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In the Matter of:	Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3)
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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
ENTERGY NUCLEAR OPERATIONS, INC.) Docket Nos. 50-247-LR/ 50-286-LR
)
(Indian Point Nuclear Generating)
Units 2 and 3)

NRC STAFF'S TESTIMONY OF ANDREW L. STUYVENBERG
CONCERNING CONTENTION NYS-9, NYS-33
AND NYS-37 (ALTERNATIVES, CONSOLIDATED)

Q.1. Please state your name, occupation, and by whom you are employed.

A.1. My name is Andrew L. Stuyvenberg. I am employed as a project manager in the Division of License Renewal in the Office of Nuclear Reactor Regulation. I also serve as a subject-matter expert in the area of energy alternatives. A statement of my professional qualifications is attached hereto. NRC000134.

Q.2. Please describe the nature of your current responsibilities.

A.2. I currently provide analyses of potential alternatives to license renewal for NRC environmental impact statements. To date, I have performed, overseen, or reviewed alternatives analyses in nineteen NRC staff environmental impact statements that either have been published or are currently in progress.

I also provide environmental expertise to agency processes, including the update of the Generic Environmental Impact Statement for License Renewal of Nuclear Plants, issues identified by the Fukushima Site Team, and proposed actions by the Japan Lessons-Learned Directorate.

Recently, I have worked with other NRC staff members to develop guidance on how to address greenhouse gas impacts in agency environmental impact statements, how to consider

terrorism in reviews of projects located in the 9th Circuit, and how to address Severe Accident Mitigation Alternatives (SAMA) reviews at the license-renewal stage for facilities that have completed a design-stage SAMA review. I have also overseen the need-for-power analysis for the proposed operation of Watts Bar Unit 2. Finally, I am a credentialed agency meeting facilitator, in which capacity I assist agency staff with planning and facilitating public and internal meetings.

Prior to joining the NRC staff, I worked for the North Carolina Sustainable Energy Association (NCSEA) – a 501(c)(3) clean-energy advocacy organization – where I coordinated the organization’s intervention in an electric-utility integrated-planning process. In that process, we alleged that North Carolina’s utilities had inadequately considered demand-side management approaches to reducing power demand and had unreasonably excluded renewable energy from their plans. While working for NCSEA, I also initiated a new proceeding at the North Carolina Utilities Commission in which NCSEA alleged that one utility was unreasonably pursuing new baseload coal capacity when less-expensive demand-side resources were available.

I have a Masters Degree in Environmental Management in Environmental Economics and Policy from Duke University’s Nicholas School of the Environmental and Earth Studies, where I concentrated my studies on energy and the environment. My coursework included classes in energy law, energy technologies, energy geology, science and technology policy, environmental law, and environmental economics, among other courses. I am currently a Juris Doctor candidate at the Georgetown University Law Center, where I have also focused on issues related to energy and the environment.

Q.3. Please explain what your duties have been in connection with the NRC staff’s review of the license renewal application (LRA) submitted by Entergy Nuclear Operations, Inc.

("Entergy" or "Applicant") for Indian Point Nuclear Generating Units 2 and 3 ("IP2" and "IP3, or "Indian Point").

A.3. From February of 2008 through October of 2011, I managed the environmental review for the proposed license renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3. I coordinated the preparation and publication of the draft and final supplemental environmental impact statements (the DSEIS and the FSEIS, respectively). From April 2007 until the FSEIS was published in December of 2010, I was also responsible for the alternatives analysis. Finally, I am responsible for the analysis of greenhouse gas emissions in Chapter 6 of the FSEIS.

Q.4. What is the purpose of your testimony?

A.4. The purpose of my testimony is to present the views of the staff of the Nuclear Regulatory Commission ("Staff" or "NRC staff") with respect to Contentions NYS-9, 33, and 37 ("Contention NYS-37 (Consolidated)"). The contentions assert that the analyses of the environmental impacts of alternatives to license renewal are inadequate in the Environmental Report ("ER") that Entergy filed in its License Renewal Application (LRA), the Staff's DSEIS, and the Staff's FSEIS. The Staff disagrees with NYS. It is the Staff's position that the alternatives analyzed are reasonable, the analysis is adequate, and that the analysis meets applicable regulatory requirements and thus constitutes a reasonable consideration of the environmental impacts of alternatives to license renewal.

Q.5. Please identify the documents that you have used to prepare your testimony.

A.5 NUREG-1437, the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (May 1996) ("GEIS"), NYS0000131A to I; the Draft Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38 regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 (December 2008) ("DSEIS")

NYS000132A to D, and the references therein; the Final Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38 regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 (December 2010) ("FSEIS"), NYS000133A to J, and the references therein; Levitan and Associates, Inc. 2005, "Indian Point Retirement Options, Replacement Generation, Decommissioning/Spent Fuel Issues, and Local Economic / Rate Impacts", prepared for the County of Westchester and the County of Westchester Public Utility Service Agencies, NYS000056; NRC Information Digest (NUREG-1350), NRC000086; DSEIS Comments from the New York State Office of the Attorney General, NYS000134; 2007 Declaration of Peter A. Bradford, NYS000105; 2007 Synapse Report, NYS000052; Written Testimony of David A. Schlissel, NYS000046; New York State Statement of Position, Contention NYS-9/33/37, NYS000045; Written Testimony of Peter A. Bradford, NYS000048; 10 CFR Part 51, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28467, NYS000127; 2009 Declaration of David A. Schlissel, NYS000053; Written Testimony of Peter J. Lanzaotta, NYS000047; 2011 Declaration of Peter J. Lanzaotta, NYS000098; National Research Council, Alternatives to the Indian Point Energy Center for Meeting New York Electric Power Needs, NYS000055; New York Independent System Operator 2010 Reliability Needs Assessment, NYS000058; Gerald Warburg, A Study of NRC Procedures for Assessing Need for Power and Alternative Energy Sources in Fulfillment of the NEPA Requirements for Environmental Impact Statements," NYS000116; New York State Energy Plan 2009 Renewable Energy Assessment, NYS000068; New York State Executive Agencies and the Department of Law Scoping Comments on the License Renewal of Indian Point Units 2 and 3, NRC000_Alt2; Letter from New York State, "Tendered" Application for Relicensure by Entergy Nuclear Indian Point LLCs for Operating Licenses Nos. DPR-26 and DPR-64, NRC000_Alt3; Energy Information Administration Electric Power Annual 2009, NRC000_Alt4;

Environmental Review for Renewal of Operating Licenses, Supplemental Proposed Rulemaking, 59 Fed. Reg. 37724, NRC000_Alt5; NRC Environmental Impact Statement Scoping Process Summary Report, NRC000_Alt6; New York State Supplemental Comments Regarding Scope of NEPA Analysis, Application for Relicensure by Entergy Nuclear Indian Point LLCs for Operating Licenses Nos. DPR-26 and DPR-64, NRC000_Alt7; Final NUREG-1437, Supplement 37, FSEIS for Three Mile Island, Unit 1, NRC000_Alt8; Final NUREG-1437, Supplement 37, FSEIS for Shearon Harris, NRC000_Alt9; Cristina L. Archer and Mark Z. Jacobsen, "Supplying Baseload Power and Reducing Transmission Requirements by Interconnecting Wind Farms," Journal of Applied Meteorology and Climatology, November 2007, NRC000_Alt10; American Wind Energy Association "Production Tax Credit" fact sheet, NRC000_Alt11; Martin LaMonica, "Flywheel Storage Maker Beacon Power Declares Bankruptcy," CNET News, October 31, 2011, NRC000_Alt12.

Q.6. Are you familiar with Contention NYS-9?

A.6. Yes. Contention NYS-9 states: "Entergy in its ER has not evaluated energy conservation as part of its 'no action' alternative analysis."

Q.7. Are you familiar with Contention NYS-33?

A.7. Yes. Contention NYS-33 states: "The DSEIS discussion of energy alternatives (Chapter 8) violates NEPA because it ignores significant new information and fails to provide a rigorous analysis of the costs, benefits, and feasibility of energy conservation and other measures under the "No-Action" Alternative in violation of 10 C.F.R. § 51.53(c)(3)(iv), 51.71(a) and (d), and 51.95, 10 C.F.R. Part 51, Subpart A, Appendix B; and 40 C.F.R. §§ 1502.14 and 1502.9."

Q.8. Are you familiar with NYS-37?

A.8. Yes. Contention NYS-37 states: "The FSEIS's discussion of energy alternatives

(Chapter 8) fails to provide a meaningful analysis of energy alternatives or responses to criticism of the DSEIS, in violation of the requirements of 42 U.S.C. §§ 4331 and 4332; 10 C.F.R. §§ 51.91(a)(1), and (C), 51.92(2), 51.95(c)(4), and Part 51, Subpart A, Appendix A and Appendix B, 40 C.F.R. §§ 1052.1, 1052.2(g), 1502.9, and 1502.14; and 5 U.S.C. § 551 *et seq.*”

Q.9. Does the ER discuss conservation as an alternative to license renewal?

A.9. No.

Q.10. Is the ER required to discuss conservation as an alternative to license renewal?

A.10. No, an applicant is not required to discuss conservation as an alternative to license renewal. The GEIS indicates that “a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable.” GEIS § 8.1, at 8-1; NYS000131D.

Conservation is not a single, discrete electric generation source; therefore, it is not included within the reasonable set of alternatives that the Staff is required to discuss. The purpose of the ER is to assist the Staff in developing its own discussion of alternatives. Because the Staff is not required to discuss conservation as an alternative, the ER is not required to discuss conservation as an alternative.

Q.11. Why is the Staff not required to analyze conservation as an alternative to license renewal?

A.11. The NRC has determined that “a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable.” GEIS § 8.1, at 8-1; NYS000131C. Because conservation is not an electric generation source, it is not included within the reasonable set of alternatives that the Staff is required to discuss. The GEIS nonetheless addresses conservation because it is an option “that states and utilities may use to reduce their

need for power generation capability.” GEIS § 8.1, at 8-2. Conservation is not a source of power; it does not constitute an electric generation source and it does not directly produce any power. Also, the GEIS states – and this Board has found – that conservation is not discrete electric generation. LBP-08-13 at 50 (“ . . . energy conservation is clearly not discrete electric generation of any sort.”). It is, therefore, not among the reasonable set of alternatives the Staff is required to analyze in the DSEIS or the FSEIS.

This treatment is an outgrowth of the purpose and need for the proposed federal action, in this case, license renewal. The purpose of license renewal is “to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license in order to meet future system generating needs”. GEIS at p. 8-1. An alternative to this option would, therefore, be an option that allows for an equal capacity for power generation. In order to provide for a meaningful comparison of the impacts of one option versus others, the options that must be considered include those that, like nuclear power plants, are electric generation sources.

Q.12. Does the GEIS address energy conservation under the no-action alternative?

A.12. Yes, the GEIS acknowledges that conservation is a possible consequence of the no-action alternative and recognizes that, while conservation is not a discrete power generation source, it is an option that may be used to reduce the need for generation capability. The GEIS indicates:

In addition, energy conservation and power imports are possible consequences of the no-action alternative. While these two alternatives are not options that fulfill the stated purpose and need of the proposed action *per se* (i.e., options that provide power generation capability), they nevertheless are considered in this chapter because they are important tools available to energy planners in managing need for power and generating capacity.

