UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Linden VFT, LLC Complainant, v. New York Independent System Operator, Inc. Respondent.	)))))))))	Docket No. EL12-__

COMPLAINT REQUESTING FAST TRACK PROCESSING OF LINDEN VFT, LLC

Pursuant to Section 206 of the Federal Power Act ("FPA"), 16 U.S.C. §824e, and Rule 206 of the Rules of Practice and Procedure, 18 C.F.R. §385.206, of the Federal Energy Regulatory Commission (the "Commission"), Linden VFT, LLC ("Linden VFT") hereby files this Complaint ("Complaint") against the New York Independent System Operator, Inc. ("NYISO").[1] The Complaint seeks relief from NYISO's discriminatory treatment of Linden VFT under the NYISO OATT as it relates to NYISO's determination of the Capacity Resource Interconnection Service ("CRIS") value for the Linden VFT project (the "Project"). The Project is a Merchant Transmission Facility[2] that connects the transmission system operated by PJM Interconnection, LLC ("PJM") in New Jersey and the transmission system operated by NYISO in New York (the "New York State Transmission System"). The Project does not have a long-term anchor customer; instead it periodically auctions its capacity to merchant shippers, so that an

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[1] Except as otherwise indicated, capitalized terms not specifically defined herein shall have the meaning set forth in NYISO's Open Access Transmission Tariff ("OATT") and, if not defined therein, the same meaning as is provided in the NYISO's Market Administration and Control Area Services Tariff ("Services Tariff"). Procedures for the interconnection of new projects to the New York State Transmission System are principally governed by the OATT, with occasional reference to definitions and procedures in the Services Tariff. Therefore, unless otherwise specified, references herein to the NYISO Tariff or Tariff procedures are to the OATT.

[2] OATT, Section 30 Attachment X (Large Facility Interconnection Procedures) § 30.1 defines a Merchant Transmission Facility as "[a] Developer's device for the transmission of electricity identified in the Interconnection Request, proposing to interconnect to the New York State Transmission System."

accurate calculation of CRIS which maximizes the Project's capacity is critical to its economic viability.

Linden VFT requests that the Commission require NYISO to recognize the Project's actual transmission capacity in the same manner that it has recognized capacity for all other grandfathered projects, including those in the 2006 interconnection "Class Year," in accordance with its OATT, giving effect to actual tested values, rather than the nominal value of 300 MW in the Project's initial interconnection request, submitted in 2002. Specifically, Linden VFT requests the Commission direct NYISO to accept the performance tests conducted by the Project when it achieved commercial operation in 2009 to establish a "Dependable Maximum Net Capability"-equivalent value for the Project, resulting in an award of 315 MW of Unforced Capacity Delivery Rights ("UDRs"), rather than requiring the Project to make a new interconnection request for 15 MWs of the Project's transmission capability, possibly making the Project responsible for additional deliverability upgrade charges in addition to interconnection charges initially allocated to the Project (now significantly in excess of the $10 million originally specified in the Project's large generator interconnection agreement).

I. Request for Fast Track Processing

Linden VFT requests fast-track processing of this complaint. Specifically, Linden VFT requests that the Commission require NYISO to establish 315 MW as the Project's applicable rating, for all purposes, as soon as possible so that the Project's full transmission capability may be committed in the NYISO summer season monthly capability auctions for Summer 2012. An expedited determination is necessary to mitigate the current harm to Linden VFT by permitting the full transmission capability of the Project to participate in NYISO Capacity and Energy markets in a manner that has been denied to it since November 13, 2009.

II. Copies of Correspondence

Please address all notices and communications regarding this filing[3] to:

*Paul J. Halas, Esq., General Counsel
Vimal Chauhan, SVP
GE Energy Financial Services, Inc.
800 Long Ridge Road
Stamford, CT 06927
Tel: 203-357-4151
Fax: 513-204-3854
paul.halas@ge.com
vimal.chauhan@ge.com

*Jon R. Mostel, Esq.
Adam H. Sheinkin, Esq.
Stroock & Stroock & Lavan LLP
180 Maiden Lane
New York, NY 10038
Tel: 212-806-5400
Fax: 212-806-6006
jmostel@stroock.com
asheinkin@stroock.co-m

III. Description of the Complainant and Respondent

Complainant

Linden VFT is a Delaware limited liability company and is an indirect wholly-owned subsidiary of General Electric Capital Corporation. Linden VFT owns the Project, a Merchant Transmission Facility that is considered a Scheduled Line[4] by NYISO pursuant to the OATT, which interconnects in both PJM and NYISO transmission systems, assisting in inter-regional integration of the bulk electric grid. The Project is one of a small number of successfully developed merchant projects in the competitive New York electricity markets and the only one without a long-term anchor customer with retail load obligations.

[3] *Denotes persons designated to receive service in accordance with 18 CFR § 385.204(b)(3).
[4] NYISO OATT, Section 1 defines a "Scheduled Line" as "[a] transmission facility or set of transmission facilities: (a) that provide a distinct scheduling path interconnecting the ISO with an adjacent control area, (b) over which Customers are permitted to schedule External Transactions, (c) for which the NYISO separately posts [Total Transfer Capacity] and [Available Transfer Capacity], and (d) for which there is the capability to maintain the Scheduled Line actual interchange at the [Desired Net Interchange], or within the tolerances dictated by Good Utility Practice.", where Total Transfer Capability is "[t]he amount of electric power that can be transferred over" the interconnected transmission network in a reliable manner; Available Transfer Capability is "[a] measure of the Transfer Capability remaining in the physical transmission network for further commercial activity, over and above already committed uses . . ." and Desired Net Interchange is "[a] mechanism used to set and maintain the desired Energy interchange (or transfer) between two Control Areas."

Respondent

NYISO is a not-for-profit corporation formed under New York law. NYISO is an entity subject to the Commission's jurisdiction, and possesses operational control over the New York State Transmission System.[5] NYISO is an independent body that provides open access transmission service, maintains reliability, and administers competitive wholesale Energy and Capacity[6] markets in New York State pursuant to tariffs filed with the Commission.[7]

IV. Background

This case involves the interconnection of a Merchant Transmission Facility between the transmission systems operated by two independent system operators, PJM and NYISO.[8] The Project, which uses GE Energy's VFT technology (which was a new technology at the time of the Project's interconnection request),[9] is under the operational control of PJM.[10] The Project made separate interconnection requests to each of PJM and NYISO and is designed to operate within the power factor and voltage ranges of the adjacent control areas.

The Project entered the NYISO interconnection process with an interconnection request in July 2002 (the "2002 Interconnection Request") that it be studied as though it were a generator. The Project achieved commercial operation on November 1, 2009 and its 315 MW transmission capability was demonstrated on October 15, 2009 through performance tests

[5] *See, e.g.*, *Central Hudson Gas & Electric, et. al.*, 83 FERC ¶ 61,352, *order on rehearing*, 87 FERC ¶ 61,135 (1999).

[6] Section 1 of the NYISO OATT defines "Capacity" as "[t]he capability to generate or transmit electrical power, . . . measured in megawatts ("MW")" and "Energy" as "a quantity of electricity that is [b]id, produced, purchased, consumed, sold, or transmitted over a period of time, and measured or calculated in megawatt hours."

[7] *Id*.

[8] The Complaint is accompanied by the affidavit of John J. Marczewski, a professional engineer for over 25 years with over 10 years of experience with NYISO's interconnection procedures. In addition to serving as a stakeholder representative, Mr. Marczewski is a former Chair of NYISO's Operating Committee and its Transmission Planning Advisory Subcommittee. Mr. Marczewski's affidavit explains the Linden VFT project, its interconnection request to NYISO and other relevant documents relating to the NYISO interconnection process. Exhibit No. 1, Affidavit of John Marczewski (the "Marczewski Affidavit"). Mr. Marczewski's curriculum vitae is attached as Exhibit No. 2.

[9] *See* Marczewski Affidavit at p. 8. VFT was a development technology in 2002. No VFT units had been constructed and placed in service.

[10] *Linden VFT, LLC*, 119 FERC ¶ 61,066 (2007), at pp 4-7, 20.

conducted in an equivalent manner by which the Dependable Maximum Net Capability ("DMNC") of generators interconnected to the NYISO system is established.[11] This is 15 MW (the "Incremental Capacity"), or 5%, greater than the nominal transmission capability stated in megawatts and estimated based on manufacturer specifications, in the Project's 2002 Interconnection Request.[12] Notwithstanding explicit requirements in its OATT that resources like the Project be awarded a CRIS value equal to their maximum capability established through testing, NYISO required that the Project initiate a new interconnection study process for the Incremental Capacity, resulting in costs and delays and subjecting the Project to unwarranted deliverability assessments.

It should come as no surprise that the actual transmission capability of the VFT technology used in the Project might exceed the "nameplate" rating assigned to it by its manufacturer in 1998. Actual performance often deviates in a non-material amount from design capability for large electrical equipment, including generators and transformers. At the time of the 2002 Interconnection Request, VFT was a new technology without a significant history of field operation. As NYISO has previously explained, nameplate data has not been an acceptable substitute for an actual demonstration of performance.[13]

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[11] *See* Marczewski Affidavit at p 17. ("The transmission capability of Linden VFT was tested in a manner identical to which the DMNC of generators is established.")

[12] The Project made identical interconnection requests to PJM (in June 2001) and NYISO (in July 2002) stating the same nominal 300 MW capacity. See Marczewski Affidavit at p. 8. (Exhibits 3-B and 3-A, respectively). PJM awarded the Project 330 MW of Firm Transmission Withdrawal Rights pursuant to its tariff, recognizing that there are some losses and auxiliary power usage between the amount withdrawn from PJM and the amount of power delivered to NYISO. Subsequently, when bidirectional service commenced on a commercial basis in June 2011, PJM acknowledged the 315 MW transmission capacity of the Project. *PJM Interconnection, LLC*, docket no. ER11-3250, PJM filing of Schedule 16-A Transmission Injection Rights (March 31, 2011), at 1.

[13] Accord *New York Independent System Operator, Inc.*, Docket No. EL07-18, Complaint of New York Independent System Operator. Inc. (Dec. 1, 2006), at p. 3 ("[n]ameplate data is . . . equivalent to neither a demonstration test nor production data. Consequently, if nameplate capacity were an acceptable form of data to supply when qualifying a resource as an ICAP Supplier, the relevant sections of both the Services Tariff and the ICAP Manual would have used that term . Further, "[w]ith the exception of the special case of Intermittent Resources (as a practical matter, wind resources), the NYISO's Service Tariff does not permit the nameplate capacity of a unit to be used to qualify as an ICAP Supplier." *Id.*

The transmission capability of 315 MW, established through testing upon commencement of commercial operation, is consistent with the manufacturer's design expectations.[14] The equipment's nominal 110 megavolt amperes (MVA) transmission capability (330 MVA in the aggregate), is also consistent with the more detailed technical data that accompanied the 2002 Interconnection Request, that was used in the power flow modeling studies for the Project, approved by NYISO in 2006, in which NYISO determined that the Project could be reliably connected to the New York State Transmission System. In 2002, when Linden VFT made the Interconnection Request, there was no pressure to be more precise (or even to modestly overstate the manufacturer's rating), it was reasonable for Linden VFT to believe that it would ultimately be awarded capacity rights based on testing upon commencement of commercial operations, as was the established NYISO practice at the time.

NYISO's Operating Committee had adopted criteria in 2001 for determining when a new interconnection request was required, including a provision that no "[m]aterial adverse difference is suggested by a size increase of 10MW… or 5%..., whichever is greater…", therefore not requiring a new interconnection request in these situations.[15] Linden VFT attached a copy of these materiality criteria to the 2002 Interconnection Request.[16] As discussed in more detail below, NYISO has applied those criteria to determine that even greater changes in a project's capability are sometimes non-material and do not warrant a new interconnection request.

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[14] *See* Marczewski Affidavit at p. 17. ("The results of the performance tests demonstrated that the Project operated within accepted engineering design limits, the Project's design specifications, and as contemplated in the interconnection request and the power factor design and voltage specified in the Interconnection Agreement.").

[15] *See* "Criteria for Defining a 'New Interconnection'" (attached as Exhibit 3-A), and "Criteria for Defining a Material Change in a Previously Proposed New Interconnection Project" (attached as Exhibit 5). As NYISO explained to the Commission, the latter procedure "was to be used for determining whether a proposed project has made a material change that would require reapplication for interconnection and a new queue position." *See 330 Fund I, L.P. v. New York Independent System Operator, Inc*. docket No. EL07-78, Answer to Complaint of NYISO (filed July 19, 2007) at pp18-19 and Exhibit B at pp. 6-9 (Affidavit of Steven L. Corey).

[16] *See* Exhibit 3-A (July 10, 2002 Interconnection Request) at p.6.

After completion of construction and performance testing, on November 13, 2009, the Project requested that NYISO recognize the Incremental Capacity demonstrated through performance tests.[17] Since January 2010, NYISO has insisted, despite numerous discussions on this issue and NYISO's practice with respect to numerous other relevant projects, and despite no change or modification of Project equipment, any actual Capacity in excess of the amount stated in the 2002 Interconnection Request (*e.g.*, anything above 300 MW) can only be recognized through the submission of a new interconnection request,[18] the study of the project in NYISO's multi-year interconnection study process subject to changes in the incumbent transmission owner's transmission planning criteria, and the potential for the incumbent transmission owner to require additional transmission upgrades, including applying deliverability criteria to the Incremental Capacity.

NYISO's action withholds 15 MW of immediately available Capacity and Energy from the competitive New York electricity market in a discriminatory manner. The Project was developed, studied, interconnected and tested as though it were a generation resource and it should be treated like a generator for the purpose of determining its capability to deliver power to the New York State Transmission System. As each grandfathered generation facility reaches completion, the OATT provides that it is tested over a five-year period, with the highest operational capability becoming its Demonstrated Maximum Net Capacity ("DMNC"). It is only fair to allow the Project's performance test in 2009 to demonstrate its transmission capability or "DMNC equivalent". NYISO's formulaic excuse for its refusal to do so, that it must re-study the Project for the Incremental Capacity, is a red herring, as NYISO is well aware that a number of engineering studies clearly establish that the Project's Incremental Capacity can be

[17] *See* Exhibit 16.
[18] *See* Exhibit 17.

interconnected with no adverse impact on system reliability. Having exhausted the NYISO's dispute resolution process, Linden VFT had no choice but to request relief from the Commission.

A. Relevant Tariff Provisions

The interconnection procedures in the OATT have changed materially since Linden VFT's 2002 Interconnection Request. A substantive change was made to the OATT after the Project had filed the 2002 Interconnection Request as a result of the Commission's Order No. 2003[19] addressing requirements for two levels of transmission service. This Complaint arises under NYISO's October 5, 2007 filing of the framework for providing a second level of interconnection service that incorporates a deliverability requirement and the grandfathering (or exemption) from that requirement of all existing projects and certain new projects that were, like the Project, progressing through NYISO's interconnection queue at the time of the 2007 filing.[20] NYISO's OATT provides that it studies interconnection of projects as a "class" and considers all projects that satisfy certain milestones as belonging to a "Class Year." As described below, the Project is a member of the 2006 Class Year.

In Order No. 2003, the Commission required all public utilities that own, control, or operate facilities for transmitting electric energy in interstate commerce to require transmission providers to offer interconnection customers two levels of interconnection service. To comply with Order 2003, NYISO revised its OATT adding a second level of interconnection service called Capacity Resource Interconnection Service ("CRIS") that incorporates a deliverability[21]

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[19] *Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003, FERC Stats. & Regs. ¶ 31,146 (2003)("Order No. 2003"), order on reh'g, Order No. 2003-A, FERC Stats. & Regs. ¶ 31,160 (2004), order on reh'g, Order No. 2003-B, FERC Stats. & Regs. ¶ 31,171 (2004), order on reh'g, Order No. 2003-C, FERC Stats. & Regs.¶ 31,190 (2005), affirmed sub nom. *Nat'l Ass'n of Regulatory Util. Comm'rs v. FERC*, 475 F.3d 1277 (D.C. Cir. 2007).

[20] *New York Independent System Operator, Inc.*, 122 FERC ¶ 61,267 (Guidance Order on Conceptual Proposal issued Mar. 21, 2008)(the "Guidance Order"), at P 3.

[21] *Id.* at P 16 ("The NYISO Deliverability Plan defines deliverability as the ability to deliver the aggregate of New York control area capacity resources to the aggregate control area load under summer peak conditions.").

requirement and renamed its basic level of interconnection service as Energy Resource Interconnection Service ("ERIS"). Where ERIS permits a customer to participate only in the NYISO Energy and Ancillary Services markets, CRIS provides the interconnection customer with the additional ability to participate in the NYISO installed capacity ("ICAP") market to the extent of its deliverable Capacity.[22]

In an order issued on March 21, 2008, the Commission accepted NYISO's "Deliverability Plan"[23] while explicitly determining that the new deliverability requirement would not apply to any pre-Class Year 2007 projects. Linden VFT was specifically identified as one of the grandfathered projects.[24]

Linden VFT proceeded to construct and interconnect the Project which achieved commercial operation on November 1, 2009.[25] Immediately before commercial operation on October 15, 2009, the Project conducted a physical performance test of its actual transmission capability.[26] Linden VFT conducted its performance test in a manner equivalent to that by which grandfathered generation projects establish their DMNC,[27] showing the capability to deliver power to the NYISO transmission system.[28] Proposed procedures for this performance

[22] *Id.*, at P. 15. After implementation of the deliverability test the CRIS value for a project may be found to be less than the physical capability of the project because a portion of project Capacity may be bottlenecked and not deliverable unless certain System Deliverability Upgrade facilities are funded. *Id.,* at P 17, 30.
[23] *Id.*, at P 1.
[24] *Id.*, at P 65.
[25] *See* Marczewski Affidavit at p. 7.
[26] *Id.*, at p. 15-16.
[27] The development of a comparable test was necessary. While NYISO's ICAP Manual establishes Unforced Capacity Deliverability Rights ("UDRs"), where the number of UDRs is based on transmission capability, as the mechanism to treat generation capacity located in an external control area as if it were located within NYISO, it does not set forth a procedure for demonstrating the transmission capability of new incremental controllable transmission projects. See NYISO ICAP Manual Section 4.14 and 4.14.1. *See* Marczewski Affidavit at 16-17 (citing ICAP Manual at Section 4.2.2). In each case the test must establish "the [amount of] power delivered to the transmission system." *Id.* In each case the operating characteristics used for the test must be those expected during the summer or winter peak load conditions and the test conformed to usual and customary industry practices. *See* NYISO ICAP Manual Sections 4.2 and 4.2.2.
[28] *See also*, NYISO ICAP Manual Section 4.2 ("All . . . Resources must test using usual and customary industry practices. For example, the operating configuration and fuel mix used to test must be the same configuration and fuel mix expected to be used during the summer or winter peak Load conditions, as applicable.")

test were provided to NYISO on June 15, 2009, a full 4 months before anticipated testing. If NYISO had any concerns with respect to the testing methodology Linden VFT proposed, it had ample time and opportunity to provide comments or objections.

The performance test showed that the Project's transmission capability was 315 MW in accordance with customary industry practices and the operating characteristics expected during peak load conditions. Based on these results, Linden VFT requested that NYISO adjust the CRIS rating of the Project and the associated number of Unforced Capacity Deliverability Rights ("UDRs") awarded to the Project by the Incremental Capacity.[29] NYISO denied Linden VFT's request.[30]

B. Project Interconnection Request and Studies

On July 10, 2002, when Linden VFT submitted the 2002 Interconnection Request,[31] NYISO's interconnection procedures did not contemplate a separate methodology for interconnection of Merchant Transmission Facilities[32] or assessing the reliability effects of such projects on the existing transmission system. Rather, the 2002 Interconnection Request explained that the "[t]he new interconnection would effectively appear as a new generator or load to the New York bulk power system."[33] NYISO accepted this equivalence to generation and assigned queue position no. 125 to the request.[34] The scope of work Linden VFT submitted for the System Reliability Impact Study ("SRIS") of the Project evidences that the Project would be studied as a generator:

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[29] *See* Exhibit 16, the Services Tariff Section 2.21 (Definitions) and NYISO ICAP Manual Section 4.14. "UDRs are rights, as measured in megawatts, associated with new incremental controllable transmission projects that provide a transmission interface to a NYCA Locality [(i.e., an area of the NYCA in which a minimum amount of Installed Capacity must be maintained)]. When combined with Unforced Capacity which is located in an External Control Area . . . UDRs allow such Unforced Capacity to be treated as if it were located in the NYCA locality."
[30] *See* Exhibit 17.
[31] *See* Exhibit 3-A.
[32] *See* Marczewski Affidavit at p. 14.
[33] *See* Exhibit 3-A at p. 2.
[34] *See* Marczewski Affidavit at p. 8. ("NYISO assigned the VFT interconnection request queue position no. 125.")

> the Project is expected to displace generation by offsetting amounts from units located inside the Con Edison system to obtain the requisite power transfer for scenarios delivering maximum power from PJM into NYISO. For scenarios delivering power from NYISO to PJM, the Project is expected to require additional generation on the Con Edison System to be dispatched to support delivery to PJM.[35]

The SRIS scope of work was reviewed by NYISO's Transmission Planning Advisory Subcommittee ("TPAS") and approved by NYISO's Operating Committee on January 22, 2004.[36]

In the Class Year 2006 interconnection study process NYISO sought to determine what, if any, System Upgrade Facilities were necessary for a reliable interconnection of Class Year 2006 projects, including Linden VFT.[37] The SRIS indicated that the Project could reliably interconnect to the NYISO system as proposed. A 93.9 MW project that had proposed to interconnect at the same location was abandoned after the SRIS was completed. Thus, there was ample available headroom, confirmed in several subsequent studies,[38] that the Project's Incremental Capacity (15MW) would have no adverse impact on system reliability.

The SRIS for the Project was completed in August 2005, reviewed by NYISO, presented to TPAS and approved by the Operating Committee on March 16, 2006, permitting the Project to be evaluated together with other Class Year 2006 projects. The Project accepted its cost allocation for System Upgrade Facilities (initially specified at $10 million in the Project's large generator interconnection agreement and significantly exceeding that estimate to date) with other

[35] *See* Marczewski Affidavit at p. 8. and Exhibit 12.
[36] *Id.*
[37] *See* Marczewski Affidavit at p. 18 n.2.
[38] On February 26, 2010, Linden VFT submitted a new interconnection request to recognize the Incremental Capacity while fully reserving its right to dispute NYISO's January 15, 2010 determination as it has in this Complaint. Marczewski Affidavit at p. 19. The new request was assigned queue position No. 351. The SRIS conducted for queue position No. 351 was approved by the Operating Committee on February 28, 2011, which allowed the Incremental Capacity to be evaluated in Class Year 2011 (the study of which is still in progress). This new SRIS confirms what is obvious from a review of the original SRIS, that the Incremental Capacity will have no adverse impact on system reliability.

Class Year 2006 projects in July 2007. An unexecuted interconnection agreement reflecting these results was filed on February 28, 2008 (and accepted by the Commission in an order issued on April 29, 2008).[39]

After Linden VFT's interconnection process was complete the Commission accepted the Deliverability Plan in an order issued on March 21, 2008, and determined that the new deliverability requirement would not apply to any pre-Class Year 2007 projects, specifically including Linden VFT.[40] Pursuant to the Commission's order, the full capability of each grandfathered project to generate or transmit Energy would be deemed deliverable and qualified for CRIS[41] without being required to perform any additional studies or construct any additional system upgrades based on deliverability.[42] OATT provisions implementing the Deliverability Plan state that the amount of grandfathered Capacity for all existing facilities and pre-Class Year 2007 projects would be determined by the highest value achieved in a test of each project's actual physical capability.[43]

On August 5, 2008, NYISO made a compliance filing to implement the Deliverability Plan. Because the Project was the only Merchant Transmission Facility in the 2006 Class Year, the filing often describes the new process in terms of generation only. However, NYISO explicitly clarified that for these purposes, the Project was included as a "generator", stating in the compliance filing,

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[39] *See* Marczewski Affidavit at p. 18 n.2.
[40] *See* Guidance Order at P. 65.
[41] The CRIS value, which is a limit on how much of a project's Capacity may be allowed to participate in the ICAP market, is now based on a deliverability test. Until the Deliverability Plan was effective, beginning with Class Year 2007, the "CRIS value" was 100% of project actual maximum net capability as determined through testing because no project had to demonstrate that its Capacity was deliverable.
[42] *See New York Independent System Operator, Inc*., 127 FERC ¶61, 318 (Order on Rehearing, Clarification and Compliance) (June 30, 2009) at PP 18-19 ("the grandfathering provisions . . strike a reasonable balance between existing capacity, pre-existing agreements and the needs of the market . . the proposed tariff revisions preserved commitments entered into in accordance with existing tariff provisions . . .").
[43] *See* OATT Attachment S § 25.9.3.1.

> [t]he NYISO's interconnection procedures accommodate merchant transmission projects as well as generation projects. As used herein, the term "Generator" includes a proposed new Generator, an increase in the capacity of an existing Generator, and a new controllable transmission facility seeking Unforced Capacity Deliverability Rights. [44]

Linden VFT does not seek special treatment. It has sought to be treated comparably, as NYISO explained to the Commission that it would be. Generation resources and merchant transmission facilities are similarly situated when they take service pursuant to the same tariff interconnection provisions and are entitled to similar treatment.[45]

Following NYISO's compliance filing, it was Linden VFT's reasonable understanding that the Project was grandfathered in like manner with 2006 Class Year generator projects. Linden VFT expressed this understanding in its comments on the NYISO's compliance filing, explaining that:

> Linden supports the Joint Compliance Filing, to the extent it accurately and appropriately implements the Commission's directive that the new deliverability requirements shall not apply to pre-Class Year 2007 projects, including Linden. Linden appreciates the Commission's clear resolution of these issues and the NYISO's attempt to comply with the Commission's directives in the March 21 Order . . . Linden is satisfied that the NYISO complied with the Commission's order with respect to grandfathering Linden and UDRs . . .[46]

These new tariff provisions established a procedure for setting CRIS values for those projects that had been grandfathered. A single standard was adopted, deeming the Capacity of these projects deliverable at their demonstrated maximum net capability:

> Generators in Class Years that pre-date Class Year 2007 are eligible to receive CRIS. For these Generators, 'the CRIS capacity level will be set

[44] Exhibit 14, (docket no. ER04-449, NYISO Compliance Filing for the Deliverability Plan dated August 5, 2008), n. 16.
[45] *See, e.g., Iberdrola Renewables, Inc., et al. v. Bonneville Power Administration,* 137 FERC ¶ 61,185, P. 62 (2011).
[46] *New York Independent System Operator, Inc.*, Docket No. ER04-449-017, Comments on and Conditional Protest of Linden VFT, LLC on the Joint Compliance Filing of the New York Independent System Operator, Inc. and the New York Transmission Owners (filed Aug. 26, 2008) at pp. 1-2.

> at the maximum [Demonstrable Maximum Net Capability ("DMNC") level achieved during . . . five summer capability periods . . . even if that DMNC value exceeds nameplate MWs . . . and the CRIS capacity level for controllable lines pre-dating Class Year 2007 will be set at the MWs of Unforced Deliverability Rights [sic] awarded to them.[47]

Neither the OATT nor the Services Tariff contains a provision that further explicates the manner in which UDRs are to be "awarded to" a "controllable line" (like the Project) other than its actual transmission capability, and the Project has reasonably assumed that no distinction between the capability of generators and controllable lines to deliver power to the New York State Transmission System was intended by NYISO in this provision. The OATT does not state that generators may establish a capacity greater than a nameplate rating by a performance test while controllable lines may not. If such a distinction was intended, it should have been explicit in order that interested parties would have been aware that NYISO had determined it appropriate to differentiate the treatment among grandfathered projects and the basis for disparate treatment. The new tariff language contained no other limitation on, nor procedure to be followed to permit, full allocation of CRIS values based on actual demonstrated net capability or its equivalent for these grandfathered projects.

