposure to EMF at extremely low frequencies (ELFs) is not expected to cause significant public health impacts on residents in and surrounding the proposed transmission facilities and associated routes.

5.1.13.3 Movement of Rodents in Urban Areas

Pest rodents in urban areas of the northeastern United States include the non-native Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*). Both species are well known for their ability to colonize urban infrastructure. Typically, rats migrate from their lairs to find new places to hide and feed and where they can cause damage and spread diseases (Faraone 2009). Rodents can be driven out of their underground homes by vibration associated with construction activity. Rodent control programs focus on long-term management planning and on changing the environment by eliminating food sources and increasing sanitation.

There are three time periods when rodents can cause impacts during construction: 1) a pre-existing population at the planned work site may be displaced during initial excavations; 2) rodents can be attracted to work sites from bordering areas during construction by trash and debris; and 3) rodents can be displaced from work sites as construction is completed and debris and materials are removed. For these reasons, a pest management program would be implemented to resolve rodent activity in the proposed work areas before construction begins, and the program would be maintained for the duration of construction. Prior to implementation, this pest management program would be reviewed and approved by the New York City Department of Health and Mental Hygiene (NYC DOHMH).

No significant increase in the emergence of rodent populations is anticipated to arise during construction activities. Therefore, impacts on public health from rodent populations are expected to be minimal.

5.1.14 Growth and Character of Communities

New transmission facilities could impact a community's growth and character. Subsections of this Final GEIS detailing potential impacts related to land use, aesthetic resources, historic resources, open space, and socioeconomics; each highlight many of the individual attributes that collectively define community character. In addition to these, the transmission alternatives undertaken through the Contingency Plan may affect growth opportunities for residents and businesses in New York State, and this growth may result in impacts relative to the character of communities served by or hosting the transmission projects.

The availability and affordability of electricity is a central component of nearly all growth opportunities; as such, limitations or constraints on the transmission of electricity may result in adverse impacts on business development. The transmission alternatives are intended to alleviate limitations or constraints on the transmission and cost of electricity that might otherwise occur as a result of the No Action alternative.

Transmission alternatives will facilitate reliability in the cost of electricity, which would impact different communities and their respective character in different ways. Industrial/commercial growth may be a welcome addition to the character

of some communities, while in others it may be less so. Typically, communities within New York State are inclined to balance the potentially negative impacts of essential services (e.g., the appearance of transmission towers) on local character with the necessity of the provision of electricity. This relationship may be viewed through a number of different perspectives, including but not limited to the appearance of the community or the fiscal impacts of utility infrastructure. This relationship also may be experienced differently by communities that are hosting transmission infrastructure versus those that are served by it. Transmission lines commonly bypass communities along their routes. For example, communities hosting the proposed transmission facilities may experience adverse impacts on the character of their communities, while not experiencing any of the benefits associated with the power provided by those projects. Likewise, the projects may facilitate growth within the recipient communities, while not necessarily causing any impacts on their respective community character.

Several of the proposed transmission alternatives involve upgrades, re-conductoring, double-circuiting, and other similar projects that involve changes to existing transmission towers and lines. In such cases, the community character impacts would be negligible, as the existing facilities already are a part of the community's character. Where transmission alternatives involve land burial or underwater placement of transmission lines, community character impacts are not anticipated.

In the event that any of the transmission alternatives require the creation of new transmission corridors, particularly those that may have a substantial visual impact (see Section 5.1.5), such projects may have an adverse impact to the extent that the industrial/utilitarian nature of those transmission corridors may conflict with adjacent land uses. However, after these facilities are constructed and operational, the new transmission towers and lines generally gain acceptance as an existing feature of the landscape and eventually become a part of the evolving character of communities.

5.1.15 Socioeconomics and Environmental Justice

Construction of the transmission lines could result in both short-term and long-term socioeconomic impacts. The short-term socioeconomic impacts could occur during the construction period and the long-term socioeconomic impacts could occur during the operation of the completed transmission lines. These potential impacts are considered below.

5.1.15.1 Economic Output, Employment, and Labor Earnings

Economic output in the local economy would increase as a direct result of hiring local construction firms and workers. The local economy would also experience positive indirect economic output impacts when local construction suppliers increase their revenues by providing materials and services for the construction activities. Positive induced economic impacts would occur, in the form of increased economic output, when the construction workers spend a portion of their incomes in the local economy and increase the revenues of other businesses.

Since construction costs are one-time expenditures, the positive economic output impacts of construction activities would be temporary and exist only while construction is occurring.

Once the transmission lines are in operation, the local economy would experience a limited increase in economic output from hiring local workers and firms for line repair and ROW maintenance. The local economy also would experience limited positive indirect and induced economic output impacts during the transmission line's operations period.

A limited number of new employees would be required for line repair and ROW maintenance and there would be a limited positive indirect and induced employment impact from hiring workers to repair the lines and maintain the ROW.

Labor earnings in the local economy would be positively impacted by the limited direct, indirect, and induced employment resulting from line repair ROW maintenance.

5.1.15.2 Population and Housing

Given the specialized nature of the construction activities, a substantial proportion of the construction workers would likely come from outside the local area. A typical work crew would be less than 100 workers. The work in a region would take approximately a year. The impact of this size of temporary workforce would not be significant in densely populated regions, but projects in more rural areas could have impacts on population and housing. The construction workers would be in the local area on a temporary basis and would move as construction activities changed location and would likely not be accompanied by their households. The transient construction workers would reside temporarily in the area in which construction work was being undertaken. Once a segment of the line was completed, they would move on. While they are in a given area, hotel/motel occupancy rates would be expected to increase (and increased hotel/motel room occupancy would increase the amount of bed tax collected in local communities). However, higher motel/hotel rates and/or the fewer available rooms might discourage some visitors from coming to these areas and thereby have the potential to temporarily reduce local tourism.

Only a small number of local workers would be needed during the operations period and the impact on the size of the local population and on local housing markets would be limited.

5.1.15.3 Public Services

Since the majority of construction workers would be in the local area on a temporary basis, they would move as construction activities changed location and would likely not be accompanied by their households; as the remaining workers would be existing residents, it is unlikely that local schools would have to accommodate additional children during construction activities.

It is not likely that the temporary increase in population arising from an influx of construction workers would place significant additional demands on local hospitals, emergency responders, or police services. There would be a slight increase in the demand for municipal services such as roads, water supply, wastewater treatment, and solid waste disposal during the short period during which construction activities were occurring in a given area. There might occasionally be a requirement for emergency responders to respond to emergency incidents.

It is not anticipated that the completed transmission lines would place any appreciable additional burden on local schools. However, there might occasionally be a requirement for emergency responders to respond to incidents.

5.1.15.4 State Income and Local Sales Tax

New York State would see a temporary increase in its personal income tax receipts as a result of the construction activities since the state imposes personal income tax on the entire income of New York residents and on New York-sourced income of non-residents. Revenues generated from local sales tax would increase temporarily as construction materials and services are purchased in the local economy, as the construction workers spend some of their income in the local economy, and as the indirect and induced economic impact result in increased local expenditures.

New York State would see a small permanent increase in its personal income tax receipts as a result of additional employment for line repairs and ROW maintenance. Local governments would benefit from increased real property tax revenues from the completed transmission lines. There would be a limited increase in local sales tax revenues as a result of line repair and ROW maintenance expenditures and the indirect and induced impacts.

5.1.15.5 Environmental Justice

During the preliminary screening of the transmission line projects by NYSDEC, it might be discovered that construction activities would occur in areas that are the subject of New York State's Environmental Justice Policy (NYSDEC 2003). The Environmental Justice Policy is intended to ensure "the fair treatment and meaningful involvement of all people regardless of race, color, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (NYSDEC 2003). The policy requires that NYSDEC identify "whether the proposed action is in or near a potential environmental justice area(s) and determine whether potential adverse environmental impacts related to the proposed action are likely to affect a potential environmental justice area(s)" during the permit application process

(NYSDEC 2003). If an environmental justice area is determined to be potentially impacted by the construction of a transmission line, the applicant is required to produce a written Public Participation Plan, conduct an analysis of the existing environmental burden on the affected area, and evaluate any additional burden resulting from any negative environmental impacts arising from the project. Impacts of a transmission project on various resource areas and, subsequently, on any identified environmental justice areas, are described in various subsections above and may include land use, open space, socioeconomics, and quality of life (noise, odor, air quality) impacts.

5.1.15.6 Property Prices

It is possible that along new ROWs property prices would be negatively impacted by the construction of transmission lines. Such a negative impact would likely not occur along existing ROWs (where property prices already incorporate any impact from proximity to transmission lines) or near underwater sections of transmission lines.

5.1.15.7 Cost of Electricity

The impact of the transmission alternative on the cost of electricity is difficult to assess because energy costs are subject to multiple factors. These are described in Section 5.1.11, Energy. The presence of more transmission capacity would enable lower-cost upstate generation to compete with higher-cost producers and potentially lower the cost of electricity compared with costs that would be incurred without a contingency plan (No Action alternative).

5.1.15.8 Greater Reliability of Electrical Power

The operation of the transmission lines compared with the No Action alternative would result in a more reliable supply of electricity. This would enable consumers to continue to enjoy the benefits of such supply. The negative impacts that would result from the lack of such supply are discussed in Section 5.4.15, which discusses the socioeconomic impacts of the No Action alternative.

5.2 Generation Facilities

The potentially significant environmental impacts associated with all generation facilities include air emissions, water use and wastewater discharge. There is also a potential for transportation and noise impacts during construction and operation. Land use, aesthetic, archaeological, and biological impacts would vary depending on the existing use of the site, sensitivity of specific locations, and whether the project involves new construction and/or land disturbance.

5.2.1 Land Use

Residential, recreational, and natural habitat uses have the greatest potential to experience adverse impacts, depending on the location of the proposed facilities. The extent of the site-specific construction impacts associated with the construction of any new power generation facility would vary according to the project location. Temporary construction impacts on land use could be similar to those of a new plant, although considerably smaller and, depending on the

existing plant location and the relative size of the expansion, many potential land use impacts would be negligible.

The addition of generation capacity to existing electric power plants or industrial brownfields would have minor to no impacts on land uses. In cases where capacity can be added to existing plants, a change in land use would not generally be expected unless the facility was expanded beyond its current boundaries.

5.2.2 Water Resources

5.2.2.1 Water Quantity

Construction-related impacts on water use for new generation facilities could result from dewatering during construction activities. Dewatering has the potential to drawdown the local aquifer and impact water levels at nearby wells. Water produced from dewatering requires treatment and disposal, all of which would be regulated by a State Pollutant Discharge Elimination System (SPDES) permit.

Impacts on water quantity would primarily be related to cooling water processes used in power generation, specifically, closed-loop cooling, which is used by most facilities constructed after the1970s in response to new CWA restrictions.

Thermoelectric power plants are responsible for 41% of the freshwater withdrawals in the United States (Macknick et al. 2011). Approximately 43% of existing thermoelectric power plants in the United States use once-through cooling, 56% use wet-recirculating, and 1% use dry-cooling (U.S. Department of Energy 2008). Closed loop (wet-recirculating) cooling systems withdraw significantly less water than their once-through predecessors; however, water withdrawn in closed-loop cooling is subject to evaporation to the atmosphere and other losses in the cooling process. Water lost in closed-loop cooling is not returned to the source watershed, which could result in decreased water levels.

A typical natural gas combined-cycle plant with closed-loop cooling consumes an average of about 198 gallons of water per MWh, with a range between 130 and 300 gallons per MWh (Macknick et al. 2011). Oil-burning plants consume about the same amount. A generation facility that would produce about 1,350 to 1,375 MWh would consume about 270,000 gallons per hour or 6.42 million gallons per day. This consumption would be spread among the various power plants and could include surface withdrawals of fresh water and salt water from lakes, streams, and embayments. Generation facilities could be permitted with air-cooled condensers (dry cooling), which consume very little water (see Table 5-1 for a comparison of water use by different types of power plants).

Of all water sources, streams are the most sensitive to withdrawals. Decreased stream base flow can adversely affect stream morphology, habitat, aquatic plant and animal communities and species, and promote growth of algae and nuisance or invasive aquatic plants. Lakes can be similarly affected (Public Service Commission Wisconsin December 2011).

Table 5-1 Consumption of Water in Fossil Fuel Electricity Generation

			Consumption (gallons/MWh)			Withdrawals (gallons/MWh)		
Fuel Type	Cooling	Technology	Median	Min	Max	Median	Min	Max
Nuclear	Tower	Generic	672	581	845	1,101	800	2,600
	Once -through	Generic	269	100	400	44,350	25,000	60,000
	Tower	Combined Cycle	198	130	300	253	150	283
		Steam	826	662	1,170	1,203	950	1,460
Natural Gas	Once -through	Combined Cycle	100	20	100	11,380	7,500	20,000
		Steam	240	95	291	35,000	10,000	60,000
	Pond	Combined Cycle	240	240	240	5,950	5,950	5,950
	Dry	Combined Cycle	2	0	4	2	0	4
	Tower	Generic	687	480	1,100	1,005	500	1,200
		Subcritical	471	394	664	531	463	678
Coal		Supercritical	493	458	594	609	582	669
	Once-through	Generic	250	100	317	36,350	20,000	50,000
		Subcritical	113	71	138	27,088	27,046	27,113
		Supercritical	103	64	124	22,590	22,551	22,611

Source: Macknick et al. 2011.

Fossil fuel-generating facilities also may use water for cleaning, drinking, and sanitation. However, these uses are generally much lower compared with the volumes used for cooling.

5.2.2.2 Water Quality and Habitat

Construction of new generation facilities could have impacts on water quality such as increased sediment, nutrients, or other pollutant loading to adjacent water bodies. The removal of vegetation that could occur during construction could lead to erosion and reduce stream bank shading, thereby increasing water temperatures and contributing to lower oxygen levels, increased aquatic plant and algal growth, and adverse impacts on native aquatic plants and animals.

The use of closed loop cooling systems for power generation could lead to decreased water levels in the source water body. Decreased water levels could result in warmer water temperatures, lower oxygen levels, changes in the rate and location of sediment deposition, increased aquatic plant and algal growth, and adverse impacts on native aquatic plants and animals.

5.2.3 Plants and Animals

The construction of a power generation facility can have both direct and indirect impacts on vegetation and wildlife. The majority of projects would be located on brownfield or disturbed sites, but some projects might be located on greenfield sites. Brownfield sites would most likely have fast-growing invasive weeds and grasses and would therefore not provide habitat for diverse vegetation and wildlife. It is unlikely that there would be significant impacts on vegetation and wildlife on brownfield sites.

Landscapes that are most vulnerable to habitat loss and fragmentation due to the construction and footprint of a facility include forests, grasslands, and wetlands (wetlands are discussed in Section 5.2.2, Water Resources). These landscapes contain small communities of plant and animal populations and potentially state-listed and federally listed rare, threatened, and/or endangered species. Direct impacts associated with construction on greenfield sites would include permanent removal or temporary disturbance of vegetation and wildlife habitat, incidental injury and mortality to terrestrial and aquatic wildlife, and silt and sediment runoff into nearby water bodies. The removal of vegetation could cause significant erosion problems on elevated areas and slopes. Additionally, in areas where vegetation is removed, potential incursion of invasive species and/or noxious weed species could occur. These influxes could be caused by bulldozers and other equipment carrying dirt containing seeds from other areas.

Migratory species that depend on the original local habitat for resting, feeding, or breeding would have to find new places for these activities. Birds could also be killed outright by striking tall power plant structures such as smoke stacks and cooling towers.

Noise and other disruptions such as lighting used at night during construction and operation could disturb normal wildlife movements.

The primary indirect impacts on vegetation would be from air pollution or surface water impacts from generation facilities. Some pollutants can damage vegetation or cause disease because they are toxins. However, some pollutants provide nutrients for vegetation. The fog from cooling towers could change the moisture in the soil and air near a cooling tower, allowing some plants to survive due to their resistance to disease and their ability to use moisture, while others might be harmed.

Vegetation in surface waters could also be affected, or lost, by shading of a floating power facility or by the construction of water intake or discharge facilities for power plant processes, or by the silt and sediment runoff into surrounding water bodies, affecting aquatic organisms. These can have negative effects on food resources, aquatic vegetation, and spawning grounds. Fish and other aquatic wildlife could become trapped in cooling water intake systems.

5.2.4 Agricultural Land Resources

New generation facilities are not proposed to be sited on active agricultural land; therefore, no impacts on agricultural land resources are expected to occur as a result of the generation project alternative.

5.2.5 Aesthetic Resources

The degree to which generation alternatives may impact aesthetic resources within New York State is largely contingent on five primary factors: physical characteristics of the projects; operational characteristics of the projects; viewpoint sensitivity and viewer sensitivity; existing landscape character; and the visual contrast posed by the introduction or expansion of project facilities to the existing landscape.

5.2.5.1 Physical Characteristics

The physical characteristics of electrical generation facilities proposed in the Contingency Plan can be described generally in terms of form, scale, and materials.

- Form. The form (or shape) of electrical generation facilities is defined by the arrangement of structural components necessary to process raw materials and transmit energy into the grid. CCNG facilities typically involve four basic structural features: gas and steam generation units, cooling units, transformers, and support facilities. Generation units typically feature a series of horizontal, tubular structures (e.g., gas and steam turbine generators) vertical, rectangular structures (e.g., heat recovery steam generators), and vertical, tubular structures (e.g., exhaust towers). Cooling towers typically feature vertical, tubular structures that are either plainly visible or screened by external walls surrounding the tower(s). Transformer structures are constructed in a number of forms and may contain any arrangement of steel lattice supports,

rectangular or tubular containment systems, and other utilitarian structures. Support facilities include air/water/gas intake facilities, instrumentation and control rooms, garage facilities, and office space.

- Scale. The scale of each generation project associated with the Contingency Plan will largely be a function of the type of project (e.g., facility upgrade, new facility), the amount of electricity generated by the facility, and whether the project requires new construction or retrofitting previously existing structures. In general, projects involving facility upgrades, smaller generation capacities, and facility retrofits are less likely to involve the introduction of large-scale changes to the visual environment.
- Materials. Electrical generation facilities may feature a range of material types, including but not limited to cast-in-place or precast concrete, corrugated steel, and composites. Materials may change substantially from one portion of a structure to another. Electrical generation facilities that include a substation will also feature the materials associated with such collection/distribution systems, including but not limited to fencing, metal-clad transformers, steel support systems, concrete, and steel or wooden transmission poles. The range of colors presented by these facilities can vary, but in most cases are dominated by grays and browns.