GEIS at 8-2. As a result, the GEIS thus discusses the environmental impacts of conservation.

I have provided, in the space below, the GEIS's summary of environmental impacts from conservation. Table 8.1 contains a summary of the GEIS analysis for the construction impacts of conservation, while Table 8.2 contains a summary of the GEIS analysis for the operational impacts of conservation.

Table 8.1 Environmental impacts of constructing 1000-MW(e)-equivalent electric power plants for non-nuclear alternative generating technologies

Alternative	Resource								
	Land use	Ecology	Aesthetics	Water quality	Air quality	Waste	Human health	Socioeconomic	Cultural
Conservation	Unquantified land lost to resource extraction for conservation technologies	Adverse impacts from resource extraction	Minimal for resource recovery and processing	Minimal for resource recovery and processing	Minimal for resource recovery and processing	Minimal for resource recovery, processing	Some risks from resource recovery	Minor employment, tax revenues from conservation industry	Minimal

Table 8.2 Environmental impacts of operating 1000-MW(e)-equivalent electric power plants for non-nuclear alternative generating technologies

Alternative	Resource								
	Land use	Ecology	Aesthetics	Water quality	Air quality	Waste	Human health	Socioeconomic	Cultural
Conservation	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minor impacts regarding radon, perhaps other contaminants (Pace 1991)	Increased jobs in conservation technologies	Minimal

Q.13. Did the Staff analyze energy conservation and energy efficiency as an alternative to license renewal in the FSEIS?

A.13. Yes. The Staff analyzed energy conservation and energy efficiency in the FSEIS in Section 8.3.3 at pp. 8-41 to 8-43; NYS000133C. The Staff found it reasonable to analyze energy conservation because—although conservation and energy efficiency are not single, discrete electric generating sources—NYS presented substantial evidence to the NRC staff that supported consideration of energy conservation and energy efficiency as an alternative to license renewal. NYS submitted this information in its comments on the DSEIS in 2009. See *generally*, FSEIS at A-984 to A-1043. In Chapter 8, NRC staff determined that the impacts of energy conservation “are generally lower than those from other alternatives, including the

proposed action.” FSEIS at 8-73.

During the Staff’s scoping process, in 2007, NYS presented limited comments on energy conservation. NYS proffered comments that asserted, very generally, that a new plan to improve energy efficiency and conservation could replace both Indian Point units. *New York State Executive Agencies and the Department of Law Scoping Comments on the License Renewal of Indian Point Units 2 and 3*, Agencywide Document Access and Management System (ADAMS) Accession No. ML073090588, at 17-18; NRC000135. While the NRC staff did not accept a plan that was—at the time the State submitted its scoping comments— newly conceived and non-binding as a sufficient basis for a replacement alternative for the Indian Point units, the NRC staff did rely on the 2006 National Academy of Sciences report to find that conservation could serve as part of a combination of alternatives in the 2008 DSEIS. The Staff also relied on the 2005 *Indian Point Options* study by Levitan and Associates, which NYS touted in its scoping comments. *Id.* at 18. To the extent that the Staff’s findings in the DSEIS included determinations that individual renewable generation options and energy conservation and energy efficiency were not available to serve as single and discrete replacements to the Indian Point units, the Staff did so on the basis of insufficient demonstrated resource quantity, inadequate lead times, or both. Nevertheless, the Staff considered renewables, conservation, and efficiency as portions of alternatives to license renewal and analyzed them in the DSEIS.

In the 2010 FSEIS, however, the Staff accepted New York State’s assertions – contained in its comments submitted on March 18, 2009 by John Sipos on behalf of the New York State Office of the Attorney General – about the adequacy of energy conservation and energy efficiency to serve as a replacement for the Indian Point Units. The NRC staff relied heavily on these comments in determining that energy conservation and energy efficiency was a reasonable alternative, and in determining the contents of the Staff’s combination alternatives.

Q.14. How did New York State's comments on the DSEIS inform the Staff's consideration of energy efficiency and energy conservation?

A.14. New York State's 2009 comments on the DSEIS were the primary drivers of Staff's inclusion of a conservation/energy efficiency alternative, and these comments also strongly influenced the Staff's combination alternatives, which included substantial quantities of energy efficiency and conservation.

a. Regarding the Staff's consideration of a stand-alone energy conservation and energy efficiency alternative in Section 8.3.3 of the FSEIS, the Staff did so based on comments that the New York State Office of the Attorney General submitted during the DSEIS comment period, on March 18, 2009. NYS000134. The Staff elected to do so even though energy conservation and energy efficiency does not constitute a single, discrete source of electric power generation as determined in the GEIS.

Most importantly, the Staff relied on NYS's DSEIS comments to establish the *state-specific* viability of conservation and energy efficiency. Comments from the New York State Office of the Attorney General asserted that energy efficiency and conservation had significant potential in the state. NYS000134. The Attorney General's Office asserted that energy conservation and energy efficiency could replace at least one Indian Point Unit by 2012, merely three years after New York State filed the comments, one year before the IP2 license would expire, and three years before the IP3 license would expire. FSEIS at A-1013. The NYS Attorney General's Office further referenced the Governor's "45x15 Program" in support of energy efficiency potential, which then-Governor Paterson indicated was "one of the most ambitious clean energy goals in America." FSEIS at A-1016. The NYS Attorney General's Office also stated that "already existing and identified New York State programs are in place"

(FSEIS at A-1021) that could achieve 1200 to 1500 MW of energy efficiency, and that “1200-1400 MW” (FSEIS at A-1020) could come from “energy efficiency programs being implemented as part of New York State’s 15x15 plan.” (FSEIS at A-1020).

Further, the 2007 Bradford Declaration, which New York State did not formally submit to Staff during either comment period, supports the notion that additional efficiency and conservation resources, beyond those discussed in the State’s DSEIS comments and Synapse Report, would potentially exist if Indian Point were to shut down. Bradford noted that, in situations of plant cancellations or shutdowns “. . . the amount of energy efficiency and other resources put into place vastly exceeded the forecasted availability of a few years earlier.” 2007 Bradford Declaration at 5, para 12 (NYS000105). Finally, the 2007 Synapse Report (NYS000052) projected levels of energy efficiency potential that are consistent with Staff’s determination in the FSEIS that energy efficiency and energy conservation constitutes a reasonable alternative to license renewal, and Mr. Schlissel’s testimony also supports this conclusion. Schlissel Testimony at 17-19; see also, Schlissel Testimony at 20-22 (NYS000046).

These New-York-specific assertions all indicate that 1) aggressive programs could replace Indian Point’s capacity; 2) the State was actively working to implement programs that were even more aggressive than existing programs and continues to do so; and 3) the State’s potential new programs could provide even more energy efficiency and conservation capacity than existing estimates suggested. These indications all support a conclusion by NRC Staff that New York could conceivably harness sufficient energy efficiency and conservation capacity by 2015 to offset the entire capacity of IP2 and IP3.

In discussing the environmental impacts of energy efficiency and energy conservation, the Staff referred to NRC license renewal SEISs for Shearon Harris and Three Mile Island

(NUREG-1437, Supplements 33 and 37, respectively), which both amplified the GEIS findings that impacts from conservation are generally small. The Staff generally adopted these impacts, i.e., SMALL impacts, for energy efficiency/conservation for Indian Point, with the exception of the site-specific observation that “loss of tax and PILOT [payments in lieu of taxes] revenue paid to municipalities near IP2 and IP3, as well as lost jobs, may result in SMALL to MODERATE socioeconomic impacts, which will not be offset by conservation.” FSEIS at 8-43. The issue that drove this impact finding was that the communities immediately surrounding the Indian Point site would suffer prompt and significant negative impacts, while any potential offsetting benefits from the implementation of conservation programs would be relatively more diffuse, and would not, in an immediate and targeted way, supply replacement revenue to the communities surrounding Indian Point.

To conclude, and to reiterate, contrary to New York State’s assertions, the Staff did not rely on either Shearon Harris or Three Mile Island FSEISs to establish the viability of energy efficiency/conservation as an alternative to Indian Point license renewal. Instead, the Staff relied on New-York-specific estimates of viability submitted by New York State Office of the Attorney General in its DSEIS comments of March 18, 2009.

b. In addition to analyzing energy conservation and energy efficiency as a stand-alone alternative to license renewal, the Staff elected to include two combinations of alternatives that also included energy conservation/energy efficiency. The Staff did this in response to public comments (including comments from NYS) that called for combinations of alternatives that included renewable energy, energy efficiency or energy conservation, and other power options. The first combination consisted of continued operation of IP2 or IP3 and conservation and energy from renewable sources (wind, hydropower, biomass, and landfill gas). FSEIS § 8.3.5.2,

at 8-60. The second combination consisted of repowering an existing fossil fuel plant with a natural-gas combined-cycle power plant and conservation and renewables (wind, new hydropower, biomass, and landfill gas). *Id.*

In developing the combination alternatives, the NRC Staff relied heavily on the DSEIS comments Mr. Sipos submitted on March 18, 2009. NYS000134. The Staff's second combination alternative ("NRC Combination 2") at § 8.3.5.2 of the FSEIS – is based, in large part, on a combination submitted by NYS ("NYS Combination 4"). See A-1021 of the FSEIS. Both NRC Combination 2 and NYS Combination 4 include 400-600 MW from repowering an existing fossil-fuel power plant in downstate New York with natural gas combined-cycle (NGCC) technology; the NRC Combination 2 includes 1000-1200 MW from efficiency or conservation, while the New York Combination 4 includes 1200-1500 MW from energy efficiency; and the NRC Combination 2 includes 600 MW from renewable generation, while the NYS Combination 4 includes 600-800 MW of renewable generation.

Further, the NRC staff offered a combination alternative that contained continued operation of only one Indian Point unit, along with conservation and renewable power (FSEIS at § 8.3.5.1), in response to New York State's scoping and DSEIS comments. New York State first formally raised this issue of continued operation of one unit in its letter of July 13, 2007.

"Tendered" Application for Relicensure by Entergy Nuclear Indian Point LLCs for Operating Licenses Nos. DPR-26 and DPR-64 (ADAMS Accession No. ML072050210), NRC000136. (NYS criticized the ER, for, as NYS put it, "The Environmental Report Improperly Limits the "No Action" Alternative to Consideration of Either Both Indian Point 2 and 3 or Neither of Them"). *Id.* New York State bolstered this view in its comments on the DSEIS when it asserted that "The DSEIS's no-action alternatives analysis fails under NEPA because it fails to consider: The no-action alternative as the relicensing of only one unit. . . ." FSEIS at A-1021. Thus, in the FSEIS,

at § 8.3.5.1, the Staff considered an alternative that consisted of the continued operation of one unit (operating with a cooling tower), renewable energy, and energy conservation/energy efficiency.

