Attachment V

UNITED STATES OF AMERICA BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc.

Docket No. ER11-2224-00_

AFFIDAVIT OF CHRISTOPHER D. UNGATE

Mr. Christopher D. Ungate declares:

1. I have personal knowledge of the facts and opinions herein and if called to testify could and would testify competently hereto.

I. Purpose of this Affidavit

2. The purpose of my Affidavit is to update the estimate for System Upgrade Facilities¹ ("SUF") costs for the Demand Curve peaking plant in New York City ("NYC"). This update is prepared in response to the Federal Energy Regulatory Commission ("Commission") order that directs the New York Independent System Operator ("NYISO") to address the arguments of the Independent Power Producers of New York, Inc., ("IPPNY") regarding the NYC SUF costs in the November Filing.²

¹ Terms with initial capitalization that are not otherwise defined herein or in the compliance filing transmittal letter to which this Affidavit is made part of, have the meaning set forth in the NYISO's Market Administration and Control Area Services Tariff ("Services Tariff"), and if not defined therein, in the NYISO's Open Access Transmission Tariff ("OATT").

² New York Independent System Operator, Inc., 134 FERC ¶ 61,058 (2011) at P. 140 ("January Order").

II. Qualifications

- 3. I am a Senior Principal Management Consultant with Sargent & Lundy LLC ("Sargent & Lundy" or "S&L") and have over thirty years of experience in electric utility operations, planning, and consulting. Prior to joining Sargent & Lundy in 2006, my professional work experience included management of generation resource planning for a 30,000 MW portfolio of nuclear, coal, hydro and gas generation, providing annual power supply plans, monthly cost forecast updates, and system reliability analyses; hydro operations business planning; re-engineering and process improvement initiatives in utility planning and operations; and laboratory and prototype testing for hydro and thermal generating plants.
- 4. My consulting practice at Sargent & Lundy focuses on the areas of integrated resource planning, financial modeling and analysis for the assessment of power generation technologies, project development, asset transactions, operational reviews, and facility modifications and refurbishment projects. I also perform due diligence reviews of new technology development, new projects, modification and refurbishment of existing facilities, asset transactions, and operational assessments.
- 5. I managed Sargent & Lundy's efforts with respect to the NYISO's 2007 and 2010 update processes for the ICAP Demand Curves. As part of that work, I managed the estimation of capital costs, fixed operations and maintenance costs, and other fixed costs for quantifying the cost of new entry ("CONE") in NYC, Long Island, and for the NYCA (with a unit located in Rest of State).

6. My resume is provided in the affidavit that I prepared and that was filed by NYISO as Attachment 3 to the NYISO's Answer filed in this proceeding on January 6, 2011.³

III. NYC SUF Costs in the NYISO November 30, 2010 Proposed Demand Curves

- 7. I estimated the interconnect costs included in the NERA/S&L Report supporting the development of the Demand Curves. SUF costs are included in the capital cost estimates and itemized as "Electrical Interconnect and Upgrades" in Table A-3 of the NERA/S&L Report.⁴ I explained the basis for my estimate of NYC SUF costs in my affidavit filed with the January Answer.⁵
- 8. As explained therein, the basis of the SUF cost for the NYC peaking plant was the average of the SUF costs for historical NYC capacity interconnection projects. In June 2010, when SUF costs were estimated for the NERA/S&L Report, the most recent NYC historical precedents were five⁶ projects from Class Years ("CY") 2001 and 2002. I used data from those projects, escalated to 2010 dollars, to form the basis of the proposed SUF costs for the NYC peaking plant. The SUF costs for the NYC peaking plant unit stated in the November Filing was \$4,800,000.

³ Request for Leave to Answer and Answer of the New York Independent System Operator, Inc., Docket No. ER11-2224-000 (filed January 6, 2011) ("January Answer").

⁴ NERA/S&L Report at 101-102.