Aware of these tariff provisions and the provisions of its Interconnection Agreement as it completed construction of the Project, on October 15, 2009, Linden VFT conducted a performance test of the Project[48] and determined, over a continuous ten (10) hour test period, that the transfer capability of the Project was 315 MW.[49] On November 13, 2009, following achievement of commercial operation by the Project, Linden VFT submitted a letter to NYISO

[47] *See* Exhibit 14 at p. 15. This single standard applied to all grandfathered projects the vast majority of which (29,057 MW (77%)) were interconnected to the New York State transmission system prior to the NYISO regime of interconnection requests and studies. Marczewski Affidavit at p. 4 (citing *NYISO Key Facts* (available at http://www.nyiso.com/public/media_room/keyfacts/index.jsp)).

[48] *See* Exhibit 15. The draft "VFT Power and Performance Testing Plan," which includes a procedure consistent with prudent electric industry practice for testing and establishing maximum power transfer, was provided to NYISO approximately four months prior to the October 15, 2009 test date. *Id.* at p. 11.

[49] *See* Marczewski Affidavit at p. 16.

requesting an increase in the UDRs granted to the Project from 300 MW to 315 MW to reflect the net transmission capability of the Project.[50] The letter referenced the procedure for awarding CRIS rights to grandfathered Generators, including the Project, based on the results of performance tests.[51]

In a letter dated January 15, 2010, NYISO denied Linden VFT's request offering only that:

> [i]n order for the NYISO to recognize any increase in the capacity of the Linden VFT facility above 300MW, the Linden VFT LLC must submit a separate Interconnection Request for the increase under the NYISO's Standard Large Facility Interconnection Procedures.[52]

There followed a series of unfruitful informal discussions between Linden VFT and NYISO in late 2009, 2010 and 2011, culminating on September 27, 2011 when Linden VFT delivered a "Notice of Dispute" to NYISO as required by Section 30.13.5 of NYISO's Standard Large Facility Interconnection Procedures, in order to begin a formal dispute resolution process.[53] During the course of the dispute resolution process, Linden VFT tried unsuccessfully to reach an equitable solution in keeping with the Commission's intent in adopting Order No. 2003 and NYISO's assurance of comparable treatment accompanying the filing of tariff language for determining the CRIS value for the grandfathered projects. However, NYISO asserted that, notwithstanding the Project's acknowledged grandfathered status, an OATT provision effective on October 5, 2004 required that Linden VFT submit a new interconnection request for any increase in the capacity of its Project.[54] The retroactive application of this tariff

[50] *See* Exhibit 16.
[51] *Id.*
[52] *See* Exhibit 17. Evaluating a portion of the Project's capacity in a separate interconnection request would require that portion of the Project's capacity to be evaluated in a subsequent Class Year, subjecting that portion of the Project's capacity to subsequently adopted transmission planning criteria and deliverability testing requirements and causing delays, incurrence of costs and lost revenue opportunities. Marczewski Affidavit at p. 5-6.
[53] *See* Marczewski Affidavit and Exhibit 21.
[54] *See* Exhibit 17.

provisions to Linden VFT, requiring a new interconnection request for NYISO to recognize a non-material increase in demonstrated Capacity, would be contrary to the Commission's orders, inequitable, discriminatory and demonstrably unnecessary. Nonetheless, on December 20, 2011, NYISO did just that, informing Linden VFT at the conclusion of the dispute resolution process that it would make no adjustment of CRIS rights or UDR awards for the Incremental Capacity.[55]

Linden VFT is not surprised by the failure to reach resolution as NYISO has been under continued stakeholder pressure to treat this Project differently in many respects. Since March 2007, stakeholders, including the incumbent transmission owner, have singled out the Project for disparate treatment. They have urged NYISO and the Commission to subject Linden VFT alone to the proposed and subsequently adopted deliverability requirements despite the grandfathering of all other Class Year 2006 projects from those requirements.[56]

V. Basis for Relief

Linden VFT developed the Project for almost a decade before construction was completed and commercial operation achieved in 2009. It remains an unusual and valuable transmission asset as it permits generation in PJM to access the NYISO Zone J market, permitting the trading of Capacity and Energy at a constrained location. The Project is also unique in that it provides this service without cost of service rate recovery or a long-term contract with an entity that has captive ratepayers who pay cost of service rates. The Project is truly merchant. Linden VFT has therefore taken pains to maintain certain of its rights under the OATT and Services Tariff, including the right as a grandfathered 2006 Class Year project pursuant to which it should have no obligation to show the deliverability of its actual

[55] In accordance with Section 30.13.5 (Dispute Resolution) of the OATT meetings of senior representatives of each party were held on October 13, 2011 and November 28, 2011 and by telephone conference on December 20, 2011.

[56] *See, e.g.*, *Linden VFT, LLC*, 119 FERC 61,066 (2007), at PP 39-40; *New York Independent System Operator, Inc.* 122 FERC ¶ 61,267 (2008), at P. 65-66; *New York Independent System Operator, Inc*, 123 FERC ¶ 61,093 (2008), at PP 13-16 (the Commission held that the deliverability requirement does not apply to the Linden VFT project and dismissed these arguments as moot).

transmission capability. NYISO's position to the contrary regarding a portion of the Project (i) is an unreasonable application of language in its OATT; and (ii) discriminates against the Project relative to numerous pre-2007 Class Year projects and several post-2007 projects. Further, the NYISO can advance no legitimate reliability concern in support of its position, as it has restudied the Project, assuming the inclusion of the Incremental Capacity, and confirmed that delivery of the Incremental Capacity would have no adverse impact on the transmission system. We elaborate on these matters below.

A. NYISO Has Incorrectly Applied the CRIS Grandfathering Procedure: No Rational Basis Exists to Deny Recognition of the Project's Actual Transmission Capability.

NYISO should recognize the full 315 MW transmission capability of the Project 315 MW as the Project's CRIS value because that is the transmission capability to which it is entitled as a grandfathered 2006 Class Year Project. However, in discussions (both formal and informal) NYISO is unwilling to concede this point because it claims that another tariff provision, filed in 2004, prevents NYISO from recognizing any increase above nominal capacity set forth in the 2002 Interconnection Request without a new interconnection request. If this interpretation were correct (which it is not), it would vitiate the repeated assurances from NYISO that, for the purposes of the interconnection process, the Project is treated as a generator and that existing non-material change criteria would continue to be applied to all those projects whose interconnection requests predated the 2004 tariff revision.

The tariff provision NYISO asserts is the definition of "Interconnection Request" set forth in OATT Section 30.1:

> **Interconnection Request** shall mean Developer's request, in the form of Appendix 1 to the Standard Large Facility Interconnection Procedures, in accordance with the Tariff, to interconnect a new Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System, or to increase the capacity of, or make a material modification to the operating characteristics of, an existing Large Generating Facility or

> Merchant Transmission Facility that is interconnected with the New York State Transmission System.[57]

This tariff provision, issued on October 5, 2004 with an effective date of August 6, 2004, was adopted to comply with the Commission's Order No. 2003.[58]

Notwithstanding the logical and equitable flaw of applying the OATT definition of an interconnection request, first effective in August 2004, to interpret the rights of a developer pursuant to an interconnection request made in July 2002, the application of this tariff provision to a project grandfathered from the subsequently adopted deliverability requirement produces an absurd result. Before Order No. 2003, project size in interconnection requests was often described, for convenience, in terms of the nameplate rating of project equipment, with the reasonable expectation that deviations within the bounds of previously published materiality criteria would not subject the project to further interconnection procedures. The interpretation NYISO asserts, applying the definition of a new interconnection request to grandfathered projects, would render meaningless specific language in the transition procedure for establishing the CRIS value for those projects which are to be set at:

> the maximum DMNC level achieved during the five most recent Summer Capability Periods prior to October 5, 2008, *even if that DMNC value exceeds nameplate MWs.* For a generator pre-dating Class Year 2007 and not having DMNC levels recorded for five Summer Capability Periods prior to October 5, 2008, its CRIS capacity level will be set, and reset if necessary, at the maximum DMNC level achieved during successive Summer Capability Periods until it has DMNC levels recorded for five Summer Capability Periods.

(emphasis added).[59]

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[57] *See* OATT, Attachment X (Standard Large Facility Interconnection Procedures)(the "LFIP"), § 30.1.

[58] *New York Independent System Operator, Inc.*, 108 FERC ¶ 61,159 (2004).

[59] *See* OATT, Attachment S, § 25.9.3.1. Based on our discussions with NYISO, we believe its interpretation would read these tariff provisions as potentially dividing grandfathered projects into two parts: a grandfathered portion up to the capacity specified in an interconnection request (if any had been made for the project) and a non-grandfathered portion, the quantity in excess of nameplate capacity, subject to a new interconnection request that would be evaluated in a subsequent class year process and subject to deliverability requirements. There is no textual support for this view.

The vast majority of grandfathered resources, existing generators, were in service prior to NYISO's interconnection procedures. There is no interconnection request against which their DMNC level equivalent could be evaluated and limited. Moreover, the tariff language, adopted to be uniformly applied to all grandfathered projects, expressly provides that the full capability of these projects would be recognized even "to the extent a DMNC value exceeds nameplate MWs."[60] NYISO's reliance on this tariff provision to deny to a grandfathered project recognition of a portion of its transmission capacity cannot be squared with both the Guidance Order and the tariffs filed in compliance therewith. It effectively eliminates from the CRIS Value any portion of the capacity of a grandfathered project that exceeds the nameplate capacity specified in an interconnection request.[61] The tariff language was clearly intended to preclude nameplate capacity as a cap for all existing projects. It could not have intended to impose a cap based on a project's interconnection request, since the vast majority of relevant projects predate NYISO and were not required to make an interconnection request. The only reasonable limit that the tariff can impose over nameplate capacity is the tested capacity of each project – precisely matching NYISO's practice for grandfathered generation facilities. The alternative – using the interconnection request as a limit for only more recent projects – has no basis in the tariff language and must be rejected.

NYISO explained to Linden VFT that it believed its tariff interpretation was consistent with a case where the Commission found that even a *de minimis* increase in capacity required a new interconnection request.[62] That case is clearly inapposite. The capacity increase in that case arose from a physical modification made to existing generation equipment. No modification or change was made to the Linden VFT project to increase its transmission capability. Equally

[60] *Id.*
[61] *See* pp. 22-27, infra.
[62] *See Midwest Independent Transmission System Operator, Inc.*, 125 FERC ¶61,210 (2008).

important, that case also did not involve the interpretation of tariff rules intended to grandfather certain projects from the prospective effect of a new interconnection tariff regime like the Deliverability Plan.

NYISO's tariff construction also inappropriately relies on a provision adopted to comply with Order No. 2003 in a manner that would frustrate the essential purpose of Order No. 2003. The Commission sought in Order No. 2003 to standardize interconnection procedures in order to facilitate the fair, open and non-discriminatory connection of additional generation to competitive markets.[63] When those same procedures are enforced formulaically, frustrating the reasonable expectation of sponsors participating in an interconnection queue that the rules will not be materially changed in mid-process, they will impede interconnection – as they would here – discouraging investment in new generation and transmission.

NYISO's Class Year interconnection study process extends over a multi-year period. A Class Year is comprised of a cluster of projects that have met specified Class Year eligibility requirements by the time the combined group study begins in March each year.[64] Not only would a new interconnection request subject a project to further unnecessary studies, but, as a result of Class Year clustering, it would not be unusual for a project to be delayed by three or more years by being required to submit a new interconnection request to NYISO despite diligent and costly efforts to comply.

It makes little sense to deny grandfathered treatment to Linden VFT by applying a "no increase" standard that was adopted two years after this Project submitted its interconnection request. When Linden VFT submitted its Interconnection Request for the Project in July 2002 the tariff then in effect defined a "New Interconnection" as:

[63] *See* Order No. 2003, at pp. 10-11 ("…relatively unencumbered entry into the market is necessary for competitive markets . . . delay undermines the ability of generators to compete in the market . . .").
[64] *See* NYISO OATT §§ 30.6, 30.7 and 30.8.

> A proposed generation or merchant transmission project that must satisfy the requirements of a System Reliability Impact Study before it can connect to the New York State Transmission System in compliance with the NYISO Minimum Interconnection Standard. A project is considered to be a New Interconnection, or not, as a result of the application of specified materiality criteria set out in the ISO Procedures.[65]

Consistent with prudent engineering practice, the materiality criteria adopted by NYISO in 2001 allowed NYISO and the Project some latitude to avoid the necessity of a new interconnection where the "change" was not material. A new interconnection request was not required where a change or modification to project equipment resulted in an increase in project capacity was less than 10 MW, or 5%, whichever was greater.[66] With respect to Linden VFT, the increase results from no change or modification to the Project. The actual transmission capability is merely greater by a non-material amount than the transmission capability estimated by the manufacturer.

NYISO's current interpretation of applicable tariff provisions is also directly contrary to the contemporaneous interpretation it gave in November 2004 shortly after this tariff provision became effective on October 5, 2004. NYISO explained that the non-material change criteria would continue to apply to projects then in the interconnection queue, notwithstanding the new rule, which would be applied only to new queue entrants.[67]

NYISO clearly intended that market participants rely on this interpretation. NYISO offered the interpretation to TPAS members whose responsibility was to review (and concur in) NYISO's rationale for such materiality determinations.[68] NYISO explained that the new "no increase" criteria would only be applied "once the transition of pre-existing projects in the queue

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[65] *See* Exhibit 6 (OATT § 1.26(a)1, First Revised Sheet No. 39 (effective September 26, 2001)) (emphasis added).
[66] *See* Marczewski Affidavit at p. 11 and Exhibit 5.
[67] Exhibit 19 at p. 3.
[68] Among those market participants was Mr. Marczewski, Linden VFT's representative on TPAS. The context in which NYISO explained its interpretation was that a proposed increase in project size for a "change in technology," larger in both absolute amount and percentage that the Incremental Capacity, was a non-material change to that project. Marczewski Affidavit at p. 21.

has been completed."[69] NYISO should not be permitted to now contradict its own tariff interpretation. This 2004 tariff amendment does not apply to Linden VFT whose 2002 Interconnection Request was pending at the time the provision was added.

NYISO's reading of its tariff would apply a provision adopted two years after the Project submitted its 2002 Interconnection Request to limit the amount of the Project's grandfathered capacity to the nominal value in its 2002 Interconnection Request, submitted with the reasonable expectation that it was an estimate.[70] The Commission has been clear in similar contexts that it is detrimental to the efficient functioning of the markets not to meet the reasonable expectations of parties as they move through the development process. Where tariff provisions changed during the time a project was in the interconnection queue, the Commission observed that: "the appropriate tariff for judging the parties' obligations was the tariff on file 'when the interconnection was being considered.'"[71] In order for the interconnection queue to operate fairly, all parties need to know what rules will control so that they can plan accordingly.[72]

B. NYISO's Application of the CRIS Tariff Procedures is Discriminatory: No Rational Basis Exists for Establishing CRIS Values for Generation and Controllable Transmission Resources in a Different Manner

The CRIS value operates as a limit on the amount of the physical Capacity that a Resource may offer as an ICAP Supplier.[73] NYISO has not applied the CRIS grandfathering

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[69] NYISO offered this explanation to explain that the non-material change criteria were properly applied to a 19.6 MW (6.8%) increase in project size for the Caithness Long Island project. Both that project and Linden VFT are "pre-existing projects in the queue." Marczewski Affidavit at pp. 20-21 (citing Exhibit 19).

[70] If Linden VFT's complaint is denied the effect would be to subject all future projects to *ex post facto* changes in the NYISO LFIP resulting in additional cost, uncertainty and detriment to those projects.

[71] *See PJM Interconnection, L.L.C.* 136 FERC ¶ 61,195(2011) at 14 n. 29 (citing *FPL Energy Marcus Hook Energy, L.P. v. PJM Interconnection, L.L.C., 118 FERC ¶61,169 (2007)* at p. 11 n. 9*).*

[72] *Id*. That is particularly apt here where the actual physical capability of a facility is being evaluated for purposes of grandfathering its right to participate in NYISO markets free from a newly adopted deliverability limitation that will be prospectively applied. The extent of the grandfathered rights must be defined by application of the preexisting tariff provisions.

[73] *See* Exhibit 14 at p. 4, " . . . By contrast, CRIS provides not only basic interconnection service, but also allows the Generator to participate in the NYISO's Installed Capacity market *to the extent of the Generator's deliverable capacity*." (emphasis added).

provisions equally to generators and to the Project even though, in its compliance filing, NYISO explained to the Commission that these provisions of the OATT do not differentiate between generators and merchant transmission facilities for interconnection purposes.[74] For generators pre-dating Class Year 2007, the OATT sets the CRIS capacity level:

> at the maximum DMNC level achieved during the five most recent Summer Capability Periods prior to October 5, 2008, even if that DMNC value exceeds nameplate MWs. For a generator pre-dating Class Year 2007 and not having DMNC levels recorded for five Summer Capability Periods prior to October 5, 2008, its CRIS capacity level will be set, and reset if necessary, at the maximum DMNC level achieved during successive Summer Capability Periods until it has DMNC levels recorded for five Summer Capability Periods.[75]

Neither the OATT nor the Services Tariff establishes the manner for determining DMNC.[76] Rather, procedures for determining DMNC are found in NYISO's ICAP Manual where, once more, NYISO establishes an equivalence, through an award of UDRs to merchant transmission projects based on transmission capability, between capacity located in NYISO and capacity located in an external control area that would be delivered over a controllable line.[77]

NYISO's ICAP Manual "contains the procedures that will be followed by the NYISO and its Customers with regard to the Installed Capacity Markets administered by the NYISO pursuant to the Services Tariff."[78] The Commission has relied on the ICAP Manual where the Services Tariff failed to address how a new resource may qualify as an ICAP supplier.[79] Section 4.2.2 of the NYISO ICAP Manual sets forth the DMNC demonstration conditions for all manner of generators, including, fossil fuel or nuclear steam units, hydro units, internal

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[74] *See* pp. 12-13 *supra.*
[75] *See* OATT, Attachment S, § 25.9.3.1
[76] *See* Marczewski Affidavit at p. 16.
[77] *See* NYISO ICAP Manual Section 4.14.
[78] NYISO ICAP Manual Section 1.
[79] *See New York Independent System Operator, Inc. v. Astoria Energy LLC,* 118 FERC¶61,216 n.17 (2007).

combustion units, combined cycle stations, Intermittent Power Resources, Special Case Resources and Energy Limited and Capacity Limited Resources.[80]

While NYISO explained to the Commission that:

> [t]he NYISO's interconnection procedures accommodate merchant transmission projects, as well as generation projects [and a]s used herein, the term "Generator" includes a proposed new Generator, an increase in the capacity of an existing Generator, and a new controllable transmission facility seeking Unforced Capacity Deliverability Rights,[81]

neither the OATT nor the ICAP Manual set forth a test regime for establishing transmission capability of, and awarding UDRs based thereon to, a Merchant Transmission Facility, with the same level of detail as the DMNC determination is used for the CRIS level for grandfathered generators.[82] In accordance with its interconnection agreement, Linden VFT was required to demonstrate its capability upon completion of the Project. Therefore, it developed a DMNC-equivalent test protocol that was at least as rigorous as the DMNC test for generation facilities, informed NYISO of its intention 4 months before it performed the test and established a 315 MW transmission capability – well within expected performance of the Project. The Commission should not permit NYISO to interpret the absence of test parameters in its tariff as belatedly authorizing disparate treatment after Linden VFT's demonstration of its capability was made.

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[80] *See* Section 4.2.2 of the NYISO ICAP Manual. The DMNC for a resource is the "sustained maximum net output of a Generator, as demonstrated by the performance of a test or through actual operation, averaged over a continuous time period as defined in the ISO Procedures." Services Tariff § 2.4. DMNC is established through the "submission of results from a DMNC tests or data from actual operation (a "DMNC Demonstration")."

[81] The OATT and the Services Tariff have few provisions specific to merchant transmission facilities. In filings with the Commission, NYISO has used the term "generator" interchangeably for both new generators and new controllable transmission facilities. Exhibit 14 at p.4 n.16. In stakeholder proceedings NYISO has used the term "generator equipment" when addressing merchant transmission facility capacity. *See* Marczewski Affidavit at p. 14.

[82] Pursuant to an obligation in its interconnection agreement to test the as built unit and demonstrate its capability, Linden VFT prepared a detailed performance test procedure in accordance with prudent electric utility practice that was shared with NYISO in June 2009. Marczewski Affidavit at p. 14-15. Linden VFT's October 15, 2009 performance test and the demonstration of the maximum transmission capability of the Project were conducted in conformance with those procedures. The Project's maximum transmission transfer capability of 315 MW was conservatively demonstrated over a 10 hour period. The longest period required of generators to demonstrate their DMNC is a four hour period.

Section 14.4.1 of the ICAP Manual clearly contemplates measurement and adjustment to establish transmission capability, explaining that:

> with respect to 2007 Class Year projects and thereafter, t]he amount of UDRs assigned by the NYISO to each new incremental transmission facility, and any future adjustments there to [sic] will be based on the transmission capability, reliability, availability of the facility, and appropriate NYSRC reliability studies . . . Projects predating Class Year 2007 [including the Linden VFT Project] that hold UDRs received CRIS pursuant to the NYISO OATT Attachment S."[83]

Moreover, the reference in the ICAP Manual to transmission projects predating Class Year 2007 provides no guidance on how the award of UDRs to a grandfathered project was to be determined. Nor does Section 25.9.3.1 of Attachment S to the OATT which merely provides in pertinent part that:

> . . . the CRIS capacity level for controllable lines pre-dating Class Year 2007 [including the Linden VFT Project][84] will be set at the MW of Unforced Capacity Deliverability Rights awarded to them . . .

The circularity of these cross-references is an ambiguity that can only be resolved in a non-discriminatory manner by the comparable treatment Linden VFT seeks in this Complaint.

As it prepared to energize the Project in 2009, Linden VFT reviewed the OATT, the order establishing its grandfathered status, Attachment S of the OATT and the ICAP Manual and reasonably believed that it would be awarded a CRIS value based on transmission capability established through testing. The OATT requires the CRIS value for grandfathered generators to be determined by a single standard: the highest value achieved during performance tests conducted in five successive Summer Capability Periods, regardless whether the result of those

[83] *See* ICAP Manual Section 4.14.1. The quantity of UDRs awarded to a merchant transmission facility is crucial because that determines an upper limit on how much Capacity and Energy customers of the facility may import into NYISO.

[84] *See New York Independent System Operator, Inc*., 122 FERC ¶ 61,267 (2008) n. 32. Linden VFT is a Class Year 2006 merchant transmission project.

tests exceeds the generator's nameplate rating.[85] No other condition must be satisfied to establish the CRIS value for a generator, nor is there any other limitation such as the quantity specified in an interconnection request. NYISO has not interpreted its tariff to use nameplate data to determine, or limit, the CRIS value for over 700[86] grandfathered generators (existing and those pre-2007 Class Year projects still under development).[87]

There is no engineering or technical rationale for differentiating between the recognition of the actual capability of a developer's generator or a developer's merchant transmission facility in the interconnection process. Both deliver power to the New York State Transmission System and the award of UDRs to merchant transmission projects is clearly intended to establish comparability.[88]

NYISO did not disagree. Its Operating Committee found in 2004 that it was appropriate to study the reliability and other potential impacts of interconnecting the Project as though it were a generator. Based on the 2002 Interconnection Request, the same study results would have resulted in the same Facility Study Upgrades if the Project had been a generator with a nameplate capacity of 300 MW, located on the same site and interconnecting at the same location. That putative generator's CRIS value would have been set through a DMNC test, and it's CRIS value would have been determined based on the test "even if that DMNC value exceed nameplate MWs". The OATT required no new interconnection request to recognize the full CRIS value of a generator for an amount in excess of the nameplate quantity specified in an interconnection request.[89]

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[85] *See* Marczewski Affidavit at p. 6.
[86] Marczewski Affidavit at 4 (citing NYISO 2011 Load and Capacity Data report (the "Gold Book"), Section III (Existing Generating Facilities")).
[87] *See* Marczewski Affidavit at pp. 4-5.
[88] *See* ICAP Manual Section 4.14.
[89] *See* OATT, Attachment S § 25.9.3.1.

Where a tariff is susceptible to different constructions or interpretations, extrinsic evidence of interpretation or intent may be relied upon to assist in interpreting how the tariff should be applied.[90] In this case, if there is any question that the Project was to receive the same treatment as the other grandfathered Class Year 2006 projects, NYISO's published guidance with respect to the grandfathering language should be dispositive. On July 2, 2008, NYISO distributed a proposal to stakeholders participating in meetings of its Interconnection Issues Task Force ("IITF") summarizing the tariff language for implementing both the new deliverability test and grandfathering procedures. The July 2nd proposal explained that, in addition to the "maximum DMNC level achieved during five successive Summer Capability Periods" procedure for generators there would also be a "DMNC level equivalent for intermittent resources and controllable lines with UDRs."[91] Although NYISO apparently agrees that such a procedure should have been provided, it never developed such a procedure.

Pursuant to its Interconnection Agreement, the Project performed tests demonstrating its "DMNC level equivalent," utilizing the performance test methodology the Project had provided to NYISO in advance pursuant to its interconnection agreement.[92] The tests performed by Linden VFT were as rigorous or more so than those specified for generators demonstrating their DMNC in the ICAP Manual.[93] In order for the Project to be treated comparably with generators

[90] *New York Independent System Operator, Inc*, 118 FERC ¶ 61,216, P 34 (2007).

[91] *See* Exhibit 18 (July 2, 2008 IITF "DELIVERABILITY -- IMPLEMENTATION ISSUES ["Proposed Resolution"] at p. 3. The procedure for grandfathering the CRIS level of intermittent resources, the combined nameplate capacity, is the "DMNC value" for intermittent resources. *See* ICAP Manual, Section 4.2.2. Notably, the sole deviation between the July 2, 2008 proposal and the final tariff language filed on August 5, 2008 is that the filed tariff established the CRIS value by DMNC test "even if that DMNC value exceeds nameplate MWs." *See* OATT, Attachment S, § 25.9.3.1.

[92] *See New York Independent System Operator, Inc*., Docket no. ER08-618, Filing of Unexecuted Standard Merchant Transmission Facility Interconnection Agreement, dated February 29, 2008 at Appendix C.

[93] See ICAP Manual Section 4, describing DMNC testing procedures. While the maximum duration prescribed in the ICAP Manual for a DMNC test for a generator is 4 hours, Linden VFT's performance test lasted 10 hours. No further duration was necessary to demonstrate that this was a dependable capability – temperatures in the VFT units had reached a peak. *See* Marczewski Affidavit at p. 15. ("Linden VFT incrementally increased the power flow of the Project until it reached the maximum power flow at which it could operate at a stable equilibrium temperature.").

as the OATT contemplates, its transmission capability of 315 MW of the Project must be recognized as its CRIS level.