New York State, however, now takes issue with the NRC's inclusion of these combinations of alternatives, despite its previous comments. First, with regard to the combination alternative that includes continued operation of one unit, New York State asserts that "Alternatives that posit the continued operation of at least one Indian Point unit with closed cycle cooling towers (FSEIS § 8.1.1 and FSEIS § 8.3.5.1) presume NRC license renewal for that unit and are therefore not a "no-action" alternative." NYS Statement of Position at 32; Proposed Finding of Fact 3 (NYS000045). Second, NYS attacks both of the NRC staff's combinations – which contained NYS-proposed approaches – as structurally overstating "the environmental impacts of renewable generation by collectively by combining them not with conservation or energy efficiency, but with the operation of fossil fuels or with one Indian Point unit with cooling towers." NYS SOP at 33; Proposed Finding of Fact 10.

c. As a final recap, the Staff analyzed energy conservation and energy efficiency as a stand-alone alternative and as part of two combinations of alternatives to license renewal of Indian Point, even though it was not required to do so. The Staff did so largely in response to comments provided by John Sipos on behalf of the New York State Office of the Attorney General. New York State—which, in its Contention NYS-37, claimed that the Staff failed to address NYS comments on the DSEIS—now assails the approaches that the staff adopted in response to comments from New York State.

Q.15. Did the Staff consider purchased power or power imports?

A.15. Yes. The NRC Staff considered purchased power (analogous to "power imports")

as a reasonable alternative to license renewal in Section 8.3.2 of the FSEIS. FSEIS at 8-39. The NRC Staff indicated that “[g]iven New York State’s power market, all alternatives considered here could supply purchased power.” FSEIS at 8-39. As part of this analysis, NRC Staff discussed two transmission projects (FSEIS at 8-40) and indicated that they were illustrative of potential transmission improvements that could occur to improve the availability of purchased power. In the same section of the FSEIS – 8.3.2 – the NRC staff indicated that it would not separately evaluate the environmental impacts of any specific transmission project, but noted that proposed projects “serve as meaningful illustrations of projects that may improve the ability of power from other regions of the State or Canada to reach the same end-use markets currently served by IP2 and IP3.”

The NRC Staff did not assign separate environmental impacts to the purchased power alternative, as the impacts associated with purchased power are likely to result primarily from power production, rather than from any new or existing transmission route. In New York, power production is likely to come from gas-fired capacity, nuclear capacity, coal-fired capacity, hydroelectric capacity, wind power installations, or any of several other means of power generation. In any case, the NRC staff evaluated the potential impacts of the types of generating capacity that could generate purchased power elsewhere in Chapter 8, either as stand-alone alternatives or as portions of combination alternatives. The NRC staff considered either a new or repowered NGCC alternative in section 8.3.1, energy conservation and energy efficiency in section 8.3.3 (not truly a potential purchased-power option, but considered by Staff nonetheless), coal-fired capacity in section 8.3.4.13 (wherein Staff dismissed new coal as a stand-alone alternative – in large part due to New York State’s comments on the DSEIS), and combinations that include renewable generation like wind and hydroelectric power (in sections 8.3.5.1 and 8.3.5.2), as well as repowering an existing gas-fired facility (in section 8.3.5.2).

Q.16. Why did NRC staff consider repowering as an alternative?

A.16. The Staff considered repowering in response to DSEIS comments from the New York State Office of the Attorney General. FSEIS at A-1018 to A-1019. The Staff had not considered repowering in the DSEIS, but it did so in the FSEIS.

Q.17. Did NYS suggest that the Staff consider other combinations as alternatives to license renewal that the Staff did not consider in depth?

A.17. Yes, NYS proffered one other combination, which New York State called "Combination 3," and which we have labeled NYS Combination 3. NYS Combination 3 was comprised of 1000-1200 MW(e) of power from renewable resources (biomass and wind), 1200-1400 MW(e) from energy efficiency and 100-200 MW (e) from combined heat and power. FSEIS at A-1020.

The Staff did not rely on NYS Combination 3 because NYS Combination 3 includes combined heat and power. The combined heat and power portion of NYS Combination 3 serves a purpose that IP2 and IP3 do not serve, namely, providing heat. Thus NYS Combination 3 (which produces heat and power) and IP2/IP3 (which produce only power), did not serve the same needs.

In any event, the level of conservation in NYS Combination 3 was very similar to the level of conservation the Staff had already analyzed in NRC Combination 2. While the amount of renewable generation was greater in NYS Combination 3 than in NYS Combination 4, the types of impacts that result from the types of renewable technologies included in NYS Combination 3 have already been discussed in the FSEIS. As the level of conservation and the impacts of renewables were discussed elsewhere in the FSEIS, and as the purpose served by a portion of NYS Combination 3 was different than the purpose served by Indian Point, the Staff did not analyze this combination in depth.

Finally, I should note here that it is theoretically possible for the Staff to consider an infinite number of combinations or mixes to meet a defined generating requirement, but as the GEIS recognized, “such expansive consideration would be too unwieldy to perform given the purposes of this analysis.” GEIS at 8-1. The NRC Staff, in the FSEIS, created two reasonable combinations that considered and incorporated comments presented to the agency by the New York State Office of the Attorney General.

Q.18. The State claims that the Staff ignored the “likely combination” of renewable generation and energy efficiency and conservation measures. NYS SOP at 12 (NYS000045). Mr. Schlissel also makes this claim, Schlissel Testimony at 48 (NYS000046), as does Mr. Bradford, Bradford Testimony at 28 (NYS000048). Did the State, Mr. Schlissel, or Mr. Bradford previously provide comments that suggested any combinations of alternatives that consisted solely of energy efficiency/conservation or demand-side management and renewable power in its comments on the scope of the SEIS or in its comments on the DSEIS?

A.18. No. None of them proposed such a combination in scoping comments or in DSEIS comments. In fact, the two combinations the State proposed to Staff during the DSEIS comment period—as included in the comments submitted by John Sipos on behalf of the New York State Office of the Attorney General—included either some amount of natural gas-fired generation (NYS Combination 4) or some amount of combined heat and power (NYS Combination 3). The assertion by NYS that a combination of renewables and efficiency is a “likely” combination does not appear in NYS comments on the DSEIS.

Further, Mr. Bradford’s assertion that NYS Combination 3 is a “no-action scenario involving only energy conservation and renewable energy. . .” Bradford Testimony at 28 (NYS000048), is not correct. The vast majority of electric-power-sector combined-heat-and-power facilities are powered by fossil fuels, mostly natural gas. See excerpt from the Energy

Information Administration's Electric Power Annual 2009, Table 1.1, at page 14 (NRC000137). Further, NYS provided no indication in its DSEIS comments that it intended the combined-heat-and-power portion of NYS Combination 3 to be fueled by renewable fuels, despite the fact that NYS indicated that a different portion of NYS Combination 3 would come "from renewable resources like biomass and wind." FSEIS at A-1020.

Nevertheless, the Staff addressed energy efficiency and energy conservation as a stand-alone alternative in the FSEIS at Section 8.3.3.

Q.19. What other alternatives to the proposed license renewal did the Staff analyze?

A.19. The Staff analyzed a variety of alternatives to the proposed license renewal. The Staff discussed the closed-cycle cooling alternative in 8.1. The Staff analyzed the no-action alternative in Section 8.2. The Staff analyzed the environmental impacts of NGCC alternatives in Section 8.3.1 and purchased electrical power in Section 8.3.2. And, as discussed above, the Staff analyzed energy conservation and energy efficiency in Section 8.3.3. The Staff analyzed two combination alternatives in Sections 8.3.5.1 and 8.3.5.2. In Section 8.3.5.1, the Staff analyzed NRC Combination 1: the continued operation of either IP2 or IP3 with 600 MW(e) of renewable energy and 600 MW(e) of conservation programs, to address criticism from NYS that continued operation of one Indian Point unit was not considered. In Section 8.3.5.2, the Staff analyzed NRC Combination 2: repowering an existing fossil-powered plant with a new 400MW(e) to 600 MW(e) combined cycle plant, along with 600 MW(e) from renewable energy sources and 1000 to 1200 MW(e) of conservation and efficiency, which was based on NYS Combination 4.

Reproduced below is a table of alternatives to license renewal that the Staff considered. The Staff published this table in the FSEIS at page 9-9 and 9-10. The purchased power alternative is not listed separately in the table because its impacts will depend primarily

on the origin of the purchased power.

Table 9-1. Summary of Environmental Significance of License Renewal and Alternatives

Impact Category	Proposed Action	No-Action Alternative ^(b)	License Renewal with New Closed-Cycle Cooling	NGCC	
	License Renewal	Plant Shutdown		At the IP Site or a Repowered Site	At a New Site
Land Use	SMALL	SMALL	SMALL to LARGE	SMALL to MODERATE	MODERATE to LARGE
Ecology—Aquatic	MODERATE and SMALL to LARGE ^(a)	SMALL	SMALL	SMALL	SMALL
Ecology—Terrestrial	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Waste	SMALL	SMALL	SMALL to LARGE	SMALL	SMALL
Human Health	SMALL ^(c)	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE
Transportation	SMALL	SMALL	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE
Aesthetics	SMALL	SMALL	MODERATE to LARGE	SMALL	SMALL to LARGE
Historical and Archeological Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE

Table 9-1 (continued)

Impact Category	Conservation/Energy Efficiency	Combination of Alternatives	
		Option 1: One IP unit, onsite gas, offsite renewables, and conservation	Option 2: Gas, offsite renewables, additional imported power, and conservation
Land Use	SMALL	SMALL to MODERATE	SMALL to MODERATE
Ecology – Aquatic	SMALL	SMALL to LARGE	SMALL to LARGE
Ecology – Terrestrial	SMALL	SMALL to LARGE	SMALL to LARGE
Water Use and Quality	SMALL	SMALL to LARGE	SMALL to LARGE
Air Quality	SMALL	SMALL to MODERATE	SMALL to MODERATE
Waste	SMALL	SMALL to LARGE	SMALL to LARGE
Human Health	SMALL	SMALL	SMALL
Socioeconomics	SMALL to MODERATE	SMALL	SMALL to MODERATE
Transportation	SMALL	MODERATE	MODERATE
Aesthetics	SMALL	SMALL to LARGE	SMALL to LARGE
Historical and Archeological Resources	SMALL	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL to LARGE	SMALL to LARGE
<p>(a) NRC staff analysis indicates that impingement and entrainment impacts are MODERATE, but that thermal shock effects could potentially range from SMALL to LARGE.</p> <p>(b) The no-action alternative does not, on its own, meet the purpose and need of the GEIS. No action would necessitate other generation or conservation actions which may include—but are not limited to—the alternatives addressed in this table.</p> <p>(c) For the collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, a specific significance level was not assigned. See Chapter 8 for details.</p> <p>(d) Analysis was based on use of a closed-cycle cooling system.</p>			

Q.20. Were there alternatives that the Staff decided not to analyze?

A.20. Yes. The GEIS provides that:

While many methods are available for generating electricity, and a huge number of combinations or mixes can be assimilated to meet a defined generating requirement, such expansive consideration would be too unwieldy to perform given the purposes of this analysis. Therefore, the NRC has determined that a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only generation sources that are technically

feasible and commercially viable.