The generation alternatives proposed as part of the Contingency Plan feature projects that may result in changes to the physical characteristics of existing generation facilities, the addition of new generation facilities at existing generation sites or previously disturbed settings (e.g., brownfields), and/or new generation facilities at previously undisturbed sites. Typically, incremental changes to the form, scale, and materials of existing facilities are the least likely to result in substantial changes to the visual environment. New facilities at existing generation sites or previously disturbed sites may produce a greater level of change in the visual environment, depending on the degree of difference between the form, scale, and materials of the existing and new facilities. The construction of new generation facilities at previously undisturbed/undeveloped sites is more likely to have a substantial impact on aesthetic resources, mitigation measures notwithstanding.

5.2.5.2 Operational Characteristics

The most significant operational characteristics of electrical generation facilities are those related to the operation of exhaust stacks and cooling towers. Depending on system designs and atmospheric conditions, stacks and cooling towers may introduce substantial changes to the visual environment in the form of steam plumes, which many viewers may find objectionable. Cooling towers generally come in one of three designs: wet, dry, or hybrid. Wet cooling towers can feature natural draft systems or fans. In either case, water is cooled as it passes through air from the top to the bottom of a vertical, tubular tower. No wet cooling towers are proposed in any of the projects. Dry cooling towers incorporate designs similar to a radiator, wherein water is cooled as it passes through heat-exchanging materials and a series of fans. Hybrid cooling towers

may be switched from dry to wet systems when conditions limit the production of water vapor plumes (e.g., low-humidity conditions, nighttime). Hybrid towers may limit the aesthetic impact of generation facilities while allowing for limited use of more efficient and/or economical cooling methods.

5.2.5.3 Viewer and Viewpoint Sensitivity and Existing Landscape Character

The influence of viewer sensitivity/attitude, viewpoint sensitivity, and existing landscape character on the visual impact of generation facilities is substantially similar to that of transmission lines; the discussion provided in Section 5.1.5 applies more broadly to generation facilities as well.

5.2.5.4 Visual Contrast

The level of contrast between facilities and the surrounding landscape is influenced by whether or not the facilities are compatible or incompatible with these existing components of the landscape. Where there is a high degree of compatibility between a project and the existing landscape, visual impact is generally minimal. For example, such cases may occur where incremental upgrades are made to existing facilities, where existing facilities are expanding, or where new facilities are constructed at previously disturbed sites within an industrial setting. Where there is a low degree of compatibility, a stronger contrast may be noted by viewers. Examples may include poorly screened structural components, unmitigated steam plumes, or large new generation facilities constructed at previously undisturbed sites or near conflicting land uses.

5.2.6 Historic and Archaeological Resources

Because the nature of ground disturbance and visual setting may result in similar impacts for generation alternatives as for transmission alternatives, the potential impacts and mitigation measures described in Section 5.1.6 and Section 7 are substantially similar to those of the generation alternatives. The presence of a visible steam plume could increase the area of potential effect for visual impact on historic resources.

5.2.7 Open Space and Recreation

New generation facilities would likely be built at existing power stations or at industrial brownfields, thereby largely avoiding impacts on open space and recreational facilities. Power plants are often sited on or near large water bodies, which are also attractive as open spaces and are used for many water-dependent or water-enhanced recreational activities. Even at an existing facility, new stacks and buildings could have direct effects on adjacent or other nearby properties such as obtrusive views, aesthetic intrusions, odors, and noise.

If new transmission corridors are needed to transmit the electricity produced, all the potential impacts related to transmission lines would be added to those resulting from the power plant itself (see Section 5.1.7).

New generating facilities could also have indirect effects on open spaces if the new generation facilities create a higher demand for natural gas, which would be produced in the rural areas of New York State. This potential impact would be offset if the new facilities result in the retirement of less efficient, older plants.

5.2.8 Critical Environmental Areas

Potential effects of new electric generation facilities on CEAs may include contamination of groundwater (drinking water) supplies from power plant operations, intrusion on vistas or other unique viewsheds, alteration of bird and other wildlife habitat, erosion and sedimentation of surface drinking water supplies and other critical waterways, and disturbance of wetlands or important coastal fish and wildlife habitats.

5.2.9 Air Resources

Construction of new facilities would result in temporary emissions at the construction sites. Air emissions would result from delivery of equipment and materials, construction worker commutes, construction equipment usage, and clearing for construction. Criteria pollutant emissions from fuel combustion would result from increased on-road vehicle traffic and off-road construction equipment. Trucks and other mobile fossil-fueled machinery would be needed for clearing trees and brush if the site has not been previously cleared, installing the new structures, and constructing switchyards. Particulate matter emissions, mostly dust and PM_{10}, would result from grading, earth-moving, and ground disturbance. Potential impacts would depend on proximity of the project activities and truck travel routes to nearby receptors. The amount of activity and, therefore, emissions would depend on the specific size of the project, and the extent of work required, which would be reduced by using existing access and structures.

Construction emissions can be reduced through implementation of mitigation measures (see Section 7). Proper maintenance of construction equipment and vehicles would reduce criteria pollutant emissions. The use of equipment to clean paved roads in the vicinity of the project and water trucks on unpaved roads and graded areas within the project area would reduce dust. Project-specific analysis and particulate matter control strategies would be established for each project, in consultation with state and local authorities, to assess and manage construction emissions, and therefore emissions would be expected to be minimal. The construction activities would not be a source of permanent air emissions and therefore no permanent impacts on air quality are anticipated. Detailed assessment of the construction of these facilities will require subsequent Article 10 or SEQRA review and compliance because site-specific impacts cannot be addressed or analyzed in this document.

Power plants, depending on the fuel they use, may have significant impacts on air resources. The changes in emissions, as compared with the No Action alternative, would depend on the source of electricity and type of fuel used for generation, and the impacts of those emissions will depend on the location of that generation.

The Contingency Plan includes various projects that would provide all 1,375 MW of required electricity capacity from natural gas and one project that would provide 100 MW of petroleum-supplied electricity. The power sector is a significant source of SO_2, NOx, CO_2, and mercury (Hg) emissions, the result of the burning of fossil fuels. Table 5-2 lists the average emissions per MWh produced for the various types of electricity generation in New York. Natural gas-fired electricity plants produce the lowest average emissions per MWh of all fossil fuel sources in New York.

Table 5-2 Emission Rates for New York State Electric Generation Plants

Source	(pounds per MW/h)			
	SO_2	NO_x	CO_2	Hg
Existing Upstate Coal Plant (average)	6.0	2.2	2,134	0.00008
Existing New York Dual-Fuel Oil/Gas Steam Plant (average)	3.0	1.5	1,445	0.0000017
Natural Gas Combined-Cycle	0.000	0.060	797	0.000

Source: NYSERDA, Coal Assessment New York State Energy Plan 2009, December 2009

The consumption of electricity in New York City results in higher average emissions per MWh compared with other load zones in New York, primarily due to limitations on the transmission systems to import electricity into New York City. While NYISO imports some electricity from low-emission power production facilities in the upstate region (such as hydro, nuclear, and wind) to meet downstate loads, the existing configuration of the current transmission system requires the use of downstate fossil fuel plants, primarily gas-fired and oil, to provide necessary electricity capacity (see Section 5.1.11 and 5.2.11 for more details on New York's energy distribution). Using generation alternative options would increase access to new sources within the region. New facilities would be subject to New Source Performance Standards (NSPS) or other specific standards based on the type of source or emissions and are also subject to control, monitoring, and reporting requirements, as applicable, based on the type and size of the source (NYSDEC 2013e).

5.2.10 Transportation

The siting, construction, and operation of new electric generation facilities could affect transportation systems in the proposed project areas. In some scenarios it is possible to affect rural upstate New York, although significant permanent impacts generally are not expected. Transportation modes and facilities that could be affected include the existing highway network, especially along the Hudson corridor and in New York City; the rail network, including Amtrak, if rail transport is required for new fuel delivery; water transport (particularly in New York Harbor, e.g., floating power plant and the Hudson River), if barge transport is required for fueling of power plants; and air traffic, particularly in the vicinity of tall stacks.

Permanent effects on most transportation networks are not expected from the addition of new generation facilities. However, the transmission of power from a new plant would require new transmission lines, although not as extensive as those in the transmission-only alternatives, that may have similar, if smaller, impacts. The siting of tall stacks on new generation facilities could pose an obstacle to air traffic, especially near airports. During construction, the transportation impacts of a new facility would be similar to those described in Section 5.1.10. During operation, regular and frequent fuel and supply deliveries by train, barge, or trucks may strain the existing road network in many localities.

5.2.11 Energy

The purpose of the Contingency Plan is to preserve reliability of the system if the IPEC is retired. The potential portfolio of power generation projects would meet all or part of the 1,350 to 1,375 MW electricity deficiency through gas and oil (dual fuel) generating capacity.

The generation alternatives would contribute to the reserve margin, which increases the reliability of the electrical system. As described in Section 4.11.2, the projected installed reserve margin for 2013 is 5,657 MW. The proposed generation alternatives represent a significant increase in installed capacity needed to satisfy the reserve margin requirement, not considering other potential increases and decreases in generating capacity. The reserve margin represents the capacity over 100% of capacity needed to serve forecasted peak, not including import and demand response capabilities. Maintaining an adequate reserve margin provides the NYISO with the to balance supply and demand on the electrical system while maintaining reliability during critical periods, including peak demand, shutdown of generation sources, and unforeseen equipment failures.

The generation alternatives would increase generation capacity from fossil fuels. As described in Section 4.11.2, fossil fuels represent more than half (66%) of New York State's energy generation capacity (nuclear power represented 14% in 2012 [NYISO April 2013]; the actual amount of electricity supplied by this generation capacity is discussed below). The generation alternatives, which would largely use natural gas, would increase the fossil fuel generation capacity by approximately 7% of 2013 levels. An increase in natural gas generating capacity would be expected to have several impacts, including maintaining the trend of electricity prices closely tracking the price of natural gas and decreasing the fuel diversity of the state's generating capacity (see Figure 4.11-3). Natural gas accounted for the majority of new capacity additions since the mid-1990s in the U.S. and has essentially replaced coal as the base load fossil fuel in New York. Due to plentiful supply and projected low prices, gas remains the most likely fuel for new generation units in New York State. The National Association of Regulatory Utility Commissions (NARUC) 2004 Resolution Supporting Fuel Diversity for Electric Generation noted that a choice of fuel mix for electric generation takes into account several factors, including long-term economic costs,

environmental effects, power system reliability, and price volatility (NARUC 2004). NYISO evaluated the concept of fuel diversity, finding that it had different meanings depending on perspective, with direct risks or benefits being local and regional in nature. The NYISO evaluation pointed out that additional natural gas generation would increase New York City's dependence on natural gas in the short term (NYISO 2008). The retirement of Indian Point would tend to decrease fuel diversity and increase New York's dependence on gas. Because electricity prices closely track gas prices, future gas prices will likely increase electricity prices.

The generation alternatives would increase the supply of electricity from natural gas generation capacity, which could impact wholesale and retail costs of electricity by shifting supply to or from lower priced to higher priced sources of power, depending on whether the transmission system is in normal operation or during periods of high demand. The price of electricity varies depending on demand, which changes based on time of day, weather, and season of the year. The location of the generation capacity also affects the cost of electricity, primarily because of the transmission constraints in the New York City area. In New York, lower-cost electricity supplies include coal, hydroelectric, wind, and nuclear. More expensive electricity has generally been associated with plants fired by gas and oil, especially as used in peaking plants. NYISO dispatches generators starting from the lowest-priced bids progressing to higher-priced bids. In the short term, a higher price for generating capacity would increase the use of the lower price generating supply until it is completely committed. In the longer term, since the price of electricity from natural gas is higher than some other sources, an increase in supply of electricity from natural gas would be expected to increase the overall price of electricity.

During periods when demand is high, additional natural gas generation capacity would supply electricity before other higher priced sources, such as peaking facilities and oil-fired generation, such that these sources may not be dispatched. Therefore, during high demand or emergency periods, it is difficult to predict if the generation alternative would supply electricity at a higher or lower price than the No Action alternative, since the No Action alternative may rely more heavily on transmission sources that utilize hydroelectric or other lower-cost sources.

5.2.12 Noise and Odor

5.2.12.1 Noise Impacts

The generation alternatives would require new construction. Noise impacts would result from direct construction of the generation facilities and from indirect construction that may be required for appurtenant facilities for the acquisition of resources (e.g., additional drilling to meet the necessary oil or gas needs).

Following construction, noise would be generated by process equipment such as steam generators, steam turbine generators, air intakes, air compressors, cooling towers, rooftop ventilation fans, site vehicles, and transmission lines.

Noise would also be generated by the automobiles, trucks, and trains needed for personnel, equipment, fuel, or other supplies needed to keep the generation facilities running.

The new generation facilities proposed by the generation alternatives would be subject to Article 10, SEQRA, and/or NEPA processes, which would include identification and potential mitigation of site-specific noise impacts, if present.

5.2.12.2 Odor Impacts

Operation and construction of new generation facilities could result in discernible odors in the vicinity of project operations. Odor impacts would be caused by combustion exhaust from vehicles and generating facility emissions, or emissions of gaseous substances including odorized fuel gas during testing or maintenance activities. Additionally, chemicals used in the generation process such as chlorine or ammonia could leak and cause unpleasant odors.

5.2.13 Public Health

There are potential indirect health and safety impacts from the portfolio of power generation projects proposed. Airborne emissions from combustion of distillate fuel oil and natural gas consist primarily of water vapor and carbon dioxide. Also emitted are low levels of PM, nitric oxide (NO), carbon monoxide (CO), carbon dioxide (CO_2), small amounts of NO_2, nitrous oxide (N_2O), and SO_2, and trace amounts of volatile organic compounds (VOCs), methane, and metals (EPA 1998, 2010).

During the peak construction year of the projects associated with the Contingency Plan, construction-related truck traffic is anticipated to increase, potentially contributing to increases in PM levels in the area. PM consists of particles found in the air, including dust, dirt, soot, smoke, and liquid droplets (EPA 2013c). Particles less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. "Fine" particles, those less than 2.5 micrometers in diameter ($PM_{2.5}$), are believed to pose the greatest health risks: because of their small size (approximately 1/30th the average width of a human hair), fine particles can lodge deeply into the lungs (EPA 2013c).

The causes of asthma and its increase over the last two decades are not known, and the triggers for its exacerbation are only partially understood. The potential relationships between vehicular exhaust resulting from increased truck traffic, emissions of PM from fossil fuel-burning power plants, and asthma, especially in communities with high rates of asthma, requires further study. The EPA has noted that approximately one out of every three people in the United States is at a higher risk of experiencing health effects related to $PM_{2.5}$ (EPA 2013c). Active children are at high risk due to the amount of time spent playing outdoors and the fact that their bodies are still developing. Elderly populations also are at risk. People of all ages who are active outdoors are at increased risk because, during

physical activity, $PM_{2.5}$ penetrates deeper into the parts of the lungs that are more vulnerable to injury (EPA 2013c).

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion is usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems (EPA 1998).

Operating power plants emit fossil fuels air pollutants into the atmosphere, many pollutants of which have been identified and are regulated by federal and state environmental regulatory agencies. Public exposure to air emissions (air pollution) is regulated by the U.S. Environmental Protection Agency (EPA) through the National Ambient Air Quality Standards (NAAQS) for major air pollutants, including sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), ozone (O_3), particulate matter ($PM_{2.5}$ or PM_{10}), and lead (Pb). NYSDEC is charged with enforcing the NAAQS by constructing statewide emissions inventories which, in turn, lay the groundwork for the development of control strategies for pollutants from facilities and other stationary sources (NYSDEC 2013d).

NO_X and volatile organic compounds (VOCs) are components of ozone formation. Ozone is a principal component of smog and can result in respiratory health and other environmental effects. Small particulates have been shown to cause respiratory problems because they can penetrate deeper into the lungs than the larger particulates. Reduction of NOx reduces the potential for ozone formation, thus reducing smog, human respiratory impacts, and acid deposition. SO_2 reductions result in reduced acid deposition and reduced fine particle formation. CO_2 reductions reduce the potential for global warming and contribute in part to reduction of the many undesirable consequences of global warming (New York State DPS August 2004). Adverse health effects from breathing air with a high $PM_{2.5}$ concentration include premature death, increased respiratory symptoms and disease, chronic bronchitis, and decreased lung function particularly for individuals with asthma (NYSDEC 2013f). Since 1999 NYSDEC has been collecting real-time direct reading hourly $PM_{2.5}$ measurements statewide to complement the EPA's Federal Reference Method network (NYSDEC 2013f).

Federal emissions standards are based on health effects research. In an effort to minimize pollutants released to the air, best-achieving emission control technologies are often made a requirement for plant operation. Even though a power plant's emissions are required to meet air emission standards, more sensitive individuals might not be adequately protected. More vulnerable individuals, such as the elderly, the sick, and the very young might experience health problems when air pollution levels increase in an area.

In the absence of a plan (the No Action alternative), these air pollutants would likely be at higher concentrations because of the necessity to dispatch sources of electricity that are older and less efficient. Thus, compared with the No Action alternative, all the alternatives considered under the Contingency Plan would have smaller public health impacts from air quality.

5.2.14 Growth and Character of Communities

The potential impacts of the generation facilities on growth and community character are substantially similar to those described with regard to the transmission facilities in Section 5.1.14.

Although generation facilities may contribute a more industrial character to their surroundings than do transmission facilities, the generation facilities associated with the Contingency Plan are mostly slated for development at sites that are either currently used for similar purposes or other previously disturbed sites. Consequently, their effect on community character is incremental and likely to be relatively minor. Where generation facilities are developed on previously undisturbed sites, they are more likely to contribute an increasingly industrial character to their community setting, mitigation measures notwithstanding.

5.2.15 Socioeconomics and Environmental Justice

5.2.15.1 Economic Output, Employment, and Labor Earnings

The construction of generation facilities would generate short-term socioeconomic impacts. Economic output in the local economy would increase as a direct result of hiring local construction firms and workers during the construction period. The local economy would also experience positive indirect and induced economic output impacts. Since the construction costs are one-time expenditures, the positive economic output impacts of construction activities would be temporary and exist only while construction is occurring.

The construction activities would also lead to a direct positive employment impact on the local economy as local construction workers are hired. A typical power plant in the 600 to 1,000 MW range might employ 1,000 workers for 12 to 18 months. In addition to the direct employment impacts described above, construction activities would also create additional indirect and induced additional employment in other sectors of the local economy. To the extent that local construction workers are hired, this might result in the hiring previously unemployed construction workers. Moreover, it is likely that some of the new, indirect, and induced jobs would be filled by local, previously unemployed workers.

Labor earnings in the local economy would be positively impacted by the direct, indirect, and induced employment that would result from construction activities. During the operational life of a power plant, a permanent workforce, smaller than that during the construction period, would be employed to operate and maintain the plant and local firms would be hired and some materials and services would be sourced locally, all of which would have a positive direct impact on the local

economy. A typical power plant in the 600 to 1,000 MW range would employ about 100 full-time workers. This direct economic output impact would be smaller in annual magnitude than that during the construction period but would last over the operational life of the power plant. The local economy would also experience positive indirect and induced economic output impacts during the life of the power plant.