The results of VFT's performance tests demonstrated that the Project operated within accepted engineering design limits, the Project's design specifications, and as contemplated in the 2002 Interconnection Request, the power factor design and voltage criteria in the Interconnection Agreement and, the maximum amount of power that the Project could reliably deliver to the NYISO transmission system.[94]

Neither NYISO nor any other party has ever suggested that the Project as constructed differs from the project that was contemplated in and studied during the interconnection process. No change or modification was made to the Project that results in this increase in Capacity. The Project's actual 315 MW transmission capability is simply the non-material difference between the manufacturer's estimate of design capability and actual performance.

C. Reliability is Not At Issue and No Change Has been Made to the VFT Project to Increase its Capacity

No technical question exists regarding whether the additional 15 MW of Project Capacity can be reliably interconnected with the New York State Transmission System. This Complaint and the relief sought are solely about NYISO's focus on process, not reliability.[95]

Each of the studies that were conducted has confirmed that there is more than adequate headroom to reliably accommodate 315 MW at this interconnection.[96] As Mr. Marczewski explains, the SRIS study approved by the Operating Committee on March 16, 2006 included an additional 93.9 MW at the same interconnection location for a project that subsequently

[94] Marczewski Affidavit at p. 17.
[95] *See* Marczewski Affidavit at pp. 4-5.
[96] *See* Marczewski Affidavit at pp. 17-18.

withdrew from the interconnection queue.[97] A subsequent SRIS for the Incremental Capacity which Linden VFT undertook under protest and that was approved by the Operating Committee at its meeting on February 28, 2011, confirms that 315 MW can be reliably connected with no adverse impact on the NYS transmission system.[98]

D. NYISO Has Failed to Apply the "No Increase" Tariff to Similarly Situated Projects, both those which are grandfathered and those that are not.

In October 2009, while Linden VFT's request was pending, NYISO began the process of evaluating and later granted a 66.4 MW (21%) increase in winter capability to Caithness Long Island, another grandfathered Class Year 2006 project. NYISO has not explained its reasons for this amendment, but the larger quantity had not been requested in Caithness's interconnection request (filed in 2001), was not studied in the SRIS approved by the Operating Committee in connection with the Class Year 2006 studies and the request was made after the Caithness project achieved commercial operation. It was the second such change approved for the Caithness project after NYISO adopted the "no increase" tariff provision that NYISO would apply strictly to Linden VFT.[99] As expected, based on its grandfathered status, NYISO did not

[97] *Id*.

[98] *See* Marczewski Affidavit at p. 18.

[99] On November 9, 2004 NYISO reported to TPAS and thereafter to the OC its approval of a 19.6 MW increase in project size from 290 MW to 309.6 MW (6.8%) for the Caithness Bellport project (queue position no. 107). Exhibit 19. On September 2, 2010, NYISO reported to the OC:

> Expanding on the Caithness winter rating topic, Mr. Corey reported that the summer peak study for the Caithness Energy Long Island SRIS (Q#107) was performed for the project operating at 309.6 MW and the Interconnection Agreement for the plant lists the plants maximum capability at 309.6 MW. He explained that, in the fall of 2009, Caithness requested an increase to a maximum winter capability rating up to 375.5 MW, but added that the NYISO had objected to the rating increase because the project had not been studied at that level, and had not been studied under winter conditions.
>
> Mr. Corey noted that Caithness had since conducted a winter peak study for the Caithness Energy Long Island Plant at the request of LIPA and the NYISO. He explained that the purpose of the study was to evaluate the impact of operating the plant at an increased winter capability of 375.7 MW compared to its previously approved summer capability of 309.6 MW. Mr. Corey reported that the study had been completed and reviewed by NYISO and LIPA on 8/18/2010 and that the results of the study confirmed that the Caithness Long Island facility can be operated at up to 375.7 MW during the winter capability period, without causing any adverse impact to System Reliability.

require Caithness to submit a new interconnection request for the recognition of this portion of its project's actual installed capability. If NYISO was able to find the Caithness increase non-material, it should have afforded like treatment to the lesser increase requested by Linden VFT. There is no basis in the OATT for requiring a new interconnection request from either grandfathered project.[100]

Further, NYISO continues to allow increases in project size for post-Class Year 2007 projects without requiring that they submit a new interconnection request, notwithstanding the OATT provision which NYISO would apply to deny Linden VFT's request.[101] On February 16, 2011, NYISO explained that it had determined that the increase in project size of three projects, attributable to some change or modification to each project's equipment, were non-material changes:

> Queue # 263 - Stony Creek Wind Farm – increase from 88.5 to 94.4 MW maximum output (5.9 MW or 6.6%) as a result of a software change in its turbine control system resulting in increased output
>
> Queue # 251 - CPV Valley Energy Center – increase in summer capacity from 656 to 678 MW (22 MW or 3.4%) and in winter capacity from 753 to 784 MW (31 MW or 4.1%) as a result of changes in purchased equipment.
>
> Queue # 310 - Cricket Valley Energy Center – increase in summer capacity from 1002 to 1019.9 MW (17.9 MW or 1.8%) and winter capacity from 1115 to 1136 MW (21 MW or 1.9%) also as a result of a change in purchased equipment.[102]

Exhibit 10.

[100] The impact of requiring Linden VFT to submit a new interconnection request, that would be evaluated in a Class Year subsequent to 2007, is that a 15 MW portion of the completed Project would become subject to different reliability, deliverability and transmission planning criteria than were applied to the Project in Class Year 2006. This would be an absurd result. An undivided portion of a single unmodified facility cannot realistically be expected to perform to two disparate sets of technical criteria – physical modification of the existing equipment could be required to meet the new technical criteria. The requirement that each interconnecting project must meet the NYISO Deliverability Interconnection Standards before it can become a qualified Installed Capacity Supplier or receive UDRs first applies to the projects comprising Class Year 2007. OATT § 25.3.1.3.

[101] This would appear inconsistent with NYISO's 2004 interpretation of the "material change" criteria, *supra* at n.11, since the interconnection requests for each of those projects was submitted after October 5, 2004. This discussion is not an exhaustive list of such exceptions. There are others.

[102] Marczewski Affidavit at pp. 22-23 (citing Exhibit 11).

None of these projects are grandfathered projects because they either were or will be evaluated in a Class Year subsequent to 2007. The “no increase” OATT provision would clearly be expected to apply to these projects because each entered the interconnection queue after the October 5, 2004 effective date of that tariff provision. NYISO’s treatment of these increases in project capacity of equivalent or greater magnitude as non-material changes without requiring that these projects submit new interconnection requests clearly illustrates the discriminatory application of the “no increase” rule to Linden VFT.

Linden VFT anticipates that NYISO may attempt to justify these disparate results by claiming that the treatment afforded these projects can be distinguished from that applicable to the Project. However, there is no relevant distinction which has been proffered by NYISO to Linden VFT. For example, the increase in Linden VFTs capacity results from no change or modification of project equipment and as indicated above, it has been conclusively demonstrated that the additional 15 MW would have no adverse impact on the transmission system. NYISO’s strict application of the “no increase” policy to Linden VFT is clearly an inaccurate reading of its own OATT by NYISO, applied in a discriminatory fashion. Generation resources and merchant transmission facilities are similarly situated when they take service pursuant to the same tariff interconnection provisions and are entitled to similar treatment.[103]

* * * *

In all of its dealings with NYISO, Linden VFT has acted in good faith and with patience in the face of NYISO’s lengthy and circuitous interconnection process. Linden VFT has incurred significantly higher interconnection charges than it expected for the right to inject power into NYISO’s service territory from PJM, increasing NYISO Zone J import capability.

[103] *See, e.g.*, *Iberdrola Renewables, Inc., et al. v. Bonneville Power Administration,* 137 FERC ¶ 61,185, P. 62 (2011).

All Linden VFT expects in return is that NYISO's rules will be fairly applied. Linden VFT has demonstrated that NYISO failed to accord the Project comparable treatment with grandfathered generators and other projects whose capacity increases were deemed non-material. NYISO should have recognized the 315 MW actual transmission capability of the Project as its CRIS value as the OATT requires that it recognize the actual DMNC of grandfathered generators for purposes of their full participation in NYISO Capacity, Energy and Ancillary Service markets. Therefore, Linden VFT respectfully requests that the Commission order NYISO to recognize the actual 315 MW transmission capability of the Project as its CRIS value, increase the amount of UDRs awarded to the Project to 315 MW and submits that this result is fair and equitable under the facts presented herein.

VI. Request for Relief

The Commission has the authority and responsibility to enforce the NYISO OATT. As the Commission has stated: "[t]he FPA [Federal Power Act] and the Commission's authority under Sections 205 and 206 (and 309) of the FPA would be virtually meaningless if [it] had no authority to enforce the tariffs that the statute requires must be filed with and reviewed by [it]."[104] In fulfilling its statutory mandate, the Commission may use its remedial discretion to restore Linden VFT to the same position it would be in if NYISO had not discriminated against it.[105] Therefore, Linden VFT respectfully requests that the Commission issue an Order:

1. Finding NYISO applied its OATT in a discriminatory manner with respect to Linden VFT and the Project.

[104] *American Electric Power Service Corp.*, 106 FERC ¶ 61,020 at P 21 (2004) (footnote omitted).
[105] *Consolidated Gas Transmission Corp. v. FERC*, 771 F.2d 1536, 1540-51 (D.C. Cir. 1985).

2. Directing NYISO to recognize the 315 MW transmission capacity of the Project as its CRIS value, and award the Project an additional 15 MW of UDRs, for a total of 315 MW of UDRs, effective as of the date such order is granted.

Linden VFT has determined that it will not ask for recompense for damages incurred as a result of NYISO's discriminatory actions; however, the Commission should be aware that the Project has been unable to bid its full capacity into NYISO's markets for over 2 years resulting in a loss of several million dollars a year and has incurred considerable expense in unnecessary interconnection study costs, consultant and legal fees and its own time and effort in working to address this matter.

VII. Compliance with the Requirements of 18 C.F.R. § 385.206

Section 206 of the Commission's Rules of Practice and Procedure require that complaints clearly identify certain information relevant to the complaint. Linden VFT addresses each of the elements of Rule 206 in turn:

In compliance with Rule 206(b)(6) of the Commission's Rules of Practice and Procedure,[106] Linden VFT states that the issues presented in this Complaint are not pending in any other Commission proceeding or in any other proceeding in which the Linden VFT is a party. Commission action is therefore needed to address the Respondents' failure to conform with the requirements of their own OATT.

In accordance with Rule 206(b)(9) of the Commission's Rules of Practice and Procedure, Linden VFT states that it has previously attempted to resolve the issues raised by this Complaint through informal means, but despite its best efforts, these discussions were unsuccessful. Those informal means were followed by the formal dispute resolution procedures found in the Interconnection Agreement and OATT, and those formal procedures were also unsuccessful.

[106] 18 C.F.R. § 385.206(b)(6).

A. Identification and Explanation of Violation

NYISO's refusal to recognize the entire 315 MW transmission capability of the Linden VFT, determined through actual performance testing of the Linden VFT upon completion of construction is based upon a misinterpretation of the applicable OATT provisions for the determination of the maximum Capacity Resource Interconnection Service values applied to grandfathered pre-Class Year 2007 projects.

Moreover, NYISO's interpretation of OATT Attachments S and X arbitrarily constrains the amount of available transmission capacity that may be utilized by Linden VFT. Through these unjust and unreasonable actions, NYISO has deprived Linden VFT (and its current and prospective customers) of the ability to fully participate in the Capacity and Energy markets operated by NYISO and PJM.

B. Financial Impact and Burden

NYISO's failure to recognize the actual transmission capability of Linden VFT has resulted in a net reduction of allocated UDRs of 15 MW (representing the difference between the actual transmission capability (315 MW) and 300 MWs (which were actually allocated) and reducing the Capacity and energy participation of the Project and its customers by the same amount. The financial impact of this failure caused Linden VFT to forego the opportunity to sell 15 MW of transmission scheduling rights since November 15, 2009 (the date of Linden VFT's request) and the ICAP value alone is conservatively estimated at several million dollars annually,.

C. Other Impacts

If permitted to go unchecked, NYISO's violations would cause a portion of the Project to participate in and be evaluated in a post-Class Year 2007, subjecting that portion of this project to a potential cost allocation for System Deliverability Upgrades from which it had been grandfathered by virtue of the Commission's March 8, 2008 order in docket no. ER04-449 should any upgrades be deemed necessary.

D. Other Proceedings

The issues raised in this Complaint are not pending in any existing Commission proceeding or a proceeding in any other forum in which Linden VFT is a party.

E. Testimony and Other Supporting Documents

The documents supporting the facts of the complaint are attached hereto in the following manner:

- Exhibit No. 1: Affidavit of John J. Marczewski;
- Exhibit No. 2: Curriculum Vitae of John J. Marczewski;
- Exhibit No. 3-A: NYISO Interconnection Request (July 10, 2002);
- Exhibit No. 3-B: PJM Interconnection Request (June 1, 2001);
- Exhibit No. 4: VFT Modeling for Planning Studies (January 31, 2001);
- Exhibit No. 5: Criteria for Defining a Material Change in a Previously Proposed New Interconnection Project, (February 14, 2001);
- Exhibit No. 6: NYISO Tariff Leaves 39, 39A;
- Exhibit No. 7: Linden VFT System Reliability and Impact Study (August 1, 2005);
- Exhibit No. 8: Proposed Interconnections/New York Control Area (12/18/2003);
- Exhibit No. 9: List of Project/Facility Changes Submitted to NYISO and Determined to Be Non-Material Under the NYISO Interconnection Procedures (Updated as of 03/12/2012);
- Exhibit No. 10: NYISO Operating Committee minutes, meeting of September 2, 2010;
- Exhibit No. 11: NYISO Summary of Project Changes Determined to Be Non-Material (February 16, 2012 TPAS Meeting);
- Exhibit No. 12: Scope of Work for Project Interconnection Study, (January 12, 2004);
- Exhibit No. 13: NYISO letter (June 13, 2008);
- Exhibit No. 14: NYISO Compliance Filing Letter (August 5, 2008);
- Exhibit No. 15: VFT Power and Performance Testing Plan; (June 3, 2009)
- Exhibit No. 16: Project Letter, (November 13, 2009);
- Exhibit No. 17: NYISO Letter, (January 15, 2010)
- Exhibit No. 18: NYISO IITF "DELIVERABILITY – IMPLEMENTATION ISSUES" (July 2, 2008);
- Exhibit No. 19: NYISO TPAS minutes, meeting of November 9, 2004;
- Exhibit No. 20: Project Letter (February 26, 2010);

- Exhibit No. 21: Project Letter (September 27, 2011);
- Exhibit No. 22: Stakeholder comments on Standard Merchant Transmission Interconnection Agreement – (October 12, 2004 TPAS meeting).

F. Form of Notice

The form of notice required by the Commission's regulations is attached to this Complaint.

VIII. SERVICE

Pursuant to Section 206(c), this Complaint has been served on NYISO and the New York State Public Service Commission, the state regulatory commission in the New York Control Area.

IX. CONCLUSION

WHEREFORE, for the foregoing reasons, Linden VFT respectfully requests that the Commission grant the relief requested in this Complaint.

Respectfully submitted,

/s/ Jon R. Mostel

STROOCK & STROOCK & LAVAN, LLP
180 Maiden Lane
New York, NY 10038
Attorneys for Linden VFT, LLC
Tel: (212) 806-5400
By: Jon R. Mostel
Adam H. Sheinkin
Jonathan M. Burke
jmostel@stroock.com
asheinkin@stroock.com
jburke@stroock.com

FORM OF NOTICE PURSUANT TO 18 CFR §385.203(D)

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Linden VFT, LLC,	)	
Complainant	)	
	)	
v.	)	Docket No. EL12-__-
	)	
New York Independent System Operator, Inc.,	)	
Respondent.	)	
	)	

NOTICE OF COMPLAINT REQUESTING FAST TRACK PROCESSING

( )

Take notice on May 4, 2012, Linden VFT, LLC ("Linden VFT") filed a formal complaint requesting fast track processing against New York Independent System Operator, Inc. ("NYISO") pursuant to Rule 206 of the Commission's Rules of Practice and Procedure, alleging that the Respondent's failure to recognize the actual transmission capacity of Linden VFT in the same manner as similarly situated projects is unduly discriminatory.

Linden VFT certifies that copies of the complaint were served on the contacts for the Respondent as listed on the Commission's list of Corporate Officials.

Any person desiring to intervene or to protest this filing must file in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). Protests will be considered by the Commission in determining the appropriate action to be taken, but will not serve to make protestants parties to the proceeding. Any person wishing to become a party must file a notice of intervention or motion to intervene, as appropriate. The Respondent's answer and all interventions, or protests must be filed on or before the comment date. The Respondent's answer, motions to intervene, and protests must be served on Linen VFT.

The Commission encourages electronic submission of protests and interventions in lieu of paper using the "eFiling" link at http://www.ferc.gov. Persons unable to file electronically should submit an original and 14 copies of the protest or intervention to the Federal Energy Regulatory Commission, 888 First Street, N.E., Washington, D.C. 20426.

This filing is accessible on-line at http://www.ferc.gov, using the "eLibrary" link and is available for review in the Commission's Public Reference Room in Washington, D.C. There is an "eSubscription" link on the web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email FERCOnlineSupport@ferc.gov, or call (866) 208-3676 (toll free). For TTY, call (202) 502-8659.

Comment Date: 5:00 pm Eastern Time on (insert date).

Kimberly D. Bose

Secretary

EXHIBIT NO. 1

AFFIDAVIT OF JOHN J. MARCZEWSKI

Exhibit 1

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Linden VFT LLC, Complainant		
v.	)))	Docket No. EL12-__-
New York Independent System Operator, Respondent.		

AFFIDAVIT

OF

JOHN J. MARCZEWSKI

ON BEHALF OF

LINDEN VFT, LLC

STATE OF NEW YORK)
) ss
NEW YORK COUNTY)

John J. Marczewski, being duly sworn, deposes and says:

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.

A. My name is John J. Marczewski. I am a Principal in the Energy Initiatives Group, LLC ("EIG") located at 176 Worcester-Providence Turnpike, Sutton, MA, 01590.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION ("FERC") OR OTHER STATE REGULATORY COMMISSIONS?

A. Yes. I have provided expert testimony before the Massachusetts Department of Public Utilities and the West Virginia Public Service Commission on substation and transmission line matters, the New York Public Service Commission on the NYISO interconnection arrangements and studies associated with the siting of two power plants and several local Conservation Commissions related to substation siting matters.

Q. PLEASE SUMMARIZE YOUR PROFESSIONAL EXPERIENCE.

A. I have worked in the electric utility industry for over twenty-five years and am familiar with electric transmission planning, design, equipment and construction. I received a Bachelor of Science in Electrical Engineering from Worcester Polytechnic Institute in 1985 and a Master of Engineering in Electric Power Engineering from Rensselaer Polytechnic Institute in 1988. My electric industry experience began at the Massachusetts Electric Company in 1985 where I worked as an associate field engineer. After I left the Massachusetts Electric Company in 1987, I attended graduate school at Rensselaer Polytechnic Institute, and then returned to work as an engineer for the New England Power Service Company. In 1992, I transitioned to PLM, Inc. where I was a principal engineer, responsible for transmission and distribution substation design and project management. In 1999, I began working as an independent consultant and founded EIG in 2000. Much of my work as a consultant has involved developing and managing interconnections with host utilities, analyzing and developing merchant transmission business opportunities and evaluating new transmission technologies and equipment. My curriculum vitae is attached as Exhibit 2.

Q. ARE YOU FAMILIAR WITH THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC.'S INTERCONNECTION PLANNING PROCEDURES AND STUDIES?

A. Yes. With respect to NYISO stakeholder activities I have served as NYISO Operating Committee ("OC") Chair (2010) and Vice-Chair (2009), Transmission Planning Advisory Subcommittee ("TPAS") Chair (2007 and 2008) and Vice-Chair (December 2006). I have been a stakeholder representative to both the OC and TPAS since 2004. The Operating Committee is responsible for ensuring reliable coordinated operation of the New York State transmission system, and its key duties include review and approval of planning and interconnection studies including System Reliability Impact Studies ("SRIS") and Class Year Facility Studies and associated cost allocations for system modifications. The TPAS is a subcommittee of the Operating Committee. TPAS reviews and discusses technical planning issues and studies, including reviewing and recommending interconnection studies and associated study scopes for approval to the Operating Committee. I have prepared and presented interconnection requests, scopes of work for interconnection studies and studies for a number of developers, including Linden VFT, LLC, who have proposed interconnections with the New York State transmission system since 2001. As both a stakeholder representative and the Chair of TPAS, I have evaluated over 100 interconnection study scopes and studies, and numerous determinations by NYISO regarding proposed material and non-material changes to interconnection projects and existing generation projects.

Q. WHAT IS THE PURPOSE OF THIS AFFIDAVIT?

A. In this affidavit, I will explain why it is unduly discriminatory for the NYISO to restrict Linden VFT to the 300 MW of Unforced Capacity Deliverability Rights ("UDRs") awarded based on the *pre-construction* 300 MW nameplate rating and nominal value that was used in the PJM Interconnection LLC ("PJM") (June 1, 2001) and NYISO (July 10, 2002) (as updated in 2004) interconnection requests and Linden VFT's May 16, 2007 submission to NYISO of a request for UDRs.

NYISO's 2011 "Load Capacity Data" report (the "Gold Book") lists over 700 generators. According to NYISO's "Key Facts," the vast majority of these (29,057 MW (77%)) were interconnected prior to the NYISO regime of interconnections studies and requests. The Capacity Resource Interconnection Service ("CRIS") value for these generators (existing and those pre-2007 Class Year projects still under development) were grandfathered and set at the maximum Demonstrated Maximum Net Capability ("DMNC") level achieved during five successive Summer Capability Periods, regardless of whether this value exceeded their nameplate MW rating.

Beginning in November 2009, I participated in numerous informal discussions with NYISO regarding why Linden VFT should be treated in a similar manner. NYISO has refused to award an additional 15 MW of UDRs to Linden VFT without a new interconnection request, despite the grandfathered status of Linden VFT as a pre-2007 Class Year Project. NYISO's denial resulted in the expenditure of more than $300,000 on interconnection studies that were unnecessary, denying the Project the revenue from and customers immediate access to available economic electricity for more than two full years.[1] On September 27, 2011 Linden VFT, after numerous unfruitful informal discussions, submitted a formal notice of dispute to NYISO. Exhibit 21.

II. BACKGROUND – ESTABLISHMENT OF CRIS CAPACITY LEVELS

Q. WHY IS THE ESTABLISHMENT OF A CRIS CAPACITY LEVEL NECESSARY FOR A CONTROLLABLE LINE TO PARTICIPATE IN NYISO'S ICAP MARKET?

A. The CRIS capacity level establishes the upper limit, measured in MW, pursuant to which the capacity of generation resources, and of generators located in an external control area using the transmission capacity of a controllable line, can participate in NYISO's ICAP market. The number of UDRs awarded to a controllable line based on its demonstrated transmission capacity is the DMNC level equivalent for a controllable line.

Q. HOW IS THE CRIS CAPACITY LEVEL ESTABLISHED?

[1] Linden VFT submitted a new interconnection request to obtain the recognition of an additional 15 MW of UDRs above 300 MW on February 26, 2010 under protest. Linden VFT explicitly reserved the right to dispute NYISOs January 15, 2010 rejection of Linden VFT's request for the additional 15 MW of UDRs and requiring a new interconnection request. Exhibit 20 at page 1.

A. For projects beginning with Class Year 2007, Section 25.7.4 of NYISO Open Access Transmission Tariff ("OATT") Attachment S states that the MW amount of CRIS requested must be deliverable and may not exceed nameplate capacity. NYISO performs deliverability studies on all projects within a Class Year to identify and allocate the cost of System Deliverability Upgrades necessary to make deliverable the capacity of each Class Year project that has requested CRIS. In order for a project to obtain its requested level of CRIS, the project must fund or commit to fund the System Deliverability Upgrades, if any, needed for its project to be deliverable.

Q. ARE DELIVERABILITY STUDIES AND NAMEPLATE RATINGS USED TO ESTABLISH A CRIS CAPACITY LEVEL FOR PRE-CLASS YEAR 2007 PROJECTS?

A. No. All pre-Class Year 2007 projects are grandfathered. These projects are not subject to a deliverability test. All of their capacity is deemed deliverable at the DMNC level established by an actual test. Section 25.7.4 of OATT Attachment S states that:

> For generators pre-dating Class Year 2007, the CRIS capacity level will be set at the maximum DMNC level achieved during the five most recent Summer Capability Periods prior to October 5, 2008, *even if that DMNC value exceeds nameplate MWs*. For a generator pre-dating Class Year 2007 and not having DMNC levels recorded for five Summer Capability Periods prior to October 5, 2008, its CRIS capacity level will be set, and reset if necessary, at the maximum DMNC level achieved during successive Summer Capability Periods until it has DMNC levels recorded for five Summer Capability Periods. Prior to the establishment of the generator's first DMNC value for a Summer Capability Period, the generator's CRIS level will be set at nameplate MW. The CRIS capacity level for intermittent resources pre-dating Class Year 2007 will be set at nameplate MW, and the CRIS capacity level for controllable lines pre-dating Class Year 2007 will be set at the MW of Unforced Capacity Deliverability Rights awarded to them. (emphasis added).

Q. WHAT ARE UDRs AND HOW ARE THEY AWARDED TO CONTROLLABLE LINES?

A. Section 2.21 of the NYISO Services Tariff defines UDRs as rights, measured in megawatts, associated with new controllable transmission lines that permits a generator located in an external control area to participate in the NYISO ICAP market. The Services Tariff provides no guidance as to how UDRs will be awarded to new projects. However, Section 4.14.1 of the NYISO ICAP Manual states that:

> [t]he amount of UDRs assigned by the NYISO to each new incremental transmission facility, and any future adjustments there to, will be based on the transmission capability, reliability, availability of the facility, and appropriate NYSRC reliability studies. Beginning with Class Year 2007, projects seeking UDRs must meet the NYISO Deliverability Interconnection Standard, in accordance with the rules and procedures set forth in the NYISO OATT Attachment S. Projects predating Class Year 2007 that hold UDRs received CRIS pursuant to the NYISO OATT Attachment S.

Q. CAN AN AWARD OF UDRs BE ADJUSTED TO REFLECT THE ACTUAL TRANSMISSION CAPABILITY OF A PROJECT?

A. Yes. Section 4.14.1 of the NYISO ICAP Manual states that adjustments are anticipated to reflect the actual physical electrical characteristics of a project:

> An incremental transmission project will be awarded UDRs after a formal request to the NYISO that includes the pertinent technical information needed to determine such award. . . . The NYISO will grant UDRs to the requestor, or designated rights holder, quantified as the Installed Capacity Equivalent of the Unforced Capacity to be delivered to the Interconnection Point in MW, throughout its project life. *The amount of UDRs awarded to a particular project may be adjusted periodically by the NYISO. Adjustments to such an award will reflect changes in physical characteristics and availability of the associated project.*

(emphasis added). Linden VFT made such a request of NYISO following the completion of performance tests immediately prior to commercial operation of the project on November 1, 2009. If the actual demonstrated capacity of the Project had been less than 300 MW these same provisions would have been used to reduce the number of UDRs awarded to the Project.