GEIS at 8-1. The Staff rejected certain alternatives as unreasonable and, in Section 8.3.4., explained why it did not analyze these alternatives. The Staff typically declined to analyze these alternatives because of resource insufficiency, inadequate technological development, or policy considerations. In keeping with the framework in the GEIS, an alternative had to be available in sufficient quantities by the 2013 and 2015 license expiration dates to serve as a sole-source replacement for IP2 and IP3 in order to be reasonable.

In some cases, commenters identified barriers to certain alternatives that the NRC staff incorporated into the FSEIS. For example, in Section 8.3.4.13, the Staff rejected coal-fired power based on the Staff's review of likely generating alternatives in New York in light of DSEIS comments and the existence of greenhouse-gas policies in New York. FSEIS at 8-49.

Foremost among the comments that asserted that coal-fired power was an unreasonable alternative is the set of comments received from the New York State Attorney General's office on March 18, 2009. In these comments, the State asserts that "no New York-based utility has a pending application for the construction of new coal generation in Zones H, I, J, and K. . ."

FSEIS at A-1018 - A-1019. The Staff removed the coal analysis from the range of reasonable alternatives, but retained the unaltered DSEIS analysis in order to preserve the Staff's already-completed consideration. The Staff noted:

The NRC staff has moved the supercritical coal-fired alternative to this section [Alternatives Dismissed from Individual Consideration] based on public draft SEIS comments, a staff review of likely generating alternatives in New York State, and policies like the Regional Greenhouse Gas Initiative that all suggest that new coal-fired generation is unlikely in New York State.

FSEIS at 8-49.

Q.21. New York State asserts that the Staff eliminated the "no-action" option from

further consideration (NYS SOP at 4). Is that correct?

A.21. No, it is incorrect. The Staff considered the no-action alternative in Section 8.2 of the FSEIS, at pages 8-20 to 8-26.

In contrast, alternatives that were eliminated from further consideration are contained in Section 8.3.4. In short, despite New York State's claim to the contrary, the NRC Staff did not eliminate the "no-action" option from further consideration, but considered it as an alternative to license renewal.

Q.22. Did the Staff analyze the environmental impacts of the no-action alternative for license renewal?

A.22. Yes. The Staff considered the environmental impacts of the no-action alternative in Chapter 8 of the FSEIS. As the Staff indicated in Section 8.2, "the no-action alternative refers to a scenario in which the NRC would not renew the IP2 and IP3 operating licenses and Entergy would then cease operating both units on or before the expiration of their current operating licenses." FSEIS at 8-20. The Staff addresses immediate impacts related to the no-action alternative in Section 8.2.

The longer term impacts of decommissioning – an activity that will take place eventually regardless of whether IP2 and IP3 receive renewed licenses – have been addressed in an agency programmatic EIS (NUREG-0586, the "Decommissioning GEIS"). Chapter 7 of both the FSEIS and the GEIS address the changes to decommissioning impacts that could occur as a result of the proposed license renewal. As the Staff explained, "The environmental impacts associated with decommissioning, following a license renewal period of up to 20 years, or following the no-action alternative, would be bounded by the discussion of impacts in Chapter 7 of the GEIS, Chapter 7 of this SEIS, and NUREG-0586". FSEIS at 8-20.

With respect to alternatives that could provide the power that would otherwise have

come from IP2 and IP3, the Staff explained that it would address those alternatives in a separate section.

Plant shutdown will result in a net loss of power generating capacity. The power not generated by IP2 and IP3 during the license renewal term would likely be replaced by (1) power supplied by other producers (either existing or new units) using generating technologies that may differ from that employed at IP2 and IP3, (2) demand-side management and energy conservation, or (3) some combination of these options. The environmental impacts of these options are considered in Section 8.3 of this SEIS.

FSEIS at 8-22. The Staff noted that “[w]hile these options can be alternatives to license renewal (given sufficient resource availability), they also constitute potential consequences of the no-action alternative. Impacts from these options will be addressed in their respective portions of this Section.” *Id.*

Q.23. Did the Staff analyze the environmental impacts of alternatives to license renewal in the no-action alternative section?

A.23. No. The Staff did not analyze the environmental impacts of alternatives to license renewal in the no-action alternative section; the Staff analyzed them in the alternatives sections of the FSEIS, Section 8.3. Rather than analyze the environmental impacts of alternatives in Section 8.2 of the DSEIS and FSEIS under the heading “No-Action Alternative”, the Staff analyzed the environmental impacts of alternatives in Section 8.3 under the heading “Alternative Energy Sources.” To reiterate: the environmental impacts of no action were analyzed in the Staff’s DSEIS and FSEIS.

Q.24. Would the analyses of the environmental impacts of alternatives have been substantially different if they had been published in Section 8.2 of the FSEIS rather than Section 8.3 of the FSEIS?

A.24. No. The analyses would have been the same regardless whether they appeared in Section 8.2 (No-Action Alternative) or Section 8.3 (Alternative Energy Sources).

Q.25. If the analyses would have been substantially the same regardless of which section of the FSEIS that they appeared in, why did the Staff choose to put the analyses in the Alternatives Section, rather than the No-Action Section?

A.25. The Staff chose to put the analyses in the Alternative Energy Sources Section in response to rulemaking comments provided by New York State, by the Council for Environmental Quality (CEQ), and by the Environmental Protection Agency (EPA) during the rulemaking process that established NRC regulations for license-renewal environmental reviews.

In 1994, in a supplemental proposed rulemaking, the Commission proposed to address alternatives solely as consequences of the no-action alternative. Environmental Review for Renewal of Operating Licenses, Supplemental Proposed Rulemaking, 59 Fed. Reg. 37724, 37725 (July 25, 1994) (NRC000138). The Commission reasoned that “[t]he only alternative to the proposed action would be the ‘no action’ alternative, and the environmental consequences of this alternative are the impacts of a range of energy sources that might be used if a nuclear power plant operating license were not renewed. . . .” Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, Final Rule, 61 Fed. Reg. 28467, 28471 (June 5, 1996) (NYS000127). CEQ, EPA, and several states (including New York) objected. *Id.* at 28472. “CEQ supported the approach proposed by the State of New York. . . CEQ wanted the NRC to address other energy sources as separate alternatives, rather than as consequences of the no-action alternative.” *Id.* In response to the concerns raised by these entities, the Commission changed its approach and in the final rule decided that alternatives should be analyzed in their own right and not as mere consequences of the no-action alternative. This approach the Commission settled on in the final rule—and applied in the Indian Point DSEIS and FSEIS—provides that “the environmental review will include a characterization of alternative energy

sources as being the alternatives to license renewal and not merely the consequences of the no-action alternative. . . .” *Id.* Thus, the Staff analyzed alternatives in the Alternatives Section of the Indian Point FSEIS (Section 8.3), rather than the No-Action Alternative Section of the FSEIS (Section 8.2) because New York State, CEQ and EPA wanted the analysis in the Alternatives Section and did not want it in the No-Action Alternatives Section.

Q.26. New York State submitted comments on the DSEIS. Did the Staff address the State’s comment in the FSEIS?

A.26. Yes. As shown in the tables below, the Staff addressed all of the comments submitted by the New York State on the DSEIS.

New York State submitted over 100 pages of comments on the DSEIS in several formats: first, Department of Environmental Conservation attorney John Parker represented “the executive agencies of the State of New York” when he provided verbal comments at one of the draft SEIS public comment meetings on February 12, 2009. FSEIS at A-1051; Mr. Parker’s comments continue through A-1054; see *also* ADAMS Accession No. ML091410354.

Table A-1: John Parker’s Comments and NRC Staff Responses

Comment Number	Response Page
132-a	A-89, A-158
132-b	A-54,
132-c	A-83
132-d	A-48
132-e	A-51, A-89
132-f	A-78
132-g	A-89

In addition, three New York State executive agencies separately submitted written comments on the DSEIS. The New York State Department of State, the New York State Department of Environmental Conservation, and the New York State Office of the Attorney General each submitted separate comment sets.

Fred Anders submitted comments on behalf of the Department of State and did so by letter dated March 19, 2009. FSEIS at A-187 through A-190; see *also*, ADAMS Accession No. ML090771329.

Table A-2: Fred Anders' Comments and NRC Staff Responses

Comment Number	Response Page
4-a	A-49
4-b	A-51, A-154
4-c	A-52, A-144 to A-145
4-d	A-52
4-e	A-52

Joan Leary Mathews submitted the New York State Department of Environmental Conservation's comments via e-mail on March 18, 2009. FSEIS at A-944 through A-983; see *also*, ADAMS Accession No. ML090780782.

Table A-3: New York State Department of Environmental Conservation's Comments and NRC Staff Responses

Comment Number	Response Page
128-a	A-48
128-b	A-172
128-c	A-56
128-d	A-50
128-e	A-78
128-f	A-63, A-78
128-g	A-63, A-79
128-h	A-68, A-70 (two responses), A-79 (two responses)
128-i	A-157
128-j	A-75 (two responses)
128-k	A-63
128-l	A-75
128-m	A-75
128-n	A-63
128-o	A-78
128-p	A-76, A-77, A-78
128-q	A-78
128-r	A-124, A-129, A-130, A-145
128-s	A-172

John Sipos submitted the New York State Office of the Attorney General's comments via e-mail on March 18, 2009. FSEIS at A-984 through A-1043; see *also*, ADAMS Accession No. ML090771328.

Table A-4: New York State Office of the Attorney General's Comments and NRC Staff Responses

Comment Number	Response Page
129-a	A-56
129-b	A-145
129-c	A-139
129-d	A-157
129-e	A-123
129-f	A-153
129-g	A-156
129-h	A-153
129-i	A-158
129-j	A-158
129-k	A-153
129-l	A-153
129-m	A-128 (two responses)
129-n	A-129
129-o	A-124

I should also note here that New York State was not the only entity to submit comments on the DSEIS. The staff responded to approximately 1140 pages of public comments from more than 500 individuals and organizations, many of whom presented views that differed from those presented by New York State.

Some of these comments asserted that continued operation of Indian Point was the only reasonable option or the best option available. See, *e.g.*, comment synopsis and response at FSEIS A-150-151 ("The following comments are generally opposed to power alternatives due to environmental impacts, lack of proven feasibility or resource availability, or potential effects on electric rates"). Another group of commenters asserted that the no-action alternative did not

adequately address negative socioeconomic impacts on local communities. FSEIS at A-151. Other comments were generally consistent with the State's position. *See, e.g.*, comment synopsis and response at A-153 to A-154 ("The following comments support alternative energy sources, indicate that the NRC staff's analysis of alternatives in the draft SEIS was too restrictive, or indicate that the staff's analysis was based on limited data.")

Regardless of a commenter's identity or view, the Staff evaluated the information presented and, where appropriate, made changes to the text that had appeared in the DSEIS.

Q.27. Did New York State submit the Synapse Report (NYS000052), the 2007 Bradford Declaration (NYS000105), or the 2009 Schlissel Declaration (NYS000053) along with its comments on the DSEIS?