⁵ See NYISO January Answer at Attachment 2 - Affidavit of Christopher D. Ungate.

⁶ My affidavit filed with the January Answer contained a typographical error: it reported three projects from CY 2001, although there were five and I reviewed data from all five.

IV. Interconnection Costs for Planned NYC Projects

- Consistent with the January Order's directive on SUFs, I reviewed SUF costs and interconnection costs for the NYC peaking plant. As indicated in Paragraph 7 above, SUFs are a category of interconnection costs.
- 10. I reviewed interconnection cost information for four projects in CY 2009 and CY 2010 that plan to interconnect to Zone J (NYC): Bayonne Energy Center ("BEC"); South Pier Improvement Project ("SPIP"); Astoria Energy II ("AEII"); and Berrians III.⁷ I also reviewed interconnection cost information for two possible points of interconnection ("POI") for the Transmission Developers, Inc. ("TDI") high voltage direct current ("HVDC") project. Two of these five projects (BEC, SPIP) plan to connect to the Consolidated Edison Company of New York, Inc., ("Con Edison") transmission system. Two others (AEII, Berrians III) plan to connect to the New York Power Authority ("NYPA") transmission system. One alternative POI for the TDI project would connect to the Con Edison transmission system and the other would connect to the NYPA transmission system.
- 11. In December 2009, Con Edison issued transmission planning criteria, which includes "fundamental design principles, which are applicable to all new projects proposed by [Con Edison] and independent developers."⁸ In February 2010, NYPA initially issued design criteria as "a guide for Developers interconnecting to the New York Power Authority

⁷ IPPNY's arguments reference data for these four projects. *See* Motion to Intervene and Protest of Independent Power Producers of New York, Inc IPPNY Protest, Exhibit 2 - Affidavit of Mark Younger at PP 88-89, Docket No. ER11-2224-000 (filed December 21, 2011).

⁸ See Consolidated Edison Company of New York, Inc., Transmission Planning Criteria, Revision 8, EP-7100-8, December 8, 2009 ("Con Edison planning criteria"); available at http://www.coned.com/documents/Transmission_Planning%20_Criteria.pdf>.

(NYPA) transmission system."⁹ For this examination, the Con Edison and NYPA criteria were presumed to be applicable to the interconnection of the LMS100 Demand Curve peaking plant. The five projects whose cost information I considered were assumed for purposes of my analysis to be compliant with the Con Edison and NYPA transmission planning criteria.

- 12. All five projects were examined because they provided data for one or more of the following interconnection cost components that might be applicable to the interconnection of the LMS100 in NYC.
 - a. Stand alone (SA) SUF costs that would be constructed by the developer;
 - b. Protection SUF costs at the POI or at locations removed from the POI that are needed to assure system reliability;
 - c. Other interconnection costs, including costs of connecting the Connecting Transmission Owner Attachment Facilities ("CTO AF") to the transmission system at the POI; and
 - d. Headroom payments to prior Developers who paid for SUFs that had capacity in excess of their needs and which is used by the proposed project ("Headroom payments").

 ⁹ See New York Power Authority, Design Criteria for Developer Connection to the New York Power Authority Transmission System, Rev. 1, March 3, 2011; available at:
 http://www.nypa.gov/transmission/Design%20Criteria%20for%20Developer%20Connection%20to%2 Othe%20New%20York%20Power%20Authority%20Transmission%20System%20R1%2003032011.pdf
 > Rev. 0 was issued on February 2, 2010; "Rev. 1" did not change technical requirements for interconnection.

13. The following table summarizes the interconnection cost estimates, including SUF cost estimates, for these projects. I am informed by the NYISO that Class Year studies and Interconnection System Reliability Impact Studies ("System Reliability Impact Study") containing interconnection cost estimates must be reviewed and approved by the NYISO's Operating Committee. Data for BEC, SPIP, Berrians III and AEII are taken from draft CY 2009 and 2010 CTO AF and SUF "Part 1 Studies" not yet approved by the Operating Committee.¹⁰ TDI data are taken from a System Reliability Impact Study.¹¹ The study containing interconnection cost estimates for one of the five projects has been approved, and studies containing interconnection cost estimates for the other four are considered draft and are subject to the final approval of the NYISO Operating Committee.