There would be a permanent increase in employment in the local economy when workers are hired to operate and maintain the power plants. The number of workers required to operate and maintain the plants would be smaller than the number of workers required to construct them, but the duration of the impact would be greater. Local unemployment would be reduced by the direct hiring of local workers to maintain and operate the power plants and by the indirect and induced employment impacts.

Labor earnings in the local economy would be positively impacted by the direct, indirect, and induced employment that would result from the operation and maintenance of the power plants.

5.2.15.2 Population and Housing

During construction, potential impacts on population and housing would be similar to the potential impacts described above under Section 5.1.15.2, but would be larger because of the larger workforce required to construct power plants.

During the operations period, a permanent workforce, smaller than that during the construction period, would be employed to operate and maintain the plants. This would result in an increase in the demand for permanent housing. However, unless the community is very small and isolated, this extra demand would likely have little impact on house prices.

5.2.15.3 Public Services

During construction, potential impacts on public services would be similar to the potential impacts described above under Section 5.1.15.3 but would be larger because of the larger workforce required to construct power plants.

Local schools would have to accommodate the children of those permanent workers at the power plants who moved in from outside the local area. Additional expenditures on emergency services such as fire, police, and first responders might occur during the operations period. Also, additional expenditures on public water supply systems, wastewater treatment and solid waste management might be required to serve the plant and the additional population.

5.2.15.4 State Income and Local Sales and Property Taxes

During construction, potential impacts on state income and local taxes would be similar to the potential impacts described above under Section 5.1.15.4 but would be larger because of the larger workforce required to construct generation facilities.

New York State would experience a permanent increase in its personal income tax receipts as a result of the employment created by the power plants.

In recent years, new power plants in New York State have been able to make payment in lieu of taxes (PILOT) agreements under which they have been exempted from paying real property taxes and have, instead, negotiated agreements with local government under which they make annual payments in place of paying property taxes. Hence, local governments would be expected to receive extra revenue from the owners of the generation facilities.

Local sales tax revenues would experience a permanent increase due to the direct, indirect, and induced impacts of expenditures by plant employees and plant expenditures on locally provided materials and services.

5.2.15.5 Environmental Justice

The construction and operation impacts of a generation project on various resource areas, and subsequently, on any identified environmental justice areas, are described in various sections above and may include land use, open space, socioeconomic, and quality of life (noise, odor, air quality) impacts.

5.2.15.6 Property Prices

It is possible that property prices near new power plant sites would be negatively impacted by construction of a generation facility; however, most of the proposals are for re-powering existing sites or construction on former industrial sites, where property prices already reflect any impact from proximity to a power plant or industrial facility.

5.2.15.7 Cost of Electricity

Implementation of generation solutions could impact the price of electricity. New generation facilities are more efficient and have lower running costs than older plants. Without a Contingency Plan, when demand increases, all available power generation would be brought on-line to meet demand. Since lower cost sources are used first, the additional generators brought on-line during peak periods would be higher cost sources (see Section 5.2.11). The availability of new generation facilities would reduce reliance on those more expensive resources. This would enable consumers to continue to enjoy the benefits of efficient supply. The negative impacts that would result from the lack of such supply are discussed in Section 5.4.15, which discusses the socioeconomic impacts of the No Action alternative.

5.2.15.8 Greater Reliability of Electrical Power

The operation of the generation facilities compared with the No Action alternative would result in a more reliable supply of electricity. This would enable consumers to continue to enjoy the benefits of such supply. The negative impacts that would result from the lack of such supply are discussed in Section 5.4.15, which discusses the socioeconomic impacts of the No Action alternative.

5.3 Battery Storage

5.3.1 Land Use

Land use impacts that may result from the development of battery storage facilities are likely to be much smaller than those for a new power generation facility. Battery storage facilities are relatively passive and would be considerably smaller, on the order of 2 acres per 100 MW. They can more easily be located in urban areas near the electric loads they would serve on relatively small parcels. They can be more easily sited as "in-fill" development in areas of existing industrial and commercial areas and may be a compatible use for a brownfield site.

Transmission of power to and from any battery storage facility would be necessary, and impacts from siting transmission lines would be similar to those of any new transmission line solution. However, the scope of these impacts would likely be smaller due to the smaller capacity and shorter transmission distances that would be required. Battery storage lends itself to distributed facilities, sited near large capacity power lines and near load centers. These facilities would be small and can be sited to minimize impacts.

If sited in an urban area with industrial or commercial land use, any of the permanent land use impacts of a battery storage project would mostly be limited to temporary impacts experienced from any construction project.

5.3.2 Water Resources

Water quality impacts related to the construction of battery storage facilities are similar to those of the construction of new commercial or small industrial facilities. Removing vegetation during construction could lead to stream bank erosion and reduce bank shading thereby increasing water temperatures and contributing to lower oxygen levels, increased aquatic plant and algal growth, and adverse impacts on native aquatic plants and animals.

Battery storage facilities are not generally associated with high volumes of water use. However, impacts on water quantity could occur from the interruption of stream or river flow during or resulting from construction activities such as moving soil, placing fill material, or using heavy equipment.

5.3.3 Plants and Animals

The battery storage project is proposed at existing buildings or industrial or commercial sites. No new impacts on vegetation and wildlife would occur are anticipated to occur as a result of the battery storage alternative.

5.3.4 Agricultural Land Resources

No impacts on agricultural land resources would be expected as a result of the battery storage alternative because the facilities would not be constructed in an agricultural setting.

5.3.5 Aesthetic Resources

Many of the factors that contribute to the visual impact of battery storage facilities are similar to those of the generation alternatives. Although battery storage facilities would be generally smaller than generation facilities, the discussion of these factors with regard to generation facilities applies to battery storage facilities as well (see Section 5.2.5).

The physical characteristics of battery storage facilities may change from one project to another in terms of the size of the facility (e.g., 100 MW, 300 MW), but the general form and materials of battery storage facility construction do not vary substantially. Battery storage facilities typically include a building envelope that is industrial in appearance, with a low profile and regular shape (i.e., single-story rectangular structures made of corrugated steel or similar materials). Although battery storage facilities may have tie-in structures, ventilation requirements or other needs specific to their use, they are not typically visually obtrusive and may be designed in a manner similar to other operations and maintenance facilities. Some facilities may be sited in existing buildings, in which case the visual impacts would be minimized.

5.3.6 Historic and Archaeological Resources

If batteries are stored in an existing building there would be no new historic or archeological impacts from this alternative. If new buildings are constructed, impacts of battery storage facilities would be similar to the impacts of transmission alternatives described in Section 5.1.6.

5.3.7 Open Space and Recreation

Siting and constructing new battery storage facilities would likely take place in established industrial areas, brownfields, or established commercial areas such as industrial/commercial parks and they would not likely affect significant open space or recreational areas. However, any site-specific construction, including that related to electric transmission in and out of the storage plant in an open space or potential recreation area, would be subject to all current environmental regulatory requirements under Article VII or Article 10 of the PSL or SEQRA review prior to construction.

Transmission of power to and from any battery storage facility would be necessary, and impacts from siting transmission lines would be similar to those of any new transmission line solution. However, the scope of these impacts would likely be smaller, due to the smaller capacity and shorter transmission distances that would be required.

5.3.8 Critical Environmental Areas

The siting and development of new battery storage facilities is not likely to impact CEAs during construction or operation because such facilities generally are expected to be sited in existing industrial or other heavy-impact land use areas that do not contain CEAs. Nevertheless, any site-specific proposal must review the area of impact for CEAs, especially those that are potential brownfields that

were designated as threats to health and the environment. These are typically former landfills, particularly in Dutchess County, and areas that have contaminated drinking water supplies.

5.3.9 Air Resources

Projects to provide up to 300 MW of battery storage have been identified for inclusion in the Contingency Plan. Battery storage would rely on existing electricity generation and would be used to address peak load conditions by saving electricity produced during low-load conditions and provide that electricity back to the grid when needed. Because there are losses of electricity due to the conversion of the electricity to chemical storage in the batteries, additional generation would be required to offset these losses upon conversion. This could be offset by efficiencies gained from using generators that would otherwise ramp down during low-load conditions. The potential change in air emissions would depend on the source of the electricity obtained for storage, but it is not feasible to predict if using battery storage alternatives will have an adverse or beneficial impact on air quality.

Construction equipment and commuting by construction workers would result in temporary and minor increases in air emissions. Detailed assessment of the construction of these facilities will require subsequent SEQRA review and compliance because site-specific impacts cannot be addressed or analyzed in this document.

5.3.10 Transportation

The siting, construction, and operation of a new battery storage facility is not likely to affect transportation systems in the proposed project areas. Construction activities would have minimal impacts on local road networks. New transmission lines may be required for delivery of power to and from a battery facility. The impacts of these transmission lines on transportation infrastructure and traffic patterns would vary according to the corridor length and whether the lines are overhead or underground. Transmission lines are most likely to be buried in urban areas, which could temporarily disrupt local traffic during installation in the existing highways ROWs.

Battery storage operations are relatively passive. During the life of the project, components would require periodic replacement; however, the impacts of these activities on local transportation networks would be negligible. The extent of site-specific construction impacts associated with the construction of any new energy facility would vary according to the location of the site. If properly sited in an area of compatible use, any impacts related to transportation would likely be limited to the temporary congestion typical of a construction project of its size.

5.3.11 Energy

The potential portfolio of battery storage projects would meet part of the 1,350 MW to 1,375 MW electricity deficiency in constrained areas, specifically Zones I, J, or K (see Section 2, Figure 2-1).

The battery storage alternative could increase the reliability of the transmission system during critical periods, specifically in Zones I, J, or K, which represent the highest demand in New York. Short-term fluctuations in the balance between supply and demand are managed through the use of the ancillary service known as Regulation (NYISO December 2009). NYISO accomplishes this by requesting generators to raise or lower output to follow moment-by-moment changes in load (NYISO 2013). Base load generating resources, including nuclear and fossil fuels that provide the majority of generating capacity and supply in New York, are most efficient when operating continuously at a constant load, even overnight when demand is low. Battery storage facilities store the electric energy generated overnight when demand is low and release it during the peak hours of the day when demand is greater. NYISO reports that the transmission constraints on this area limit the flow of electricity to several hundred megawatts below the amount needed during peak demand periods (NYISO 2012). Battery storage capacity would provide NYISO with additional resources to respond to peak demand needs on short notice and increase the reliability of the electric transmission system.

The battery storage alternative could reduce the cost of electricity during critical demand periods, compared with the No Action alternative. The minimum and maximum price for energy in the New York market are greatest between hours in the middle of the night that represent the lows of energy demand and price and the hours in the middle of the day, which represent the highs of energy demand and price, and during extreme temperatures in the summer (NYISO 2009). Energy would be stored during periods of lower price and lower demand. Use of this stored energy during high demand and higher price periods could lower the overall cost of providing electricity. In addition, the availability of the stored energy during peak hours could reduce the necessity for dispatching expensive peaking generators, which are typically powered by fossil fuels (NYISO 2009).

5.3.12 Noise and Odor

5.3.12.1 Noise Impacts

The construction and operation of battery storage facilities may generate noise associated with the transmission lines or substations (e.g., humming or buzzing) and construction of the facility.

5.3.12.2 Odor Impacts

Odor impacts are not expected to result from operation of a battery storage facility. Operations and transmission of electricity may produce a limited amount of ozone, but not in quantities expected to produce complaints about odor.

5.3.13 Public Health

The construction of a battery storage facility would require a building of approximately 500 feet by 150 feet, or just less than 2 acres, for each 100 MWh of storage. Construction of the facility would potentially have temporary impacts on public health or health-related quality of life. Impacts associated with the construction of the facility would be much like those of the construction of any

industrial facility of similar size—air emissions and noise generated by the construction equipment and activities. If the facility were at a new site and not re-using an existing building, grading and clearing land for the facility and trucks used to haul away material and bring in necessary construction materials would have the potential disturb health-related quality of life of surrounding property owners. Operations of the battery storage facility would not impact public health; however, some of the storage technologies use flammable lithium substrates that present a fire risk.

5.3.14 Growth and Character of Communities

The potential impacts of the battery storage alternatives on growth and community character are substantially similar to those described with regard to the generation alternatives in Section 5.2.14. However, because battery storage facilities are likely to be housed within existing industrial areas or brownfields, existing buildings or new buildings that can be designed to be compatible with other land uses, their impact on existing community character is likely to be relatively small.

5.3.15 Socioeconomics and Environmental Justice

The construction and operation of the battery storage facility could result in both short-term and long-term socioeconomic impacts on the local areas. These impacts are the same types as those described above in Section 5.1.15 but would be localized in the neighborhood hosting the building that would house the battery storage facilities and the interconnections to the grid. The impacts would be temporary during construction.

The permanent impacts associated with the battery storage alternative would be related to the small workforce required for the projects, and the impact of the alternative on electricity price and reliability. As described in Section 5.3.11 of this Final GEIS, the battery storage alternative would have a positive impact on electricity prices since batteries would be charged at times when electricity is available at low cost (e.g., nighttime) and then sold on the grid when the demand is high. This effectively avoids dispatching more expensive electricity.

5.4 No Action

5.4.1 Land Use

The No Action alternative would not generate land use impacts from new construction. However, electricity consumers may seek alternative means to meet their energy needs if supplies are not reliable or load-shedding is required. Installing and using smaller power generation facilities and using personal or emergency generators could cause adverse impacts but are not likely to lead to significant changes in land use.

5.4.2 Water Resources

The No Action alternative assumes that a deficiency of up to 1,375 MW of power would potentially have to be generated by implementing a NYISO emergency operations plan. Methods could include re-starting less energy-efficient plants

that have older technologies and use more water per MWh of generation. Emergency efforts could also include conservation or planned brown outs.

Average water consumption for fossil fuel electric generation is provided in Table 5-1. Table 5-1 compares consumption in millions of gallons for different energy sources and technologies. Water uses for oil-burning plants are comparable to natural gas per MWh. Consumption of water is water lost, whereas withdrawal refers to water that is returned to the source after it is used to absorb heat. The No Action alternative would use a mix of these technologies that would total 1,350 to 1,375 MWh.

5.4.3 Plants and Animals

The No Action alternative would not result in direct impacts on vegetation and wildlife.

Indirect impacts would include increased emissions from diesel plants with no contingency plan in place. These emissions could potentially affect the health of vegetation and wildlife via the potential impacts discussed in Section 5.2.3.

5.4.4 Agricultural Land Resources

There are no direct impacts on agricultural land resources as a result of the No Action alternative.

5.4.5 Aesthetic Resources

The No Action alternative may impact aesthetic resources to the extent that previously seldom-used generation facilities would be brought on-line, which could introduce cooling tower plumes and stack emissions.

5.4.6 Historic and Archaeological Resources

The No Action alternative is not likely to result in impacts on historic and archaeological resources.

5.4.7 Open Space and Recreation

The No Action alternative would deal with the loss of generating capacity by inducing subsequent activities that result in numerous small-scale impacts. These impacts would have less direct effects on open space and recreational areas. Some impacts could occur near existing power plants with increased output, but behind-the-fence generation (i.e., individual generators at the point of demand) would likely create higher levels of pollution, noise, and odor that could indirectly affect open space by limiting recreational use and potentially damaging natural resources (see Section 5.2.7).

5.4.8 Critical Environmental Areas

The No Action alternative would deal with the loss of generating capacity by inducing subsequent activities that result in numerous small-scale impacts. These impacts would have a smaller scale effect on CEAs than the transmission or generation alternatives. Some impacts could occur from behind-the-fence

generation (i.e., individual generators at the point of demand) that would likely create higher levels of pollution, noise, and odor, but these generators would be sited at existing industrial or commercial locations and would not likely affect CEAs. This could indirectly affect CEAs by limiting their recreational use and potentially damaging their natural resources.

5.4.9 Air Resources

Under the No Action alternative, the New York City region would rely primarily on the limited available existing natural gas and oil generators. The lack of a contingency plan would require NYISO to make maximum use of existing generating capacity in New York State and in the surrounding regions. New York State-obtained electricity from a variety of sources, inside and outside the state, and increasing generation would result in an increase of emissions from existing electricity sources.

Table 5-1 lists the average emissions per MWh produced by the various types of electricity generation in New York. A mixture of these sources would be used to meet demand under the No Action scenario. The choice of sources would be limited, higher priced, and less efficient and more polluting plants would be utilized during periods when the demand dictated their use.

The increased use of natural gas and oil electricity sources would increase emissions in the New York City metropolitan area because existing sources would be required to produce more electricity, using more fossil fuels. Some sources may require expansions of air quality permit emission limits. If more people drive because of actual or anticipated disruption in commuter rail service, or if drive times are increased because of failed traffic controls (see Section 5.4.10), air emissions from vehicles would increase.

Some of this increase may be off-set or mitigated by demand reduction programs, including existing NYSERDA, LIPA, and NYPA programs to support installation of on-site generation such as solar and small wind power facilities (NYSERDA 2013).

5.4.10 Transportation

Transportation modes and facilities that could be affected if no action is taken include the New York City commuter system, especially the New York City subways and the electrified commuter rails, including the Metro North line, which could suffer interruptions if shortages of electricity occurred. In addition, the railroad network, particularly the electrified portion of Amtrak between New York and Albany could be affected. Motor vehicle traffic on the highway network could be impacted, particularly on New York City streets, which could suffer loss of traffic controls if the electrical system failed.

5.4.11 Energy

In the event that IPEC is no longer in service, the lack of a Contingency Plan would require NYISO to make maximum use of existing generating capacity and

imports from the surrounding regions. NYISO would request electricity supply from the available capacity of generation resources during projected peak demand for electricity, including existing in-state generation capacity and imported power. The projected statewide installed capacity reserve margin for 2013 is 5,657 MW; however, the installed reserve margin in 2016 would be affected by other potential increases and decreases in generating capacity related to environmental regulations and market conditions. The use of existing generating capacity would mean that additional gas- and oil-fired peaking units would operate at a higher price and with higher emissions than more efficient base load facilities. Retirements of existing generation are anticipated as a result of several environmental regulations with compliance deadlines in 2015, including mercury and toxics standards, best technology available for cooling water intake structures, and the Cross State Air Pollution Rule, which could also reduce the reserve margin. At the same time, as of March 31, 2013, more than 6,000 MW of new power projects have been proposed in New York, including natural gas, gas and oil, and wind (NYISO 2012).