A.27. No, the State did not submit the Synapse Report, the 2007 Bradford Declaration, or the 2009 Schlissel Declaration to the Staff as part of its comments on the DSEIS. The DSEIS comments from the New York State Office of the Attorney General, submitted by John Sipos and dated March 18, 2009, were the only comments submitted by New York State that referred to Peter Bradford, David Schlissel, or Synapse. *See, generally*, FSEIS at A-984 through A-1043; *see also*, ADAMS Accession No. ML090771328 (NYS000134).

The New York State Office of the Attorney General referred to the Synapse Report in its comments on the DSEIS, but it never submitted the Synapse Report as part of its comments. *See, generally*, FSEIS at A-984 through A-1043. Had New York State wished the Staff to formally consider the entirety of the Synapse Report, rather than the selected results that the New York State Office of the Attorney General presented in its March 18, 2009, comments, the Attorney General's Office could have submitted the report itself to the Staff as part of its comments.

The New York State Office of the Attorney General also referred to the 2009 Schlissel

Declaration as part of its March 18, 2009, comments on the DSEIS. It did so in two locations. The first instance was in support of an assertion that “reduced energy sales and peak loads [are] being experienced by utilities in downstate New York as a result of the current economic recession,” (FSEIS at A-1008). The second instance was in support of the assertion that “Already existing and identified New York State programs are in place to achieve these results [the combinations of alternatives called NYS Combinations 3 and 4].” FSEIS at A-1021. As I noted earlier, the NRC Staff carefully considered both combinations submitted by New York State: NRC staff relied on NYS Combination 4 in developing NRC Combination 2, and the Staff rejected NYS Combination 3 because it relied, in part, on combined heat and power.

Finally, and perhaps most importantly, the NRC Staff considered all of the DSEIS comments that New York State submitted and addressed them all in the FSEIS. To the extent that New York State “reiterated the substance of those reports [the 2007 Synapse Report, 2007 Bradford Declaration, and the 2009 Schlissel Declaration],” in its comments, as the State claims it did in its Statement of Position (at 29), the Staff has formally addressed the substance of those documents.

Q.28. Did New York State submit the Synapse Report or the 2007 Bradford declaration along with its scoping comments in 2007?

A.28. No. New York State did not submit either of these documents with its scoping comments in 2007.

Q.29. Did New York State have an opportunity to submit the Synapse Report and the 2007 Bradford Declaration when it submitted its scoping comments in 2007?

A.29. Yes. New York State had an opportunity to submit these documents along with comments. Although the environmental scoping period formally closed on October 12, 2007, the NRC Staff considered even late-filed scoping comments from New York State because the

Staff found it practicable to do so. See NRC Environmental Impact Statement Scoping Process Summary Report, ADAMS Accession No. ML083360115 (NRC000139). New York State filed one late set of comments on October 31, 2007 (“New York State Executive Agencies and the Department of Law Scoping Comments on the License Renewal of Indian Point Units 2 and 3,” ADAMS Accession No. ML073090588; NRC000135), and then filed another untimely set of comments on November 30, 2007 (Supplemental Comments Regarding Scope of NEPA Analysis, Application for Relicensure by Entergy Nuclear Indian Point LLCs for Operating Licenses Nos. DPR-26 and DPR-64, ADAMS Accession No. ML073600658; NRC000145). NRC Staff considered all of these comments, despite their being untimely, because the Staff found it practicable to accommodate the State.

New York State’s comments of November 30, 2007, were submitted on the same day as its adjudicatory filings. These comments did not indicate that New York State had prepared or otherwise thought the Staff should consider the Synapse Report or the Bradford Declaration.

As the State did not submit the Synapse Report or the 2007 Bradford Declaration for Staff consideration as part of the scoping process, the Staff was not required to formally address either document. The State – or Messrs. Schlissel and Bradford – could have submitted the Synapse Report and the 2007 Bradford Declaration to the NRC staff during the scoping process, but the State – and they – never did so.

Q.30. Did New York State submit any 2007 scoping comments that addressed alternatives to license renewal?

A.30. Yes. New York State offered comments on alternatives to license renewal in its comments of October 31, 2007 (“New York State Executive Agencies and the Department of Law Scoping Comments on the License Renewal of Indian Point Units 2 and 3,” ML073090588, at pages 16 to 18; NRC000135). New York State’s comments of November 30, 2007, however,

contained no comments on alternatives.

The NRC staff formally addressed all scoping comments, including those proffered by NYS, in its December 19, 2008, “Environmental Impact Statement Scoping Process Summary Report.” ADAMS Accession No. ML083360115 (NRC000139). The Staff reviewed and considered a larger volume of scoping comments for the Indian Point license renewal review than for any license renewal review before or since.

As the Board is aware, the Synapse Report and the 2007 Bradford Declaration supported three contentions – NYS-9, NYS-10, and NYS-11. NYS-10 and NYS-11 were denied in their entireties, and NYS-9 was only partially admitted, as narrowed to “Entergy in its ER has not evaluated energy conservation as part of its ‘no action’ alternative analysis.” The Synapse report and Bradford Declaration both addressed many issues, most of which were outside of the admitted issue of conservation as part of a no-action alternative analysis.

Q.31. Does the FSEIS analyze the need for the power produced by Indian Point?

A.31. No, the FSEIS does not analyze the need for power produced by Indian Point. The reason the FSEIS does not analyze need for power stems in part from the NRC’s accommodation of State comments in development of the license renewal rule. In response to comments from states – and, in particular, comments from New York State – the NRC determined that it would not analyze need for power in license renewal SEISs.

Several states, including New York, voiced concerns that the NRC’s analysis of need for power in license renewal environmental impact statements would preempt State energy planning decisions. Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, Final Rule, 61 Fed. Reg. at 28471 (NYS000127); Environmental Review for Renewal of Operating Licenses, Supplemental Proposed Rulemaking, 59 Fed. Reg. at 37725 (NRC000138). The States “argued that the determination of need for generating capacity has

always been the States' responsibility." 61 Fed. Reg. at 28471. "They expressed strong concerns that the proposed rule would intrude adversely on traditional State regulatory authority over these matters. . . [and] would adverse affect independent State consideration of these matters[.]" 59 Fed. Reg. at 37724. In response to the concerns raised by the States, including NYS, the NRC determined that it would not analyze need for power in license renewal EISs. The NRC explained that its decision "acknowledge[d] the primacy of State regulators and utility officials in defining energy requirements and determining the energy mix within their jurisdictions." 61 Fed. Reg. at 28468. In the Statement of Consideration that accompanied the final rule, the NRC stated, "With respect to the States' concerns regarding need for generating capacity analysis, the NRC will neither perform analyses of the need for power nor draw any conclusions about the need for generating capacity in a license renewal review." 61 Fed. Reg. at 28472. In keeping with the NRC's stated intentions in promulgating the 1996 rule, the Staff did not perform a need-for-power analysis in the Indian Point DSEIS or FSEIS.

Q.32. In the absence of a need-for-power assessment, how does the Staff determine the electric generating capacity that alternatives must provide?

A.32. In general, the Staff assumes that alternatives would have to replace the capacity currently provided by Indian Point. For electric generating technologies that are not capable of providing capacity on a baseload duty cycle, the Staff may considers capacity factors and capacity credit in determining whether an alternative could provide the same services that Indian Point provides.

The assumption that alternatives must be able to replace the capacity provided by Indian Point, however, is for purposes of the Staff's alternatives review and does not constitute a conclusion by the Staff that there is a need for the power that Indian Point produces, nor is it intended to supplant state- or utility-level decisions about power needs. See, e.g., FSEIS at 1-7,

FSEIS at 9-1. Pursuant to 10 CFR 51.95(c)(2), however, the NRC Staff did not perform an analysis of the need for power in the FSEIS.

Q.33. What was the basis for the FSEIS assumption that 2,158 MW of baseload power would need to be supplied by alternatives?

A.33. Indian Point Units 2 and 3 currently generate 2,158 MW of baseload power. The Staff looks only to replace the power that Indian Point Units 2 and 3 currently generate. As such, the Staff considered alternatives that could provide 2,158 MW of baseload electricity generation.

Q.34. Does the Staff's analysis of the no-action alternative include a discussion of the likelihood and extent of measures to be taken if license renewal is denied? Why or why not?

A.34. No. The no-action alternative does not include a discussion of the likelihood or extent of the specific measures to be taken if license renewal is denied. The NRC Staff defers to state and utility-level decisionmakers with regard to decisions about the type and amount of generation to be relied upon should IP2 and IP3 cease operations. Decisions regarding which alternatives to implement are not the NRC's to make. Nevertheless, the NRC staff noted, in the no-action alternative

Plant shutdown will result in a net loss of power generating capacity. The power not generated by IP2 and IP3 during the license renewal term would likely be replaced by (1) power supplied by other producers (either existing or new units) using generating technologies that may differ from that employed at IP2 and IP3, (2) demand-side management and energy conservation, or (3) some combination of these options. The environmental impacts of these options are considered in Section 8.3 of this SEIS.

FSEIS at 8-22. As I indicated previously, the NRC Staff directly addressed the impacts of plant shutdown as a result of no action in Section 8.2, and also considered, throughout section 8.3, the potential impacts of alternatives to license renewal that may arise as a result of no action; the alternatives considered in Section 8.3 are not merely potential consequences of the no-

action alternative, however. They are also alternatives to license renewal.

Lanzalotta Testimony

Q.35. Mr. Lanzalotta indicates, Lanzalotta Testimony at 21 (NYS000047), that the Staff expressed a belief that New York State zones H, I, J, and K were critical congestion areas and would remain so indefinitely. Did the Staff express a belief in these facts?

A.35. No. The Staff did not indicate that zones H, I, J, and K were critical congestion areas. The Staff did, however, indicate that the U.S. Department of Energy (DOE) had identified critical congestion areas. FSEIS at 8-27. The Staff did not indicate that they would exist indefinitely. The term “zones H, I, J, and K,” does not exist in the FSEIS alternatives analysis.

As Mr. Lanzalotta notes, these designations were ultimately vacated in Federal court. As a result of the controversy surrounding these designations, the NRC staff did not specifically rely on them in the FSEIS in determining any environmental impacts, and the Staff did not assert that DOE’s designations would affect transmission capability for the purpose of the FSEIS alternatives assessment. The Staff, in fact, assumed that adequate transmission would exist to support the alternatives considered in Chapter 8. FSEIS at 8-27. Thus, regardless of the legal status of external assessments of transmission availability, the NRC staff did not indicate that potential transmission constraints would limit alternatives.

The NRC staff added language indicating that it assumed adequate transmission would exist in response to DSEIS comments from the New York State Office of the Attorney General, FSEIS at A-1017, which suggested that additional transmission capacity was likely to exist.

Q.36. Mr. Lanzalotta indicates, Lanzalotta Testimony at 18 (NYS000047), that the Staff’s FSEIS failed to consider methods of providing voltage support other than synchronous

condensers. Did New York State or Mr. Lanzalotta present comments to the NRC staff to suggest that other means of voltage support – like static var compensators (SVCs), static synchronous compensators (STATCOMS), or replacement generation – should be considered in the FSEIS?