III. LINDEN VFT'S INTERCONNECTION REQUEST

Q. PLEASE DESCRIBE LINDEN VFT'S INTERCONNECTION REQUEST.

A. EIG was engaged in 2001 by El Paso Merchant Energy and its affiliate, East Coast Power, LC, predecessors in interest to the current owner, Linden VFT, LLC, for the development of the Linden VFT project. The engagement included preparation of the interconnection requests and coordination of interconnection studies for the Project which would operate as a controllable bi-directional inter-tie between the PJM and NYISO control areas. On July 10, 2002, Linden VFT submitted an interconnection request ("Interconnection Request") to NYISO, attached as Exhibit 3-A. NYISO assigned the VFT interconnection request queue position no. 125. Linden VFT described the size of the project in nominal terms stating that it proposed to build a 300-MW controllable transmission tie-line employing GE Hydro Power's new variable frequency transformer ("VFT") technology for bi-directional power transmission between the PJM power grid and the NYISO power grid. Linden VFT had submitted an identical interconnection request to PJM on June 1, 2001, also describing the project in the same nominal terms. Exhibit 3-B. Each interconnection request contained additional technical information and requested the opportunity to discuss the new VFT technology and the project's merchant transmission business model. An SRIS scope of work (Exhibit 12) was reviewed by TPAS and approved by OC on January 22, 2004.

Q. WERE ANY VFT UNITS IN SERVICE IN 2002?

A. No. Although the VFT is comprised of well-established hydro-generator, motor and variable speed drive technology, no VFT units had been constructed and placed in commercial service.

Q. HAD THE MANUFACTURER ASSIGNED A "NAMEPLATE RATING" TO THE VFT UNITS?

A. Yes. The VFT units were designed by GE to provide an asynchronous tie between two AC transmission systems and were given a base nameplate rating of 100 MW. Linden VFT is comprised of three such units installed in parallel. I have attached a January 31, 2001 report titled "VFT Modeling for Planning Studies" where the 100 MW "nameplate rating" is described along with the maximum allowable power flow of 1.1 (*i.e.*, 110%) for use in planning studies. Exhibit 4 (Tables 5.1.1 and 5.1.2). In 2001, I prepared one line drawings (attached as Exhibit 3-B at pages 11-12) for the project that were submitted contemporaneously to both PJM and NYISO with the interconnection requests and throughout the process where each VFT unit is described as rated at 110 MVA.

Q. PLEASE EXPLAIN.

A. AC generators and transformers are typically rated in apparent power, with units typically expressed as mega-volt amperes or MVA, which is the product of voltage and current. Related reference temperatures for equipment elements can be stated explicitly or embodied in standards that govern the design and manufacture of a particular type of equipment. When a manufacturer makes a device like a generator or transformer it is designed to be used in many settings where load power factor may vary. Thus, when a nameplate rating is described in MW instead of MVA an associated power factor must be assumed, although the equipment will be designed to be operated over a range of voltage and power factors. For example, the NYISO interconnection agreement for the Project, filed with the Commission in docket ER08-618 on February 29, 2008, required that the Project operate reliably within a power factor range between 0.85 lagging and 0.95 leading, and voltage levels between 346 kV and 362 kV. Like many large generators, each VFT is constructed on site and a significant part of its assembly is by hand. Given this variability, the actual capability of a VFT unit can only be confirmed when the unit has been constructed and installed.

Q. WHAT DID THE MANUFACTURER EXPECT WOULD BE THE ACTUAL PERFORMANCE OF THIS NEW EQUIPMENT?

A. In 2001, the manufacturer's nameplate rating was 100 MW and the expected intrinsic power transmission capability of these units was between 100-110 MW. Each VFT unit was assembled on site and, as a result, there are natural deviations in the electrical characteristics and performance of each unit. The actual output of individual units and the Project as a whole can only be confirmed when the unit has been fully constructed and installed. The continuous current rating of the VFT units is 110 MVA, at a unity power factor. The 315 MW actual transmission capacity of this Project as demonstrated during performance testing, the first installation in which multiple VFT units were to be operated in parallel, compares favorably with the manufacturer's expectation. The actual performance of the Project merely exceeds the descriptive nameplate capacity by an amount that is within the ordinary engineering design parameters and tolerances anticipated when the Project was proposed.

Q. WHEN LINDEN VFT SUBMITTED ITS INTERCONNECTION REQUEST IN JULY 2002, WHAT DID NYISO'S TARIFF PROVIDE REGARDING NEW INTERCONNECTION REQUESTS?

A. Linden VFT's Interconnection Request was submitted in July 2002. The Tariff definition of a New Interconnection effective in September 26, 2001 stated:

> A project is considered to be a New Interconnection, *or not*, as a result of the application of specified materiality criteria set out in ISO Procedures.

Exhibit 6 (First Revised Sheet 39, Original Sheet 39A) (emphasis added). On February 14, 2001 the NYISO Operating Committee had approved a "Criteria for a 'New Interconnection'" and a companion "Criteria for Defining a Material Change in a Previously Proposed New Interconnection Project", each of which states that it may be presumed that any increase in project size (capacity) less than 10 MW, or 5%, whichever were greater, would not be a material change and would not require a new interconnection request. In fact, a copy of this criteria was appended to the interconnection request the Project submitted to NYISO. Exhibit 3-A at page 6. The Project team relied on that definition in preparing the interconnection request for the Project and understood that non-material changes in project size would not require a new interconnection request. Had the Project team known that NYISO would treat the nominal quantity stated in an interconnection request as an upper limit on equipment performance we would have stated a greater quantity. As a member, and as chair of both TPAS and OC, I have attended and presided over many meetings where NYISO staff sought concurrence that even larger increases in capability, including those where physical changes to the planned facility such as a different generator model or technology was proposed, were determined to be non-material changes.

Q. PLEASE DESCRIBE THE INFORMATION CONTAINED IN AN INTERCONNECTION REQUEST.

A. When an interconnection request for a project is submitted to the NYISO, the request contains a description of the project and its electrical characteristics, including the nominal nameplate rating of the electrical equipment. When Linden VFT's interconnection request was submitted, the nameplate rating simply connoted the manufacturer's description of the *designed capability* of the project. It was not intended to be an upper limit on Project capability. At the time Linden VFT's interconnection request was submitted, no VFT facility had been built, no performance test results were available, and no operating experience yet existed for this technology. The *actual capability* of the project would not be known until a project utilizing this new technology was constructed and subject to performance testing to determine the level of power flow at which the project could reliably operate. The actual capability was expected to be within ordinary industry tolerances consistent with NYISO's material change criteria.

Q. IS IT EXPECTED THAT THE ACTUAL CAPABILITY OF PROJECTS, ONCE CONSTRUCTED, WILL CORRELATE EXACTLY WITH THE NOMINAL NAMEPLATE RATING THAT MAY HAVE BEEN USED TO DESCRIBE THE PROJECT IN ITS INTERCONNECTION REQUEST?

A. No. The nameplate MW rating attached to equipment by the manufacturer may be lower than the actual capability of a generating plant or controllable transmission line because it may have been established conservatively, as would be the case where the manufacturer is implicitly or explicitly providing a performance guarantee for commercial purposes. It may also be conservative because it assumes a different power factor, voltage range or ambient temperature condition than is the practice in NYISO for rating the actual dependable capacity of resources. NYISO did not rely on nameplate ratings to qualify newly constructed resources as an ICAP Supplier. It required a DMNC test or actual production data. I understand that in tariffs filed in August 2008 to implement the Deliverability Plan, NYISO proposed to make the nameplate capacity the upper limit on elections for capacity resource interconnection service ("CRIS") for new projects. However, those tariff provisions were to be applied prospectively and do not apply to pre-Class Year 2007 projects like Linden VFT.

Q. IF THE INTERCONNECTION REQUEST SUBMITTED TO NYISO AND PJM WERE IDENTICAL WHY DID PJM AWARD THE PROJECT 330 MW OF FIRM TRANSMISSION WITHDRAWAL RIGHTS?

A. While the Project was described as nominally 300 MW in both the NYISO and PJM interconnection requests, the amount of power withdrawn from PJM is not identical to the amount of power that is delivered to the NYISO transmission system for flow from PJM to NYISO. As a matter of engineering necessity the amount of power withdrawn, the number of Firm Transmission Withdrawal Rights ("FTWRs"), must be greater than the amount of power transferred. A portion of the power that is withdrawn from PJM is used as auxiliary power to operate the facility and for internal losses (dissipated as heat within project equipment). As illustrated in the one-line diagram prepared for the Project, connections supplying auxiliary power required to operate the Project are on the PJM side of the VFT's rotary transformer, which controls power flow through a VFT unit. Thus, the Project must withdraw more power from PJM in order to deliver a particular quantity of power at the point of delivery in NYISO. At the time the interconnection request was made no VFT facility had yet been built, so the quantity of auxiliary power and losses were estimated at 10% and FTWRs in the amount of 330 MW were awarded. FTWRs are described in the PJM Tariff as the amount of energy withdrawn from the PJM transmission system at the PJM interconnection. No VFT equipment had been installed and used in commercial service when these interconnection requests were submitted. It was not yet known precisely how much power would need to be withdrawn from one system in order to deliver a specific quantity to the other system. There were two engineering estimates: the VFT's actual transmission capability, and the amount of auxiliary power that would be consumed and the internal losses that would occur. Pursuant to Section 232 of the PJM OATT, the number of FTWRs awarded to the Project will be reduced after three years to the actual physical capability to withdraw and transfer power.

Q. DOES NYISO HAVE SIMILAR DEFINITIONS IN ITS TARIFF?

A. No. NYISO did not have in 2002 and still does not have a "merchant transmission facility capacity" definition in its tariff. Instead, it has looked at merchant transmission facilities deliveries as a "generator equivalent," although discussions in 2004 recognized that there are two related concepts: capacity or rating of a transmission facility and the transfer capability across an interface. I have attached as Exhibit 22 the minutes of the October 12, 2004 meeting of TPAS at which stakeholder comments on a proposed Standard Merchant Transmission Agreement were discussed. Despite discussing those concerns, NYISO did not adopt tariff provisions to further define merchant transmission facility capacity. Instead, on April 10, 2009, in docket ER09-981, NYISO filed tariff revisions to implement Linden VFT as a "new Scheduled Line in its market systems by adding a new Generator/Load proxy bus pair which will be defined as the Linden VFT Proxy Generator Bus."

IV. PERFORMANCE TESTING OF LINDEN VFT'S COMPLETED FACILITY

Q. PLEASE DESCRIBE HOW A PROJECT IS TESTED AFTER COMPLETION TO DETERMINE IF THE PROJECT WAS CONSTRUCTED AS PROPOSED IN THE INTERCONNECTION REQUEST.

A. The purpose of testing an interconnection project after construction is to demonstrate its performance and determine that the project as completed is the same project as was proposed in the interconnection request. In the case of generators and transformers the project would be operated over a time period at several power levels to determine that operating characteristics, such as current and intended temperatures, are within design limits. For Linden VFT, the amount of power withdrawn from PJM and the amount of power delivered to NYISO, in MWs measured on the Project's revenue meters, was increased incrementally during the performance test until the internal temperature of critical components during operation was close to, but not in excess of, acceptable engineering limits. Typically, the maximum dependable output of a generation or transmission project is rated at the highest net power delivery at stable equilibrium temperature, adjusted for ambient conditions, over a continuous period of from one to four hours, depending on the type of equipment tested.

Q. PLEASE DESCRIBE THE PERFORMANCE TEST PROCEDURES APPLIED TO LINDEN VFT.

A. A draft VFT Power and Performance Testing Plan was submitted to NYISO on June 15, 2009, four months in advance of anticipated testing and commissioning, and comments were requested. No comments were received from NYISO. In accordance with obligations in its interconnection agreement and to its customers Linden VFT needed to demonstrate that it could transfer at least 300 MW on the Project's revenue meters and operate continuously at its maximum transfer capability. In accordance with the testing plan, during the final performance tests power flow was ramped up in increments, at each point demonstrating stable power flow and a stable internal equilibrium temperature so that losses and load flow data could be captured. Linden VFT incrementally increased the power flow of the Project until it reached the maximum power flow at which it could operate at a stable equilibrium temperature. See Exhibit 15 at Section 5.8.

Q. WHAT WERE THE RESULTS OF LINDEN VFT'S PERFORMANCE TESTS?

A. The Linden VFT Project was found to operate reliably at a continuous transmission capability of 315 MW for a period that exceeded ten (10) hours.

Q. WHY TEN (10) HOURS?

A. The VFT test plan anticipated a test with up to a twelve (12) hour duration. This period of time was allowed so that internal temperatures would have enough time to stabilize. During the actual test on the Linden VFT facility on October 15, 2009, it was determined that temperatures had fully stabilized prior to ten (10) hours and we concluded that 315 MW was the actual capability of the facility. The ten (10) hour period is more than 2-1/2 times longer than the longest time period (four (4) hours) required by NYISO for testing the DMNC of any generation resources.

Q. WAS THE PERFORMANCE TEST FOR THE PROJECT COMPARABLE TO THE DMNC TESTS NYISO USES TO RATE THE CAPABILITY OF GENERATING UNITS?

A. Yes. The transmission capability of Linden VFT was tested in a manner identical to which the DMNC of generators is established. Section 4.2.2 of the NYISO ICAP Manual provides that with respect to DMNC test conditions, "DMNC shall mean the power delivered to the transmission system on a clock-hour basis (top-of-hour to top-of-hour), net of station service Load necessary to deliver that power." The Linden VFT is an inter-tie between PJM and NYISO control areas. We developed a performance test that would demonstrate the maximum capability of the Project to transfer and deliver power reliably between the adjacent control areas on a dependable basis, and met the intent of capability testing as defined in both control areas.

Q. WERE THE RESULTS OF LINDEN VFT'S PERFORMANCE TESTS CONSISTENT WITH THE PROJECT AS IT HAD BEEN DESCRIBED IN ITS INTERCONNECTION REQUEST?

A. Yes. The results of the performance tests demonstrated that the Project operated within accepted engineering design limits, the Project's design specifications, and as contemplated in the interconnection request and the power factor design and voltage specified in the Interconnection Agreement. Linden VFT had promised its initial customers that the Project would have at least a minimum 300 MW capability. The 315 MW demonstrated maximum capability was within a normal engineering tolerance expected of electrical equipment of this type and is consistent with, and not materially different from, the manufacturer's expectation in assigning a nameplate rating to the equipment.

Q. IS THE NEW YORK STATE TRANSMISSION SYSTEM CAPABLE OF RELIABLY RECEIVING THE ADDITIONAL 15 MW OF CAPACITY FROM LINDEN VFT?

A. Yes. Linden VFT interconnects at the Linden Cogen ring bus, which then connects to Con Edison's Goethals substation. Multiple interconnection studies have established that there is more than adequate headroom for the delivery of 315 MW. Under normal conditions, the existing transmission facilities connected to the Goethals substation, and as those facilities will exist when a ring bus is completed, can reliably accept a combined input from the Linden VFT and Linden Cogen of more than 1010 MW under summer conditions. When the Linden VFT SRIS[2] was prepared and approved by NYISO's Operating Committee in March 2006, the study anticipated flow of an additional 93.9 MW from the Liberty Generating project (which proposed a connection into Goethals substation but was withdrawn just after completion of the VFT Project study) in accordance with NYISO procedures for SRIS studies. Exhibit 7 at page 3.2. With the Liberty project abandoned it can be conclusively said that from a power flow perspective this 93.9 could flow from other resources, including Linden VFT.

Furthermore, subsequent SRIS studies specifically evaluating the 315 MW output of Linden VFT alone, conducted at Linden VFTs expense and approved by NYISO's Operating Committee in February 2011, determined that the incremental 15 MW has no adverse impact on system reliability.

[2] A SRIS is performed as part of the interconnection study process to determine what System Upgrade Facilities will be necessary for a reliable interconnection of the proposed project's Capacity. Linden VFT was assigned to be evaluated as a Class Year 2006 project and thus accepted its cost allocation for System Upgrade Facilities with the Class Year 2006 in July 2007.

Q. IS IT APPROPRIATE FOR NYISO TO USE THE NAMEPLATE RATING IN LINDEN VFT'S INTERCONNECTION REQUEST AS AN ABSOLUTE LIMIT ON PROJECT CAPACITY THAT MAY BE RELIABLY INTERCONNECTED?

A. No. The power flow and modeling studies performed in the NYISO interconnection studies are an engineering estimate of transmission system performance. It is important to not attribute a false precision to those studies. They should be understood as describing reliability over a range of project performance and transmission system performance and power factors. For example, the current carrying capacity of transmission facility elements in MW is typically rated in such studies at a 90% power factor. That is, a transmission element that can reliably transmit 110 MVA is attributed a MW power rating of 100 MW in the study. The nameplate ratings in MW attributed to generators and transformers may be lower than their actual capability because the ratings were established conservatively (at the lowest power factor that they may experience) or at assumed ambient operating conditions that differ from the rating practices used to establish DMNC in NYISO. The combined effect of these differences, between ratings and study parameter estimates, may typically understate actual transmission system performance by 10% or more. That is why it was common industry practice to accept as non-material deviations from estimates of project size that were 10 MW, or 5%, which ever was greater. Limiting a project to the descriptive quantity in an interconnection request that was submitted before an absolute limit of no increase was adopted would be inappropriate. It would elevate form over engineering substance and impose unnecessary costs on projects without any corresponding benefit to system reliability. It would harm ratepayers who would be denied timely access to economical resources.

Q. HOW CAN LINDEN VFT OBTAIN RECOGNITION FROM NYISO OF ITS ADDITIONAL 15 MW OF CAPACITY?

A. In its January 15, 2010 letter denying Linden VFT's request for an additional 15 MW of UDRs, NYISO stated that a new interconnection request is required to recognize any increase in the capacity of Linden VFT above 300 MW. Exhibit 17. On February 26, 2010, Linden VFT, although expressly reserving its right to dispute NYISO's determination, submitted to NYISO a new interconnection request for the incremental 15 MW of demonstrated capacity. Exhibit 20.

Q. PLEASE DESCRIBE LINDEN VFT'S NEW INTERCONNECTION REQUEST.

A. NYISO assigned the new VFT interconnection request queue position no. 351. An SRIS was conducted and approved for queue position no. 351 by NYISO's Operating Committee on February 28, 2011, permitting the "new" 15 MW project to be evaluated as a Class Year 2011 project. This new SRIS determined that the additional 15 MW of capacity had no adverse impact on system reliability.

Q. WHAT HAS NYISO'S INSISTENCE ON A NEW INTERCONNECTION REQUEST FOR THE ADDITIONAL 15 MW OF CAPACITY COST LINDEN VFT?

A. In addition to a delay of at least 2-3 years (and lost revenue), Linden VFT has spent $40,000 on the NYISO interconnection request fee and initial study deposit, $160,000 on a power engineering consultant's preparation of the SRIS report and $100,000 for an initial deposit for Class Year 2011 study costs. In addition, Linden VFT has incurred additional costs to my firm and outside counsel to support the new interconnection request.

V. TREATMENT OF OTHER GRANDFATHERED PROJECTS

Q. HAVE OTHER PROJECTS BEEN ALLOWED TO INCREASE THEIR CAPACITY WITHOUT SUBMITTING A NEW INTERCONNECTION REQUEST?

A. Yes. One such project is Caithness Long Island Energy Center ("Caithness"), a generator, in Brookhaven, New York. Caithness was evaluated along with Linden VFT in Class Year 2006 and is also grandfathered under the Deliverability Plan. Caithness submitted an interconnection request for 255 MW on October 9, 2001. Exhibit 8 (Proposed Interconnections/New York Control Area (12/18/2003)). Caithness was later permitted to increase its project size from 290 MW (another increase from 255 MW to 290 MW is not explained in NYISO documents) to 309.6 MW (19.6 MW, or 6.8%). I have attached as Exhibit 9 a copy of a List of Project / Facility Changes Submitted to NYISO and Determined to Be Non-Material Under the NYISO Interconnection Procedures (Updated as of 03/12/2012) that describes the Caithness and other non-material changes approved by NYISO. I was a member of TPAS on November 9, 2004 when Caithness's request that its MW capability be increased to 309.6 MW was discussed. My notes from that TPAS meeting are that a "change in technology" (i.e., different equipment) was reviewed and found not to be material. At the November 9, 2004 TPAS meeting, NYISO was asked what standard applied to this non-material change. NYISO explained that it was the OC criteria for non-material changes that applied. It explained that the new tariffs for implementation of the Large Facility Interconnection Procedures (effective on October 5, 2004), which permitted "no increase", would only be applied "once the transition of pre-existing projects in the queue has been completed." Exhibit 19 at page 3. Further, on September 2, 2010 NYISO reported to OC that it had reviewed with TPAS its determination that, based on additional studies, the Caithness project could be operated at its previously unstudied 375.7 MW winter capability (a rating increase of 66.1 MW, or 21%) without causing any adverse impact on transmission system reliability. I have attached a copy of the minutes of that meeting as Exhibit 10.

Q. WAS CAITHNESS REQUIRED TO SUBMIT A NEW INTERCONNECTION REQUEST TO OBTAIN RECOGNITION OF ITS CAPABILITY ABOVE THAT REQUESTED IN ITS INITIAL INTERCONNECTION REQUEST?

A. No. Caithness was evaluated in Class Year 2006 with Linden VFT. Caithness's two increases in recognized MW capability – the first from 290 MW to 309.6 MW (in late 2004) before its SRIS was prepared, and the second from 309.6 MW to 375.7 MW (in September 2010) after all studies had been completed and the project was in commercial operation – are each greater than Linden VFT's requested increase in both absolute terms and percentage-wise.

Q. IS THERE ANY RATIONALE FOR TREATING THESE TWO PROJECTS DIFFERENTLY?

A. No. Although Caithness is a generator and Linden VFT is a controllable line, there is no rationale for differentiating between these two projects. A controllable transmission line's impact on the transmission system is no different than generation. From an engineering perspective, the output of a controllable line and a generator are functionally the same. In fact, NYISO's interconnection studies model controllable transmission as generation. Fundamentally, for both controllable lines and generators, a wire delivers energy and capacity to the point of interconnection (usually a substation or switchyard). There is absolutely no difference between the power provided by a wire that delivers electricity from a controllable line located outside of the NYCA and that from a generator located within NYCA.

Q. HAS NYISO CONTINUED TO DETERMINE THAT SOME INCREASES IN PROJECT SIZE ARE NOT MATERIAL AND DO NOT REQUIRE A NEW INTERCONNECTION REQUEST?

A. Yes. On February 16, 2012 NYISO discussed its determination that certain physical changes or modifications to the equipment or controls of three projects, resulting in increases in project size of between 1.8% and 6.7%, were not material. No new interconnection requests were required. By way of contrast, while the demonstrated capacity of Linden VFT exceeds the amount in its interconnection request by a similar range that increase does not result from any change or modification of the Project.

NYISO informed TPAS that the three projects, Stony Creek Wind Farm, CPV Valley Energy Center and Cricket Valley Energy Center, had made changes that increased their capacity and that NYISO had determined these were non-material changes. Exhibit 11 (Summary of Project Changes Determined to Be Non-Material February 16, 2012 TPAS Meeting), which was prepared by NYISO, summarizes those and other changes discussed at the February 16th TPAS meeting. In each case, the projects had made some change or modification to project equipment or controls resulting in an increase in the project size described in the interconnection request originally submitted to NYISO. The changes in capacity are in some cases greater, as an absolute matter or as a percent of the project's initial capacity, than is the difference between the nameplate transmission capacity used to describe the Project in its interconnection request and the actual transmission capacity demonstrated in the Project's October 15, 2009 performance test.

[*Remainder of page intentionally blank.*]

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

JOHN J. MARCZEWSKI

Sworn to before me this
4TH day of May, 2012

NOTARY PUBLIC

JON R. MOSTEL
NOTARY PUBLIC, State of New York
No. 02MO6193055
Qualified in Nassau County
Commission Expires Sept. 8, 2012

EXHIBIT NO. 2

CURRICULUM VITAE OF JOHN J. MARCZEWSKI

JOHN J. MARCZEWSKI
johnm@eig-llc.com

176 Worcester-Providence Turnpike, Suite 102
Sutton, MA 01590
Phone: 508-865-8021, Fax: 508-865-8035

EDUCATION

Master of Engineering, Electric Power Engineering, Rensselaer Polytechnic Institute, Troy, NY (August, 1988).
- **Research Assistantship -** Distribution transformer statistical inventory optimization and failure prediction.
- **GPA:** 3.9/4.0, 4.0/4.0 for electric power course work.

Bachelor of Science, With Distinction, Worcester Polytechnic Institute, Worcester, MA (May, 1985).
- **Projects -** ***MQP*** involved design, construction, and testing of an automatic synchronizer for an A.C. generator; ***IQP*** was research, development, and production of a television program exploring the possibilities of high-speed rail travel on the Northeast Corridor.

WORK EXPERIENCE

October, 2000-Present: **Principal and Founding Partner,** Energy Initiatives Group, LLC, Sutton, MA
- Provides consulting, engineering, and project management services for electric and energy services clients that include generation developers, operators, large electric users, and traditional utilities.
- Active in many areas associated with the deregulated electric energy industry, including merchant generation, merchant transmission, distributed generation, and renewable resource development.
- Involved in developing, siting, engineering, and constructing projects nationwide that include large generation, AC and DC transmission, high-speed rail, and distributed generation.

April, 1999-October, 2000: **President and Founder,** JMEnergy, Inc., Holliston, MA
- Provided engineering and consulting services to generation developers and host utility companies to design, manage, and coordinate generator interconnections and facility design/construction.
- Acted as owner's engineer for new generator interconnections totaling over 3750 MW in Texas and New England.
- Managed the host utility interface for projects under development nationwide, including Texas, California, New Mexico, New York, Missouri, and West Virginia.
- Evaluated and studied special technical and power quality issues associated with several interconnections including effects of large arc furnace loads located close to generators and performance of harmonic filters associated with electric traction supply systems.

July, 1992 -April, 1999: **Principal Engineer,** PLM Electric Power Engineering, Hopkinton, MA.
- Performed project management, design, contracting, and consulting for clients in the electric utility, transportation, and manufacturing industries.
- Prepared specifications, drawings, contracts, budgets, schedules, and other related technical and non-technical aspects of design project management, including technical supervision and guidance of engineers and designers.

August, 1988-July, 1992: **Engineer,** Electrical Stations Engineering, New England Power Service Company, Westboro, MA.
- Designed, estimated, and supported construction for new and existing substation facilities.
- Engineered and designed critical power supply systems for mainframe dispatching computer systems.

June, 1985-August, 1987: **Associate Field Engineer,** Massachusetts Electric Company, Hopedale, MA.
- Designed, estimated, and supervised construction of electric distribution facilities.
- Supervised clerical, technical, and construction personnel during normal, off hour, and emergency situations; planned, directed, and performed system switching and restoration operations.

REGISTRATION Registered Professional Engineer in Massachusetts, Connecticut, and Rhode Island.