In the short term, in the event that the IPEC is no longer in service, the lack of a Contingency Plan could decrease the amount of capacity available to meet the reserve margin, which would decrease reliability of the transmission system and may result in implementation of NYISO emergency operations. NYISO evaluates the amount of generation and demand-side resources needed to minimize the probability of an involuntary loss of firm electric load (the LOLE). The state's bulk electricity grid is designed to meet the LOLE that is not greater than one occurrence of an involuntary load disconnection in 10 years, expressed mathematically as 0.1 days per year (NYISO 2012). The reserve margin installed capacity requirement and management of the loads on the transmission system are intended to ensure that the involuntary load loss does not occur. In the event that IPEC is no longer in service and there are no replacement resources under a Contingency Plan, a reduction in the capacity available to meet the required reserve margin would have the potential to cause a loss of load during periods of high demand, particularly on a very hot summer day. The degree of the impact would be defined by NYISO's emergency categories: warning, alert, major emergency, and restoration. For all emergency categories, NYISO coordinates with the affected TOs to implement the following corrective actions:

- Curtailment of interruptible load and emergency demand response programs
- Voltage reduction
- Curtailment of non-essential market participant load
- Voluntary curtailment of large load service entities customers
- Public appeals (NYISO June 2013).

The lack of a Contingency Plan in the event of an IPEC shutdown would result in violation of the resource adequacy requirement of the NPCC and the NYSRC beginning in 2016, and therefore, may result in interruptions of service during

peak summer demand periods. Downstate New York, which includes Zones I, J, and K, regularly relies on power transmitted from upstate as well as out-of-state generation resources. Under normal weather conditions, nearly 1,990 MW are supplied from upstate generation to meet the power needs of the southeast portion of the state. Extreme weather, such as heat waves, can increase this power transfer level to rise to nearly 2,800 MW. However, transmission constraints limit the ability to move power into the region to about 3,000 MW (NYISO 2012). The lack of a Contingency Plan would leave this condition in place, or in the short term exacerbate this condition due to changes in market supply, consumer demand, and summer temperatures. Overall, the lack of a Contingency Plan would increase the potential for interruptions of service in downstate New York during critical demand periods.

5.4.12 Noise and Odor

5.4.12.1 Noise Impacts

Actions taken to meet the electrical demand under the No Action alternative could create noise impacts. Sources of generation not normally used could create noise. In a peak demand period where forced load shedding could occur, individual users or businesses may use alternative means to meet their energy needs such as smaller power generation facilities and the use of personal or emergency generators to make up the shortfall. This may result in intermittent noise impacts on receptors throughout the affected electrical distribution areas.

5.4.12.2 Odor Impacts

Odor impacts may potentially result from exhaust produced by the combustion engines used by the temporary power generation solutions such as personal generators, emergency generators, or other personal or business power generation solutions. This may result in intermittent odor impacts on receptors throughout the affected electrical distribution areas.

5.4.13 Public Health

The absence of a Contingency Plan would result in short-term and long-term impacts and responses, including maximum use of existing available generation. Public health impacts from the maximum use of energy-generating facilities in New York State would potentially include respiratory issues, including asthma, due to potentially more air emissions from generation facilities that generate higher air emission standards, and increased use of diesel generators that are high in particulate emissions. In an emergency situation, force load shedding could impact public health if air conditioning, communications, and public transit are impaired.

As described in Section 4.11.5, customers who depend upon utilities for life-support equipment would be notified if a power outage were planned. If electricity were to be curtailed because of the inability of the utilities to meet power demands, those customers who require life-support equipment would be identified from the files maintained by the electric service providers and visited by field services representatives. If necessary, special arrangements and possibly

transportation to a medical facility with an emergency generator would be provided. Nonetheless, extended or more frequent power outages resulting from the No Action alternative could put these customers at greater risk of a medical emergency.

5.4.14 Growth and Character of Communities

To the extent that a more costly supply of electricity would influence business attraction and expansion, the No Action alternative may impact different communities and their respective character in different ways. Higher cost electricity, or a less reliable supply, could influence the siting of large industrial facilities. For example, if the affordability of electricity were to become a limiting factor in the commercial/industrial growth of exurban areas, the character of those areas may evolve over time toward that of a sparsely developed bedroom community. Similarly, if large and long-term increases in the cost of electricity correspond to generally higher costs of living, a decrease in population and economic growth could affect both the vitality and demographics of communities of any type (i.e., rural, suburban, or urban). However, such potential scenarios depend on many interdependent factors; it is not expected that the No Action alternative, in and of itself, will result in substantial growth or substantial restrictions on growth for otherwise affected communities.

5.4.15 Socioeconomics and Environmental Justice

As discussed in Sections 3.5 and 5.4.11 of this Final GEIS, the No Action alternative would require the dispatch of electricity from available sources. Some of these existing sources are only used when the less expensive base load facilities are not able to meet demand. These "peaker" plants and other facilities are not routinely used because they produce electricity at higher cost, and sometimes with higher levels of air emissions. Their advantage is that they can be turned on and off faster than the base load facilities, which are more efficient. During a high load period, such as a summer heat wave, all available power generation and transmission would be implemented. Electricity from outside the region might be limited because in a high-demand scenario it is likely that the demand outside the region would also be high.

Costs of electricity tend to have the greatest impacts on low-income people. Large users would be encouraged to shed load. Some customers would run their backup generators, which add costs to their operations, or they might furlough workers. High costs and less reliable service could also discourage companies from locating to the region, thus inhibiting some economic development. In the extreme scenario, it is possible that demand would exceed supply and forced load-shedding would occur. This could impair services that use electricity, such as railroads, which could cause temporary disruptions to economic and social activities. Over time (several years), the market in the No Action scenario would respond to the demand and new generation and/or transmission solutions would be developed and conditions would stabilize.

6 Cumulative Impacts

Consistent with the mandate of the SEQRA, this Final GEIS analyzes cumulative impacts where such impacts are "applicable and significant" (6 NYCRR 617.9). Cumulative impacts are two or more individual environmental effects, which, when taken together, may become environmentally significant or may compound or increase other environmental effects. Cumulative impacts are most likely to occur when a proposed action is added to other past, present, or reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over time. Accordingly, a cumulative impact analysis identifies and defines the scope of other actions and their interrelationship with the proposed action or its alternatives if they overlap in space and time.

This section examines the potential cumulative impacts that may result from the implementation of the Contingency Plan. Potential environmental impacts from the four alternatives—transmission facilities, generation facilities, battery storage, and no action—were described above in Section 5. The resource areas that could be impacted cumulatively include land use, water resources, plants and animals, agricultural land resources, aesthetic resources, historic and archaeological resources, open space and recreation, critical environmental areas, energy, transportation, noise and odor, public health, and growth and character of communities. For most resources, the potential impacts are local in character and thus would not be cumulative unless projects are constructed close to one another.

In addition, the potential for cumulative impacts with other actions undertaken in the future pursuant to Governor Andrew Cuomo's "Energy Highway Blueprint" plan is also considered in this Final GEIS.

6.1 Transmission Facilities

The transmission projects discussed in this evaluation either propose using existing rights-of-way or they are separated from each other by miles, except at shared connection points, and are not likely to produce cumulative impacts on environmental resources.

There could be potential cumulative impacts of multiple transmission facilities on energy. By providing more opportunities to transmit energy from sources outside southeast New York, transmission projects could improve reliability and alleviate

the congestion that currently exists. The potential impacts on energy resources are described in more detail in Section 5.1.11.

Cumulative impacts on socioeconomic conditions are possible and would be related to potential changes in electricity rates. As explained in Section 5.1.15, the impact of adding more transmission facilities would provide the NYISO with more flexibility in dispatching power from different suppliers. The NYISO would select for lower cost sources, so the addition of transmission facilities could help lower the cost of energy.

Potential cumulative impacts on air quality from the construction of the transmission facilities would be local during construction and are not likely to occur because of the geographic separation of the proposed projects. For example, most of the emissions expected from the transmission facilities would be from construction equipment and dust from earthmoving, with substantially lower emission rates occurring throughout the operation and maintenance phases.

Other than at common interconnection substation locations where two projects may be located close to each other, it is not expected that two separate transmission projects would be close enough to each other to generate significant adverse cumulative impacts during construction and operation. Expansion of existing substations to accommodate additional transmission facilities may be necessary, particularly if multiple major facilities would interconnect to one station. However, the substation design features that may be needed to accommodate multiple interconnecting facilities are not likely to have any significant cumulative environmental impact.

Operational effects on air quality resulting from transmission projects would not result directly from the installation of transmission lines, but rather would be indirect effects, resulting from changes in the dispatch of electric generating facilities interconnected to the statewide grid. Dispatch would be affected by market conditions, fuel prices, plant availability and other factors. Given the predictions that transmission upgrades will enhance deliverability of renewable energy production and clean gas-fired facilities from upstate areas, there should be at most only minor negative cumulative impacts on air quality resulting from the addition of transmission facilities; because renewable or other clean generating sources may be favorably affected by the addition or enhancement of transmission facilities, the cumulative impacts on regional air quality may be neutral or net positive.

6.2 Generation Facilities

As discussed in Section 2.3, 4.11.4, and Section 5.2.11, the purpose of the Contingency Plan is to preserve system reliability upon the retirement of the IPEC. As explained in Section 5.2.15, the potential socioeconomic impacts of the generation alternative are difficult to predict, as are the cumulative socioeconomic impacts. However, it is likely that, as compared with the No Action scenario, a

cumulative impact of implementing the generation solution may be to mitigate the energy price effects of an IPEC retirement.

Cumulative air quality impacts would occur if emissions from the new plants accumulate and increase levels of air pollutants at a regional level. Air emissions, primarily occurring during operations, would take place under this generation alternative. Principal regulated air emissions from fossil fuel power plants include CO, SO_x, NO_x, Hg, PM_{10}, and $PM_{2.5}$. In addition, CO_2 emissions would be restricted in compliance with the EPA's new "tailoring rule" under the New Source Review and Prevention of Significant Deterioration reviews for new major source emission sources. Because of new sources under this alternative, there is a potential that emissions from multiple power plants could add up to become cumulative impacts.

However, the potential cumulative air quality impacts would be addressed in the permitting process. Emissions from all the fossil fuel generation project alternatives would undergo individual permitting under the Clean Air Act, as enforced by NYSDEC and the EPA. The required Title V permits require each permit applicant to evaluate a reasonable area around the proposed facilities to ensure that no regional degradation of air quality would occur. Another safeguard to prevent regional degradation of air quality is the requirement to purchase credits for some pollutants. Development could be curtailed because cap-and-trade credits for some pollutants may raise the price of developments. Because of these controls, cumulative impacts from the operation of the generation alternatives are not expected to be significant.

Construction would generate emissions of CO, NO_X, VOCs, SO_X, PM_{10}, and $PM_{2.5}$. However, construction emissions are local, and none of the proposed generation projects is proposed to be located near any of the others, so it is unlikely that construction emissions would overlap and create cumulative impacts.

6.3 Battery Storage

Typically, the impacts associated with the construction of battery storage facilities would be localized to a particular geographic area; for example, such facilities would be built in areas of existing industrial and commercial development pursuant to applicable permitting requirements and construction mitigation measures, thereby avoiding significant adverse impacts on urban and/or residential communities. The required land use for such facilities is approximately 2 acres per 100 MW. Therefore, cumulative impacts would be negligible.

6.4 No Action

As discussed in Section 5.4, the absence of a Contingency Plan, i.e., the No Action alternative, would potentially create baseline conditions that are associated with economic challenges, reduced energy availability, noise, odors, public health risks, and adverse effects on air resources. However, since no specific action is

proposed for this alternative, it is not feasible to analyze the potential cumulative impacts of the activities that might occur in the absence of a Contingency Plan.

6.5 Energy Highway Program

The New York Energy Highway Blueprint is an initiative of Governor Cuomo to modernize the state's energy infrastructure. Thirteen specific objectives were identified by the governor's appointed Task Force (CEOs from NYPA, NYSDEC, PSC, and NYSERDA) in early 2012. The objectives include:

- Initiate AC transmission upgrades to increase capacity and alleviate congestion/bottlenecks from upstate to downstate
- Develop and implement Contingency Plans to prepare for potential large power plant closings/retirements
- Initiate transmission upgrades in Northern New York to facilitate renewable energy
- Provide public power entities flexibility in contracting for public-private partnerships (legislation still under development)
- Accelerate investments in new energy infrastructure with a focus on reducing repair backlogs, increase tree trimming, and enhance ability to recover from severe storms
- Accelerate investments in natural gas distribution to reduce costs to consumers
- Conduct a competitive solicitation for renewable resources
- Characterize Atlantic coast offshore wind resources
- Repower inefficient power plants on Long Island
- Utilities required to evaluate repowering as an alternative to retirement
- Establish Community Support Plan and Greenhouse Gas Emissions Reduction Program for electricity sector
- Fund smart grid demonstration projects
- Pursue federal energy research grants.

There is a potential for activities arising out of these various initiatives contributing to the impacts of the projects in the Indian Point Contingency Plan. However, not all of these initiatives have reached a stage of development at which the specific activities and geographic areas that will be affected by them are known. Some Energy Highway efforts – those involving the potential construction or reconstruction of transmission facilities – are reasonably likely to result in cumulative impacts, to the extent any of those projects is located in an area also affected by a Contingency Plan project.

The AC transmission component of the Energy Highway program has advanced to the point where transmission project proposals have been solicited for a siting

process. Some Contingency Plan project sponsors have indicated an intent to submit their projects in the AC transmission proceeding. The potential environmental impacts of these, as well as of any other AC projects that might result from the AC proceeding, are the same as those already identified in this GEIS for transmission resources. Certain cumulative impacts can be avoided by identifying whether any proposed Contingency Plan project may also meet the AC transmission objectives. If other projects overlap in location and time of construction, local construction impacts are likely to be greater than those identified in this GEIS.

7 Mitigation and Permits/Approvals

7.1 Mitigation

To avoid or minimize the environmental impacts that may result from implementation of any of the alternatives, both general and site-specific design and construction techniques and mitigation measures would be employed during project construction and operation. Many of the following mitigation measures would be determined on a site-specific basis but would include the following:

- Carefully site structures to avoid sensitive resource areas, including mature forests, wetlands, sensitive wildlife habitat or plant areas, critical environmental areas, and open space/recreational areas.
- Locate projects away from population centers and existing/planned residential development to the extent practicable.
- Adhere to appropriate setbacks from residences, property lines, roads, and other structures to help minimize operational noise and visual impacts.
- Limit construction activity at specific times (e.g., rush hour, daytime hours) or specific seasons/months to reduce impacts on sensitive receptors (e.g., schools, community facilities, etc.), vegetation, sensitive habitats, and/or seasonal recreational activities.
- Conduct surveys or develop plans (e.g., biological surveys, cultural resources surveys, erosion control plans, storm water pollution prevention plans, pest management programs, emergency response plans etc.) to protect soils, streams, wetlands, agricultural lands, public health and other resources.
- Revegetate disturbed areas with native species and regularly maintain restored areas to reduce impacts on plants, animals, and ecosystem resources.
- Use construction mats, erect temporary crossings, or use horizontal directional drilling to avoid working in streams and disruption of aquatic systems.
- Control drainage and erosion on slopes near wetland areas to minimize grading effects and protect aquatic habitat.
- If dewatering activities are required, discharge the extracted water back into the source watershed using appropriate control measures.
- Use construction mats or erect temporary crossings to avoid working in streams.

- Reduce slopes near wetland areas to minimize grading effects and protect aquatic habitat.
- If dewatering activities are required, discharge the extracted water back into the source watershed.
- Employ BMPs to reduce impacts on active agricultural lands. These may include using existing access roads, installing structures in line with plowing patterns, segregating top soil from subsoils, and minimizing soil compaction in saturated soils or sensitive areas.
- To minimize impacts on water resources, recycle internal process water, including boiler feedwater, blowdown, and condensate; use degraded or impaired water sources such as storm water, treated wastewater, brackish groundwater, or desalinated sea water; and use dry or hybrid cooling technology.
- Reduce visual impacts by using existing transmission corridors, minimizing clearing within the ROW, incorporating vegetative screening, and using low-profile structures. Additionally, use appropriately colored transmission towers, non-reflective finishes, vegetative screens, and context-sensitive architectural treatments to address site-specific impacts.
- Utilize appropriate lighting design and controls to minimize off-site illumination during normal operation to reduce light pollution at night.
- To significantly reduce the sulfur content of diesel fuel, adhere to EPA's Clean Air Non-road Diesel Emissions Rule, a comprehensive national program requiring stringent emissions controls on diesel engines used in construction.
- Control and minimize emissions of criteria air pollutants by compliance with permit conditions for these pollutants.
- Employ best management practices to minimize impacts on nearby receptors (homes, schools, parks, etc.) that would be affected by dust associated with construction activities. These practices may include using a truck wash station at the project fence line; periodic spraying of haul roads with water; stone aprons at construction road access points, or street cleaning to control dirt and dust on public roadways, depending on local site conditions.
- Site facilities and structures away from sensitive noise receptors; maintain power lines to reduce corona/arcing or vibration and associated noises.
- Consider the project's compatibility with local land use, zoning,
- Apply design features as available to ensure a project's compatibility with local land use, zoning, comprehensive plans, and the character of the host community.
- If construction activities or facility operation will impact an environmental justice area, prepare and implement a public participation plan, and implement appropriate controls to minimize impacts.

- Employ BMPs and mitigation measures on a project- and resource-specific basis to minimize adverse impacts.
- Designate an environmental monitor to ensure compliance with permit requirements and environmental protection commitments during construction.

7.2 Permits and Approvals

General mitigation measures include adhering to various local, state, and federal ordinances and regulations. A number of governmental agencies may be involved in the formal approval of transmission, generation, and battery storage facilities within New York State. This list (Table 7-1) is not comprehensive and applicable to all projects in all places, but it is intended to provide a general list of the principal permits these projects would require, with an emphasis on those discretionary permits for which compliance requires a review and plan to mitigate potential project impacts.