A.36. No. The first time New York State raised this issue was in Contention 37, as supported by the 2011 Lanzalotta Declaration (NYS000098). This Contention was proffered after the FSEIS was published. Neither Mr. Lanzalotta nor the State provided comments on alternative means of voltage support in scoping comments, in the DSEIS, or in the State's Contention 33.

In any event, the Staff addressed this issue in the same way in both the DSEIS and the FSEIS. The DSEIS addressed the issue at page 8-27, lines 14-26, and the FSEIS addressed the issue on page 8-22, at lines 14-25. The only change in wording in the passages between the DSEIS and FSEIS is that the word "draft" is removed from line 14 in the FSEIS. To summarize, in both documents, the staff indicated 1) that that the SEIS does not assess specific needs for corrections to reactive power that would be necessary in the event of Indian Point shutdown; 2) that reactive power is essential for grid operation; 3) that it may be possible to use the existing Indian Point generators as synchronous condensers; 4) that any impacts would not be significant as the generators would likely only function until replacement power generation provides additional reactive power; and 5) operating the generators as synchronous condensers would not necessarily slow or impede decommissioning activities. FSEIS at 8-22, DSEIS at 8-27.

Q.37. Mr. Lanzalotta cited several transmission alternatives from the 2005 Levitan report. Lanzalotta Testimony at 10-11. Did the State or Mr. Lanzalotta propose these transmission alternatives to Staff in comments on the draft SEIS?

A.37. No. Neither the State nor Mr. Lanzalotta had previously suggested in comments that the staff should consider these options.

While the routes suggested by the Levitan report may have some value for transmission planners, I should note that transmission planning was not NRC staff's purpose in the FSEIS. Given 1) the lack of NRC authority over transmission planning, and 2) the variety of transmission projects that State had presented and about which the Staff was aware, the Staff assumed "that adequate transmission will exist. . ." and thus did not use transmission availability as a means to exclude any alternatives. FSEIS at 8-27.

Finally, I note that Mr. Lanzalotta's reliance on the Levitan report here is at odds with the State's assertion that the Levitan report itself is an example of the supposedly outdated reference materials upon which the Staff relied. Here, the State's expert has relied on it.

Q.38. Did the NRC Staff assert that maintaining synchronous condensers on site would have any environmental impacts?

A.38 No. The Staff noted, at FSEIS 8-22, that, as synchronous condensers would operate "only until reactive power could be supported by new, real replacement power generation, their operation is not considered as a significant contributor to the impacts described [in Section 8.2]." FSEIS at 8-22. The Staff also noted that, even if the generators (and not the reactors) were to continue to function as synchronous condensers, the Indian Point "plant may not be decommissioned for many years after shutdown. . . ." *Id.* Further, the Staff noted that "continued operation of the IP2 and IP3 generators would not necessarily slow or impede decommissioning activities." *Id.*

Q.39. How would the Staff's analysis have been different had it not asserted that operation of the generators as synchronous condensers may be necessary?

A.39. It would not have altered any impact levels. Staff would merely have stricken

passages that addressed synchronous condensers.

Q.40. Did NRC staff perform an assessment of need for reactive power?

A.40. No. The staff performed no assessment of the need for reactive power, and mentioned synchronous condensers because the National Research Council asserted that synchronous condensers were one way to provide reactive power if Indian Point is retired. See “Alternatives to the Indian Point Energy Center for Meeting New York Electric Power Needs,” at page 153 (NYS000055). The National Research Council also indicated that synchronous condensers were less costly than STATCOMs or SVCs. *Id.* Unlike STATCOMs or SVCs, using the existing generators does not require new construction, and thus minimizes potential environmental effects. In any event, the Staff did not assign specific impacts from synchronous condensers, and so the discussion about them does not bias the impact assessment against any alternatives.

Q.41. Mr. Lanzalotta referred to the New York Independent System Operator’s (NYISO’s) 2010 Reliability Needs Assessment (NYS000058) in his testimony. Lanzalotta Testimony at 18. Does this document indicate that electric reliability would be unaffected by Indian Point’s retirement?

A.41. No. The 2010 Reliability Needs Assessment (RNA) indicates that “Reliability violations of the NYS Reliability Council and NPCC resource adequacy criteria would occur if the Indian Point Plant were to be retired at the latter [2015] of the current license expiration dates” NYISO RNA 2010 at 34 (NYS0000058). NYISO found that the violations grew more severe throughout its study period until the loss-of-load expectation becomes almost four times higher, in 2020, than its one-day-in-ten-years criterion. *Id.*

Regardless of the accuracy of the Staff’s reliability assertions, however, the Staff’s purpose was not to evaluate the reliability of New York’s electric grid operations, to provide an

evaluation of NYISO's various methods for addressing reliability concerns, or to indicate that only one remedy was available for reliability concerns. The purpose was to show that, to the extent that reliability concerns would result from Indian Point retirement, there were options that could alleviate these concerns without requiring the continued operation of the Indian Point reactors.

Bradford Testimony

Q.42. Have you reviewed Mr. Bradford's testimony?

A.42. Yes, I have.

Q.43 Mr. Bradford's testimony refers to a study that Mr. Bradford requested while he was an NRC Commissioner. When was that report produced?

A.43. The date of that report – which I'll refer to as the Warburg Report – is 1979, or thirty-three years ago. The title of the report is "A Study of NRC Procedures for Assessing Need for Power and Alternative Energy Sources in Fulfillment of the NEPA Requirements for Environmental Impact Statements." (NYS000116).

Q.44. Did the Warburg Report address environmental impact statements prepared as part of license renewal reviews?

A.44. No. License renewal did not exist at the time the Warburg Report was written. The license renewal GEIS, for example, was published in final form in 1996, or seventeen years after the Warburg Report. The regulations applicable to license renewal were promulgated in 1996, as well.

License renewal EISs differ from the EISs published during initial licensing procedures in several important ways. As an initial, terminology matter, EISs published during initial licensing are called Final Environmental Statements, or FESs, while license renewal EISs are

Supplemental EISs, or SEISs, because they supplement the GEIS.

The most important difference between SEISs and the FESs reviewed by Mr. Warburg is that in a license renewal SEIS, the nuclear power plant has already been sited and constructed. The SEIS compares impacts from continued operation of a nuclear power facility to those of possible alternatives to license renewal. A FES, on the other hand, compared the impacts of initial plant construction and operation to construction and operation of alternatives.

A second important difference is that FESs contained need-for-power analyses, while SEISs do not. These analyses typically comprised a full chapter of the FES, and provided the staff's determination as to whether and when the power from the proposed facility would be needed. The Warburg Report devotes much of its content to concerns about NRC need-for-power analyses.

The staff did not perform a need for power analysis in the FSEIS because it is not required to do so under 10 CFR 51.95(c)(2). Thus, the Warburg Report's concerns about the poor quality of NRC's need-for-power analyses are not applicable to license renewal SEISs.

Q.45.x Mr. Bradford asserts that NRC approach to assessing alternatives to the construction and operation of nuclear power plants has long been inadequate. Bradford Testimony at 31. The Warburg Report indicates that the Staff's comparison of alternatives merely compared the construction and operation coal-fired power to nuclear power and always found that nuclear power was preferable to coal-fired power. Are these assertions correct?

A.45. In my experience with 1970s-era FESs, the Warburg Report's assertions appear to be correct. In response to Mr. Bradford's testimony, I've reviewed alternatives assessments from several FESs produced by NRC Staff in the 1970s. I should note that, because the Warburg Report does not identify specific FESs or specific power plants, I've sampled FESs from the 1970s to attempt to acquaint myself with the alternatives issues that the Warburg

Report claims to identify. In each of the 1970s-era FESs that I've reviewed, it appears that NRC staff compared nuclear generation to coal-fired generation and in each case found nuclear power to be preferable to coal-fired power.

Q.46. How long were the comparisons of alternatives contained in these EISs?

A.46. Typically, the comparisons of energy alternatives were fifteen or fewer pages in length. Some were as few as four pages. Most of the remaining pages in the alternatives chapters were devoted to assessments of alternative cooling systems and alternative sites.

Q.47. How long is the assessment of energy alternatives in the Indian Point FSEIS?

A.47. It is 53 pages in length. This excludes sections devoted to cooling system alternatives, the introduction, the conclusion, and the references.

Q.48. Did any of the 1970s-era FESs you reviewed determine that alternatives other than coal were reasonable alternatives?

A.48. No. All of them dismissed non-coal generation from consideration as reasonable alternatives.

Q.49. Did the Indian Point FSEIS consider alternatives other than coal to be reasonable alternatives?

A.49. Yes. The Indian Point FSEIS found many alternatives to be reasonable. The reasonable alternatives included a natural-gas combined-cycle (NGCC) unit at the Indian Point site, a NGCC unit at an alternative site, a NGCC facility installed as part of a repowering project, an energy conservation and energy efficiency alternative, a purchased power alternative, and two combination alternatives, along with a no-action alternative and a cooling-system alternative.

The first combination alternative considered in the FSEIS included continued operation of one Indian Point unit, renewable generation, and energy efficiency and conservation. The

second combination alternative considered in the FSEIS included natural gas combined cycle generation, renewable generation, energy efficiency and conservation.

Q.50. Did the Indian Point FSEIS consider coal-fired power as a reasonable alternative to license renewal?

A.50. No. The staff dismissed coal-fired power as an unreasonable alternative. The staff did this in response to comments on the DSEIS—particularly comments from New York State—that asserted that coal-fired power was not a reasonable alternative.

Q.51. Did any of the 1970s-era FESs that you reviewed determine that energy efficiency or energy conservation were reasonable alternatives to a new nuclear power plant?

A.51. No. None determined energy efficiency or energy conservation were reasonable alternatives to license renewal.

Q.52. Did any of the 1970s-era FESs that you reviewed determine that natural gas was a reasonable alternative to a new nuclear power plant?

A.52. No. None determined that natural gas was a reasonable alternative to a new nuclear power plant.

Q.53. Did any of the 1970s-era FESs that you reviewed determine that purchased power was a reasonable alternative to a new nuclear power plant?

A.53. No. None determined that purchased power was a reasonable alternative to a new nuclear power plant.

Q.54. Did any of the 1970s-era FESs that you reviewed consider combinations of alternatives as reasonable alternatives to a new nuclear power plant.

A.54. No. None determined that combination alternatives were reasonable alternatives to a new nuclear power plant.

Q.55. Are the criticisms in the Warburg Report applicable or relevant to the Staff's

current NEPA reviews for license renewal?

A.55 I do not believe they are directly applicable or relevant to the Staff's current NEPA reviews for license renewal.

As I mentioned earlier, the license renewal program didn't exist in 1979, so the Warburg Report provides no insight into the license renewal Staff's performance. Second, NRC's license renewal Staff has worked to address a broader range of alternatives in recent license renewal SEISs than Staff addressed in FESs during Mr. Bradford's time at the agency.

The Three Mile Island, Unit 1, FSEIS (NRC000140), and Shearon Harris FSEISs (NRC000141), which NYS has attached as exhibits in this proceeding, provide representative samples of the Staff's EISs in license renewal.