Cost	BEC	SPIP	Berrians III	AEII	TDI
Category					
SA SUF	\$59,527,723	None	\$37,097,572	\$37,097,572	\$18,000,000
Protection SUF	\$1,202,536	\$10,063,200	\$2,960,456	\$2,960,456	Not available
Other	\$10,220,000	None	None	None	Not available
Headroom	\$4,655,573	\$31,002	\$4,969,397	\$3,342,633	Not available

¹⁰ See Consolidated Edison of New York, Inc., "Class Year 2009 (CY09) Q232, Bayonne Energy Center, Connection Transmission Owner Attachment Facilities & System Upgrade Facilities, "Part 1 Study", Point of Interconnection (POI): Con Edison's 345kV Gowanus Substation, prepared for New York Independent System Operator (NYISO), Final, December 10, 2010. See also Consolidated Edison of New York, Inc., "Class Year 2010 (CY09) Q261, South Pier Improvement Project, Connection Transmission Owner Attachment Facilities & System Upgrade Facilities, "Part 1 Study", Point of Interconnection (POI): Con Edison's Gowanus 138kV Substation, prepared for New York Independent System Operator (NYISO), Draft 2, September 20, 2010. See also TRC, "Q266 Berrians III and Q308 Astoria II, Class Year 2010, Part 1 Facilities Study, Point of Interconnection (POI): New NYPA 345kV Astoria Annex Substation, prepared for New York Independent System Operator (NYISO), Draft 03, December 9, 2010.

¹¹ See Siemens Energy, Inc., "Optional Interconnection Study for TDI's NYC Merchant Transmission Project with POI at Astoria (NYISO Queue #305)," prepared for Transmission Developers, Inc., Siemens PTI Project Number P/21-113470-B-1, Report R55-10, Final, July 30, 2010.

CTO AF	\$1,241,431	\$80,000	\$1,136,269	\$1,086,236	Not available
Total	\$76,847,263	\$10,174,202	\$46,163,694	\$44,486,897	Not available

- 14. The relatively wide variation in SA SUF costs is based on various differences at the POI. BEC is an eight unit, 500 MW, simple cycle gas turbine peaking facility that will connect to Con Edison's Gowanus 345 kV substation. In addition to the installation of a circuit breaker, disconnect switches, transformers, and relays, the existing north and south busses of the Gowanus substation will be reconfigured into a ring bus arrangement. Relocation of two shunt reactors is required to mitigate high energy duties and transient overvoltage contingency conditions (cost is shown as Other in the table). The AEII and Berrians III projects are planned to interconnect at NYPA's Astoria Annex 345 kV substation. AEII is a 2x2x1 576 MW combined cycle project and Berrians III projects are planning to interconnect to a new substation (Astoria Annex) that will be constructed using gas insulated substation ("GIS") equipment in a four breaker ring bus configuration with an open position for a fifth breaker in the future.
- 15. The SPIP is a one-unit simple cycle gas turbine with a capacity of 103.7 MW. It would replace generating units that would be retired and hence it has no SA SUF costs.
- 16. SA SUF costs are available for two possible POIs for the TDI project. Under one plan, TDI would connect to the single available breaker position at NYPA's Astoria Annex substation, which was initially required for the AEII and Berrians III projects. The cost shown in the table assumes that TDI can obtain a second breaker position at this

substation. Under the other plan, TDI identifies the cost of adding breakers at Con Edison's West 49th Street substation. A cost of \$20,000,000 (not shown in the table) is identified to expand, modify, and upgrade the substation.¹² The plan for the West 49th Street substation includes expanding from a single ring configuration to a double ring and installing three additional breakers.