PROFESSIONAL ORGANIZATIONS Member, IEEE, NSPE, and Eta Kappa Nu; Chair (2007-2008) of NYISO Transmission Planning Advisory Subcommittee (TPAS). Chair (2010) of NYISO Operating Committee

EXHIBIT NO. 3-A

NYISO INTERCONNECTION REQUEST
(JULY 10, 2002)

El Paso Merchant Energy
North America Company
1001 Louisiana Street
Houston, Texas 77002

July 10th, 2002

Mr. Steven L. Corey
Manager
Transmission Planning
New York ISO, Inc.
290 Washington Avenue
Albany, New York 12203

Subject: Request for Interconnection Feasibility Study
Proposed 300-MW VFT Transmission Project

Dear Sir:

Pursuant to the New York ISO, Inc. Open Access Transmission Tariff ("OATT"), El Paso Merchant Energy North America Company ("EPMENAC") submits this Request for Interconnection Feasibility Study. EPMENAC proposes to interconnect a 300-MW controllable transmission tie-line employing GE Hydro Power's variable frequency transformer ("VFT") technology, between the PSEG 230-kV U-2273 transmission line near the Linden No. 80 Substation and the 345-kV Linden Cogeneration Plant Substation No. 9C ("The Linden VFT Project" or the "Project"). The Project would provide much needed bi-directional power transfer capacity between the PSEG/PJM and ConEd/NYISO systems improving inter-area reliability and further facilitating the economic interchange of energy between these regions.

EPMENAC proposes to develop the Linden VFT Project using the merchant transmission model, whereby new transmission capability would be offered to the open market by the Project company. Under this model, EPMENAC would finance and build the Project, and EPMENAC or its affiliate or a third party would own and operate the Project, providing open-access, non-discriminatory transmission service to market participants. Capital invested would be "at risk" in the sense that cost recovery would be based solely upon a FERC-approved revenue methodology associated with the use of the Project.

Attached please find a completed Interconnection Study Application with an accompanying description of the proposed Project facilities. EPMENAC makes this application using the Request For Interconnection Feasibility Study form recognizing that the requested interconnection technically is neither for new generation nor for new load. EPMENAC took this course of action because:

1) The new interconnection would effectively appear as a new generator or load to the New York bulk power system, and
2) Discussions held previously with NY-ISO personnel indicated that a Feasibility Study Request appeared to be the most appropriate type of application for a merchant transmission interconnection.

Please advise us if this type of application is no longer the most appropriate one to use.

We would appreciate an opportunity to meet with you at your earliest convenience to review our request for interconnection feasibility, to review the VFT technology concept, and to discuss our Merchant Transmission business model. Upon receipt of this letter and application, please call me at 713-420-4145 or email to chris.frantz@elpaso.com at your convenience so we can arrange a time to meet. Thank you in advance for your consideration.

Very truly yours,

Christopher J. Frantz
Vice President
El Paso Merchant Energy
North America Company

NYISO Study Application Form

This form may be used t request a transmission or interconnection study pursuant to the *NYISO Open Access Transmission Tariff (OATT).*

Information to be provided by Applicant

Company Name: EL PASO MERCHANT ENERGY NORTH AMERICA COMPANY
Company Address: 1001 LOUISIANA STREET, ROOM N834A________________
HOUSTON, TEXAS 77007________________________________

Company Representative – Name: CHRISTOPHER FRANTZ__________________
Title: VICE PRESIDENT________________________
Phone: 713-420-4145 FAX: 713-420-3977 E-Mail: chris.frantz@elpaso.com

Type of Study Request:

____1. **Reinforcement Options Study** (to develop a limited number of illustrative transmission reinforcement options for increasing the transfer capability from one point or area to another, or across one or more NY transmission interfaces.)

Sending Point or Area- ________________________________
Receiving Point or Area- ________________________________
Interface(s)- ____
Desired Increase in Transfer Capability (in MW)__________________

___2. **System Impact Study** (to identify specific transmission reinforcements that would be required to comply with an Eligible Customer's request.)

Sending Point or Area- ________________________________
Receiving Point or Area- ________________________________
Interface(s)- ____
Desired Increase in Transfer Capability (in MW)__________________
Any Other Study Objectives(s)____________________________

____3. **Facilities Study** (to develop a detailed design and cost estimate of new and/or modified frailties for a transmission expansion under consideration by an Eligible customer).

Identification of Transmission Expansion for which Facilities Study is requested-

____

_X_4. **Interconnection Study** (to develop a detailed design and cost estimate for a proposed interconnection of load or generation to the NYS Power System, and to assess the impact of the proposed interconnection on the reliability of the Bulk Power System)

Proposed Project Name: LINDEN VFT INTER-TIE PROJECT
Generation or Load: GENERATION / LOAD Size: 300 MW
Type: CONTROLLABLE INTER-TIE
Location: NEW BIFURCATION OF PSEG U-2273 TRANSMISSION LINE
Proposed Connection Point: CONSOLIDATED EDISON'S GOETHALS #70 SUBSTATION, USING EXISTING CABLE CONNECTION(S) TO LINDEN COGENERATION PLANT SUBSTATION NO. 9C
Voltage Level: 345 kV
Proposed Service Date: JUNE 1, 2004

____5. **System Reliability Impact Study** (to confirm that a proposed generation or transmission project would meet all applicable reliability standards.)

Proposed Project Name: ________________________
Description (Type, Size, Location, Connection Point(s), Voltage Level(s)):
____
____
____
Proposed Service Date: ________________________

By signature below, applicant acknowledges that the study requested by this application will be entered into the NYISO's Studies Queue List, which is made available to the public.

Applicant Signature: [signature] Date: JULY 12, 2002

Mail or FAX Completed Application to:

New York ISO, Inc.
290 Washington Avenue Ext
Albany, New York 12203
FAX: (518) 356-6208

Attn: Steven L. Corey
Manager, Transmission Planning
Phone: (518) 356-6134
e-mail: scorey@nyiso.com

New York ISO, Inc. Use Only

Received By: ______________________ Date Received: ___________

Notified By: *Applicant/Local Transmission Provider*: ______________________

Affected Transmission Owner (s)	Date Notified:	Dated Agreed to Participate:
______________________	______________________	______________
______________________	______________________	______________
______________________	______________________	______________
______________________	______________________	______________
______________________	______________________	______________

Study Lead/Coordinator: ____________________________ ______________

Study Agreement Execution Date: ___________

Completion/Termination Date: _______________

<u>Criteria for Defining A "New Interconnection"</u>

(Approved by the Operating Committee February 14, 2001)

For purposes of determining whether of not a proposed generation or transmission project is to be deemed a new interconnection project that is obligated to satisfy the queuing and reliability impact study requirements of Sections 19B and 19C of the OATT, the following factors shall apply:

- The proposed generation or transmission project shall be presumed to be a new interconnection subject to the requirements of Sections 19B and 19C of the OATT.

- The Developer can <u>rebut</u> this presumption if it satisfies the ISO Staff and TPAS that the proposed project is not a new interconnection, but that it merely represents certain changes to an existing interconnection.

- In seeking to rebut the presumption that its project is a new interconnection, the Developer <u>must</u> satisfy ISO Staff and TPAS that both of the following two points are true:

  (1) The defining electrical characteristics of the Developer's generation or transmission facility when the proposed project is completed do <u>not</u> differ materially from the defining electrical characteristics of the preexisting facility in a manner adverse to system reliability.

  Electrical characteristics shall be defined in terms of:

  (a) <u>Project Size</u>. Material adverse difference is suggested by a size increase of 10 MW or more, or 5% or more, whichever is greater.

  (b) <u>Interconnection Point</u>. Material adverse difference is suggested by a materially different system interconnection point, at a voltage level of 115kV or greater.

  (c) <u>Stability Impact</u>. Material adverse difference is determined by ISO Staff in accordance with SRIS criteria.

  (d) <u>Voltage Impact</u>. Material adverse difference is determined by ISO Staff in accordance with SRIS criteria.

  (e) <u>Thermal Impact</u>. Material adverse difference is determined by ISO Staff in accordance with SRIS criteria.

  (f) <u>Short Circuit Impact</u>. Material adverse difference is determined by ISO Staff in accordance with SRIS criteria

These factors shall be considered together. No single factor shall be considered automatically conclusive in the determination of whether or not the proposed project will result in a facility that differs materially from the preexisting facility. ISO Staff shall make an overall determination of whether or not a material adverse difference exists, and shall report that determination to TPAS.

(2) The preexisting facility has not been retired.

Retired status shall be defined in terms of:

(a) The Annual NYISO Load And Capacity Report. The preexisting facility has not been retired if, at the time the developer first contacts ISO Staff about the proposed project, the preexisting facility is reported as an active facility, or the preexisting facility has been reported as a reserve or standby or deactivated facility for no more than three years.

(b) Other Reports. The Preexisting facility has not been retired if, at the time the developer first contacts ISO Staff about the proposed project, the preexisting facility is reported as active generation capacity, and retired, on DOE Form EIA-860A or DOE Form EIA-860B, or an equivalent federal or state reporting form.

These factors shall be considered together; neither alone shall be considered automatically conclusive in the determination of whether or not the preexisting facility has been retired. ISO Staff shall make a determination about the status of the preexisting facility, and shall report that determination to TPAS.

- In seeking to rebut the presumption that its project is a new interconnection, the Developer may also present any additional information that it thinks is relevant to support the conclusion that the proposed project merely represents certain capital improvements to an existing interconnection.

- On the basis of all information presented, the ISO Staff will come to an overall determination as to whether or not the Developer has rebutted the presumption that the proposed project is a new interconnections subject to the requirements of Sections 19B and 19C of the OATT

    - ISO Staff shall report its determination to TPAS for discussion, review and confirmation.

    - TPAS will report the results of this process to the operating committee.

EXHIBIT NO. 3-B

PJM INTERCONNECTION REQUEST
(JUNE 1, 2001)

June 1, 2001

Mr. Steven R. Herling
General Manager
System Coordination Division
PJM Interconnection, L.L.C.
955 Jefferson Avenue
Valley Forge Corporate Center
Norristown, PA 19403-2497

Subject: Request for Interconnection Feasibility Study
Proposed 300-MW VFT Transmission Project

Dear Sir:

Pursuant to the PJM Interconnection L.L.C. Open Access Transmission Tariff ("OATT"), El Paso North America ("EPNA") submits this Request for Interconnection Feasibility Study. EPNA proposes to interconnect a 300-MW controllable transmission tie-line employing GE Power Systems VFT technology, between the PSEG 230-kV U-2273 transmission line near the Linden No. 80 Substation and the 345-kV Linden Cogeneration Plant Substation No. 9C ("The Linden VFT Project" or "Project"). The Project would provide much needed bi-directional power transfer capacity between the PSEG/PJM and ConEd/NYISO systems improving inter-area reliability and further facilitating the economic interchange of energy between these regions.

EPNA proposes to develop the Linden VFT Project as a "Merchant Transmission Project". As such, EPNA would finance, build, own and operate the Project and provide open-access, non-discriminatory transmission service to third-party market participants. Capital invested would be "at risk" in the sense that cost recovery would be based solely upon a FERC-approved rate associated with the use of the Project.

Attached please find a completed Interconnection Feasibility Study Agreement with an accompanying description of the proposed Project facilities. The required $10,000 filing fee will forwarded shortly under separate cover letter.

We would appreciate an opportunity to meet with you at your earliest convenience to review our Request for Feasibility Study, to review the VFT technology concept, and to discuss our Merchant Transmission business model. Please feel free to call me at 713-420-6840 to set up the meeting. Thank you in advance for your time.

Very truly yours;

Daniel J. Lorden
Senior Vice President

Interconnection Feasibility Study Agreement

RECITALS

1. This Interconnection Feasibility Study Agreement ("Agreement"), dated as of ______________, is entered into by and between El Paso Merchant Energy Holding Company ("Customer") and PJM Interconnection, L.L.C. ("Transmission Provider") to assess preliminarily the feasibility of interconnecting to Transmission Provider's Transmission System, Customer's proposed 230/345KV bi-directional, controllable transmission facility (called a "VFT") with the following specifications:

a) Location of interconnection site:
230/345KV VFT to be located within the Tosco Refinery in Linden, NJ on land located near Linden Cogeneration Plant Substation No. 9C, which is owned by Cogen Technologies Linden Venture. The proposed VFT location is also immediately adjacent to Public Service Electric And Gas's ("PSEG's") U-2273 transmission line right-of-way.

b) Size in megawatts of requested interchange capacity:
Up to 300MW of controlled, bi-directional interchange capacity between PSEG's 230 KV transmission line U-2273 and Consolidated Edison's ("ConEd's") 345KV Goethals No. 70 Substation.

c) Description of the proposed transmission facility and its configuration:
In Linden NJ, tap PSEG's U-2273 230KV line between the new Tosco Substation and existing Warinanco Substation and connect, through three new 230KV circuit breakers, to the VFT's 230KV terminals. Connect 345KV VFT terminals via approximately 2000 feet of new 345KV cable to a new 345KV circuit breaker position at the Linden Cogeneration Plant 345KV Substation No. 9C. Utilize additional capacity on existing 345KV cables G23L and G23M, once upgraded, to connect the VFT (through Linden Cogeneration Plant Substation No. 9C) to ConEd's 345KV Goethals No. 70 Substation on Staten Island, NY.

d) Planned date the proposed transmission interconnection will be in service:
   May 31, 2003.

e) Other information:
   Please refer to Attachment #2 for One Line Interconnection Diagrams.

PURPOSE OF THE FEASIBILITY STUDY

2. Transmission Provider, in coordination with the affected Transmission Owner(s) ("RTO(s)"), shall conduct a feasibility study, consistent with Schedule 6 of the Amended and Restated Operating Agreement of PJM Interconnection, L.L.C. ("Operating Agreement") and in a manner consistent with the performance of such studies according to the terms of Section 36.2 of the PJM Interconnection, L.L.C. Open Access Transmission Tariff ("PJM Tariff"), to provide Customer with preliminary determinations of: (i) the type and scope of the Attachment Facilities, Local Upgrades, and/or Network Upgrades, as those terms are defined in Part IV of the PJM Tariff, that will be necessary to accommodate the proposed interconnection to the PJM Transmission System of Customer's proposed transmission facility; (ii) the time that will be required to construct such facilities and upgrades; and (iii) Customer's cost responsibility for the necessary facilities and upgrades. In the event that Transmission Provider is unable to complete the feasibility study within 30 days after execution of this Agreement, it shall so notify Customer and shall explain the reasons for the delay.

3. The feasibility study conducted hereunder will provide only preliminary, non-final estimates of the cost and length of time required to accommodate Customer's request for interconnection. More comprehensive estimates will be developed only upon execution of a System Impact Study Agreement and a Facilities Study Agreement, in a manner consistent with the interconnection study

process of Part IV of the PJM Tariff and with the regional transmission expansion planning process under Schedule 6 of the Operating Agreement. The feasibility study will necessarily employ various assumptions regarding Customer's interface request, pending Interconnection Requests, and Transmission Provider's Regional Transmission Expansion Plan at the time of the study. The feasibility study shall not obligate the Transmission Provider or the RTO(s) to interconnect with Customer or to construct any facilities or upgrades.

CONFIDENTIALITY

4. Customer agrees to provide all information requested by Transmission Provider necessary to complete the feasibility study. Subject to Sections 5 and 6 of this Agreement and to the extent consistent with, or required by, the PJM Tariff, information provided pursuant to this Section 4 shall be and remain confidential.

5. Until completion of the feasibility study, Transmission Provider shall keep confidential all information provided to it by Customer. Upon completion of the feasibility study, the study shall be listed on Transmission Provider's OASIS and, to the extent required by Commission regulations, will be made publicly available upon request, except that the identity of Customer shall remain confidential and will not be posted on Transmission Provider's OASIS. Additionally, Customer acknowledges and consents to such other disclosures as may be required under PJM Tariff or the Commission's rules and regulations.

6. Customer acknowledges that, notwithstanding the foregoing Sections 4 and 5, and consistent with Schedule 6 of the Operating Agreement, the RTO(s) and the Transmission Expansion Advisory Committee ("TEAC") will participate in preparation and/or review of the feasibility study and that Transmission Provider may disseminate to the RTO(s) and/or the TEAC and may rely upon them to conduct, and/or to evaluate, part or all of the feasibility study.

COST RESPONSIBILITY

7. (A) Customer shall reimburse Transmission Provider for the actual cost of the feasibility study. Concurrent with the execution of this Agreement, Customer shall provide to Transmission Provider a deposit of $10,000, which shall be applied toward Customer's cost responsibility hereunder. Within 60 days after Transmission Provider completes the feasibility study, it shall provide an accounting of, and the appropriate party shall make any payment to, the other that is necessary to resolve any difference between Customer's responsibility for the actual cost of the feasibility study and Customer's deposit.

   (B) In the event that Transmission Provider anticipates, at any time prior to completion of the feasibility study, that actual costs of the study will exceed $10,000, it shall promptly notify Customer with an estimate of the expected costs of the study. Within 10 days after receiving such estimate, Customer may terminate this Agreement by providing written notification thereof to Transmission Provider. If it does not terminate this Agreement after receiving such estimate, Customer agrees to pay additional costs of the feasibility study.

   (C) In the event that Customer terminates this Agreement pursuant to paragraph (B) of this section, within 60 days after the date of Customer's notice of termination, Transmission Provider will deliver to Customer a statement of Customer's responsibility for the costs of the feasibility study incurred to the date of termination and Transmission Provider shall retain any unexpended portion of Customer's deposit. In the event that Customer's cost responsibility as of the date of termination exceeds its deposit for the feasibility study, Transmission Provider's statement will include an invoice in the amount of the excess. Customer shall pay that invoice within 10 days after it receives it. In the event that Customer does not pay the invoice within 10 days after receipt, it shall owe the invoice amount plus interest at the applicable rate prescribed in 18 C.F.R. 35.19a (a)(2)(iii), accrued from the day after the date payment was due until the date of payment. In the event that Customer's cost responsibility as of the date of termination was less than its deposit for the feasibility study, Transmission Provider's statement will include a payment to Customer in the amount of the difference.

DISCLAIMER OF WARRANTY, LIMITATION OF LIABILITY

8. In analyzing and preparing the feasibility study, Transmission Provider, the RTO(s), and any other subcontractors employed by Transmission Provider shall have to rely on information provided by Customer and possibly by third parties and may not have control over the accuracy of such information. Accordingly, NEITHER TRANSMISSION PROVIDER, THE RTO(S), NOR ANY OTHER SUBCONTRACTORS EMPLOYED BY TRANSMISSION PROVIDER MAKES ANY WARRANTIES, EXPRESS OR IMPLIED, WHETHER ARISING BY OPERATION OF LAW, COURSE OF PERFORMANCE OR DEALING, CUSTOM, USAGE IN THE TRADE OR PROFESSION, OR OTHERWISE, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICLUAR PURPOSE WITH REGARD TO THE ACCURACY, CONTENT, OR CONCLUSIONS OF THE FEASIBILITY STUDY. Customer acknowledges that it has not relied on any representations or warranties not specifically set forth herein and that no such representations or warranties have formed the basis of its bargain hereunder. Neither this Agreement nor the feasibility study prepared hereunder is intended, nor shall either be interpreted, to constitute agreement by Transmission Provider or by any of the RTO(s) to provide any transmission or interconnection service to or on behalf of the Customer, either at this point in time or in the future.

9. In no event will Transmission Provider, any RTO(s), or any other subcontractors employed by Transmission Provider be liable for indirect, special, incidental, punitive or consequential damages of any kind including loss of profits, whether under this Agreement or otherwise, even if Transmission Provider, the RTO(s), or other subcontractors employed by Transmission Provider have been advised of the possibility of such a loss. Nor shall Transmission Provider, any RTO(s), or any other subcontractors employed by Transmission Provider be liable for any delay in delivery of the feasibility study, or for the non-performance, or delay in performance, of Transmission Provider's obligations under this Agreement.

Without limitation of the foregoing, Customer further agrees that the RTO(s) and any other subcontractors employed by Transmission Provider to prepare or assist in the preparation of the feasibility study shall be deemed third party beneficiaries of this provision entitled "Disclaimer of Warranty/Limitation of Liability."

MISCELLANEOUS

10. Any notice or request made to or by either party regarding this Agreement shall be made to the representative of the other party as indicated below.

Transmission Provider

PJM Interconnection, L.L.C.
955 Jefferson Avenue
Valley Forge Corporate Center
Norristown, PA 19403-2497

Customer

El Paso Merchant Energy Holding Company
1001 Louisiana Street
Suite 500 – PO Box 2511
Houston, TX 77252-2511
Attn: Mr. Daniel J. Lorden

11. No waiver by either party of one or more defaults by the other in performance of any of the provisions in this agreement shall operate or be construed as a waiver of any other or further defaults, whether of a like or different character.

12. This agreement or any part thereof, may not be amended, modified, or waived other than by a writing signed by each of the parties hereto.

13. This agreement shall be binding upon the parties hereto, their heirs, executors, administrators, successors, and assigns.

14. Any dispute between the parties arising under, or relating to, this Agreement or the feasibility study shall be resolved through the dispute resolution process of the PJM Tariff.

15. THIS AGREEMENT SHALL BE GOVERNED BY, AND SHALL BE CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF DELAWARE, WITHOUT REFERENCE TO CHOICE OF LAWS PRINCIPALS.

16. Neither this Agreement nor the feasibility study performed hereunder shall be construed as an application for service under Part II, Part III, or Part IV of the PJM Tariff.

17. Capitalized terms used, but not otherwise identified herein, shall have the meaning ascribed to them in the PJM Tariff.

IN WITNESS WHEREOF, Transmission Provider and Customer have caused this Agreement to be executed by their respective authorized officials.

Transmission Provider

By: ____________________ ____________________ ____________________
Name Title Date

Customer

By: ____________________ ____________________ ____________________
Name Title Date

ATTACHMENT #1

Scope Of Analysis

Investigate the feasibility of establishing a highly controllable, bi-directional transmission system power interchange of up to 300MW between a tap point on Public Service Electric And Gas's ("PSEG's") U-2273 230KV line (which tap point is located between the new Tosco Substation and PSEG's Warinanco Substation) in Linden, NJ and Consolidated Edison's ("ConEd's") 345KV Goethals No. 70 Substation on Staten Island, NY. This interconnection will involve connecting the 230KV terminals of a 300MW VFT facility to PSEG's U-2273 line through three (3) circuit breakers; connecting the 345KV terminals of the VFT via approximately 2000 feet of new cable to a new 345KV circuit breaker position at Linden Cogeneration Plant Substation No. 9C; and utilizing additional capacity obtained through upgrading existing 345KV circuits G23L and G23M to connect the VFT (through Linden Cogeneration Plant Substation No. 9C) to ConEd's 345KV North Bus at Goethals 345KV Substation.

The scope of system analysis will include the following:

- Evaluation of local transmission system impacts for establishing a highly controlled, bi-directional power exchange of up to 300MW between PSEG's U-2273 230KV transmission line and ConEd's 345KV Geothals No. 70 Substation.

- Evaluation of regional system impacts based on the controllable operation of this VFT facility under import and export modes to the PJM system.

- Where possible, evaluate the application of automatic and control action or operating procedures to minimize transmission system impacts and potential system reinforcements.

- Development of preliminary interconnection configuration(s) to PSEG's U-2273 230KV transmission line that minimize system costs and impacts.

- Preliminary cost and time schedule of potential network reinforcements required for interconnection of the proposed Project with the PJM system.

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Updated 5/29/01

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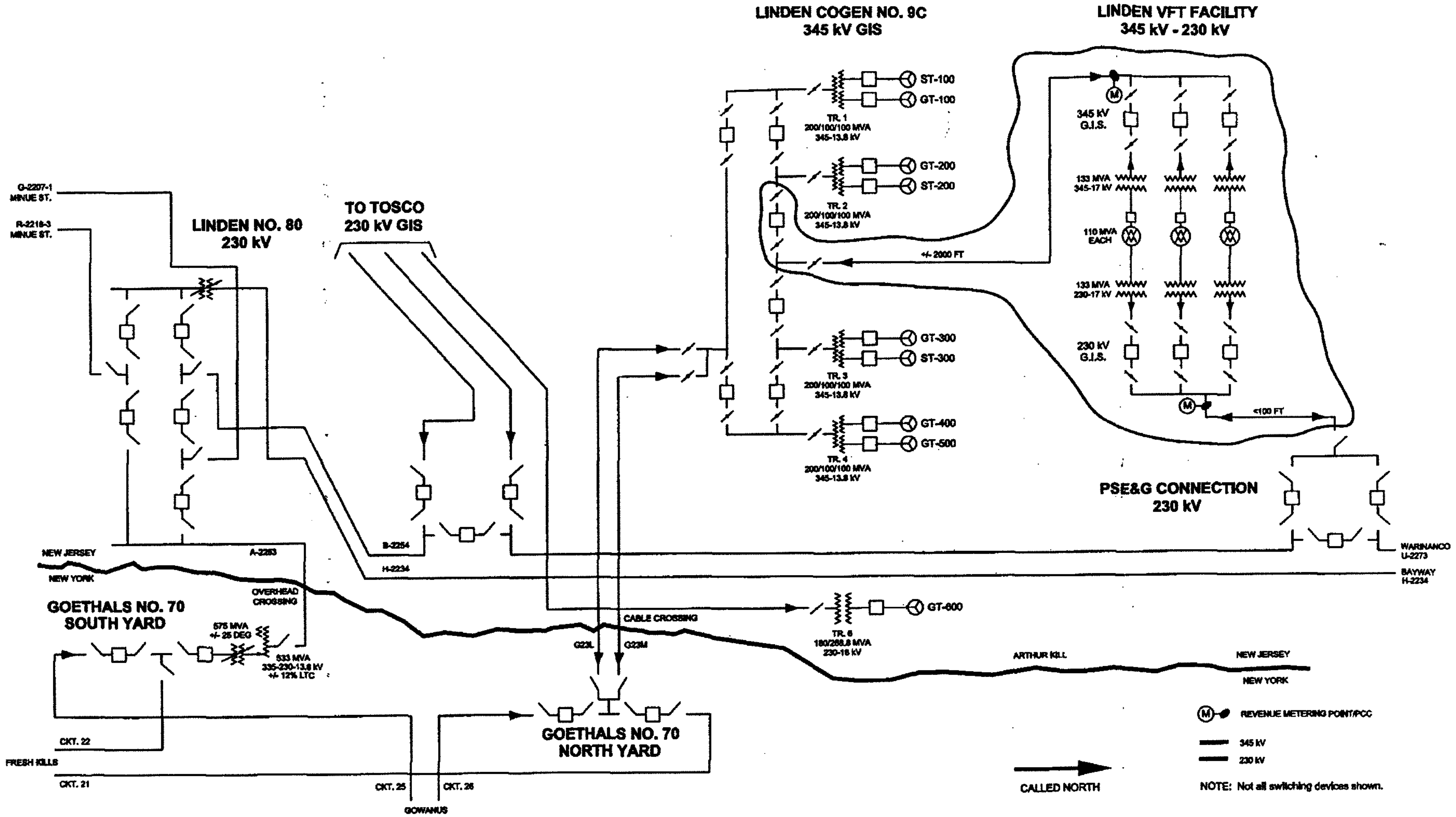

EXHIBIT 2 - PAGE 1

NO.	DATE	REVISIONS	BY	CHK	APRV
0	5/15/2001	ORIGINAL ISSUE	JJM	BUH	

J.MARCZEWSKI
J.MARCZEWSKI
D.HOLT

EIG

176 Worcester Providence Turnpike, Suite 102
Sutton, Massachusetts 01590
Phone: 508-865-0021 Fax: 508-865-0035

EL PASO MERCHANT ENERGY HOLDING COMPANY
PROPOSED 345-230 kV VFT FACILITY
LINDEN, NEW JERSEY
ONE LINE INTERCONNECTION DIAGRAM