Unlike the 1970s-era FESs I reviewed, the Three Mile Island, Unit 1, FSEIS includes five reasonable alternatives. One of these alternatives was coal-fired, while the remaining four were not. Perhaps most importantly, the Three Mile Island, Unit 1, FSEIS reached the conclusion that energy efficiency and conservation was the environmentally preferred alternative to license renewal. NRC000140 at 8-46. I've found no evidence that a NRC FES during Mr. Bradford's tenure reached such a conclusion. This conclusion is also counter to the assertion that NYS makes in its Statement of Position that "the FSEIS created by NRC Staff reveals that Staff has already concluded every license renewal is environmentally preferable to the no-action (non-relicensing) alternative. . . ." NYS SOP at 69.

In the Shearon Harris FSEIS, the NRC Staff considered seven reasonable alternatives to license renewal. NRC000141. Again, this consideration of alternatives goes far beyond the consideration of alternatives from the 1970s-era FESs I've seen. In addition, the Shearon Harris FSEIS concluded that conservation was the environmentally preferred alternative. *Id.* at 8-75. Again, I've found no evidence in reviewing NRC FESs from the 1970s that any FES

reached such a conclusion. The conclusion in the Shearon Harris FSEIS is also counter to the State's assertion that "Staff has already concluded every license renewal is environmentally preferable. . . ."

Q.56 The Warburg Report, as quoted in Mr. Bradford's Testimony, asserts that "The Commission has consistently failed to perform full cost-benefit analyses. . . as required by NEPA." Bradford Testimony at 31. Is a full cost-benefit analysis required by NRC's license renewal regulations?

A.56 No. As a matter of fact, NRC's NEPA regulations for license renewal, promulgated in 1996, or 17 years after the Warburg report and 14 years after Mr. Bradford left the Commission, state that economic costs and economic benefits of license renewal need not to be discussed in license renewal EISs except insofar as they are essential to a determination about the range of alternatives or mitigation. 10 CFR 51.95(c)(2).

Q.57 Mr. Bradford indicates that the NRC staff incorrectly assigned the causes for high electricity prices in his testimony. Bradford Testimony at 17-18. Did NRC staff develop an assessment of the reasons for high prices?

A.57 No. The NRC staff relied on a report from the Department of Energy for that fact. FSEIS at 8-27. As the Staff has not assessed any impacts as a result of electricity prices – either high or low – the NRC staff's reference to DOE's findings does not modify the impact assessment, nor does it drive Staff consideration of any alternative.

Schlissel Testimony

Q.58 At page 29 of his testimony, Mr. Schlissel asserts that the Staff adopted "DOE/EIA's conclusion that coal generation is forecast to decline, but ignores the DOE/EIA's conclusion that renewable generation is forecast to sharply increase over the time period

relevant to license renewal.” Do you agree?

A.58 No. The Staff stated DOE/EIA’s conclusion that renewable generation is forecast to increase sharply. In the FSEIS, at page 8-28, Staff stated that “EIA projects that renewable energy sources will account for 36 percent of capacity additions through 2035.” As we noted at page 8-28, that amount of renewable capacity exceeds capacity additions for coal (12 percent) and nuclear power (3 percent), and is second only to natural gas capacity additions (46 percent). I should note here that 36 percent is a typographical error, and the true value reported by DOE/EIA 2010 is actually 37 percent, but the relative magnitude of renewable capacity additions compared to coal and natural gas capacity is essentially the same.

Mr. Bradford also claims that the NRC Staff’s ignored DOE/EIA findings regarding increases in renewable generation. Bradford Testimony at 27. Mr. Bradford then states, “The FSEIS does not explain why it found one DOE/EIA 2010 conclusion persuasive and the other not worth mentioning.” Bradford Testimony at 27-28. Mr. Bradford’s assertion that the Staff omitted DOE/EIA’s projections for increased renewable capacity, like Mr. Schlissel’s similar assertion, is incorrect.

Q.59 At page 31 of his testimony, Mr. Schissel cites a NYISO wind study that concluded that “the addition of up to 8,000 MW of wind generation to the New York power system will have no adverse reliability impact (and) would supply in excess of 10% of the system’s energy requirement.” Is this study inconsistent with the analysis of wind power in the FSEIS?

A.59 No. The NRC staff has not assessed whether or how wind power could affect reliability of the New York State transmission system, and the staff has not used it as a reason to exclude wind power. NRC staff considered, in Section 8.3.4.1, whether wind power could provide an adequate replacement for the baseload power generated by Indian Point, and

decided that it could not do so alone. This was not based on any system integration limitations.

In the FSEIS, the Staff acknowledged that New York State already had 1275 MW of installed wind capacity in 2010. FSEIS at 8-43. The Staff also acknowledged that the State had a total of 8257 MW of capacity potential, according to the State's estimates. *Id.* The Staff also acknowledged that NYISO's interconnection queue had approximately 7000 MW of wind-power projects pending. FSEIS at 8-44.

The Staff found, however, that NYISO grants wind a capacity credit of slightly less than 10 percent. *Id.* What this means is that, for system planning purposes, 7000 MW of wind power counts for 700 MW toward meeting peak system demands. *Id.* This reflects the likelihood that wind power will be available during a time of peak system demand. Indian Point, along with other power plants that have availability similar to Indian Point, would typically receive capacity credit that was close—or equal—to the power plant's rated capacity.

Mr. Schlissel ignores this issue in his testimony, however, and focuses on total wind capacity that could be constructed. He notes that 1587 MW of additional wind capacity could be constructed by 2017. According to the capacity credit, however, this would count as less than one-tenth of the installed amount, or less than 159 MW. Additionally, 2017 is two years after Indian Point 3's current license expires, and four years after Indian Point 2's current license expires. Therefore, new wind power capacity was not available in sufficient quantities or in a sufficient timeframe to have been included as a reasonable alternative to license renewal. The New York State Energy Plan 2009's Renewable Energy Assessment (NYS000068) supports this capacity credit, “. . . the capacity contribution of an onshore wind plant to the reliability of the New York system at time of peak demand was approximately 10 percent of its rated plant capacity.” NYS000068 at 36.

The Staff also considered another important issue that Mr. Schlissel ignores in his

testimony: wind power capacity factors. A capacity factor is a percentage or ratio derived by dividing the amount of energy produced by a generator during a particular time period by the amount of energy it would have generated if it had functioned at full nameplate capacity for that entire time period. This issue matters here because we are looking at alternatives to replace a baseload generating station. The NRC staff noted that wind capacity factors are typically “on the order of 30 to 40 percent.” FSEIS at 8-44. At the same time, Indian Point 2 has operated at an average capacity factor of 93% from 2003 to 2010, and Indian 3 has operated at an average capacity factor 94% over the same period. See NUREG-1350, Appendix A (NRC000086). To replace the energy generated by Indian Point, then, a typical wind-powered facility would have to have more than twice the capacity of Indian Point, and perhaps more than three times the capacity. Mr. Schlissel’s review, however, suggests that wind power with a nameplate capacity equal to approximately 74% of Indian Point’s rated capacity could be available several years after the licenses expire. This supports the NRC Staff’s determination that wind was not sufficient to serve as a stand-alone alternative. When adjusted for capacity factor as presented in the FSEIS, 1587 MW of wind capacity produces an equivalent amount of energy to a 500-700 MW facility that operates at the same capacity factor as Indian Point’s units.

I should note that using the capacity factor to determine an equivalent baseload output from a wind farm is conservative insofar as empirical data suggests. Archer and Jacobsen in 2007, for example, suggested that an interconnected array of 19 wind farms could provide approximately 21 percent of its rated capacity 79 percent of the time, providing a rough approximation of a dispatchable baseload facility. NRC000142. Archer and Jacobsen’s virtual array, however, was spread across several southwestern states in a manner that would be difficult to replicate in New York State. *Id.* Using Archer and Jacobsen’s results, 1587 MW of wind capacity would produce 330 MW or more of power output approximately 80 percent of the

time. The total energy produced by such an array provided an annual capacity factor of 47%, or about half the capacity factor of the Indian Point units. *Id.*

Regardless of how one attempts to account for wind-power variability and capacity, the net result is that the Staff's analysis in the FSEIS appropriately rejected wind power as a stand-alone alternative to license renewal.

Finally, I should note that there is reason to believe that the outlook for future windpower development will soon be somewhat less rosy. At the end of 2012, the Production Tax Credit is set to expire. NRC00143. As currently structured, it provides a credit of 2.2 cents for each kilowatt-hour of electricity produced by a qualifying wind turbine for a period of ten years. *Id.* Unless Congress acts to extend the credit, any wind energy facilities completed after December 31, 2012, will not qualify for this credit. *Id.* While the credit has expired in the past and then been later renewed by Congress, the expiration typically results in dramatic decreases in wind-power deployment. In previous years without the credit, wind power development saw declines of 73 to 93 percent from the prior year. *Id.* While expiration of the credit does not mean that wind is not a useful means of generating electricity in New York, it does mean that some projected wind capacity may be available either at a later than anticipated date, or it may not materialize at all.

Q.60 At page 32 of his testimony, Mr. Schlissel asserts that the FSEIS has failed to take into account energy storage projects that can be used in tandem with renewable resource power production. Mr. Schlissel cites a flywheel energy storage project. Was the flywheel storage project considered by the Staff in the FSEIS and, if not, why not?

A.60 The flywheel energy storage project was not considered in the FSEIS. It is a very small capacity project. The flywheel has a capacity, as Mr. Schlissel indicated at page 32 of his Testimony, of 20 MWe. This is less than 4% of the renewable capacity NRC staff

considered in its combination alternatives. In addition, the flywheel facility Mr. Schlissel mentions is designed to provide frequency support and is not intended to supply backup to renewable power projects. While the concept could be applied to a facility or facilities that support wind power generation, existing facilities of this type do not yet perform this function.

Finally, as the Board may be aware, the company that makes the flywheel storage system, Beacon Power, filed for protection in bankruptcy in October of 2011, despite having received a \$43 million loan guarantee from the Department of Energy. NRC000144. The date of Beacon's bankruptcy filing was two months before Mr. Schlissel submitted testimony on this contention.

Q.61 At pages 32-33, Mr. Schlissel asserts that the NRC Staff arbitrarily limited the amount of wind generation to a maximum of 600 MWe. Do you agree?

A.61 No. The 600 MWe of renewable generation the Staff used in Combinations 1 and 2 at (FSEIS at 8-60) is consistent with the figure provided by NYS in its comments on the DSEIS. New York State suggested a combination of alternatives that included 600-800 MW of renewable capacity. FSEIS at A-1021. Furthermore, the Staff stated that it was not expressly limiting the amount of renewable energy to 600 MWe. "The staff notes that none of these combinations are intended to place a limit on available resource capacities." FSEIS at 8-60.

I should also note here that the notion that wind supported by other power sources—as included in the staff's combinations of alternatives, and addressed in the FSEIS at 8-60—is a concept that Mr. Schlissel himself advocated in his 2007 Synapse Report: "When combined with other energy resources, wind can produce energy in patterns comparable to a baseload facility." Synapse Report at 8. The Staff essentially provided such a combination in the 600 MWe of renewable electricity it considered in both combination alternatives, and the Staff credits wind and other renewables for providing baseload renewable capacity.