Table 7-1 Generalized List of Permits and Approvals

Agency	Permit, Review, or Approval	Project Type (Applicable?)			
		Transmission	Generation	Battery Storage[1]	No Action
Federal					
United States Army Corps of Engineers	Clean Water Act Section 404 Wetland Permit	X	X		
United States Fish and Wildlife Service	Endangered Species Act Section 7 Consultation	X	X		
Federal Energy Regulatory Commission	Interstate gas transmission pipeline construction permit	X			
Federal Aviation Administration	Notice of Proposed Construction or Alteration	X	X		
State					
New York State Department of Environmental Conservation	Clean Air Act Prevention of Significant Deterioration Permit		X		
	Clean Air Act Title V Operating Permit (air quality)		X		
	Clean Air Act Title IV Acid Rain Permit (air quality)		X		
	Freshwater Wetlands Permit	X	X		
	Clean Water Act Section 401 Water Quality Certification	X	X		
	SPDES General Permit for Storm Water Discharges from Construction Activities	X	X		
	Natural Heritage and Endangered Species Program Consultation/Incidental Take Permit	X	X		
	Oil and chemical storage authorization	X	X	X	
New York State Public Service Commission	Article VII Certificate of Environmental Compatibility and Public Need	X			
Board on Electric Generation Siting and the Environment	Article 10 Certificate of Environmental Compatibility and Public Need		X		
	Section 68 Certificate of Public Convenience and Necessity	X	X	X	

Table 7-1 Generalized List of Permits and Approvals

Agency	Permit, Review, or Approval	Project Type (Applicable?)			
		Transmission	Generation	Battery Storage[1]	No Action
New York State Office of Parks, Recreation, and Historic Preservation	National Historic Preservation Act Section 106 Consultation	X	X		
New York State Department of Transportation	Highway work permit for non-utility work	X	X	X	
New York State Department of State	Coastal Zone consistency determination	X	X	X	
New York State Department of Agriculture and Markets	Agricultural Notice of Intent for impacts in designated agricultural districts	X	X		
Local					
County Health Department	Water well construction	X	X		
	Septic system approval	X	X	X	
County Planning Board	Site Plan Review	X	X	X	
Town/ City Planning Board	Special Permit/Site Plan Review and associated SEQRA review	X	X	X	
	Erosion/sediment control	X	X	X	
	Consistency with local planning documents	X	X	X	
Town Zoning Board	Zoning variances	X	X	X	
Building Inspector	Building/Occupancy Permits		X	X	
Local, New York City-specific					
New York City Department of City Planning	Uniform Land Use Review Procedures	X	X	X	
	Waterfront Revitalization Consistency Review	X	X	X	
New York City Landmarks Preservation Commission	Permit to Modify Historic Structures	X	X	X	

[1] Assumes battery storage facilities would be in an existing industrial or commercial area with no new site development. If battery storage facilities would require new transmission facilities, permits in the transmission alternatives column would apply.

8 Unavoidable Adverse Impacts

Chapter 5 discusses the potential generic impacts that may result from implementation of the Contingency Plan. The purpose of the GEIS is not to evaluate specific energy projects and their site-specific impacts. As previously discussed, there could very well be significant environmental impacts resulting from individual projects implemented pursuant to the Plan. However, the generic review presented in Section 5 does not identify any unavoidable environmental impact of a type that cannot be mitigated through one or more of the techniques discussed in Chapter 7. Unavoidable impacts of the No Action alternative (i.e., IPEC closes and there is no Contingency Plan in place to fill the gap caused by the closure of IPEC in absence of a plan) are discussed in Section 3.5.

9 Irreversible and Irretrievable Commitment of Resources

Approval of the Contingency Plan by the PSC does not, in itself, result in irreversible or irretrievable commitment of resources unless and until the components of the approved plan are implemented. The Plan itself also contemplates that projects may be terminated before any resources are actually impacted. Potential commitment of resources related to each alternative is discussed in Section 5 of this Final GEIS.

10 Growth-Inducing Aspects

Growth-inducing aspects of a proposed action or project generally refer to "secondary" impacts that may trigger further development.

The actions that could arise subsequent to the approval of the Contingency Plan are intended to provide additional energy needs. As a consequence, the approval of the Contingency Plan could result in more construction, with concomitant growth in temporary and permanent jobs. These new jobs could generate new residents, daily workers, and visitors. This new growth could require transportation improvements and other services within the proposed project areas. The direct effect of Contingency Plan approval, however, remains uncertain because no particular energy project or site will be licensed for construction by approval of the actions evaluated in this Final GEIS.

Although the Contingency Plan under consideration does not endorse or approve any specific energy generation or transmission projects, it could provide an incentive for development of such projects. Actual socioeconomic impacts such as tax implications, employment, and other community benefits are not known at this time as they are dependent on the project details and the context in which a project is proposed. Although specific socioeconomic impacts cannot be determined at this time, implementation of the Contingency Plan is expected to provide economic development benefits to New York State. Incentives to spur further development of emerging technologies, and construction and operation of transmission and generating facilities, should result in the creation of both direct and indirect jobs, purchases of local products and services, which add revenues to local economies, and new and increased tax payments by employees and facilities. The following discussion explains, in general terms, some potential impacts and the factors that should be considered in determining actual impacts of a project when its details are known.

Employment

New energy projects have the potential to directly affect employment in several ways. During construction, a workforce is needed to prepare sites and to construct the facility and associated transmission lines, substations and other appurtenant facilities. The impact of this workforce depends on its availability in the area, whether it is temporarily imported, and the duration and scope of the project. Typically, once a project is built, the workforce consists of a smaller operational staff that might be provided by the existing workforce or, depending

on the requirements, may come from outside the community. There are also potential indirect employment impacts resulting from construction of energy resources. Any new workforce in a community—whether construction or operational—affects local retail, supply, and service businesses. A new workforce in a rural, low-population area could represent a substantial relative increase in secondary economic activity. However, several unknown factors make it difficult to determine actual employment changes, if any. For example, owners of existing plants could take actions to increase their competitiveness, reduce emissions, or transfer workforce to other existing or new energy generating facilities.

A second potential indirect impact relates to the manufacture of energy facilities' equipment. Manufacturing is generally a global activity, but if the IPEC facility's license to operate is not renewed and the demand for energy in New York continues to increase, it is possible that manufacturers of the equipment, and providers of ancillary services associated with such equipment, may be attracted to sites in New York. The state has facilities that manufacture gas turbines and other large components of energy projects. Consequently, additional jobs would be created, which would benefit the local and state economies.

Another growth-inducing impact could be the stimulus of the regional natural gas industry if generation alternatives are selected that use natural gas. The gas industry also could be stimulated by the selection of transmission alternatives that derive their energy from natural gas. The specific source of gas cannot be determined, since pipeline gas is comingled from many sources.

Tax Impacts

Traditionally, tax impacts/benefits would be determined by a project's value and the local taxing structure. In such a traditional circumstance, the tax revenues are determined by the location, project value, and tax rate. Alternatively, many new commercial and industrial developments negotiate a tax schedule, known as a payment in lieu of taxes (PILOT) agreement, which usually provides a tax reduction in early years (to encourage the project to locate in the area) and a gradual (i.e., 10- to 15-years) ramp-up to a fully taxed status. The impact of traditional or PILOT taxation also depends on the size of the existing tax base; a project of modest taxable value added to a large tax base would have little overall effect on local tax. In contrast, a large project in a rural area with a small tax base could add significantly to the local tax base. An increase in tax revenues can induce growth by adding public service jobs to the host region.

Other Local Economic Impacts

To the extent that energy-generating facilities require leases or purchase of lands from local owners, additional funds could be injected into the local economy and could stimulate other business. In rural areas, royalty payments could supplement farm income, provide smaller farms and businesses opportunities for diversifying sources of income, or could be used for agricultural improvements to increase productivity.

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12 List of Preparers

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A Response to Public Comments on the Draft GEIS

Table A-1 Response to Public Comments on the Draft GEIS

Commentor	Comment Letter and Number	Comment	Section	Comment Response
US PowerGen	1-1	[There are] several inaccuracies in the descriptions of the USPG projects in the Indian Point Contingency Plan, Draft Generic Environmental Impact Statement July 2013. The necessary clarifications are as follows: Luyster Creek Option A: The GEIS incorrectly states that the proposal will "from June 2016 until June 2017 provide the 430 MWs from the repowered 387 MW Astoria Unit 40 ... " As stated in US PowerGen's filing, during this period Unit 40 will only be providing 387 MW, not the 430 MW stated in the GEIS. The new combined cycle would make 430 MW available starting in June 2017. Unit 40 Upgrade (stand-alone proposal): The GEIS incorrectly states that "This proposal is to provide the 430 MW from the repair and restoration of the 387 MW Astoria Unit 4 ..." The clarification is that the Unit 40 repair and restoration will only provide 387 MW, not 430 MW. South Pier Improvement Project: Initially, the GEIS incorrectly refers to US PowerGen as "US PowerGen Oil." Furthermore, the GEIS incorrectly states that the project "is a proposal for a floating barge with a 100 MW natural gas power plant with a 30-day ultra-low sulfur diesel backup to be moored at the Gowanus Canal in Brooklyn." Please note that, as stated in US PowerGen's original filing, the plant would be constructed on a landed pier at the Gowanus Generating Station, and is not a floating barge.	Section 2.4.1	Comment noted. These clarifications have been incorporated into the FGEIS , Section 2.4.1.

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Commentor	Comment Letter and Number	Comment	Section	Comment Response
Greenberg Traurig, LLP, Counsel to Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc.	2-1	SEQRA does not authorize the PSC's use of the GEIS process in this instance. The projects that are proposed for inclusion in the IPEC Contingency Plan have been identified on this record, and their potential environmental impacts should thus be analyzed in a traditional EIS. Given the narrow scope of this proceeding and the identifiable nature of the projects that would be potentially included in the IPEC Contingency Plan, a DGEIS is procedurally inappropriate. The NYSDEC's SEQRA regulations state, in pertinent part: "A generic EIS may be used to assess the environmental impacts of: (1) A number of separate actions in a given geographic area which, if considered singly, may have minor impacts, but if considered together may have significant impacts; or (2) A sequence of actions, contemplated by a single agency or individual; or (3) An entire program or plan having wide application or restricting the range of future alternative policies or projects, including new or significant changes to existing land use plans, development plans, zoning regulations or agency comprehensive resource management plans." As illustrated by these examples, the GEIS process is typically reserved for the consideration of broad-based actions or related groups of actions that an agency may approve, fund or undertake. The instant proceeding fails to qualify under any of the above categories. ***(see comment letter for further detail).***	Sections 1.1, 1.2	The Commission's Action, the approval of a reliability contingency plan, is a plan that may have wide application for various places within the State of New York. The Commission, in its approval of a contingency plan, is taking a pro-active planning approach in the event of a possible shut-down of a major electric generation facility that would cause reliability deficiencies in the state's electric power grid and would have wide-reaching consequences. Using that planning assumption, a generic EIS is appropriate and the Commission properly identifies and evaluates the potential environmental impacts in the Draft GEIS (DGEIS) that may flow from implementation of the contingency plan – compared with not having a contingency plan.

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Commentor	Comment Letter and Number	Comment	Section	Comment Response
Greenberg Traurig, LLP, Counsel to Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc.	2-2	The IPEC Contingency Plan DGEIS impermissibly fails to analyze the cumulative environmental impacts of PSC action on the IPEC Contingency Plan together with PSC action in the related AC Transmission Proceeding. The two proceedings were commenced on the same date, share the same regulatory purposes and include overlapping project submissions. PSC action in both proceedings thus presents potentially common environmental impacts. To satisfy SEQRA, the IPEC Contingency Plan DGEIS must consider the potential environmental impacts of the two proceedings together. The IPEC Contingency Plan DGEIS correctly identifies, but then fails to apply, the cumulative impacts standard...the cursory discussion fails to mention the AC Transmission Proceeding, much less analyze the cumulative environmental effects of these two proceedings together. This clear error is particularly remarkable because application of DPS Staff s formulation of the cumulative impacts test leads to the conclusion that the two proceedings are sufficiently related for SEQRA purposes such that they must be considered together in the cumulative impacts analysis. Unquestionably, PSC action in the AC Transmission Proceeding is "reasonably foreseeable." Moreover, the instant proceeding and the AC Transmission Proceeding, and the projects identified thereunder, obviously "overlap in space and time" - indeed, as noted, supra, projects proposed here have also been proposed in the AC Transmission Proceeding. This clear relationship between the two proceedings, including their potentially common environmental impacts, should have compelled DPS Staff to include in the GEIS a cumulative impacts	Section 6	The comment acknowledges the disclosure in the DGEIS that transmission lines under development could result in cumulative impacts and correctly states that the AC Transmission Proceeding was not specifically described as a reasonably foreseeable action that could result in cumulative adverse environmental impacts. It should be noted, however, that the AC transmission proceeding (Case 12-T-0502) and the IPEC Contingency Plan proceeding do not share the same regulatory purpose, the former being to identify transmission congestion that may be eliminated for economic and reliability purposes and the latter being to identify a plan to ensure continued electric reliability in the event of a major electric generation plant shutdown. Although there are some projects that have been identified in both proceedings, they will be analyzed separately in each proceeding to determine the extent to which they would achieve the

Table A-1 Response to Public Comments on the Draft GEIS

Commentor	Comment Letter and Number	Comment	Section	Comment Response
		analysis that took into account the AC Transmission Proceeding. The failure to do so violates SEQRA. By viewing the potential environmental impacts of adopting an IPEC Contingency Plan in isolation, the IPEC Contingency Plan DGEIS is procedurally and substantively deficient ***(see comment letter for further detail).***		varying regulatory objectives. A description of the AC Transmission Proceeding was added to the FGEIS. However, since the exact alignments of the transmission alternatives that may be selected for the Indian Point Contingency Plan and the alignments for the AC Transmission projects have not been determined, the discussion of potential impacts in the FGEIS remains generic.
Greenberg Traurig, LLP, Counsel to Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc.	2-3A	By limiting its alternatives analysis to projects that already have been submitted in this proceeding, the IPEC Contingency Plan DGEIS does not review all of the reasonable alternatives to satisfy the potential system needs in the hypothetical Indian Point closure scenario, as SEQRA requires. The PSC cannot rely on its delay in commencing SEQRA review to limit the alternatives considered in the IPEC Contingency Plan DGEIS. SEQRA requires an EIS to "describe and evaluate the range of reasonable alternatives to the action that are feasible." SEQRA requires that "[a]s early as possible in the formulation of a proposal or an action, the responsible agency shall make an initial determination whether an environmental impact statement need be prepared for an action." The PSC waited nearly eight months after initiating the proceeding to adopt the IPEC Contingency Plan DGEIS' It appears from the PSC's environmental assessment form ("EAF") that the agency did not attempt to fulfill its	Section 3	Both the DGEIS and the FGEIS discuss the range of reasonable alternatives available to correct the 1350 to1375 MW deficiency in electrical generation that would occur, absent a contingency plan. These alternatives are identified as a subset or combination of transmission, generation, and battery storage proposals that have been identified in the proceeding. Furthermore, the planning exercise that is supported by the DGEIS does not involve any determination as to whether the IPEC should or

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Commentor	Comment Letter and Number	Comment	Section	Comment Response
		SEQRA responsibilities until May 2013, after it had already issued two substantive orders, the March Order and the April Order, and authorized Con Edison to spend as much as $10 million dollars on preliminary planning activities in furtherance of the TOTs Projects. The premature approval of the sufficiency of the Joint Plan and acceptance of RFP submissions before commencing SEQRA review cannot furnish a basis now on which to ignore myriad other reasonable alternatives to the adoption of an IPEC Contingency Plan, including market-based alternatives. The IPEC Contingency Plan DGEIS' alternatives analysis thus fails to consider additional, readily identifiable alternatives, which also include the alternative of the PSC supporting IPEC's requested license renewal based on the facility's significant role in helping New York State to meet its energy needs with a baseload, clean, reliable, virtually emissions free source of power (which alternative avoids all the potentially adverse environmental impacts identified in the IPEC Contingency Plan DGEIS). Rather than plan for the facility's hypothetical demise by pre-selecting approximately $800 million in potentially unneeded new transmission capacity and energy efficiency programs, an alternate means of protecting against the effects of hypothetical Indian Point closure is to support license renewal. The IPEC Contingency Plan DGEIS alternatives analysis is thus further incomplete because the PSC has not yet examined the steps the agency could take to promote license renewal as an alternative to the massive PSC-led transmission build out the TOs advance in the Joint Plan.		should not be shut down at the expiration of its license in 2015; therefore, the suggestion that the DGEIS failed to consider "support" for license renewal of the IPEC to remain open is inappropriate as an alternatives analysis in this exercise.

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	2-3B	The IPEC Contingency Plan DGEIS mischaracterizes the "No Action" alternative by ignoring existing regulatory processes that would proceed in the absence of an IPEC Contingency Plan. Specifically, the DGEIS ignores the NYISO FERC-approved Comprehensive Reliability Planning Process (CRPP).		The CRPP, administered by the NYISO, has not been ignored and, in fact, was the basis for the Commission's action since the NYISO identified a serious reliability risk, through the CRPP, and the need for additional resources by 2016 if IPEC were to become unavailable at the expiration of its license; however, the existing CRPP does not provide a mechanism for the development of timely and cost-effective solutions to this type of contingency. Section 3.5 of the DGEIS and FGEIS notes that market-based solutions to resolve the capacity shortfall are not likely to be ready in time and therefore will be too late to address the reliability needs in a reasonable manner.

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Greenberg Traurig, LLP, Counsel to Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc.	2-4	The IPEC Contingency Plan DGEIS fails to take the required "hard look" at the following: **(1) the proposed action's potential growth-inducing effects:** It omits any discussion of whether the action has the potential to induce new generation project development. The NYSDEC's SEQRA Handbook provides an analogous example: "the IGEIS] should describe any potential that the proposed actions may have for 'triggering' further development, such as: increasing the development potential for a local area by installing or upgrading sewers, watermains and utilities. The IPEC Contingency Plan DGEIS is remarkably silent in this regard, notwithstanding the clear growth-inducing potential were the PSC to direct the development of any TOTs or other transmission projects as part of the IPEC Contingency Plan.	Section 10	Section 10 does acknowledge that new energy projects can induce job growth and additional manufacturing.
		(2) the proposed action's effect on the use and conservation of energy (including consistency with the State Energy Plan): It contains no discussion concerning whether any of the projects that might be included in the IPEC Contingency Plan are "reasonably consistent" with the State Energy Plan. Whether characterized as a procedural omission or a substantive flaw, the failure to discuss a required element of all EISs that entail energy projects is fatal to the PSC's SEQRA review.		Comment noted. A discussion of the State Energy Plan has been added to Section 4.11 of the FGEIS.