SCALE: NONE
DRAWING No.: LIN-1

5/15/01

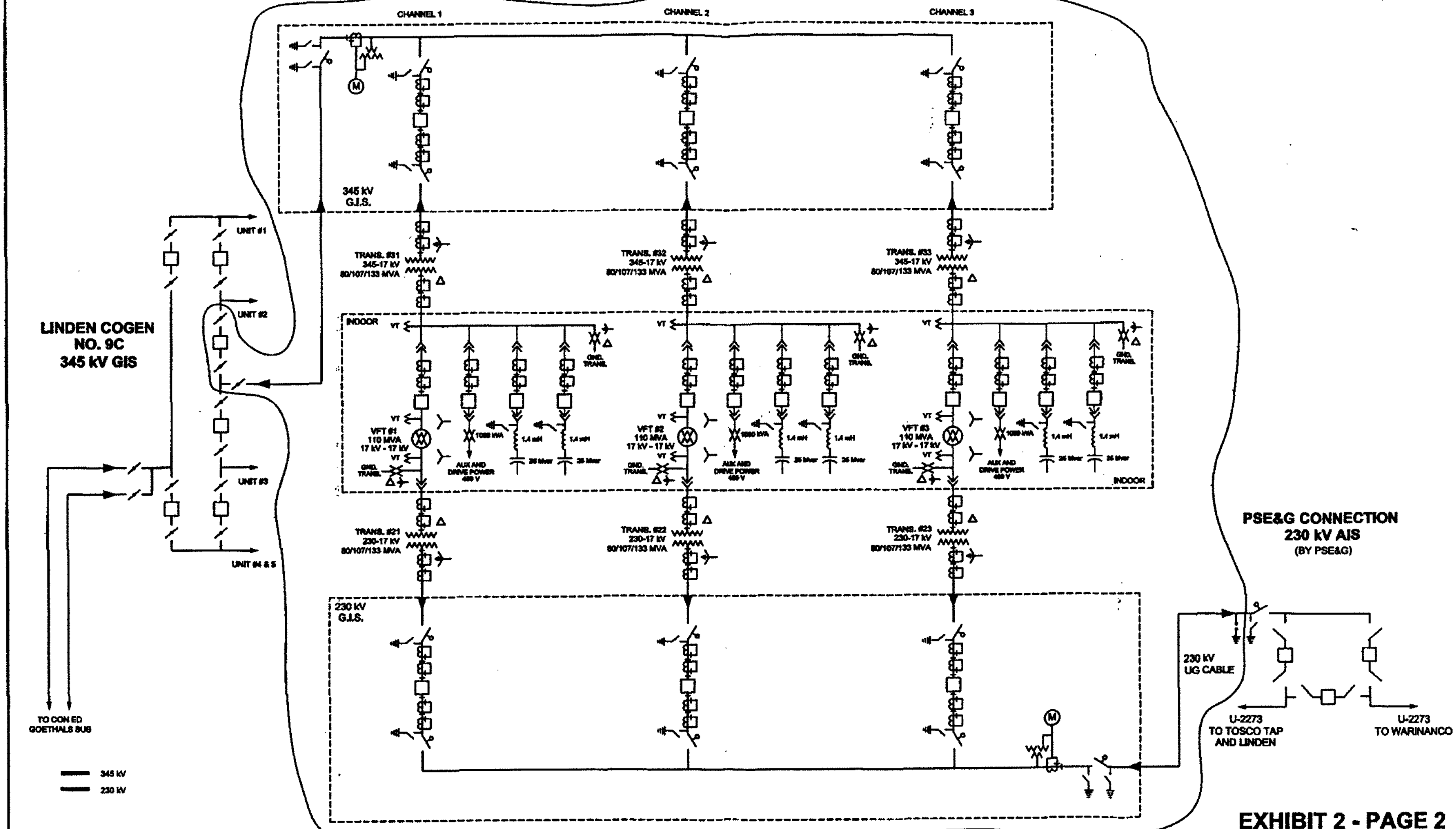

EXHIBIT 2 - PAGE 2

NO.	DATE	REVISIONS	BY	CHK	APRV
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DESIGNED BY J.MARCZEWSKI
DRAWN BY J.MARCZEWSKI
CHECKED BY D.HOLT

EIG
178 Worcester Providence Turnpike, Suite 102
Sutton, Massachusetts 01590
Phone: 508-865-8021 Fax: 508-865-8036

EL PASO MERCHANT ENERGY HOLDING COMPANY
PROPOSED 345-230 kV VFT FACILITY
LINDEN, NEW JERSEY
VFT ONE LINE DIAGRAM

FILE No.
SCALE NONE
DRAWING No. LIN-2

EXHIBIT NO. 4

VFT MODELING FOR PLANNING STUDIES
JANUARY 31, 2001

VFT Modeling For Planning Studies

January 31, 2001

Principal Contributors

Einar Larsen
Ian McIntyre

Foreword

This document was prepared by General Electric International, Inc. through its Power Systems Energy Consulting (PSEC) in Schenectady, NY. Technical and Commercial Questions and any correspondence concerning this document should be referred to:

Einar Larsen
Power Systems Energy Consulting
General Electric International, Inc.
Building 2, Room 605
Schenectady, New York 12345
Phone: (518) 385-1883
Fax: (518) 385-5703
Email: einar.larsen@ps.ge.com

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Disclosure of any information in this report is subject to the written approval of an authorized GE representative.

Table of Contents

1. Scope

The VFT ("Variable-Frequency Transformer") is a new technology for interconnecting two asynchronous ac power systems. A brief description of the VFT is included in Section 2 of this document. The remainder of this document defines model structures appropriate for typical planning studies, covering load flow, short-circuit, and stability analysis.

2. VFT Description

2.1 VFT installation

A VFT installation, illustrated in Figure 2-1, includes the following major components:

1. Rotary transformer, which provides a continuously-controllable phase shift for any angle, including different frequencies on the two sides.
2. Drive system and control to adjust the angle and speed of the rotary transformer to regulate power flow through the VFT.
3. Reactive compensation on either medium-voltage or high-voltage buses. This can be in the form of switched capacitors or static var compensation, as needed for the application.
4. Transformers to connect the medium-voltage windings of the rotary transformer to the high-voltage transmission bus.

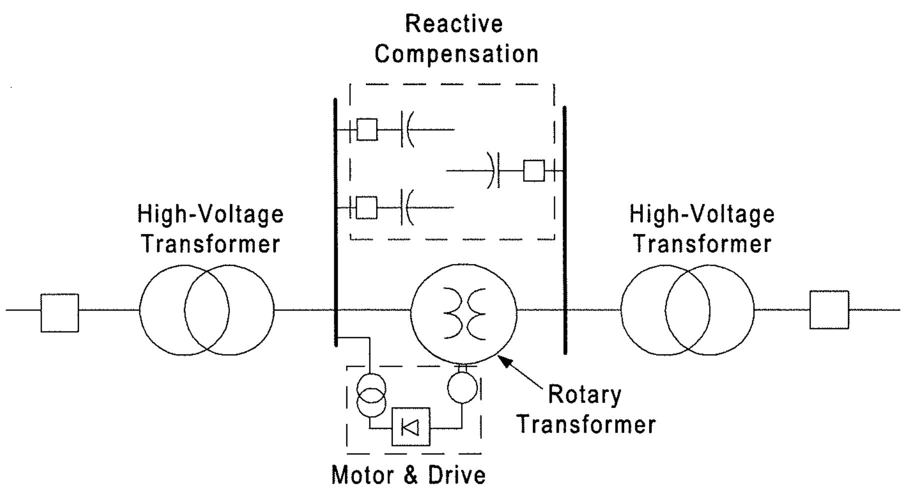


Figure 2-1 Typical Elements of a VFT Installation

2.2 VFT Operation

Power flow is proportional to the angle of the rotary transformer, as with any ac power circuit. The impedance of the rotary transformer plus transformers and ac grid determine the amount of angle shift needed to obtain a given power transfer. Typically the total impedance from high-voltage bus to high-voltage bus is on the order of 35% to 40% of the VFT rating.

The power regulator senses power flow through the VFT and adjusts the angle until the actual power matches the power command. If the two grids have different frequency, the rotary transformer will continuously rotate to maintain the appropriate effective power angle.

For reactive power flow, the VFT acts just as any transformer. The series impedance of the rotary transformer plus high-voltage transformers determines reactive flow through the system as a function of voltage difference between the two high-voltage buses. An area of lower voltage will naturally draw reactive support from the opposite system with no control action.

Shunt capacitors or static var compensators applied at any bus will provide voltage regulation as in a conventional ac system. The medium-voltage bus offers an economical position for reactive control equipment.

3. Load Flow and Short-Circuit Representation

3.1 Load Flow Model

For load flow analysis, the VFT is represented as a phase angle regulator. The limits of phase angle can be set as large as needed to obtain the desired power flow. The series reactances of the system, and extent of reactive compensation, limit maximum achievable power flow.

Reactive compensation can be represented as in normal load flows. Either fixed capacitors or controlled-compensation of some type can be added where appropriate to realize desired voltage control.

Figure 3-1 illustrates the power circuit to be included between two high-voltage buses. Typical parameter values are indicated in Table 3-1.

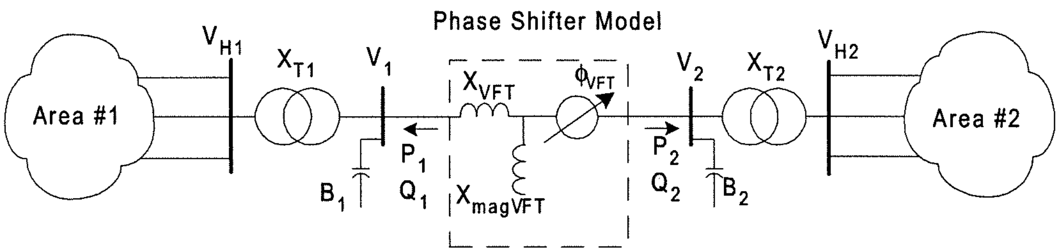


Figure 3-1. VFT Power Circuit for Loadflow Analysis

Table 3-1 Typical values for preliminary planning studies

Parameter	Typical Value (based on VFT rating)
XVFT	18%
XmagVFT	10pu (i.e. magnetizing current = 10%)
Xt1 and Xt2	10%
B1, B2	20% to 80% total, depending on transmission grid needs

3.2 Short-Circuit Calculations

For short-circuit calculations, the impedance is the only information required. The contribution to a bus will be on the order of 150% to 250% of the VFT rating, depending upon the strength of the transmission grid on the opposite side.

4. Dynamic model

The model described here is suitable for studies of dynamic events. The only approximation is that frequency of the two grids remains within a few percent of nominal.

4.1 Overview

Figure 4.1-1 shows an overview of the dynamics model for the VFT installation. An overview of the control system is shown in Figure 4.1-2. The components are described in subsequent subsections.

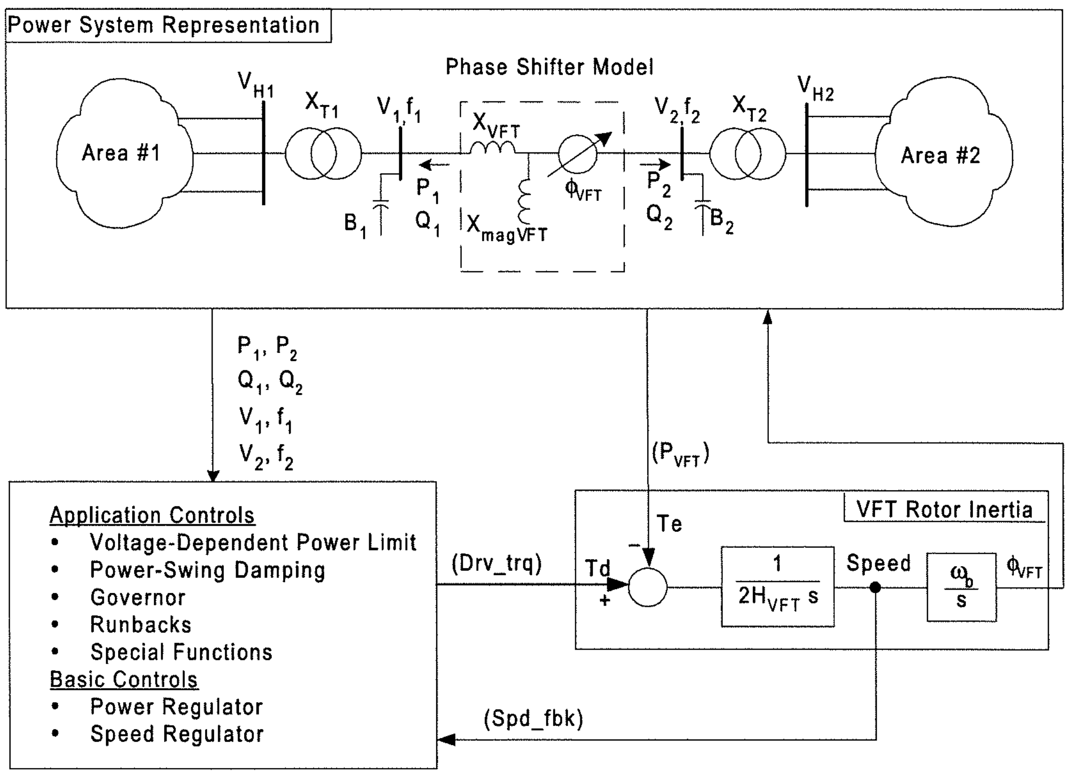


Figure 4.1-1 Overview of VFT Dynamics Model

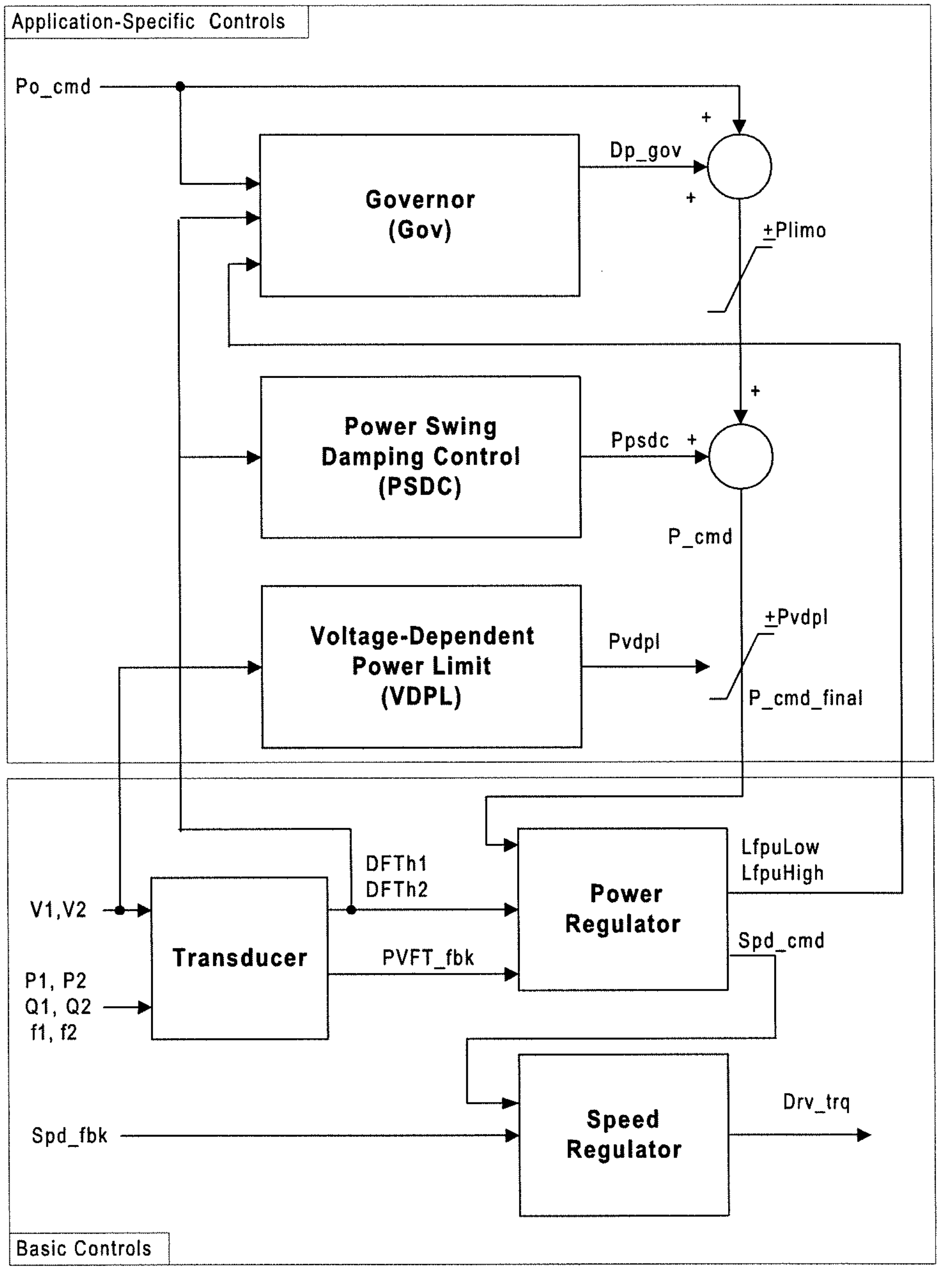


Figure 4.1-2 Overview of VFT Controls

4.2 Physical Equipment

The substation, with reactive compensation, is represented as in the load flow. Should the reactive compensation include controls, these should be represented as normally done in stability simulations.

The rotary transformer is represented as a controlled phase-shifting transformer. The position is determined by the rotor inertia model, and must be implemented in a continuous manner in the network solution. Note that this angle must be able to wrap around multiple 360° rotations during the course of a simulation.

The rotor dynamics are straightforward. An inertia integrates torque difference between what the controls and drive determine and the reaction from the electrical transmission grid. For the purposes of this model, the electrical reaction torque can be approximated as being equal to the electrical power transferred through the rotary transformer, in per unit on a common base.

The angle of the phase shifting transformer is the integral of speed. In steady state operation with nominal frequency on both sides, speed is zero and the angle is constant. The value will be initially determined from the power flow.

4.3 Basic Controls

The basic controls are responsible for regulating power flow to the command from the application controls, subject to speed limits of the rotary system. Detailed block diagrams of the power and speed regulators are shown in Figures 4.3-1 and 4.3-2, respectively.

The speed regulator is a simple P-I type with limits. In a practical system the torque limits will be a function of speed, but for typical planning purposes this relationship can be ignored.

The power regulator is a P-I-D type, augmented by a predictive setting of speed order based on measured frequency on the two sides of the VFT. The limit on speed command represents the maximum allowable speed for the unit.

The status of the limit is used to prevent windup of the integrator within the power regulator. This limit status is also defined as two logic variables for use by other control functions. LfpuHigh is true when the upper limit is enforced, and similarly for LfpuLow for the lower limit.

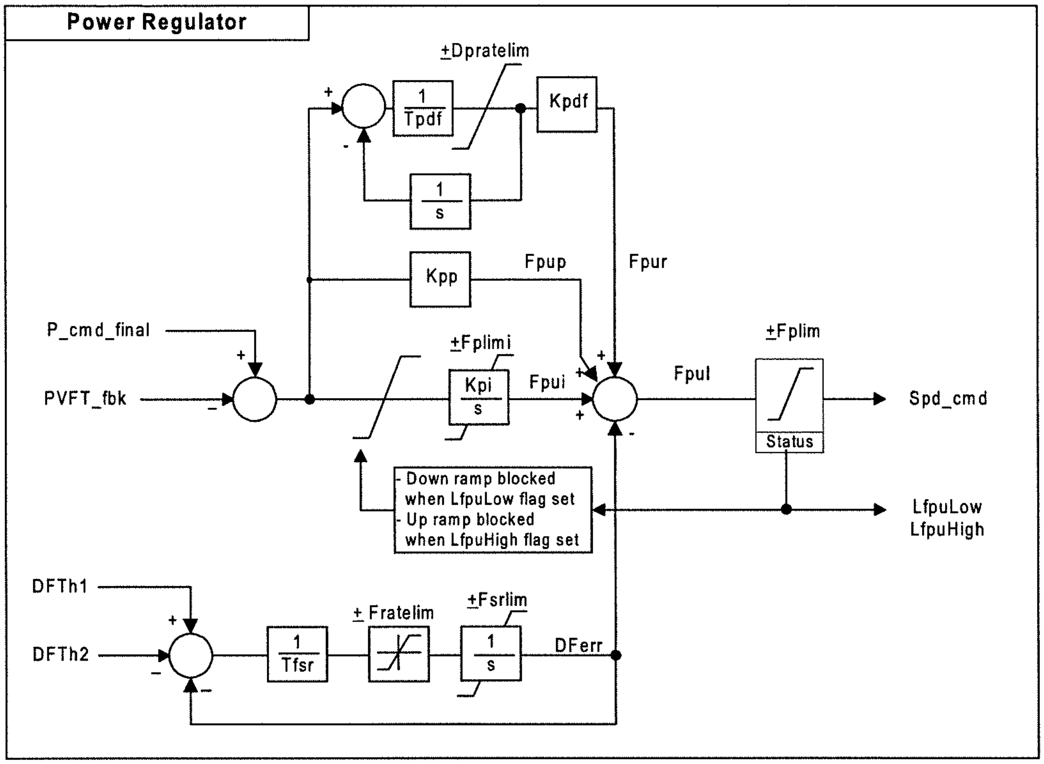


Figure 4.3-1 Power Regulator

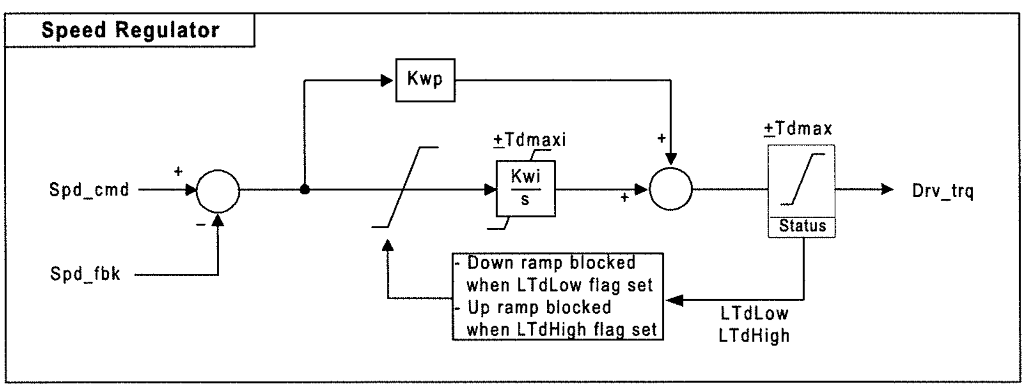


Figure 4.3-2 Speed Regulator

4.4 Transducer

4.4.1 Thevenin Equivalent

The frequency signal used for predictive setting of speed order is determined from a Thevenin equivalent looking into each transmission grid separately. The purpose of this is to decouple the measured frequency signal from the action of the regulators. This signal can also be used as feedback for other application-layer controls, e.g. power swing damping.

The value of reactance used in the Thevenin equivalent calculation (Xth) is not too critical to performance; it should simply be an estimate of the average short-circuit impedance from the high-voltage bus plus the transformer reactance.

Using the power conventions of Figure 3-1, and assuming the shunt capacitance is not significant, the Thevenin equivalent voltage at side 1 is:

$$\overline{Vth1} = \left[V1 - \frac{Q1 \cdot Xth1}{V1} \right] - j\left[\frac{P1 \cdot Xth1}{V1} \right]$$

Thus, the Thevenin voltage and frequency are calculated as:

$$Vth1 = \min[Mag(\overline{Vth1}), 0.1]$$
$$Ath1 = Ang(\overline{Vth1})$$
$$Fth1 = \frac{sAth1 + f1}{1 + sTfx}$$
$$DFth1 = Fth1 - Fbase$$

where Fbase is the system frequency and Tfx is the transducer time constant for measuring frequency.

Note that the value of V1 should be limited to be above a threshold, e.g. 10%, prior to using in denominator when computing the components of Vth1. The magnitude of Vth1 is similarly limited to a small value prior to its use elsewhere in the control logic. Finally, should the magnitude of Vth1 be smaller than a threshold, e.g. 10%, the angle should be set to zero to prevent windup of the filter.

The side 2 Thevenin parameters are calculated in the same manner.

4.4.2 Power Direction

The direction of power must be established in the simulation tool. Typical convention is to set "from" and "to" bus designations. The transducer then picks either P1 or P2 depending upon direction.

4.5 Application-Specific Controls

Selected application-specific controls are described here. Block diagrams are shown for basic implementations. These are expected to provide good starting points for planning studies.

4.5.1 Voltage-Dependent Power Limit (VDPL)

The VDPL function is intended to prevent voltage collapse due to sudden loss of transmission capacity. Figure 4.5.1-1 shows a simple form of the VDPL.

The power limit is adjusted as a function of the lowest voltage on either side of the VFT. Drops in power limit are followed relatively quickly while rises are followed slowly.

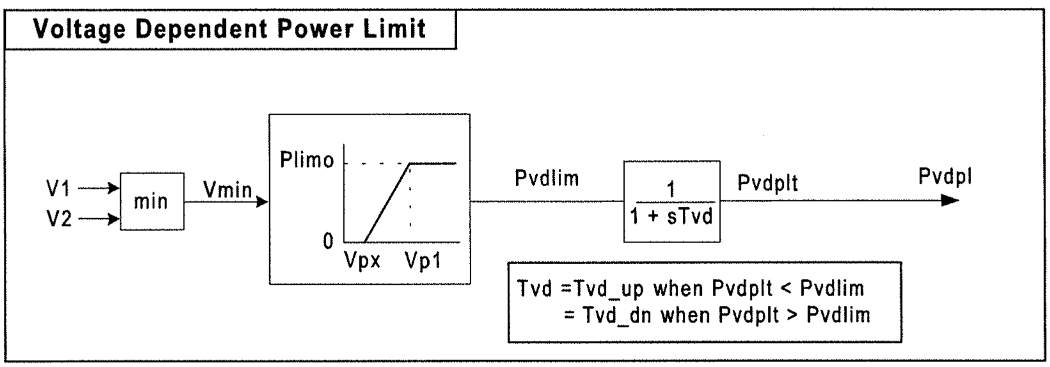


Figure 4.5.1-1 VDPL Block Diagram

4.5.2 Governor (GOV)

The governor function is intended to serve applications where security requires rapid response to limit frequency excursions on one side of the VFT. This may exist where one side may become islanded. Because the VFT can provide blackstart capability, this function can also be used to regulate frequency on the load side by setting the deadband and droop as desired for the application.

Note the governor is implemented as a modulation to operator power order, with limits that vary with operator power order. The output is rate-limited, and windup is prevented while the power regulator is in limits.