Q.62 Mr. Schlissel also asserts that the FSEIS contradicts itself because it concludes that renewable resources will provide only 600 MWe and yet it forecasts a total of 1,765 MWe combined renewable generation to be on line by 2015. Please address Mr. Schlissel's assertion.

A.62 The FSEIS does not contradict itself. As I explained above, the 600 MWe figure was proposed by NYS and is not a limit. Further, the 1,765 MWe figure that Mr. Schlissel provides includes 1,076 MW of wind capacity and 689 MW of capacity from other renewable sources. As I explained earlier, wind power does not provide full capacity most of the time. Using the capacity credit approach, this amount of land-based wind power would receive approximately 100 MW of capacity credit. Using the capacity factor approach from the FSEIS, this amount of wind power would likely produce an amount of energy equivalent to approximately 350 to 460 MW of generation with the same capacity factor as the Indian Point units.

Using the more-generous of the two approaches (capacity factors), the Staff's combination could rely on all of the projected wind power capacity, which comprised 61% of Mr. Schlissel's 1765 MW figure, and it would yet need to rely on additional resources to provide 600 MWe of baseload capacity. Other renewables—which comprise the remaining 689 MW of capacity in Mr. Schlissel's 1765 MW figure—would have to fill in the remainder of the 600 MWe staff credited to renewable power. The Staff indicated "By 2015, then, new renewable resource additions could readily supply the 600 MW of renewable capacity considered here with sufficient biomass, hydropower, and landfill gas additions to back up wind power generation." FSEIS at 8-61.

The Staff's ascribing 600 MW of generation capacity to renewable generation, then, is not internally contradictory. In addition, the Staff's inclusion of 600 MW of renewable capacity in

its combination alternatives was based on NYS DSEIS comments and was not intended to “place a limit on available resource capacities, nor [is it] intended to supplant State or utility level policy decisions about how to generate electricity, reduce or add to loads, set prices, or promote different approaches to generating electricity or managing loads.” FSEIS at 8-60.

Q.63 Mr. Schlissel claims that the Staff in the FSEIS dismissed solar power from consideration as an alternative to license renewal without analyzing the assertions in Mr. Schissel’s September 2007 Report that suggested continued growth in the solar sector. Schlissel Testimony at 33. Was Mr. Schissel’s September 2007 Report submitted as a comment on the DSEIS such that it should have been addressed in the FSEIS?

A.63 No, it was not. First, Mr. Schissel’s September 2007 Synapse Report was not submitted as a comment on the DSEIS, nor was it submitted in comments on the scope of the staff’s environmental review and, therefore, it was not formally addressed in the FSEIS.

Second, the Staff considered that other solar power projects were being developed in New York State, but that, at the time the FSEIS was published, they were relatively modest in capacity. FSEIS at 8-46. The staff noted that the Department of Public Service projected that 52.27 MW(e) of capacity could come from solar power by 2015. *Id.* The Department of Public Service report upon which staff relied was published two years after the Synapse report, and included projections based on the State’s progress in implementing its renewable portfolio standard through 2009, with projections of implementation through 2015.

Had Staff relied on Mr. Schlissel’s 2007 Synapse Report, it would have found a variety of conflicting claims regarding solar power, most of which showed less solar power potential than the Staff found in the FSEIS. First, the Synapse Report indicated that the State “required the addition of” 16 MW of solar power by 2013 to meet its renewable portfolio standard targets (Synapse Report at 7). Second, the Synapse report provided results from a 2003 NYSERDA-

sponsored study that found that zero MW (no capacity) of photovoltaic power was likely to be economic by 2007, 2012, or 2022 in either low- or high-cost scenarios, but that a small, unstated amount of solar-thermal capacity was economically possible (Synapse Report at 9 and 10, Tables 5 and 6; the tables provide no specific figures for solar-thermal capacity, but its net energy production is less than half that provided by 54 MW of landfill-gas capacity in Table 6). Third, the Synapse Report indicates that an unnamed private-sector initiative, which included “R&D, manufacturing, and industry leaders,” had set a goal of increasing grid-connected solar power in New York from 12 MW in 2007 to more than 2,000 MW by 2017. Synapse Report at 11.

Given the variety of limited claims in the Synapse Report—a report neither New York State nor Mr. Schlissel submitted to NRC Staff as part of comments on the scope of the environmental review or as part of comments on the DSEIS—the NRC Staff prudently considered other, more-recent and more-authoritative sources of information in the FSEIS to address solar power.

Q.64 Mr. Schlissel, at 48, claims that the FSEIS does not account for the impact of the American Recovery and Reinvestment Act (ARRA) of 2007. Is this true?

A.64 No. In fact, the NRC staff asserted that aspects of ARRA “supported renewable capacity growth and will likely continue to do so.” FSEIS at 8-28. The NRC Staff added this passage in response to comments from the New York State Office of the Attorney General that suggested that ARRA would provide funding to support innovation in the New York energy sector. FSEIS at A-1010 to A-1011. Most of New York State’s ARRA-related comments focused on the Act’s potential effect on energy efficiency and conservation initiatives. These comments also supported Staff’s inclusion of an energy conservation and energy efficiency alternative in Section 8.3.3.

Q.65 Mr. Schlissel claims, Testimony at 33, that Staff disregarded the conclusions of his 2011 Declaration regarding the potential for wind power to reduce the need for capacity from the Indian Point units. Did Staff have an opportunity to consider Mr. Schlissel's 2011 Declaration?

A.65 No. The Staff published the FSEIS in December of 2010. Mr. Schlissel's 2011 Declaration was submitted after the FSEIS was published.

Q.66 Mr. Schlissel claims, Testimony at 46, that the Staff's statement that environmental impacts of a natural gas combined cycle plant "would be essentially the same for a repowered facility as for a facility constructed at Indian Point" (FSEIS at 8-29) is incorrect and potentially overstates impacts of repowering. Do you agree?

A.66 No. Further, the NRC Staff's assertion that environmental impacts "would be essentially the same for a repowered facility as for a facility constructed at Indian Point" is consistent with Mr. Schlissel's assertions in his 2007 Synapse Report. In it, Mr. Schlissel asserted "In practice, repowering can be done in at least two ways, either by rebuilding and replacing part or all of an existing plant or by closing down an existing plant, building a new unit next to it and reusing the existing transmission and fuel facilities." The latter type of repowering—closing down an existing power plant, building a new unit next to it and reusing the existing transmission and fuel facilities—is the NRC Staff's natural-gas combined-cycle alternative constructed at the Indian Point site. While the gas-fired alternative at the Indian Point site would not rely on Indian Point's fuel facilities, it would rely on the gas pipeline that crosses the Indian Point property, and it would rely on the existing transmission facilities.

Q.67 Mr. Schlissel indicates that "there is no evidence that any replacement capacity for Indian Point would need to be fully dispatchable and Staff did not offer any response to my evidence to the contrary." Testimony at 30. Did Mr. Schlissel offer any comments to Staff to

suggest that replacement capacity for Indian Point would not need to be fully dispatchable?

A.67 No. Mr. Schlissel did not offer any comments to the Staff to suggest that replacement capacity for Indian Point would not need to be fully dispatchable. I've also found no indication in any of New York State's 2007 comments on the scope of the Staff's environmental review or New York State's 2009 comments on the DSEIS that suggest that replacement capacity would not need to be fully dispatchable.

Transmission Projects

Q.68 New York State Office of the Attorney General provided comments on the DSEIS that identified a variety of transmission projects. (FSEIS at A-1017). Did the NRC staff rely on these projects in its alternatives analysis?

A.68 The Staff did not specifically rely on these projects, although they were crucial to staff's assumption that adequate transmission would exist to support the alternatives considered in Chapter 8. FSEIS at 8-27, lines 24-28.

Some of the projects identified in the Attorney General's comments were already in operation, and the remainder of them collectively amounted to less capacity than was provided by Indian Point. As a result, the staff did not specifically address these projects in any greater depth.

In addition, the Staff was aware of other, larger projects that were also proposed and that provided the potential for capacity similar to – and potentially greater than – Indian Point's capacity. The Staff discussed these larger projects in its consideration of purchased power. Importantly, however, the staff indicated that it considered these larger projects as illustrative, rather than definitive, examples of the types of transmission improvements that would improve access to purchased power and generally improve transmission in New York State. In large

part, the staff treated these projects as illustrative, rather than definitive, because New York State had shown that a variety of other, smaller, projects could also occur.

One of the projects that Staff discussed in the FSEIS, the Champlain-Hudson Power Express, Inc. (CHPEI) line, was not addressed by New York State in its comments on the DSEIS, but Mr. Schlissel touts it in his testimony as a new potential transmission improvement. Schlissel Testimony at 37-38.

Q.69 The Staff included one project, the New York Regional Interconnect (NYRI), as an illustrative example that New York State has indicated is no longer being pursued. How would the lack of the NYRI project change the staff's analysis of purchased power?

A.69 It would have an immaterial effect on the purchased power alternative. Staff included NYRI as an example of the type of project that is illustrative of the potential for transmission improvements. Staff generally discussed the types of impacts such a project would have, but Staff did not assign any specific impact levels based on its specific route, capacity, or plan.

Need for Indian Point Units

Q.70 The New York State Office of the Attorney General asserted in its DSEIS comments that the "NRC Staff tacitly acknowledges that IP2 and IP3 power reactors could be replaced by natural gas-fired combined-cycle generation. . . ." FSEIS at A-1019. New York State adds that "NRC Staff's analysis of natural gas is a tacit recognition that the continued operation of the IP2 and IP3 power reactors are [sic] not necessary." (FSEIS at A-1019). Is the gas-fired alternative a tacit recognition that IP2 and IP3 can be replaced?

A.70 The alternatives analysis in Chapter 8 is an *explicit* indication that IP2 and IP3 can be replaced. In the DSEIS and the FSEIS, the staff considered a number of alternatives

that could reasonably and feasibly replace Indian Point.

Q.71 Did the Staff assert that the “IP2 and IP3 power reactors” could not be replaced, or that they are necessary?

A.71 The Staff did not assert that the “IP2 and IP3 power reactors” could not be replaced, nor did it assert that the “IP2 and IP3 power reactors” are necessary.

Q.72 Did the Staff assert that any part of the Indian Point facility is necessary?

A.72 No. The Staff did, however, assert that the generator units—part of the non-nuclear portion of the power plant—could temporarily remain in service as synchronous condensers to provide reactive power if the IP2 and IP3 reactors’ licenses are not renewed.

Q.73. Does this conclude your testimony?

A.73. Yes.

March 30, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
ENTERGY NUCLEAR OPERATIONS, INC.) Docket Nos. 50-247-LR/ 50-286-LR
)
(Indian Point Nuclear Generating)
Units 2 and 3))

AFFIDAVIT OF ANDREW L. STUYVENBERG

I, Andrew L. Stuyvenberg, do hereby declare under penalty of perjury that my statements in the foregoing Testimony Concerning Contention NYS-9, NYS-33 and NYS-37 (Alternatives, Consolidated) and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 C.F.R. § 2.304(d)

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Dated at Rockville, Maryland
This 30th day of March, 2012