Table A-1 Response to Public Comments on the Draft GEIS

Commentor	Comment Letter and Number	Comment	Section	Comment Response
		It does not demonstrate that adoption of the Joint Plan will "satisfy electric generating capacity needs or other electric system needs." In fact, as the PSC has acknowledged throughout this proceeding, with continued Indian Point operations, there are no such needs on the system now. Even if there were any such system needs, the skeletal nature of the Joint Plan precludes any meaningful analysis of whether the TOTs or RFP Projects can satisfy them in completely or in part. Until that information is filed and analyzed, there is simply no way for the IPEC Contingency Plan DGEIS to make a finding of consistency with the State Energy Plan or satisfaction of State energy needs as required by 6 N.Y.C.R.R. Sec 617.9(bX5)(iii)(e).		
		(3) whether the proposed action is consistent with New York State Coastal Policies (or, as applicable, local waterfront revitalization program policies): It makes no assessment whatsoever of the potential consistency, or not, of the TOTs Projects or RFP Projects with any coastal policies, yet clearly acknowledges, "[B]ecause many of the proposed alternatives are located near coastlines, the regulated coastal area would be affected, and consistency with the NYSDOS-administered New York State Coastal Management Program would be required. Again, whether deemed a fatal procedural omission or substantive defect, the IPEC Contingency Plan DGEIS' failure to address coastal zone consistency represents a fatal flaw in the PSC's SEQRA review.	Section 4.1 and Table 7-1	A specific assessment of project impacts on the coastal zone would require the availability of a project footprint. That assessment would take place during each project review. The DGEIS and FGEIS, in Section 4, and the FGEIS, Table 7-1, indicate that a coastal zone consistency assessment would be required for those projects that are within a designated coastal zone. A site-specific review of coastal zone consistency will be required for individual project proposals prior to project implementation.

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		(4) reasonable mitigation measures: Here, the DGEIS generally identifies a series of potential mitigation measures, but defers their application or enforcement to a future date and/or to other agencies. The deferral of mitigation issues until after the completion of the SEQRA procedure, therefore, has made the process substantively defective, requiring the courts to conclude that the board's determination as arbitrary, capricious and unsupported by substantial evidence. Similarly, the IPEC Contingency Plan DGEIS suggests that mitigation measures may be available, but fails to recommend that any be imposed by the PSC as conditions to its approval of an IPEC Contingency Plan. Thus, the PSC failed to properly evaluate and analyze sufficient and acceptable alternatives to the project, improperly relied upon plans for future mitigation and improperly delegated its SEQRA duties to other agencies, and has failed to take the requisite hard look at potential environmental impacts."	Section 7	The Commission is not directing or approving the construction of any projects as part of the reliability contingency plan nor is it delegating its responsibilities to other agencies. The DGEIS and FGEIS appropriately address general mitigation measures that are typically considered in the permitting of transmission or generation projects under consideration.
Greenberg Traurig, LLP, Counsel to Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, Entergy Nuclear FitzPatrick, LLC and Entergy Nuclear Operations, Inc.	2-5	Informational deficiencies in the record preclude the PSC from engaging in SEQRA's required weighing and balancing of public benefit against the proposed action's potentially adverse environmental impacts. Should the PSC approve an IPEC Contingency Plan that goes beyond planning and directs actual project development, the PSC must make an "explicit finding" that "consistent with social, economic and other essential considerations, to the maximum extent practicable,		The action being considered in the DGEIS and FGEIS does not direct project development or construction. Rather, it involves a reliability contingency plan that, if approved by the Commission, may result in subsequent actions, including applications for permits for the construction

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		adverse environmental effects revealed in the IGEIS] process will be minimized or avoided." In other words, "SEQRA is not merely a disclosure statute; it 'imposes far more "action-forcing" or "substantive" requirements on state and local decision makers than NEPA imposes on their federal counterparts. Because the record remains deficient, the PSC lacks an adequate basis on which to assess whether the TOTs Projects or RFP projects offer any "social, economic or other essential" benefits that can be weighed and balanced against their potential adverse environmental impacts. Without having before it critical information concerning the extent, timing or characteristics of the potential reliability needs and whether and, if so, to what extent the TOTS Projects and/or RFP Projects will satisfy those needs, the PSC has nothing to place on the benefits side of the SEQRA scale. The PSC must remedy that informational gap before it can render a final SEQRA determination.		of transmission and generation under the proper permitting authorities. The DGEIS and FGEIS provide sufficient information for the balancing of benefits against the potential adverse impacts the Commission must consider when deciding whether to approve the Contingency Plan.

B Summary of Changes from the Draft to Final GEIS

1. Clarification of the project descriptions of US PowerGen generation projects.
2. Disclosure that the Federal Energy Regulatory Commission (FERC) has approved a new local capacity zone covering NYISO Zones G-J (see Section 4.15.6).
3. Discussion of the New York State Energy Plan has been added to Section 4.11.4 of the Final GEIS.
4. New subsections were added (Sections 4.11.5 and 5.4.13) to address the impacts of power outages on customers with special needs.
5. A new section in Chapter 6, Cumulative Impacts, was added to specifically address the potential overlap between Energy Highway projects and the Indian Point Energy Center Reliability Contingency Plan components.
6. Additions to Table 7-1, the list of required generalized permits and approvals.

FEDERAL REGISTER

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Part III

The President

Executive Order 13653—Preparing the United States for the Impacts of Climate Change

Federal Register
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Wednesday, November 6, 2013

Presidential Documents

Title 3—

The President

Executive Order 13653 of November 1, 2013

Preparing the United States for the Impacts of Climate Change

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to prepare the Nation for the impacts of climate change by undertaking actions to enhance climate preparedness and resilience, it is hereby ordered as follows:

Section 1. *Policy.* The impacts of climate change—including an increase in prolonged periods of excessively high temperatures, more heavy downpours, an increase in wildfires, more severe droughts, permafrost thawing, ocean acidification, and sea-level rise—are already affecting communities, natural resources, ecosystems, economies, and public health across the Nation. These impacts are often most significant for communities that already face economic or health-related challenges, and for species and habitats that are already facing other pressures. Managing these risks requires deliberate preparation, close cooperation, and coordinated planning by the Federal Government, as well as by stakeholders, to facilitate Federal, State, local, tribal, private-sector, and nonprofit-sector efforts to improve climate preparedness and resilience; help safeguard our economy, infrastructure, environment, and natural resources; and provide for the continuity of executive department and agency (agency) operations, services, and programs.

A foundation for coordinated action on climate change preparedness and resilience across the Federal Government was established by Executive Order 13514 of October 5, 2009 (Federal Leadership in Environmental, Energy, and Economic Performance), and the Interagency Climate Change Adaptation Task Force led by the Council on Environmental Quality (CEQ), the Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA). In addition, through the U.S. Global Change Research Program (USGCRP), established by section 103 of the Global Change Research Act of 1990 (15 U.S.C. 2933), and agency programs and activities, the Federal Government will continue to support scientific research, observational capabilities, and assessments necessary to improve our understanding of and response to climate change and its impacts on the Nation.

The Federal Government must build on recent progress and pursue new strategies to improve the Nation's preparedness and resilience. In doing so, agencies should promote: (1) engaged and strong partnerships and information sharing at all levels of government; (2) risk-informed decisionmaking and the tools to facilitate it; (3) adaptive learning, in which experiences serve as opportunities to inform and adjust future actions; and (4) preparedness planning.

Sec. 2. *Modernizing Federal Programs to Support Climate Resilient Investment.* (a) To support the efforts of regions, States, local communities, and tribes, all agencies, consistent with their missions and in coordination with the Council on Climate Preparedness and Resilience (Council) established in section 6 of this order, shall:

(i) identify and seek to remove or reform barriers that discourage investments or other actions to increase the Nation's resilience to climate change while ensuring continued protection of public health and the environment;

(ii) reform policies and Federal funding programs that may, perhaps unintentionally, increase the vulnerability of natural or built systems, economic sectors, natural resources, or communities to climate change related risks;

(iii) identify opportunities to support and encourage smarter, more climate-resilient investments by States, local communities, and tribes, including by providing incentives through agency guidance, grants, technical assistance, performance measures, safety considerations, and other programs, including in the context of infrastructure development as reflected in Executive Order 12893 of January 26, 1994 (Principles for Federal Infrastructure Investments), my memorandum of August 31, 2011 (Speeding Infrastructure Development through More Efficient and Effective Permitting and Environmental Review), Executive Order 13604 of March 22, 2012 (Improving Performance of Federal Permitting and Review of Infrastructure Projects), and my memorandum of May 17, 2013 (Modernizing Federal Infrastructure Review and Permitting Regulations, Policies, and Procedures); and

(iv) report on their progress in achieving the requirements identified above, including accomplished and planned milestones, in the Agency Adaptation Plans developed pursuant to section 5 of this order.

(b) In carrying out this section, agencies should also consider the recommendations of the State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience (Task Force) established in section 7 of this order and the National Infrastructure Advisory Council established by Executive Order 13231 of October 16, 2001 (Critical Infrastructure Protection in the Information Age), and continued through Executive Order 13652 of September 30, 2013 (Continuance of Certain Federal Advisory Committees).

(c) Interagency groups charged with coordinating and modernizing Federal processes related to the development and integration of both man-made and natural infrastructure, evaluating public health and social equity issues, safeguarding natural resources, and other issues impacted by climate change—including the Steering Committee on Federal Infrastructure Permitting and Review Process Improvement established by Executive Order 13604, the Task Force on Ports established on July 19, 2012, the Interagency Working Group on Coordination of Domestic Energy Development and Permitting in Alaska established by Executive Order 13580 of July 12, 2011, and the Federal Interagency Working Group on Environmental Justice established by Executive Order 12898 of February 11, 1994—shall be responsible for ensuring that climate change related risks are accounted for in such processes and shall work with agencies in meeting the requirements set forth in subsections (a) and (b) of this section.

Sec. 3. *Managing Lands and Waters for Climate Preparedness and Resilience.* Within 9 months of the date of this order and in coordination with the efforts described in section 2 of this order, the heads of the Departments of Defense, the Interior, and Agriculture, the Environmental Protection Agency, NOAA, the Federal Emergency Management Agency, the Army Corps of Engineers, and other agencies as recommended by the Council established in section 6 of this order shall work with the Chair of CEQ and the Director of the Office of Management and Budget (OMB) to complete an inventory and assessment of proposed and completed changes to their land- and water-related policies, programs, and regulations necessary to make the Nation's watersheds, natural resources, and ecosystems, and the communities and economies that depend on them, more resilient in the face of a changing climate. Further, recognizing the many benefits the Nation's natural infrastructure provides, agencies shall, where possible, focus on program and policy adjustments that promote the dual goals of greater climate resilience and carbon sequestration, or other reductions to the sources of climate change. The assessment shall include a timeline and plan for making changes to policies, programs, and regulations. Agencies shall build on efforts already completed or underway as outlined in agencies' Adaptation Plans, as discussed in section 5 of this order, as well as recent interagency climate adaptation strategies such as the *National Action Plan: Priorities for Managing*

Freshwater Resources in a Changing Climate, released October 28, 2011; the *National Fish, Wildlife and Plants Climate Adaptation Strategy*, released March 26, 2013; and the *National Ocean Policy Implementation Plan*, released April 16, 2013.

Sec. 4. *Providing Information, Data, and Tools for Climate Change Preparedness and Resilience.* (a) In support of Federal, regional, State, local, tribal, private-sector and nonprofit-sector efforts to prepare for the impacts of climate change, the Departments of Defense, the Interior, Agriculture, Commerce, Health and Human Services, Housing and Urban Development, Transportation, Energy, and Homeland Security, the Environmental Protection Agency, the National Aeronautics and Space Administration, and any other agencies as recommended by the Council established in section 6 of this order, shall, supported by USGCRP, work together to develop and provide authoritative, easily accessible, usable, and timely data, information, and decision-support tools on climate preparedness and resilience.

(b) As part of the broader open data policy, CEQ and OSTP, in collaboration with OMB and consistent with Executive Order 13642 of May 9, 2013 (Making Open and Machine Readable the New Default for Government Information), shall oversee the establishment of a web-based portal on "Data.gov" and work with agencies on identifying, developing, and integrating data and tools relevant to climate issues and decisionmaking. Agencies shall coordinate their work on these data and tools with relevant interagency councils and committees such as the National Science and Technology Council and those that support the implementation of Presidential Policy Directive–21 of February 12, 2013 (Critical Infrastructure Security and Resilience).

Sec. 5. *Federal Agency Planning for Climate Change Related Risk.* (a) Consistent with Executive Order 13514, agencies have developed Agency Adaptation Plans and provided them to CEQ and OMB. These plans evaluate the most significant climate change related risks to, and vulnerabilities in, agency operations and missions in both the short and long term, and outline actions that agencies will take to manage these risks and vulnerabilities. Building on these efforts, each agency shall develop or continue to develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives and submit those plans to CEQ and OMB for review. Each Agency Adaptation Plan shall include:

(i) identification and assessment of climate change related impacts on and risks to the agency's ability to accomplish its missions, operations, and programs;

(ii) a description of programs, policies, and plans the agency has already put in place, as well as additional actions the agency will take, to manage climate risks in the near term and build resilience in the short and long term;

(iii) a description of how any climate change related risk identified pursuant to paragraph (i) of this subsection that is deemed so significant that it impairs an agency's statutory mission or operation will be addressed, including through the agency's existing reporting requirements;

(iv) a description of how the agency will consider the need to improve climate adaptation and resilience, including the costs and benefits of such improvement, with respect to agency suppliers, supply chain, real property investments, and capital equipment purchases such as updating agency policies for leasing, building upgrades, relocation of existing facilities and equipment, and construction of new facilities; and

(v) a description of how the agency will contribute to coordinated interagency efforts to support climate preparedness and resilience at all levels of government, including collaborative work across agencies' regional offices and hubs, and through coordinated development of information, data, and tools, consistent with section 4 of this order.

(b) Agencies will report on progress made on their Adaptation Plans, as well as any updates made to the plans, through the annual Strategic

Sustainability Performance Plan process. Agencies shall regularly update their Adaptation Plans, completing the first update within 120 days of the date of this order, with additional regular updates thereafter due not later than 1 year after the publication of each quadrennial National Climate Assessment report required by section 106 of the Global Change Research Act of 1990 (15 U.S.C. 2936).

Sec. 6. *Council on Climate Preparedness and Resilience.*

(a) *Establishment.* There is established an interagency Council on Climate Preparedness and Resilience (Council).

(b) *Membership.* The Council shall be co-chaired by the Chair of CEQ, the Director of OSTP, and the Assistant to the President for Homeland Security and Counterterrorism. In addition, the Council shall include senior officials (Deputy Secretary or equivalent officer) from:

(i) the Department of State;

(ii) the Department of the Treasury;

(iii) the Department of Defense;

(iv) the Department of Justice;

(v) the Department of the Interior;

(vi) the Department of Agriculture;

(vii) the Department of Commerce;

(viii) the Department of Labor;

(ix) the Department of Health and Human Services;

(x) the Department of Housing and Urban Development;

(xi) the Department of Transportation;

(xii) the Department of Energy;

(xiii) the Department of Education;

(xiv) the Department of Veterans Affairs;

(xv) the Department of Homeland Security;

(xvi) the United States Agency for International Development;

(xvii) the Army Corps of Engineers;

(xviii) the Environmental Protection Agency;

(xix) the General Services Administration;

(xx) the Millennium Challenge Corporation;

(xxi) the National Aeronautics and Space Administration;

(xxii) the U.S. Small Business Administration;

(xxiii) the Corporation for National and Community Service;

(xxiv) the Office of the Director of National Intelligence;

(xxv) the Council of Economic Advisers;

(xxvi) the National Economic Council;

(xxvii) the Domestic Policy Council;

(xxviii) the Office of Management and Budget;

(xxix) the White House Office of Public Engagement and Intergovernmental Affairs;

(xxx) the United States Trade Representative; and

(xxxi) such agencies or offices as the President or Co-Chairs shall designate.

(c) *Administration.* CEQ shall provide administrative support and additional resources, as appropriate, for the Council to the extent permitted by law and within existing appropriations. Agencies shall assist and provide

information to the Council, consistent with applicable law, as may be necessary to carry out its functions. Each agency shall bear its own expenses for participating in the Council.

(d) *Council Structure.* The Co-Chairs shall designate a subset of members of the Council to serve on a Steering Committee, which shall help determine priorities and strategic direction for the Council. The Co-Chairs and Steering Committee may establish working groups as needed, and may recharter working groups of the Interagency Climate Change Adaptation Task Force, as appropriate.

(e) *Mission and Function of the Council.* The Council shall work across agencies and offices, and in partnership with State, local, and tribal governments (as well as the Task Force established in section 7 of this order), academic and research institutions, and the private and nonprofit sectors to:

(i) develop, recommend, coordinate interagency efforts on, and track implementation of priority Federal Government actions related to climate preparedness and resilience;

(ii) support regional, State, local, and tribal action to assess climate change related vulnerabilities and cost-effectively increase climate preparedness and resilience of communities, critical economic sectors, natural and built infrastructure, and natural resources, including through the activities as outlined in sections 2 and 3 of this order;

(iii) facilitate the integration of climate science in policies and planning of government agencies and the private sector, including by promoting the development of innovative, actionable, and accessible Federal climate change related information, data, and tools at appropriate scales for decisionmakers and deployment of this information through a Government-wide web-based portal, as described in section 4 of this order; and

(iv) such other functions as may be decided by the Co-Chairs, including implementing, as appropriate, the recommendations of the Task Force established in section 7 of this order.

(f) *Termination of the Interagency Climate Change Adaptation Task Force.* The Interagency Climate Change Adaptation Task Force (Adaptation Task Force), established in 2009, created the framework for coordinated Federal action on climate preparedness and resilience, driving agency-level planning and action. The Adaptation Task Force shall terminate no later than 30 days after the first meeting of the Council, which shall continue and build upon the Adaptation Task Force's work.

Sec. 7. *State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience.*

(a) *Establishment.* To inform Federal efforts to support climate preparedness and resilience, there is established a State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience (Task Force).

(b) *Membership.* The Task Force shall be co-chaired by the Chair of CEQ and the Director of the White House Office of Intergovernmental Affairs. In addition, its members shall be such elected State, local, and tribal officials as may be invited by the Co-Chairs to participate. Members of the Task Force, acting in their official capacity, may designate employees with authority to act on their behalf.

(c) *Mission and Function.* Within 1 year of the date of this order, the Task Force shall provide, through its Co-Chairs, recommendations to the President and the Council for how the Federal Government can:

(i) remove barriers, create incentives, and otherwise modernize Federal programs to encourage investments, practices, and partnerships that facilitate increased resilience to climate impacts, including those associated with extreme weather;

(ii) provide useful climate preparedness tools and actionable information for States, local communities, and tribes, including through interagency collaboration as described in section 6 of this order; and

(iii) otherwise support State, local, and tribal preparedness for and resilience to climate change.

(d) *Sunset.* The Task Force shall terminate no later than 6 months after providing its recommendations.

Sec. 8. *Definitions.* As used in this order:

(a) "preparedness" means actions taken to plan, organize, equip, train, and exercise to build, apply, and sustain the capabilities necessary to prevent, protect against, ameliorate the effects of, respond to, and recover from climate change related damages to life, health, property, livelihoods, ecosystems, and national security;

(b) "adaptation" means adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects; and

(c) "resilience" means the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.