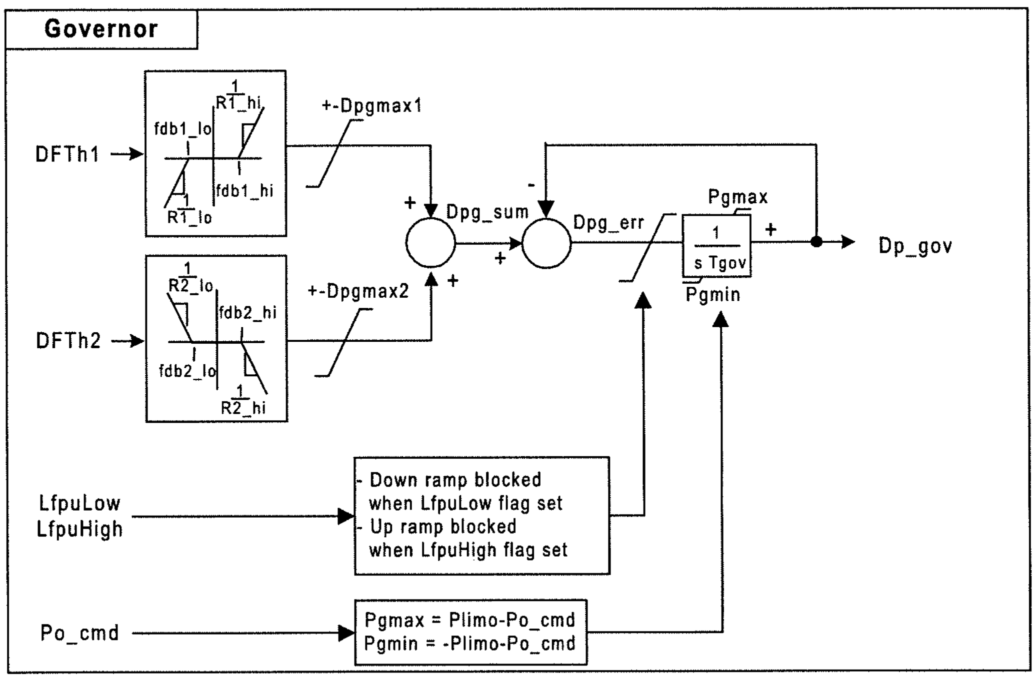


Figure 4.5.2-1 Governor Block Diagram

4.5.3 Power-Swing Damping Control (PSDC)

The power-swing damping control may take many forms. The function shown in Figure 4.5.3-1 is based on using only locally-measured variables, i.e. the frequency of an equivalent within the respective side as described in section 4.4. A washout and 2nd order transfer function should be adequate to test various modulation strategies.

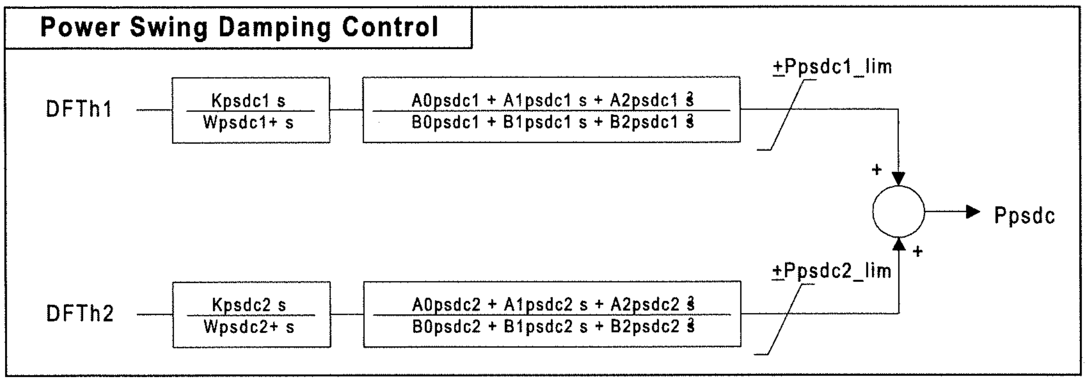


Figure 4.5.3-1 PSDC Block Diagram

4.5.4 Runbacks

"Runback" is a term used to denote an open-loop change in power order. This may involve power increases or power reversal, as well as reduction.

Such functions should be represented as open-loop changes to the operator power command (Po_cmd).

4.5.5 Special Functions

Examples of special functions are island frequency regulation and tie-line regulation. These are higher-level functions that would adjust the operator power command (Po_cmd) to meet a system regulation objective.

5. Example Cases

The test system shown in Figure 5-1 is used to illustrate performance of the VFT, and provide benchmark results for model validation. Model parameters are defined in section 5.1.

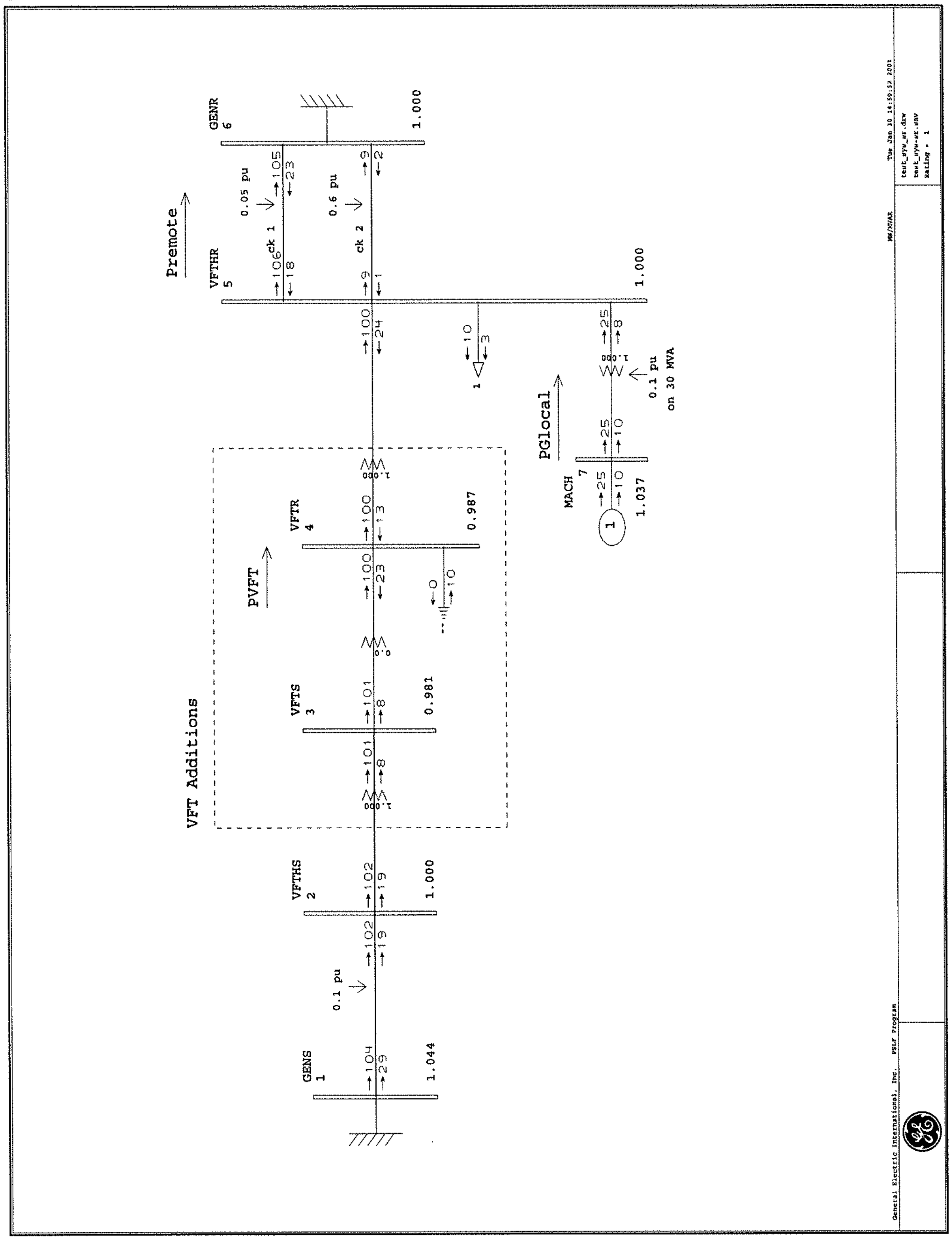


Figure 5-1 Test System

5.1 VFT Model Parameters

Tables 5.1-1 and 5.1-2 define the VFT parameters used for the example cases. The first table covers the physical system and basic controls. The second table covers the application-specific functions used in the examples. Model data for the small machine on Bus 7 is contained in Appendix A.

Table 5.1-1 VFT Model Parameters for Physical System and Basic Controls

Physical System Parameters			
Parameter	*Units*	*Value*	*Comments*
VFT MVA	MW rating	100	Nameplate rating of VFT System
XVFT	Pu-VFT	0.2	
XmagVFT	Pu-VFT	10	
HVFT	Pu-VFT-sec	25	
XT1	Pu-VFT	0.1	
XT2	Pu-VFT	0.1	
B1	Pu-VFT	0	
B2	Pu-VFT	0.1	Fixed capacitor
Speed Regulator			
Parameter	*Units*	*Value*	*Comments*
Kwp	PuT/ puSpd	500	Note speed base for model is system frequency, not actual rated speed of machine
Kwi	PuT/sec /puSpd	500	
Tdmax	puT	3	Torque base is 1.0 for PVFT = 1.0
Tdmaxi	puT	1.5	
Power Regulator			
Parameter	*Units*	*Value*	*Comments*
Kpp	Pufreq/puP	.035	
Kpi	Pufreq/ sec/ puP	.003	
Kpdf	Pufreq/ puP/sec	.003	
Tpdf	Sec	.025	
Dpratelim	PuP/sec	10.	
Fplimi	Pu freq	.02	
Fplim	Pu freq	.04	Maximum frequency difference
Fsrlim	Pu freq	.04	Maximum frequency difference
Fratelim	Pu freq/sec	0.06	
Tfsr	Sec	0.1	
Transducer - Thevenin Synthesis			
Parameter	*Units*	*Value*	*Comments*
Xth1	Pu-VFT	.15	XT1 + average short-circuit impedance at side 1 HV bus
Xth2	Pu-VFT	.3	XT2 + average short-circuit impedance at side 2 HV bus
Tfx	Sec	.05	Filter time constant on frequency measurement

Table 5.1-2 VFT Model Parameters for Example Case Application Functions

Voltage-Dependent Power Limit			
Parameter	*Units*	*Value*	*Comments*
Plimo	PuP	1.1	Maximum allowable power, or set slightly higher than operating power
Vp1	PuV	0.95	Voltage below which power limit is lowered
Vpx	puV	0.7	Voltage where Pvdlim=0
Tvd_dn	Sec	0.3	Rate for reducing power limit
Tvd_up	Sec	3.0	Rate for increasing power limit
Governor			
Parameter	*Units*	*Value*	*Comments*
Tgov	Sec	0.3	
fdb1_lo	PuFreq	-0.01	Deadband for underfreq
R1_lo	PuFreq for 1puP	0.01	Droop for underfreq
fdb1_hi	PuFreq	0.01	Deadband for overfreq
R1_hi	PuFreq for 1puP	0.01	Droop for overfreq
Dpgmax1	puP	1.5	Limit on power change due to freq deviation
fdb2_lo	PuFreq	-0.01	Deadband for underfreq
R2_lo	PuFreq for 1puP	0.01	Droop for underfreq
fdb2_hi	PuFreq	0.01	Deadband for overfreq
R2_hi	PuFreq for 1puP	0.01	Droop for overfreq
Dpgmax2	puP	1.5	Limit on power change due to freq deviation

5.2 Stub Fault

Figure 5.2-1 shows the results of a six-cycle three-phase stub fault applied at Bus #5. Recovery is smooth, with VFT power regulated closely to the final command within a short time after fault clearing. Note the final power command is reduced during the fault by the VDPL function, then slowly reset to the original operator setpoint. The small local generator oscillates against the receiving transmission system with very little participation through the VFT.

5.3 Line Clearing Resulting in Weak Receiving System

Figure 5.3-1 shows the results of a six-cycle three-phase fault applied at Bus #5, which is cleared by opening circuit 1 between Bus#5 and #6. The high impedance (0.6 pu) of the remaining circuit results in a very weak receiving end system. Figure 5.3-2 shows the result of simply tripping the strong line, without a fault.

In both cases, recovery is stable, with the VFT power helping to stabilize the oscillations of the local machine as the VFT ramps back to near full power via the VDPL function. At the end of these simulations, the voltage on the weak system side of the VFT (Bus 4, "V2" on plots) is below the 95% breakpoint of the VDPL. Thus, full power is not quite achievable without additional voltage support.

These examples illustrate how the VDPL operates to prevent voltage collapse.

5.4 Fault with Clearing Resulting in Islanded Receiving System

Figure 5.4-1 shows the results of a six-cycle three-phase fault applied at Bus #5, which is cleared by opening both circuits between Bus#5 and #6. This results in a local islanded system on the receiving end, consisting of the Bus#5 load and the Bus#7 generator.

In this case the VFT must rapidly reduce power, since the receiving transmission grid is removed. Only the small local load (10MW) and generator (25MW) remain, so in steady state the VFT must absorb the excess generation (approximately 15MW).

The initial fast drop of power is a consequence of the natural response of the VFT, as it acts like a transformer connecting the two systems. The power regulator sees a mismatch compared to the operator command, so acts to increase speed of the VFT. This increases the frequency on the island, and the governors of both the VFT and the small generator react to attain a new equilibrium with a small overfrequency condition. The final frequency is a function of the governor characteristics, with the VFT being the dominant factor.

This would be a situation where a special control, e.g. island frequency regulation, would be appropriate to adjust the operator power command such that the island frequency returned to normal.

5.5 Steps in Power Order

Steps to power order are shown in Figures 5.5-1 and 5.5-2. While such transients would probably not be done in practice, the simulations serve to illustrate the nature of the regulator performance as well as providing benchmarks for model validation.

Both large and small steps are shown. The large step shows a complete reversal, from full power in one direction to full power in the opposite direction. The small step shows a 20% change, selected to illustrate operation within the linear range of the regulators.

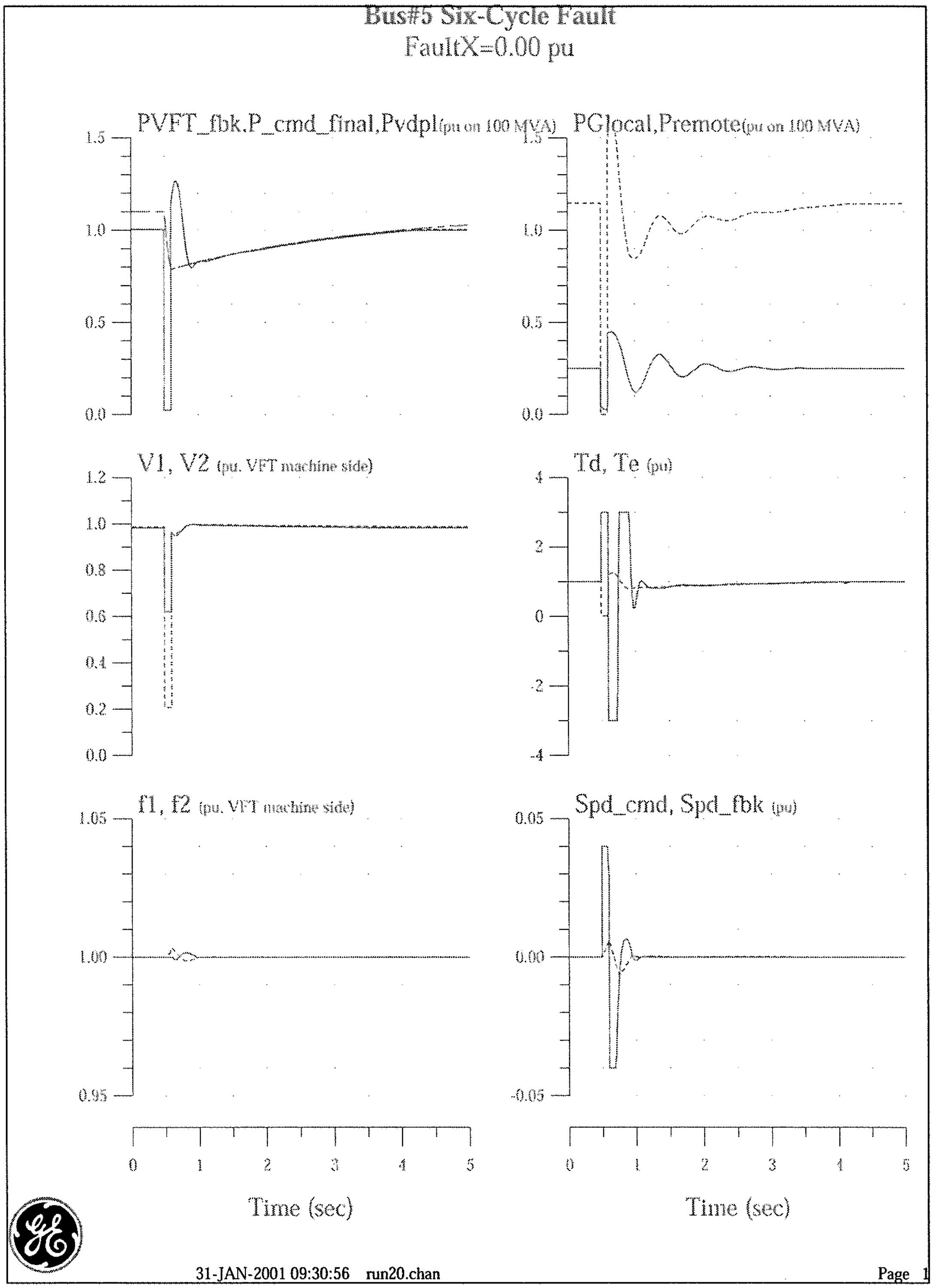


Figure 5.2-1 Six-Cycle Stub Fault

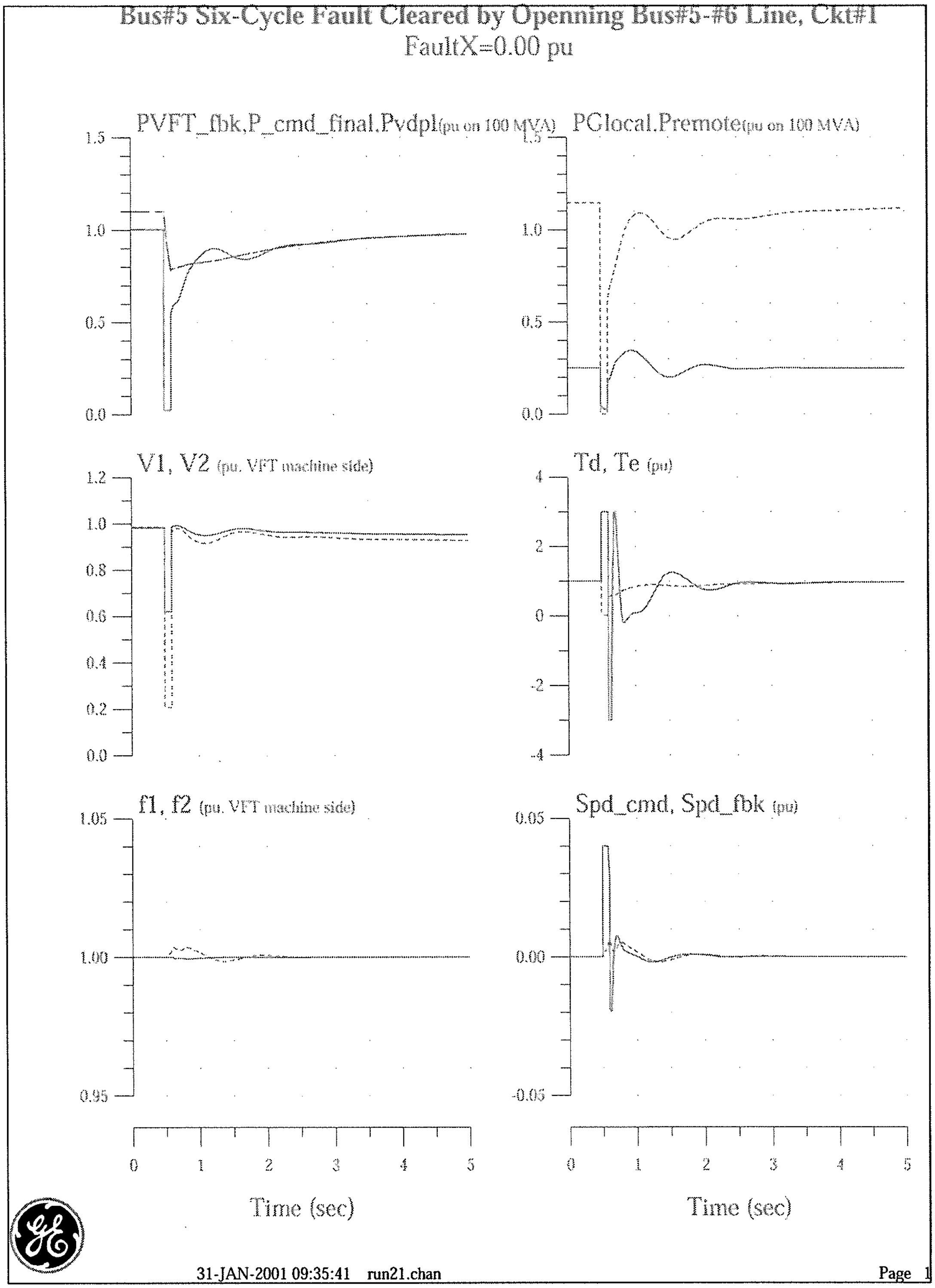


Figure 5.3-1 Six-Cycle Fault with Clearing Resulting in Weak Receiving System

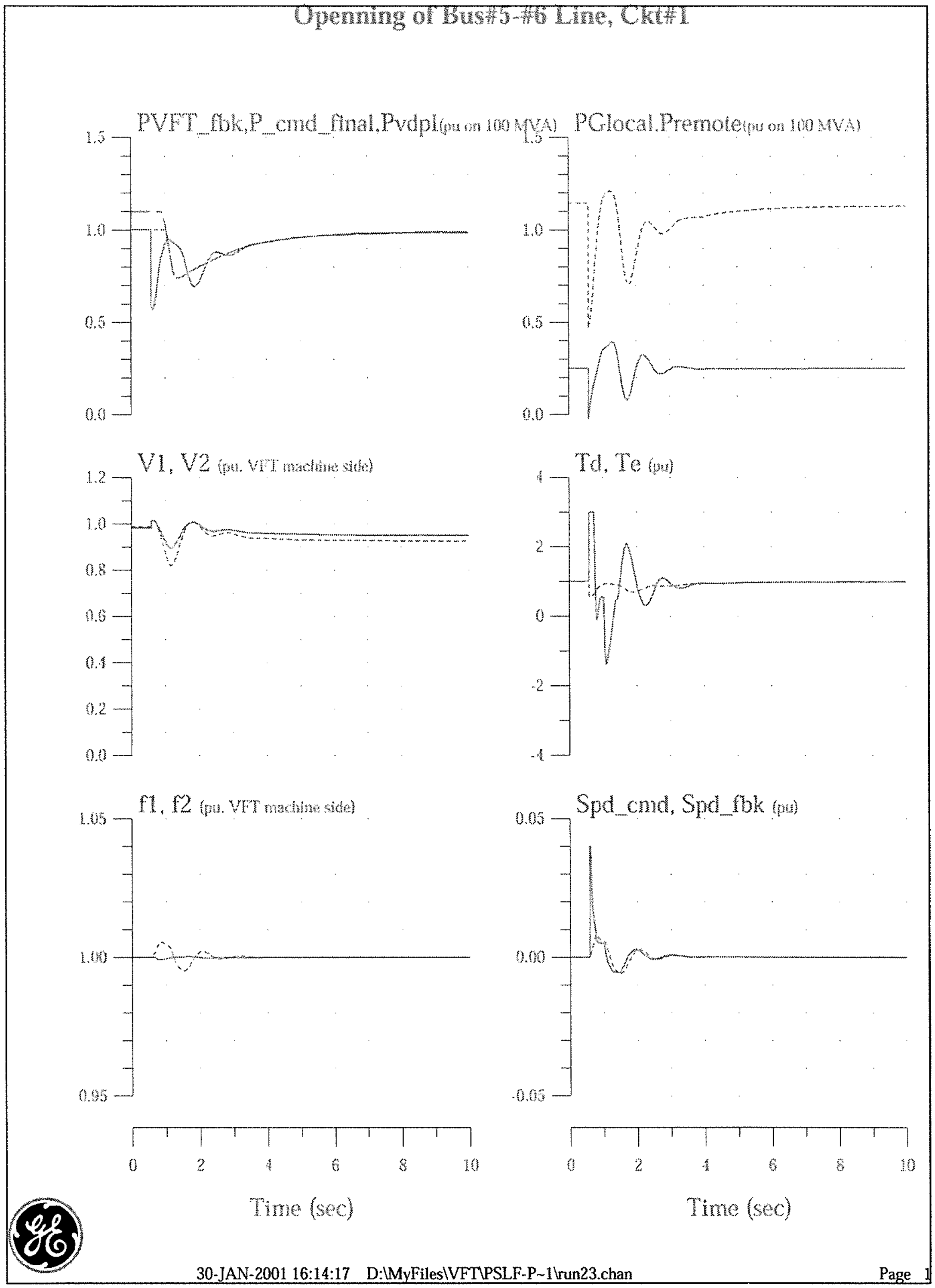


Figure 5.3-2 Line Opening Resulting in Weak Receiving System

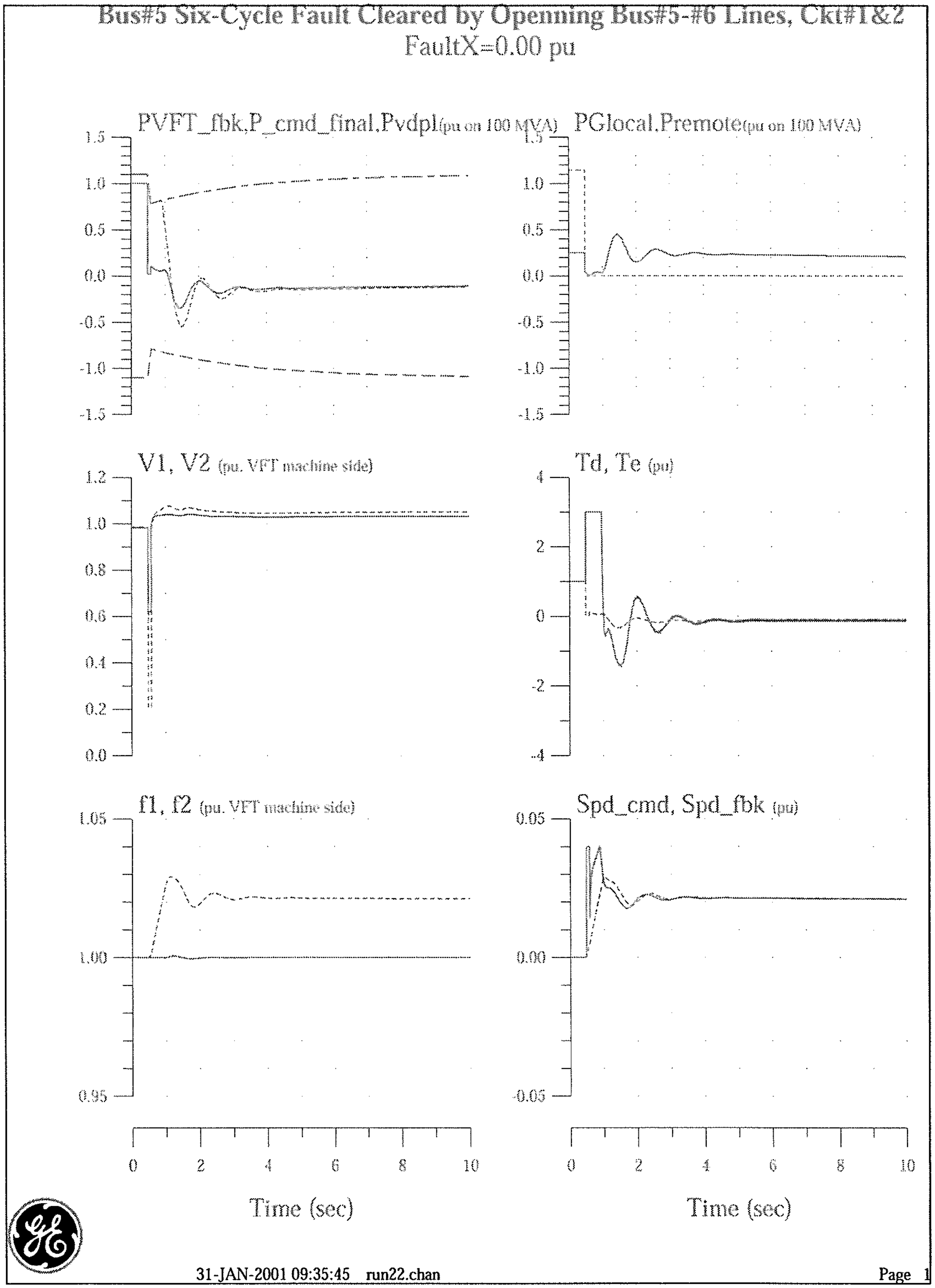


Figure 5.4-1 Six-Cycle Fault with Clearing Resulting in Islanded Receiving System