17. Other cost categories for the five projects are lower in magnitude than SA SUF costs.
Protection SUF costs vary between \$1,202,536 and \$10,063,200, averaging \$4,297,000.
Headroom payments vary between \$31,000 and \$4,969,397, averaging \$3,250,000.
CTO AF costs vary between \$80,000 and \$1,241,431, averaging \$886,000.

V. Updated NYC Interconnection Cost Estimates

- 18. The peaking unit for the NYC ICAP Demand Curve is an LMS100 dual-fueled combustion turbine operating in simple-cycle mode. It is a two-unit plant. A 2-unit LMS100 has a summer capacity of 195 MW.
- 19. S&L prepared an updated interconnection cost estimate for this peaking plant based on cost data from the five identified projects, supplemented with S&L's independent cost estimates. Although time did not permit a full consultation with Connecting Transmission Owners, S&L believes that the three cases (described below) for the peaking plant's SA SUFs for which S&L developed cost estimates will meet NYPA and Con Edison planning criteria.

¹² See Siemens Energy, Inc., "Optional Interconnection Study for TDI's NYC Merchant Transmission Project with POI at West 49th Street 345kV Substation (NYISO Queue #305)," prepared for Transmission Developers, Inc., Siemens PTI Project Number P/21-113470-B-4, Report R66-10, Final, January 7, 2011.

- 20. None of the SA SUF cost estimates from the five projects provides a reasonable basis to estimate the SA SUF costs for a 195 MW, 2-unit peaking addition. BEC, AEII, and Berrians III are large projects that require significant reconfiguration of an existing substation or the addition of a new substation at the POI. Both plans for TDI seek two breaker positions at the POI. SPIP is a unit replacement.
- 21. S&L prepared an SA SUF cost estimate for the 195 MW, 2-unit peaking plant addition. It consists of circuit breakers, disconnect switches, transformers, and relays located an open position at an existing substation. S&L used the same cost estimating assumptions used in the NERA/S&L Report, with the exception of the contingency.¹³ A contingency of 25 percent was assumed because, in addition to expected uncertainties due to price variations in labor, materials and equipment, and adjustments in materials quantities, the site conditions, configuration of the existing substation equipment, and specific equipment configuration needed for interconnection, are uncertain.
- 22. Con Edison has informed the NYISO and me that there are open positions for a 2-unit, 195 MW generating unit addition; for example, at Rainey, a 345 kV open air substation; and at Hudson Avenue, a 138 kV open air substation. There is also a plan for an open position at a 345 kV GIS substation: the Astoria Annex substation.¹⁴ SA SUFs were estimated for each of these three types of substations.¹⁵

¹³ NERA/S&L Report at 24-26.

¹⁴ See Paragraph 14 of this Affidavit.

¹⁵ The NYISO informs me that, as described in the Affidavit of Steven Corey, it determined that the peaking plant was deliverable at the three locations described in Paragraph 22.

- 23. The average of the cost of protection SUFs, Headroom payments, and CTO AFs for the five projects is representative of CTO AF costs of the 2-unit peaking plant addition.
- 24. Analyzing Headroom payments along as a category of interconnection costs is reasonable because it is a potential cost of the developer to interconnect. In this analysis, I conclude that it is reasonable to include Headroom payments because, at present in NYC, it is an expected cost included in CONE. The average of recent history of Headroom payments results in a reasonable estimate of these costs for the Demand Curve peaking plant because the CONE for the peaking plant is not based on a specific POI and, therefore, the details of a specific interconnection location cannot be used to compute a specific cost.
- 25. No additional costs were allocated for atypical connection costs, such as the relocation of shunt reactors required for the BEC project; hence the Other cost category is shown as zero cost.

shown in the table	below.			_
Cost Category	138 kV open air	345 kV open air	345 kV GIS]