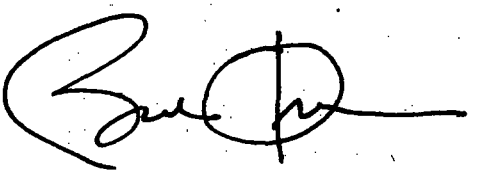
Sec. 9. *General Provisions.* (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to an executive department, agency, or the head thereof; or

(ii) the functions of the Director of OMB relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with U.S. obligations under international agreements and applicable U.S. law, and be subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.



THE WHITE HOUSE,
November 1, 2013.

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PlaNYC

NEW YORK CITY'S PATHWAYS TO DEEP CARBON REDUCTIONS

DECEMBER 2013

A GREENER, GREATER NEW YORK

The City of New York
NYC Mayor's Office

The City of New York would like to thank everyone who lended their valuable assistance in producing this report:
All correspondence related to this report should be directed to OLTPS, at planyc@cityhall.nyc.gov

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This document was designed by Aaron Lewis .

Cover Photo: Looking south from Manhatta, Empire State Building
Credit: John Lee

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This report would not be possible without the contributions from numerous private and public sector partners who generously provided their time and expertise. We are deeply grateful to all of them for their ongoing support.

The Cleaner, Greener Communities Program

In 2011, New York Governor Andrew M. Cuomo announced the establishment of the Cleaner, Greener Communities Program. Administered by NYSERDA, the Cleaner, Greener Communities Program provides resources to New York State communities for the development and implementation of sustainable development practices. The program aims to guide integrated, sustainable solutions, from statewide investments to regional decision-making on land use, housing, transportation, infrastructure, energy, and environmental practices to improve New Yorkers' quality of life.

The Cleaner, Greener Communities Program will provide up to $100 million in competitive grants to the state's 10 Regional Economic Development Council Zones over two phases. Phase 1 provided nearly $10 million to support the development of regional sustainability plans. As New York City already has a sustainability plan in PlaNYC, the City used $1 million in Phase 1 funding to study possible pathways to achieve deep carbon reductions by 2050, the results of which are the subject of this report. In addition, the City used this funding to study the economic impact of PlaNYC's initiatives, to complete an audit of its current greenhouse gas inventory, and to develop recommendations to support the City's completion of a neighborhood-level greenhouse gas emissions inventory. Phase 2 of Cleaner, Greener Communities Program commenced in 2013 and provides implementation funding for projects that will reduce greenhouse gas emissions, save energy, deploy renewable energy, and support the achievement of the targets and goals established by the Phase 1 planning process, providing economic and environmental benefits for the state's communities.

Executive Summary

The City of New York committed to reduce its greenhouse gas emissions by 30 percent before 2030 (30 by 30) as part of its long-term sustainability agenda, PlaNYC. Six years later, emissions have fallen by more than 19 percent, or nearly two-thirds of the way to the 30 by 30 goal. The city's power supply is cleaner; buildings are more energy efficient; and New Yorkers are driving less and generating less waste. The City has also created ambitious policies and programs to foster emissions reductions throughout the public and private sectors.

Despite this local progress, global greenhouse gas emissions (GHG) are rapidly accelerating. If the current trajectory continues, temperatures could rise by 4 to 6°C this century and yield up to six feet of sea level rise. The New York City Panel on Climate Change (NPCC) predicts that local sea-level rise could be even greater. The United Nation's Framework Convention on Climate Change set a goal to limit the rise in temperature this century to just 2°C to prevent "dangerous anthropogenic interference with the climate system." Respecting this limit would require cutting global emissions by at least 50 percent below 1990 levels by mid-century. The European Union and several U.S. states, including California and New York, have pledged to cut their emissions 80 percent by 2050 from 1990 levels (80 by 50).

Cities, too, must act. More than half of the world's population now lives in cities, and cities are responsible for the vast majority of global emissions. New York City alone produces roughly half a percent of total global emissions. The City also has significant tools to promote emissions reductions, including its ability to regulate buildings and land use, collect taxes and offer incentives, create innovative programs and public-private partnerships, and build and operate major infrastructure as well as thousands of public facilities. Investments in resiliency can also be leveraged to promote emissions reductions.

For a city like New York, whose residents and businesses already emit far less on a per capita basis than the U.S. average, the question is: what is the appropriate long-term reduction target and what would it take to get there? The 2011 update to PlaNYC called upon the Mayor's Office of Long-Term Planning and Sustainability (OLTPS) to undertake a study to answer this question.

Study Objectives and Methodology

This study seeks to evaluate the potential for achieving deep long-term carbon reductions in a way that is grounded in practical realities — particularly the complexity and uniqueness of New York City's built environment and infrastructure — and is thoughtful about economic impacts. The goal of the study is to ask whether it is possible to reduce the city's GHG emissions by 80 percent before 2050 from 2005 levels, and if achievable, to identify the lowest cost pathways and highest priority near-term actions needed to reach this goal.

The study begins by evaluating the 'technical potential' for reducing emissions in the four highest impact sectors — buildings, energy supply, transportation, and solid waste. An internally consistent quantitative model is used to determine the abatement potential and cost-effectiveness of more than 70 unique measures across the four sectors. A cost-production model is also used to evaluate options and timelines for decarbonizing the electric grid. A macro-economic model is then used to evaluate the economic and jobs impacts of the 80 by 50 pathway compared to business as usual.

The analysis focuses on existing and emerging technologies and practices rather than pinning hopes on future breakthroughs. It also grapples with key challenges to implementing carbon reductions, including insufficient financing, high opportunity costs, split incentives, behavioral inertia, market constraints, and regulatory obstacles. To test the limits of what is possible, New York City is assumed to act alone, in the absence of Federal policy, and without a significant price on carbon.

Summary of Findings

Technical Feasibility

New York City could achieve 80 by 50 but it would be exceptionally difficult

Achieving 80 by 50 is theoretically feasible but would require change at an unprecedented and technologically-untested scale. It would require large investments in energy efficiency and cleaner energy sources, wholesale transition to low-carbon transportation technologies, and the transformation of the solid waste sector. Up to two thirds of these investments could be cost effective because they would yield energy savings that would offset upfront costs; the rest would yield little or no payback. Regardless of the economics, market barriers would need to be overcome at every step of the way.

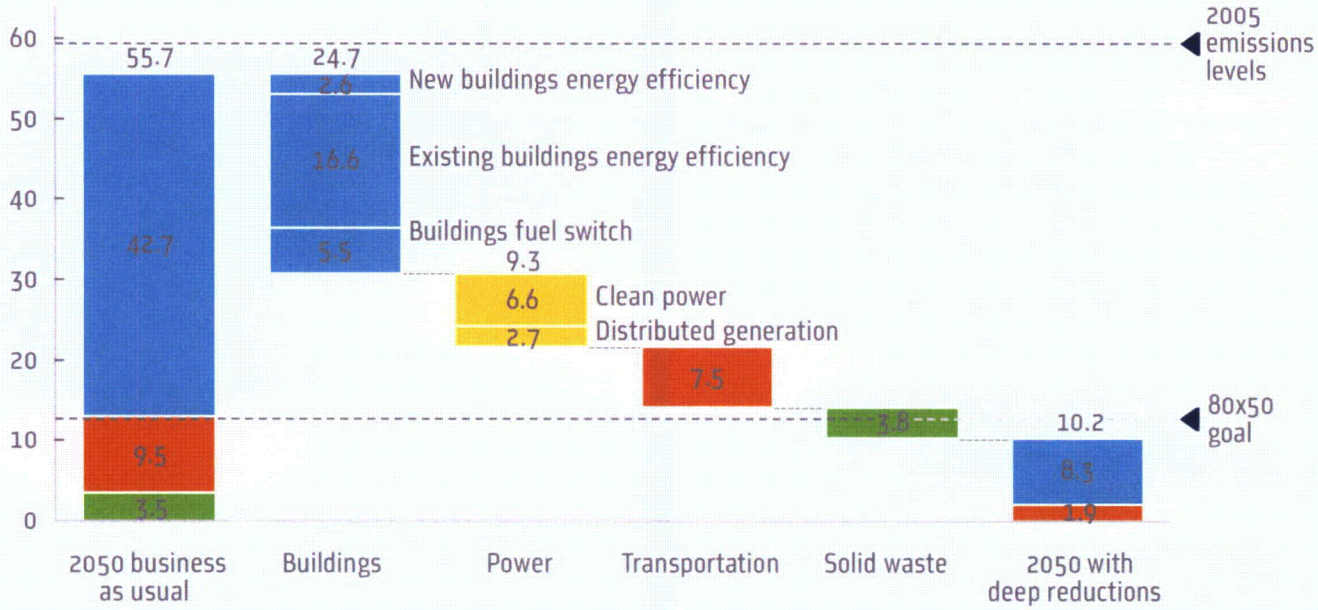
Action on all fronts would be needed

Achieving 80 by 50 would require targeted actions to reduce emissions in every sector, market segment, and technology application. With no shortcuts available, and with no reasonable expectation of breakthrough technologies on the horizon, a portfolio of small actions using currently available practices would be needed. The majority of the reductions would come through energy efficiency in buildings (62 percent), followed by cleaner power (18 percent), transportation (12 percent), and solid waste (8 percent).

Accelerating near-term action would increase the likelihood of achieving 80 by 50

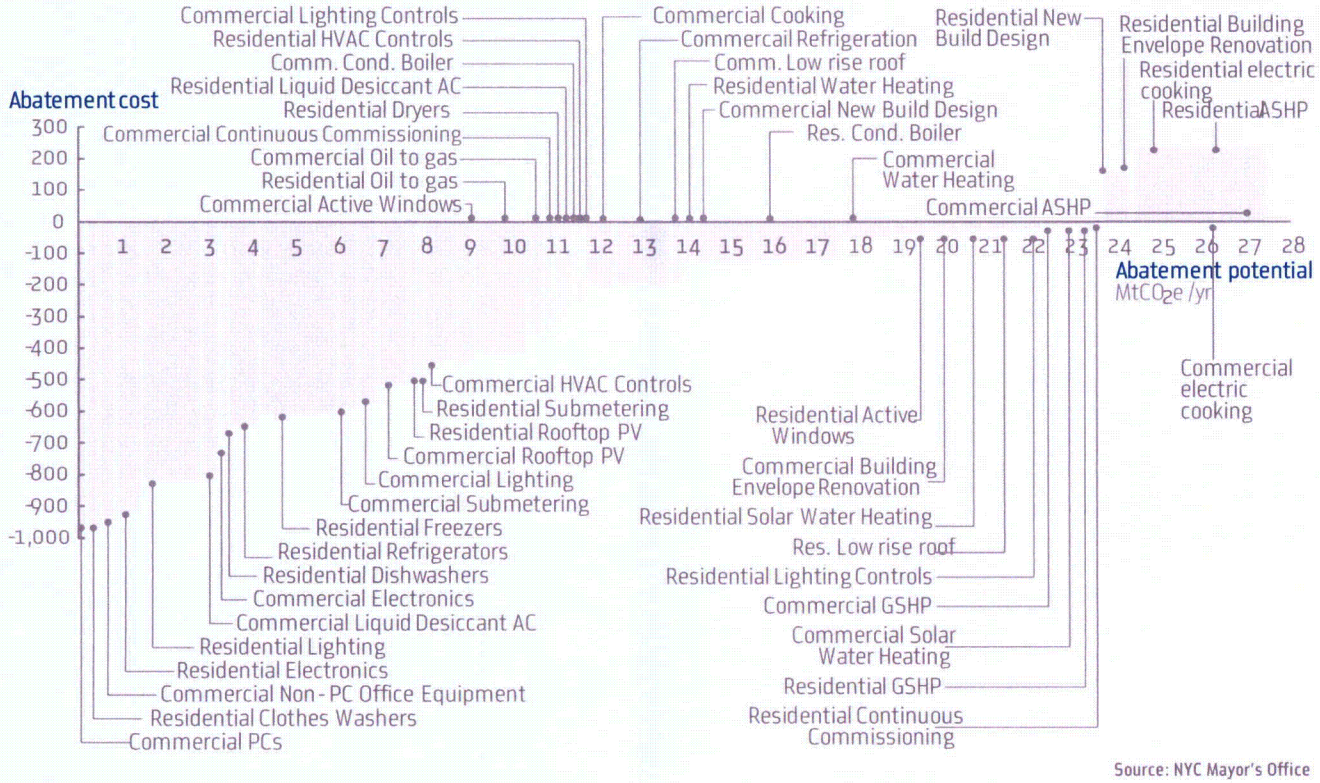
Achieving deep emissions reductions by mid-century would require consistent progress year in and year out. Accelerating attainment of the PlaNYC 30 percent reduction goal by 10 years — reaching it by 2020 rather than 2030 — would put the City on a trajectory to achieve 80 by 50. The sooner the City is able to get on a pathway to deeper reductions, the more likely it is to reach 80 by 50. However, even if the City reaches 80 by 50, it would still emit roughly 60 percent of the total emissions that would be expected under business as usual.

Abatement Potential by Sector
Million Metric tons of Carbon Dioxide Equivalent ($MtCO_2e$)



Source: NYC Mayor's Office

2050 Marginal Abatement Cost Curve for Buildings Sector
$/tCO$_2$e



Source: NYC Mayor's Office

Reductions by Sector

Buildings

Energy use in buildings is directly or indirectly responsible for 75 percent of the city's carbon emissions. Substantial opportunities exist to cost-effectively save energy, with the potential to yield up to 27.8 million tons of emissions reductions (43 percent of 2005 emissions). To achieve 80 by 50, New York City must retrofit a large majority of today's existing buildings; convert onsite combustion of fossil fuels to renewable or low-carbon energy; construct new buildings 75 percent more efficiently than existing construction standards; and greatly improve the efficiency of appliances and electronics.

A foundation for action is already in place. The Greener, Greater Buildings Plan is demonstrating the important role that public disclosure of energy performance data can play in encouraging activity in the marketplace. The NYC Clean Heat program shows that a combination of regulations, resources, and partnerships can help building owners to accelerate investments in building systems. And the New York City Energy Efficiency Corporation (NYCEEC) is successfully working with private lenders and businesses to increase the availability of financing.

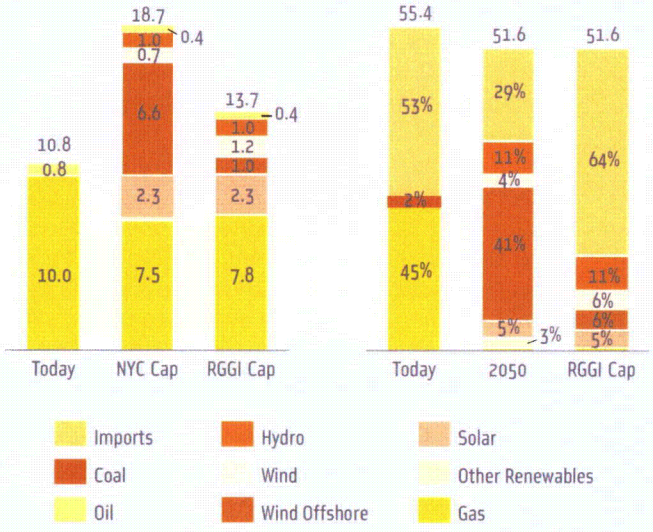
Capturing the full potential of these reductions, however, could be extraordinarily difficult. The sheer scale of the undertaking, spread across nearly one million buildings, is far beyond what the current marketplace for energy efficiency can support. The City would also need to provide encouragement to building owners to undertake efficiency measures when they face limited access to capital and competing needs, and may also be unable to realize the benefits of their investments because building tenants may receive a large portion of the energy savings. Finally, there is a widespread need for education and technical assistance.

Power

New York City's power system is already one of the Nation's cleanest and most reliable. Two thirds of the city's electricity is generated from natural gas, which is far cleaner than coal or heavy oil, while carbon-free hydro and nuclear resources supply the remainder. Achieving 80 by 50, however, would require the power system to become even cleaner. Assuming that electricity demand from other sectors decreased by as much as 36 percent, some inefficient and carbon-intensive generation could retire, but significant gas-fired generation capacity would need to remain online to maintain reliability. The remaining supply would have to be decarbonized almost completely.

The city has already made significant progress in decarbonizing its power supply in recent years. Electricity is more than 30 percent less carbon-intensive today than it was in 2005 because power plants have switched from heavy oil to cleaner and less expensive natural gas, inefficient plants have retired, and several new state-of-the-art facilities have come online. The City is also supportive of developers' plans to import up to 1 gigawatt (GW) of hydropower from Quebec and build up to 700 MW of offshore wind turbines in the waters off of the Rockaway peninsula. Meanwhile, the City is working closely with utilities, research partners, and private businesses to accelerate the growth of clean distributed generation — including photovoltaic solar (PV) and combined-heat and power (CHP).

Installed In-City Capacity and Generation Mix
GW and TWh, respectively



Source: NYC Mayor's Office

To reach 80 by 50, the City would need to overcome unprecedented technical challenges to interconnect large-scale renewable energy resources like solar and wind that only operate intermittently. It would also be necessary to fundamentally rethink the current regulatory model in the power sector. Costly investments in cleaner sources would also be necessary and tradeoffs would need to be made among competing resources — for example, determining the appropriate role of nuclear power. Equipment installed today may still be around by mid-century, but that should not deter investments in more efficient technologies like natural-gas fired cogeneration that are still far from optimal from a carbon emissions standpoint.

Transportation

New York City's expansive mass transit system allows New Yorkers to drive much less than other Americans. Because New Yorkers take so many fewer car trips, they emit 75 percent less CO_2e than the per capita American average. Yet transportation in New York City is still responsible for over ten million tons of annual emissions, or 20 percent of our citywide total. Nearly all of these emissions stem from the combustion of fossil fuels in on-road vehicles. To achieve 80 by 50, the city must almost entirely shift from automobiles powered by fossil fuels to other less polluting technologies and modes of transportation.

PlaNYC is already fostering positive changes in the transportation sector by focusing on actions that the City can undertake on its own: making streetscapes more lively and pedestrian-friendly; zoning for neighborhood density and diversity to reduce the need for car travel; expanding mobility options through launching the Select Bus Service program and the nation's largest bike share program; and creating electric vehicle charging infrastructure. The City's automotive fleet also operates over 5,000 hybrid and alternative technology vehicles and is utilizing up to 20 percent biofuels in all diesel vehicles.

Capturing the full potential of transportation emissions reductions would require navigating a complex web of City, State, and Federal policies and many layers of private sector involvement to expand investment in the region's transit system — a task as necessary as it is challenging. Full regional collaboration, as well as perseverance, would be needed to make longer-term, transformative investments to enhance transit service and

connectivity. Consumer education, behavioral change, and accelerated adoption of cleaner technologies would also be essential. Finally, the City and region would need to find creative ways to mitigate traffic congestion and fund transit improvements in a challenging fiscal and political environment.

Solid Waste

New York City generates more than 11 million tons of waste each year — the equivalent volume of 3,000 large trucks every day. Emissions from the solid waste sector are 22 percent lower today than they were in 2005 because New Yorkers are generating less and the City is using cleaner modes of transport, but solid waste still accounts for nearly 5 percent of total emissions. The potential exists to reduce emissions by up to 3.5 million tons and even to achieve carbon neutrality in the sector. This would require significant increases in recycling rates and waste reduction efforts. It would also require diverting the majority of organic waste from landfills and converting waste into energy at state-of-the art facilities.

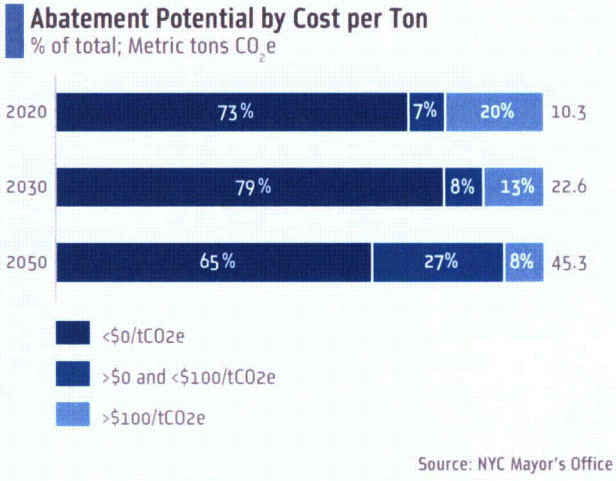
The City is making tremendous strides to improve the sustainability of the waste sector. To support the PlaNYC goal of diverting 75 percent of solid waste from landfills, the city now accepts all rigid plastics for recycling — the largest expansion to the recycling system in its 25-year history. The City is also conducting successful pilots to collect and process organic waste from residential buildings and public schools; and it is partnering with leading restaurants to divert food waste from landfills. Finally, the City is continuing to implement the Solid Waste Management Plan by shifting from truck-based transport to less polluting rail and barges.

Nevertheless, the City faces significant challenges in decarbonizing the waste sector. Aggressive and sustained efforts would be needed to change behavior and engage more New Yorkers in recycling. Significant private investment in the region's waste processing infrastructure would also be necessary, but investment would only occur if the policy environment is conducive. Finally, New Yorkers would need to continue reducing the amount of waste they generate, which will be challenging since they already produce far less waste per capita than most Americans.

Economic Impacts

Many carbon abatement measures would be cost-effective

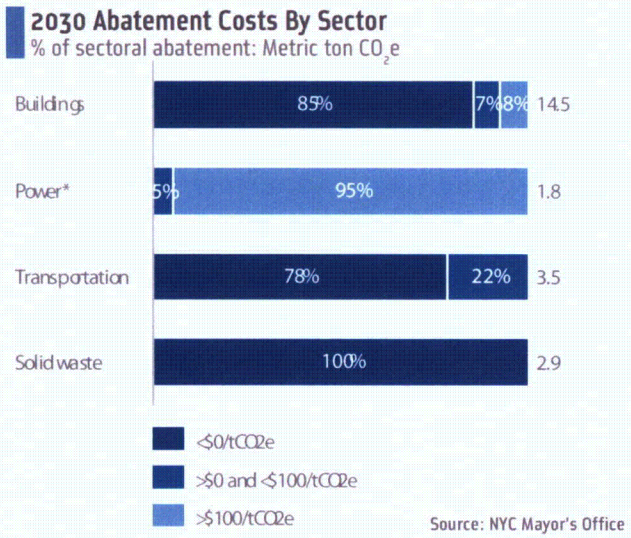
Roughly two-thirds of the measures evaluated in this study would be cost-effective from a societal standpoint, meaning that economy-wide benefits would outweigh costs. This assumes that investments are made with financing at a low interest rate of 4 percent, which is equivalent to a long-term government bond. In reality, most residents and businesses would incur higher costs of capital and seek greater economic returns. Nevertheless, ample opportunities exist to save money and yield quick paybacks for individual actions and economy-wide.



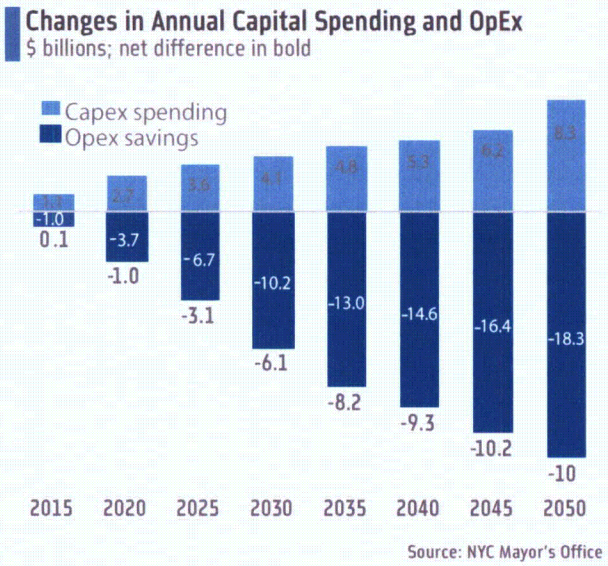
Source: NYC Mayor's Office

Costly investments in energy infrastructure would be required

Since New York's power sector has already captured most 'low-hanging fruit' through fuel switching to natural gas (although significant potential remains in the buildings sector), it would be expensive to achieve substantial additional reductions. Up to $5 billion of incremental investment would be needed per year and retail electricity prices could increase by up to 9 percent above the business as usual case. Individual buildings would also need to make costly investments to transition away from fossil fuels.



*For the sake of this analysis, "Behind the meter" technologies such as solar PV and combined heat and power are included as demand reduction measures in the building sector.



Achieving 80 by 50 could promote local economic growth and competitiveness

Although capital spending on carbon reduction could displace other types of spending, it would yield a net-savings on total energy costs across the local economy and would therefore increase competitiveness. This would be the case even if power prices increase as the grid decarbonizes. By 2030, this could yield up to 18,000 new jobs and $1.9 billion of economic activity a year.

But acting alone would increase costs and lead to inefficiencies

Although theoretically possible, the City could not realistically achieve 80 by 50 by acting alone. Federal or at least regional action is needed to create a level playing field and send a price signal to the entire marketplace. Unilateral actions, on the other hand, could create market distortions and economically inefficient outcomes. Although it is less desirable than action at the Federal level, increased coordination at the regional level could lead to cost savings. In the power sector, regional coordination would enable the City to reach 80 by 50 for 30 percent less cost than if it pursued the goal on its own.

80 by 50 may not be the right goal for now but New York City could still aggressively accelerate its emissions reductions

80 by 50 makes sense as a global goal — but it may make less sense for New York City, which is already relatively energy efficient. While it may be possible to achieve an 80 percent carbon reduction through retrofitting hundreds of thousands of buildings, cheaper opportunities are available outside the region — including, for example, the retirement of remaining coal-fired power plants —which may make the scale of the challenge within the five boroughs more manageable. Whatever the exact goal, New York City could become a proving ground for innovative technologies, financing methods, and programs aimed at achieving deep carbon reductions.

Challenges

2050 is far enough away that the future is highly uncertain

Technologies evolve and behaviors change faster than the city's physical landscape — and they will change by 2050, too, in ways that we cannot imagine. Trying to bet on which power generation technology will be more economical in 2050 would be impractical. For example, few would have predicted the shale gas revolution even as recently as 2003. By 2050, the landscape of carbon abatement will change dramatically, upending even the best-informed assumptions made in 2013. Orienting towards the 2050 goal is critical but it cannot dominate today's

decision-making or else it could deter interim steps that are positive but far from perfect.

Businesses and residents face barriers to acting – even when abatement measures are cost-effective and will yield paybacks

More than two thirds of carbon reduction opportunities may yield positive economic returns at the societal level, but this may not be the case at the level of individual tenants, landlords or business owners who may demand higher returns from their investments. Action may also be hindered by insufficient education and awareness of opportunities; technical challenges and the hassle of implementing measures, particularly those that need to interface with regulatory bodies or utilities; and insufficient access to financing. Even when these barriers are not especially challenging to overcome, other issues compete for decision-makers' attention. A landlord, for example, may have a long list of priorities that yield a better return on investment and time spent than a potentially disruptive building retrofit.

A portion of abatement measures is not economical without carbon prices

At least a third of the abatement measures will not make economic sense even at a low societal discount rate unless there is a substantial price on carbon or strong market signal. Whether investing in solar thermal systems in an era of cheap natural gas or building out large-scale offshore wind farms, some abatement measures will require incremental spending that will not be recovered through operational savings. This barrier could prove more powerful than any other.

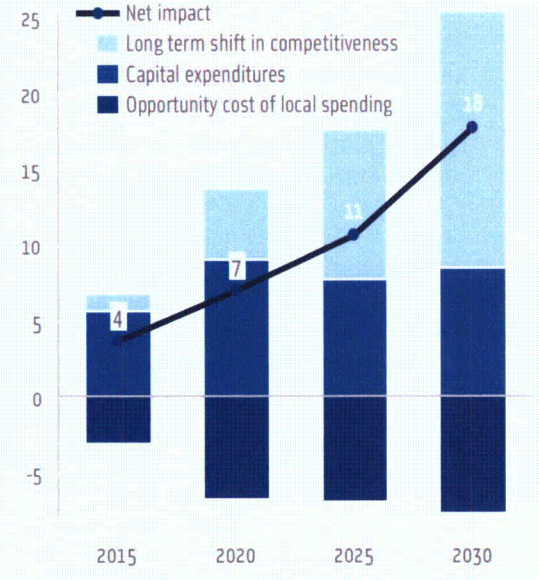
Multiple parties need to be involved, and value capture is complicated

An individual opportunity may make sense on the fundamental economics, but if it involves value capture across sectors, consumer classes or multiple parties, then high transaction and coordination costs could interfere. In commercial buildings, for example, owners may find it difficult to justify installing better lighting if tenants are going to capture the benefits of energy savings. Likewise, on large transportation infrastructure projects, coordinated planning, budgeting and project management — not to mention perseverance and political will — would be needed across agencies and levels of government. Aligning incentives and objectives will be challenging at every scale and for every project type.

Infrastructure may need to be upgraded

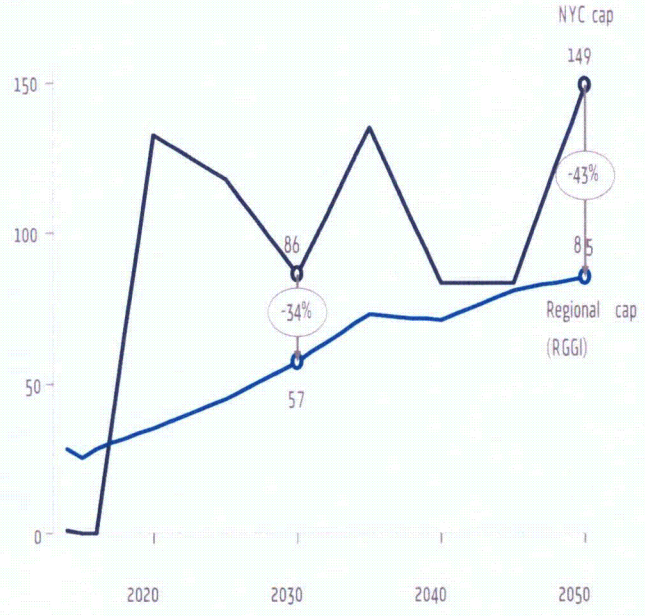
Once barriers are overcome and incentives are aligned,

Employment Impacts by Type
Thousands; by type of impact



Source: NYC Mayor's Office

Implied Carbon Costs per Ton
Dollars



Source: NYC Mayor's Office

tens of thousands of individual decision-makers may finally decide to take action — but in some cases, having the right infrastructure would be critical. New York City's infrastructure is robust but compared to some other large international cities, it is aging and in need of modernization. Infrastructure and consumer technologies may often need to coevolve to be successful — for example widespread composting of organic waste would depend on adequate processing infrastructure, but developing this infrastructure would require a guaranteed supply of organic waste. Similar dilemmas could occur with electric vehicle chargers and other measures, and would need to be overcome.

Capturing the Potential

Addressing market barriers would be essential

The City is well positioned to assist in overcoming a range of regulatory, information and market barriers that could otherwise inhibit progress towards 80 by 50. For example, the City can work with utilities to streamline and improve the process for interconnecting renewable energy resources into the electric grid. It can coordinate across levels of government to cut bureaucratic red tape that slows the introduction of new technologies. It can encourage private lenders, in coordination with NYCEEC to expand financing options that recognize the value of energy savings. It can work with the real estate industry to foster the realignment of incentives for undertaking efficiency projects. And it can work with key partners to provide technical assistance and information to help encourage the marketplace.

All the tools of government and the private sector would be needed

The typical tools of government are insufficient to achieve such deep carbon reductions. Instead, the City would need to encourage lending institutions to expand and diversify financing options, work with utilities and energy companies to foster innovative investments, partner with community groups and NGOs to spur local action, and collaborate with New York State to increase local uptake of its incentives and technical assistance programs. The City could build on successful models like the NYC Clean Heat program, which pairs regulations with technical assistance, financing, and incentives to accelerate the transition to cleaner heating fuels.

Individual New Yorkers could play a significant role in reducing emissions

Individual New Yorkers could make a significant difference in achieving carbon reductions by choosing to create less waste, use more sustainable modes of transit, and make purchasing decisions that promote energy efficiency and carbon reduction. The City's marketing campaign, GreeNYC, can provide New Yorkers with the information and encouragement they need to make individual choices that can save energy and reduce greenhouse gas emissions.

Decarbonization and resiliency could go hand in hand

As New York City continues to recover from the impacts of Hurricane Sandy, it has the opportunity to integrate carbon reduction and climate resiliency objectives. Approximately two-thirds of in-city electricity generation capacity is located in FEMA's latest 100-year flood zone and a number of plants experienced flooding during Hurricane Sandy; by mid-century 97 percent of the city's generation capacity is projected to be within the 100-year floodplain. Modernizing existing plants could make them better equipped to handle storm surge and other extreme weather risks while improving operating efficiency. Distributed generation could allow a building (or a set of buildings in the case of a microgrid) to continue operating during a grid-wide failure and reduce its carbon footprint, depending on the technology. Implementing the City's resiliency plan, PlaNYC: A Stronger, More Resilient New York, could create many other opportunities to reduce emissions.

New York City could become a laboratory for low-carbon innovation

New York City can demonstrate leadership and foster the commercialization of new low carbon technologies. The City operates 4,000 public buildings, over 300 public housing sites, 15 hospitals and health care centers, and 14 wastewater treatment plants. The City is working with research institutions, Con Edison, NYSERDA, and the private sector to identify and test out promising technologies at these facilities, and make New York a living laboratory.

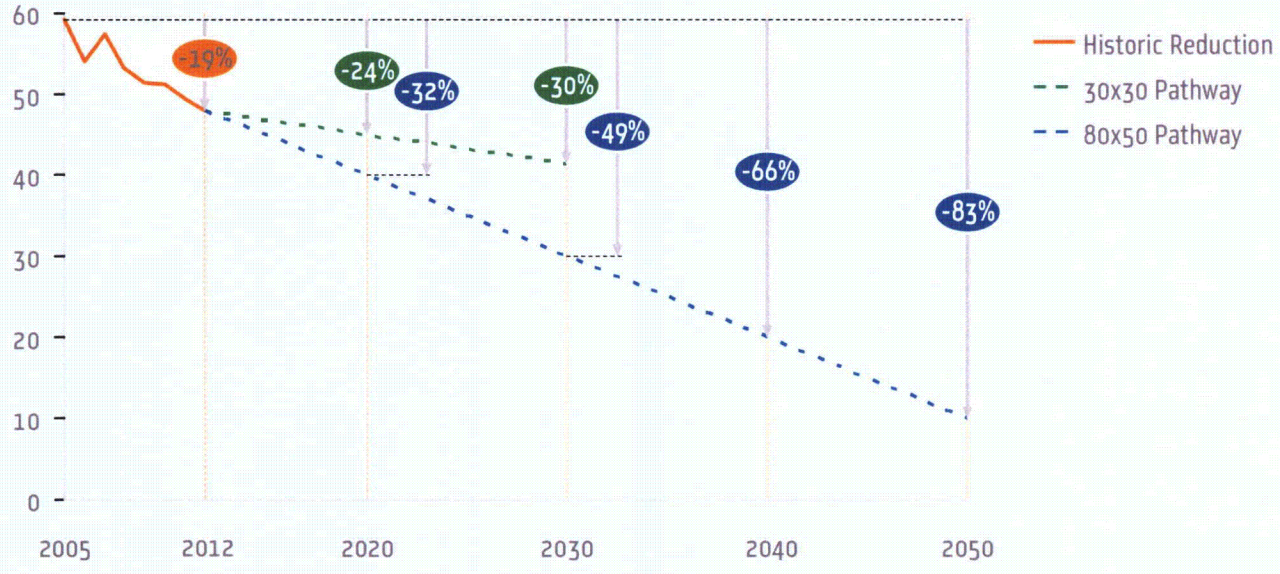
Near-term Actions

Even though the exact shape of a low-carbon city is uncertain today — and the 80 by 50 goal itself may well be too aggressive for a relatively efficient city like New York — the city has both the tools and the momentum to accelerate carbon reduction efforts this decade. As the City is now close to two-thirds of the way to the PlaNYC 30 percent greenhouse gas reduction goal, it could consider accelerating the target date for reaching the goal, from 2030 to 2020. Doing so could put New York City on a trajectory to achieve 80 by 50 while maintaining focus on what is doable today.

To reach a 30 percent reduction, emissions would need to fall another 6.5 million tons below 2012 levels. If the City aggressively implements and strategically expands several existing initiatives it could achieve the 6.4 million ton reduction within this decade. These reduction actions are focused on the buildings, transportation and waste sectors. Several promising near-term opportunities exist in the power sector as well and could be pursued.

Achieving 30 by 20 would require tremendous effort and consistent reductions of 2 percent per year through the end of the decade. This will not be easy, but New Yorkers stand to gain along the way. Reducing energy consumption in buildings will lower operational expenses and create jobs. Converting to cleaner fuels in buildings, electrifying vehicles, or using biodiesel in vehicles will improve air quality. Diverting waste from landfills will save city residents and businesses on waste export costs and could promote local industries. These and other measures could reinforce and strengthen New York City's global leadership in responding to climate change, while making the city more competitive, livable, and resilient.

GHG Emissions Pathways
Metric tons CO_2e; % reduction vs. 2005 in a give year



Source: NYC Mayor's Office

Credit: Mayor's Office

Aerial view of the City looking South from