26.	The updated interest	connection	costs for	the 2-unit,	195 MW	peaking	addition in	n NYC is
	shown in the table	below.						

Cost Category	138 kV open air	345 kV open air	345 kV GIS
SA SUFs	\$2,984,000	\$4,081,000	\$11,074,000
Protection SUFs	\$4,297,000	\$4,297,000	\$4,297,000
Other	None	None	None
Headroom	\$3,250,000	\$3,250,000	\$3,250,000
CTO AF	\$886,000	\$886,000	\$886,000
Total	\$11,417,000	\$12,514,000	\$19,507,000

- 27. No specific location for the peaking plant addition in NYC is assumed as part of the Demand Curve reset analysis. Therefore, I used the average of the three cases shown in the table (138 kV open air, 345 kV open air, and 345 kV GIS), which I believe is reasonably representative of the interconnection costs for the 2-unit peaking plant addition. The average total interconnection cost is \$14,479,000.
- 28. Substituting the revised interconnection cost estimate of \$14,479,000 for the original estimate of \$4,800,000 increases the EPC Costs¹⁶ for the 2-unit LMS100 with selective catalytic reduction ("SCR") in NYC shown in Table A-3 of the NERA/S&L Report from \$276,318,000 to \$285,997,000. Owner's Costs, which are estimated as a percentage of EPC Costs, increase from \$29,062,000 to \$30,054,000. Financing and Working Capital and Inventories increase from \$49,888,000 to \$51,608,000, also due to the increase in EPC costs. Consequently, the Total Capital Investment shown in Table A-3 and in Table II-3 of the NERA/S&L Report increases from \$326,206,000 to \$337,605,000, an increase of \$11,399,000.¹⁷

VI. Cost and Operating Performance for Combined Cycle Plant in NYC

29. S&L estimated the cost and operating characteristics for a combined cycle plant in NYC using the same approach to estimating capital and O&M costs and operating performance presented in the NERA/S&L Report. The assumed combined cycle plant uses GE 7FA combustion turbines in a 2x2x1 configuration. The plant is dual fueled, and has an SCR and CO catalyst for emissions control. Most key assumptions are the

¹⁶ EPC Costs are the costs to engineer, procure, and construct the peaking plant.

¹⁷ NERA/S&L Report at 101-102 and 27. Corresponding change also in Table A-10.

same as presented in the NERA/S&L Report. Differences in key assumptions, and the estimated cost and performance of the combined cycle plant, are presented in the following paragraphs.

- 30. The net plant capacity with average degradation is 564.5 MW in the summer, 626.8 MW in the winter, and 547.1 MW for ICAP conditions. The net plant heat rate with average degradation is 7,133 Btu/kWh in the summer, 7,025 Btu/kWh in the winter and 7,202 Btu/kWh for ICAP conditions. The EFOR is 4.51%. The natural gas consumed during startup is 3,385 mmBtu/unit.
- 31. The fixed operation and maintenance ("O&M") cost is \$119.68/kW-yr, including labor, routine materials and contract services, administrative and general, site leasing costs, property taxes without tax abatement, and insurance. Plant staffing of 24 full time equivalents is assumed 16 in operations and 8 in maintenance. Plant land area is 30 acres. Variable O&M is \$0.69/MWh, covering catalysts, chemicals, consumables and water, and \$9,499 per factored start, covering major maintenance parts and labor.
- 32. The estimated total capital investment cost is \$1,027,880,000. This includes interconnection costs based on the average of the SA SUF costs for the five recent projects discussed previously, which include four large projects, two of which are combined cycle projects.

This concludes my Affidavit.

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ATTESTATION

I am the witness identified in the foregoing affidavit. I have read the affidavit and am familiar with its contents. The facts set forth therein are true to the best of my knowledge, information, and belief.

<u>Christopher D. Ungate</u>

Subscribed and sworn to before me this 29th day of March 2011

aun M. Brown

Notary Public

Notary Public My commission expires: Oct 16, 2012