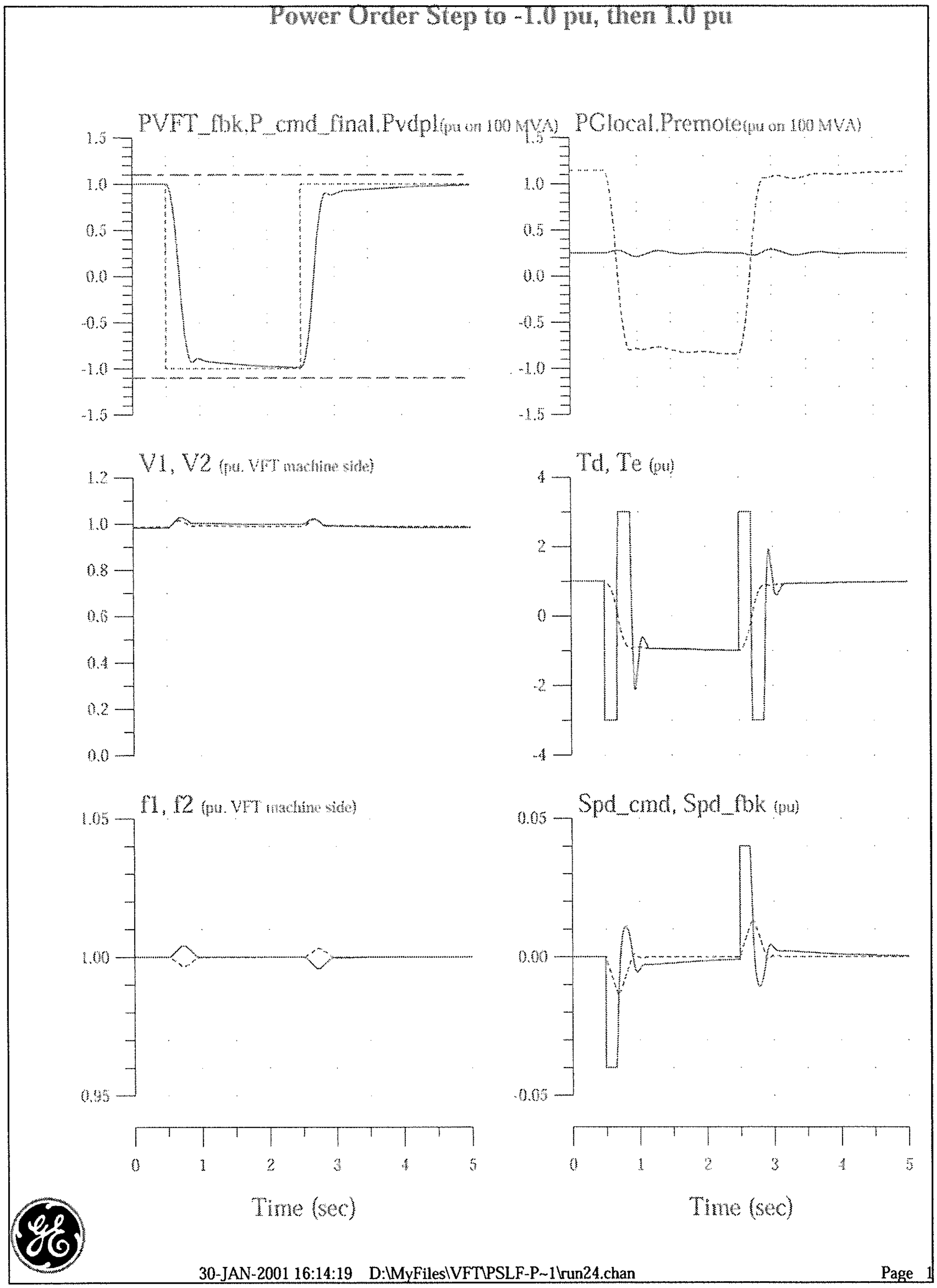


Figure 5.5-1 Large Step in Power Order

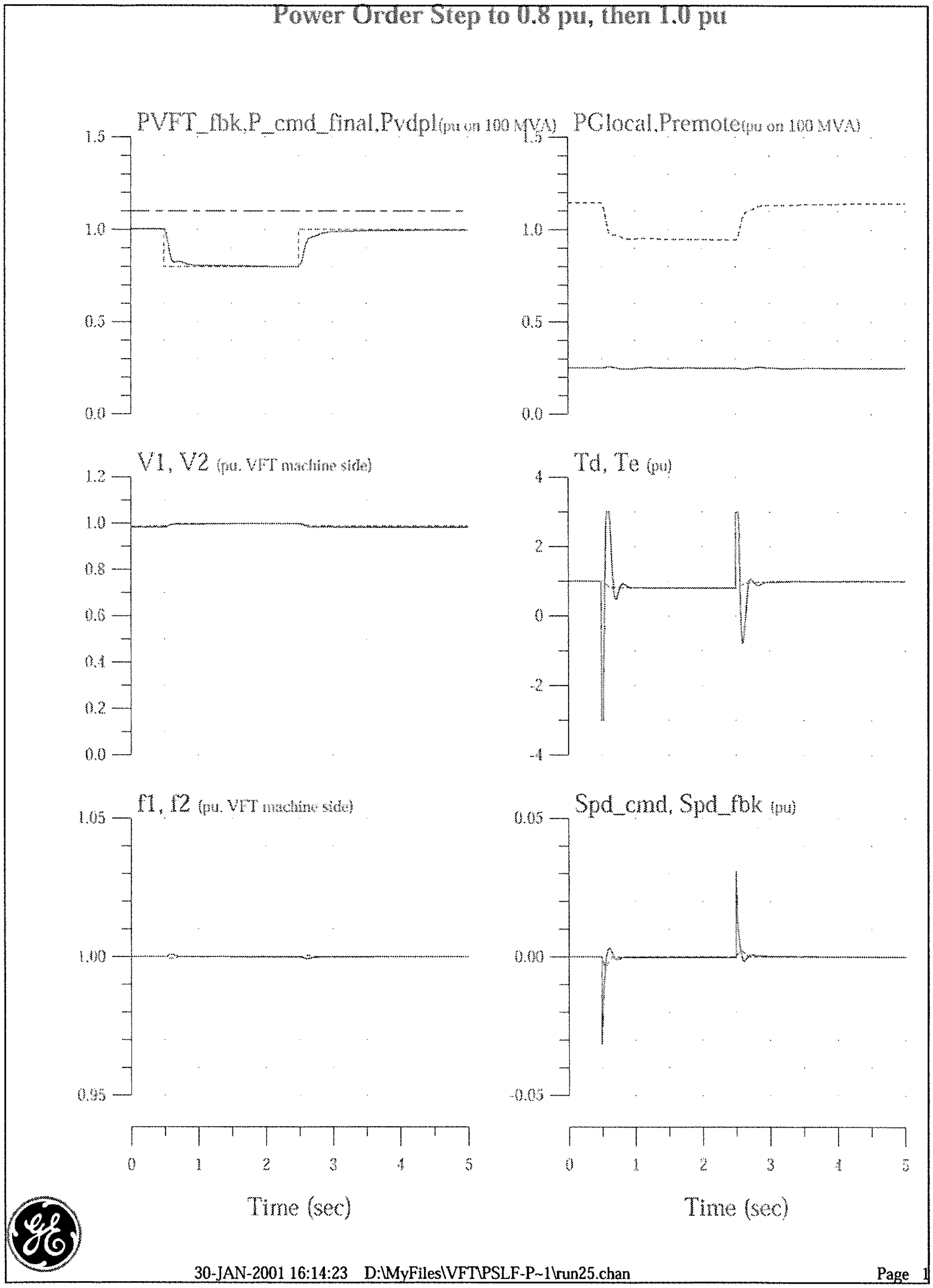
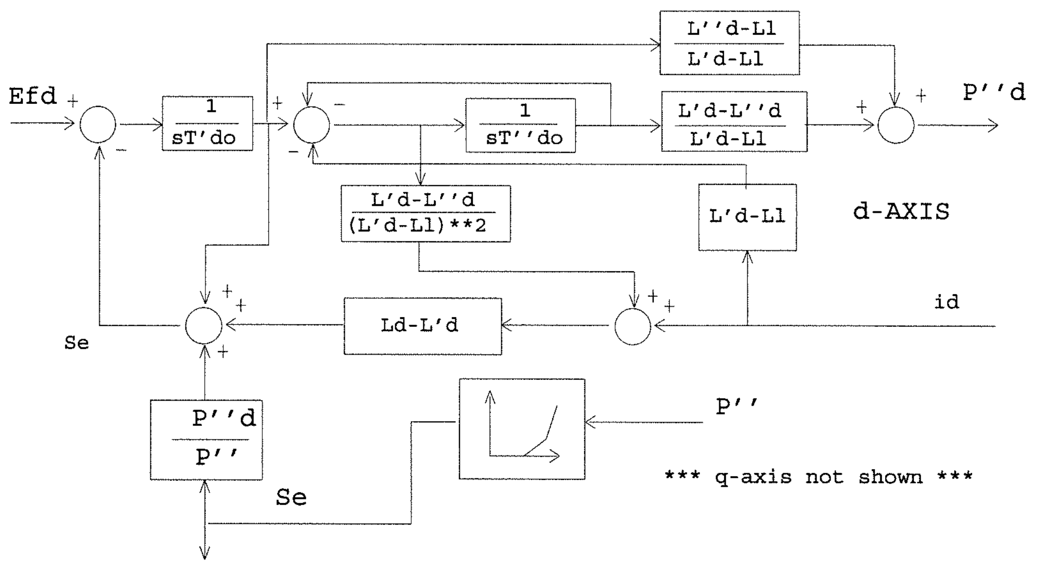


Figure 5.5-2 Small Step in Power Order

Appendix A BUS #7 MACHINE MODEL DATA

This Appendix contains the machine model data for Bus 7 generator, used in the Section 5 example cases. The following PSLF models, with data, are given:

- Generator model (GENROU)
- Exciter model (EXST4B)
- Governor model (TGOV1)

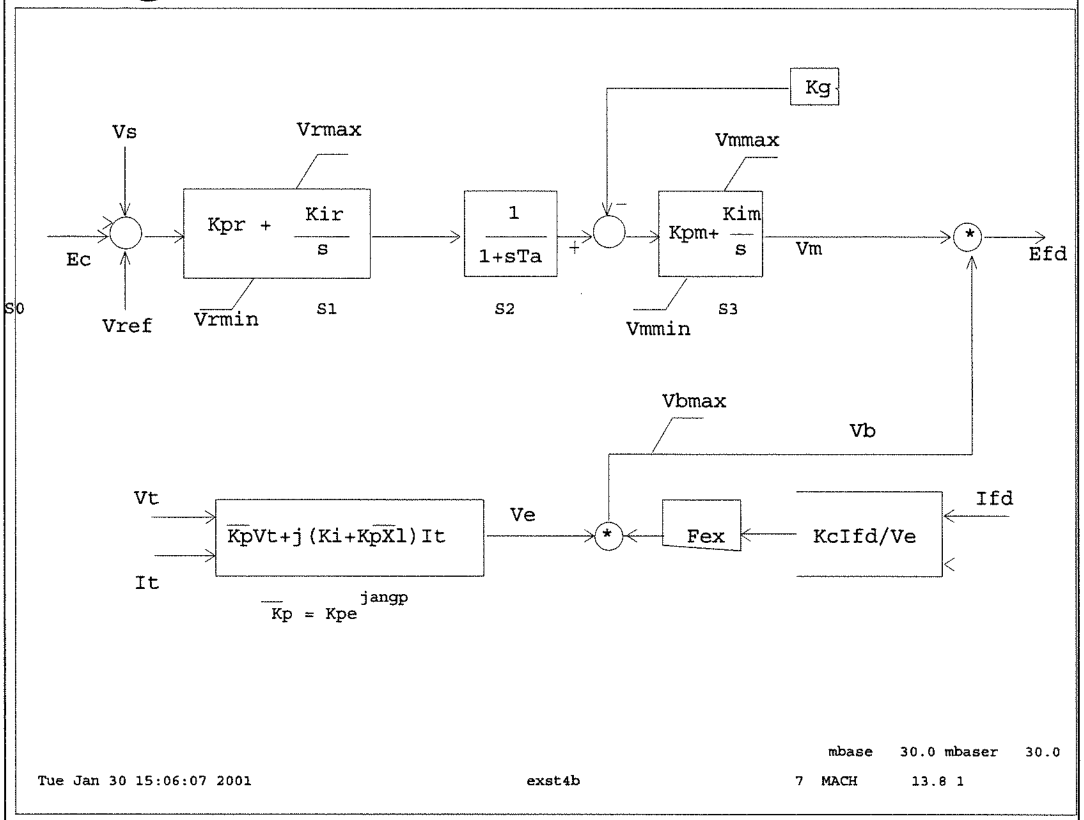


mbase 30.0 mbaser 30.0

Tue Jan 30 15:05:58 2001 genrou 7 MACH 13.8 1

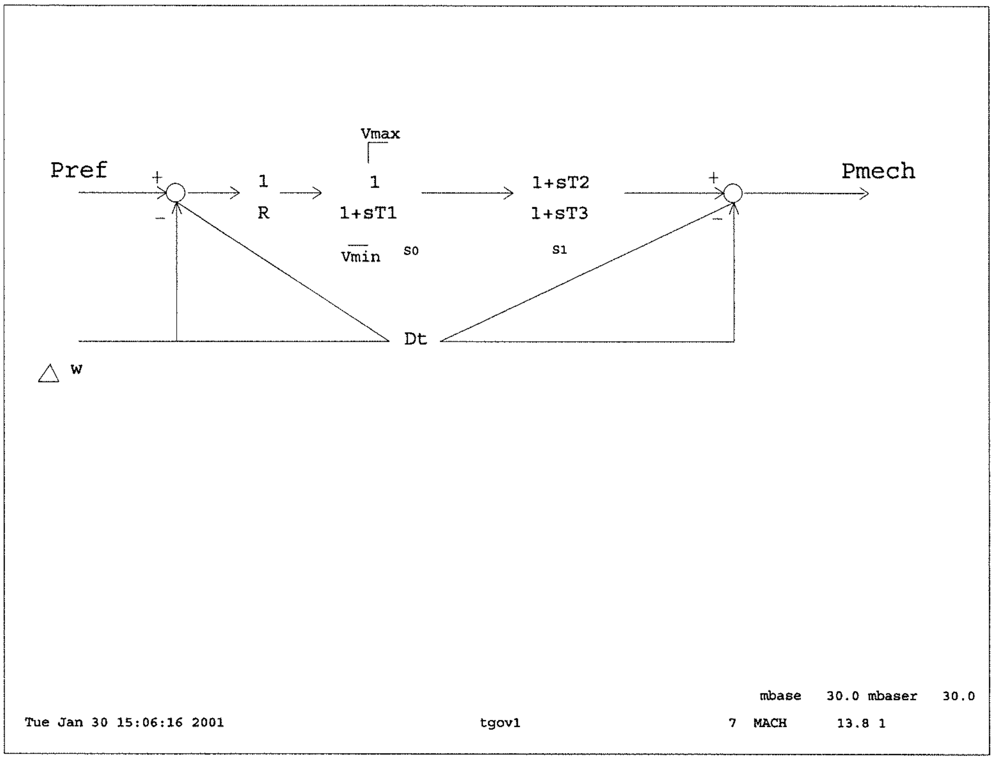
ld	1.6210	s12	0.2300
lpd	0.2440	h	6.3900
lppd	0.1740	d	0.0000
lq	1.5470	rcomp	0.0000
lpq	0.4170	xcomp	0.0000
lppq	0.1740	accel	0.5000
ll	0.1430		
ra	0.0000		
tpdo	4.7670		
tppdo	0.0330		
tpqo	0.4000		
tppqo	0.0780		
s1	0.0500		

Figure A-1 Bus 7 Generator Model



Tr	0.0000	Ki	0.0000
Kpr	3.9600	Kc	0.0800
Kir	3.9600	Xl	0.0000
Ta	0.0167	Vbmax	6.3100
Vrmax	1.0000		
Vrmin	-0.8700		
Kpm	1.0000		
Kim	0.0000		
Vmmax	1.0000		
Vmmin	-0.8700		
Kg	0.0000		
Kp	5.0500		
Ang p	0.0000		

Figure A-2 Bus 7 ExciterModel



r	0.0500
t1	25.0000
vmax	1.0000
vmin	0.0000
t2	0.0000
t3	0.5000
dt	0.0000

Figure A-3 Bus 7 Governor Model

EXHIBIT NO. 5

CRITERIA FOR DEFINING A MATERIAL CHANGE IN A PREVIOUSLY PROPOSED NEW INTERCONNECTION PROJECT (FEBRUARY 14, 2001)

Criteria for Defining a Material Change in a
<u>Previously Proposed New Interconnection Project</u>

(Approved by the Operating Committee February 14, 2001)

For purposes of determining whether or not a previously proposed interconnection project, with an established queue position, has undergone an overall material change, such that it must be considered a new project requiring a new application and new queue position, the following factors shall apply:

- A proposed interconnection project has undergone an overall material change if the defining electrical characteristics of the revised project, taken together, differ materially from the defining electrical characteristics of the previously proposed project in a manner adverse to system reliability.

  - Electrical characteristics shall be defined in terms of:

    (a) Project Size. Material adverse difference is suggested by a size increase of 10 MW or more, or 5% or more, whichever is greater.

    (b) Interconnection Point. Material adverse difference is suggested by a materially different system interconnection point, at a voltage level of 115 kV or greater.

- These factors shall be considered together. No single factor shall be considered automatically conclusive in the determination of whether or not the revised project is materially different from the previously proposed project. ISO Staff shall make an overall determination of whether a material adverse difference exists, and shall report that determination to TPAS for discussion, review and confirmation.

- TPAS will report the results of this process to the Operating Committee.

EXHIBIT NO. 6

NYISO TARIFF LEAVES 39, 39A

may elect to designate less than its total Load as Network Load but may not designate only part of the Load at a discrete Point of Delivery. Where an Eligible Customer has elected not to designate a particular Load at discrete points of delivery as Network Load, the Eligible Customer is responsible for making separate arrangements under Part II of the Tariff for any Point-To-Point Transmission Service that may be necessary for such non-designated Load.

1.23 Network Operating Agreement: An executed agreement that contains the terms and conditions under which the Network Customer shall operate its facilities and the technical and operational matters associated with the implementation of Network Integration Transmission Service under Part III of the Tariff. For Eligible Customers that take service under the ISO Services Tariff, that Tariff shall function as their Network Operating Agreement.

1.24 Network Operating Committee: The ISO Operating Committee will serve this function.

1.25 Network Resource: Any generating resource that provides Installed Capacity to the NYCA designated under the Network Integration Transmission Service provisions of the Tariff. Network Resources do not include any resource, or any portion thereof, that is committed for sale to third parties or otherwise cannot be called upon to meet the Network Customer's Network Load on a non-interruptible basis.

1.26 Network Upgrades: Modifications or additions to transmission facilities that are integrated with and support the Transmission Owner's overall Transmission System for the general benefit of all users of such Transmission System.

1.26a Network Upgrade Agreement: An agreement entered into between a Transmission Customer and a Transmission Owner that identifies the rights and obligations of each party with respect to the Network Upgrade, as described in this Tariff.

1.26a.1 **New Interconnection:** A proposed generation or merchant transmission project that must satisfy the requirements of a System Reliability Impact Study before it can connect to the New York State Transmission System in compliance with the NYISO Minimum Interconnection Standard. A project is considered to be a New Interconnection, or not, as a result of the application of specified materiality criteria set out in ISO Procedures.

1.26b New York Control Area ("NYCA"): The Control Area that is under the control of the ISO which includes transmission facilities listed in the ISO/TO Agreement Appendices A-1 and A-2, as amended from time-to-time, and Generation located

EXHIBIT NO. 7

LINDEN VFT SYSTEM RELIABILITY AND IMPACT STUDY
(AUGUST 1, 2005)

GE Energy

Final Report to:

East Coast Power, L.L.C.

for

Linden VFT System Reliability Impact Study

Prepared by:

Kara Clark, GE Energy
William W. Price, GE Energy
Conrad St. Pierre, Electric Power Consultants

August 1, 2005

General Electric International, Inc.
1 River Road
Schenectady, NY 12345

Foreword

This document was prepared by GE Energy through its Energy Consulting group in Schenectady, NY. It is submitted to East Coast Power, L.L.C.. Technical and commercial questions and any correspondence concerning this document should be referred to:

Kara Clark
GE Energy
Building 2, Room 624
Schenectady, New York 12345
Phone: (518) 385-5395
Fax: (518) 385-9529
E-mail: Kara.Clark@ge.com

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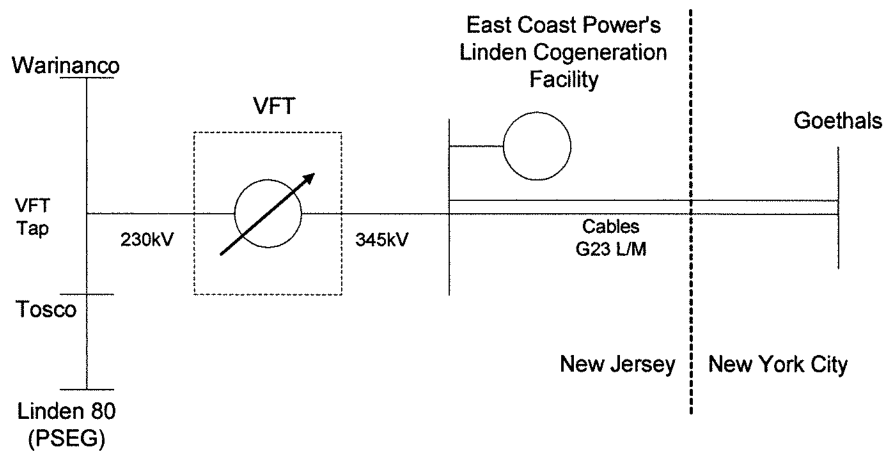
Executive Summary

A 300MW Variable Frequency Transformer (VFT), which is an asynchronous bi-directional transmission tie, between the PSE&G 230kV system and Con Edison's 345kV system has been proposed. The interconnection will be via the existing Linden Cogeneration substation, as shown below:



A circuit breaker diagram, including the Linden VFT, Linden generating plant, local PSE&G substations (e.g., Tosco, Linden) and local ConEd substations (e.g., Goethals, Fresh Kills) is shown in the linked file, VFT Local Area Breaker Diagram.pdf.

Project Description

The 300MW VFT project will consist of three 100MW VFT modules or channels. For this project, each VFT channel includes the following major components:

1. A 100MW rotary transformer, which provides a continuously controllable phase shift for any angular or frequency difference between the two sides.
2. Drive system and control to adjust the angle and speed of the rotary transformer to regulate power flow through the VFT.
3. A 25MVAr shunt capacitor for reactive compensation on each side of the VFT, connected at the terminal buses.
4. Transformers to connect the terminals of the rotary transformer to the EHV transmission buses.

Power flow is proportional to the angle of the rotary transformer as with a conventional phase shifter. The impedance of the rotary and stationary transformers and the ac grid determine the amount of angle shift needed to obtain a given power transfer. The total impedance between the EHV buses is 32% of the VFT rating.

The VFT control system senses power flow through the VFT and rapidly adjusts the angle until the actual power matches the power command. If the two grids have different frequencies, the rotary transformer will continuously rotate to maintain the appropriate effective power angle.

For reactive power flow, the VFT acts just as any transformer. The series impedance of the rotary and stationary transformers determines reactive flow through the system as a function of voltage difference between the two EHV buses. An area of lower voltage will naturally draw reactive support from the opposite system with no control action.

SRIS Scope of Work

A system reliability impact study (SRIS) was performed to evaluate the impact of the proposed 300MW VFT project on the bulk power transmission system in the southeast New York area. This study was performed in accordance with the work scope, Linden VFT SRIS Scope 1-12-2004.doc, approved by the NYISO on January 12, 2004. For this study, the three parallel VFT modules were combined into one equivalent 300MW unit. The SRIS evaluated the VFT project with both 300MW of power transfer from PJM to NY and with 300MW of power transfer from NY to PJM.

The above scope of work included a list of proposed projects to be included in the study. The Liberty 400MW Radial Interconnection to NYC was among those projects. The addition of the Liberty project required a reconfiguration of the Goethals 345kV substation as shown in the Liberty SRIS. Therefore, this reconfiguration was also included in the study assumptions.

Conclusions

The overall conclusion from this study is that the proposed Linden VFT project has no significant adverse impact on thermal, voltage, power transfer, short circuit or stability performance of the interconnected power system.

Transfer Limit Analysis

An AC transfer limit analysis was performed in order to evaluate the VFT's impact on interface power transfers within New York and between PJM and New York. Both the summer normal and the summer emergency transfer limits were evaluated.

Both analyses showed that the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 250 to 300MW for the Total East, UPNY-ConEd, UPNY-SENY and NY City Cable interfaces. There was no significant change in the Central East transfer limit due to the addition of the VFT, which was also not included in that interface definition. Also as expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 200 to 300MW for the PJM-NY and NY-PJM interfaces.

Voltage and transient stability analyses were performed for a summer system condition with power transfer that exceeded the calculated thermal transfer limit. Both voltage and stability performance met criteria for this condition. Therefore, the thermal limit was the most constraining of the thermal, voltage, and stability limits.

Thermal and Voltage Analysis

An evaluation of thermal and voltage performance for contingencies in and around the Staten Island and In-City load pockets was performed. This analysis was performed for pre- and post-project cases for summer 2005 system with VFT flow into NYC and flow out of NYC, and for winter 2005 system with flow into NYC. The addition of the VFT had no adverse impact on the voltage and thermal violations for the load pockets.

Six contingencies were specified for analysis of non-simultaneous double element outages. Two N-1 base cases were developed (e.g., Linden-Goethals radial Feeder G23L/M out, and Inter-Tie PSEG-ConEd Feeder A2253 out), with adjustment of generation dispatch, as necessary, to return branch flows to within normal limits. The remaining contingencies were tested on each of these cases. The addition of the VFT had no adverse impact on voltage and thermal performance for these non-simultaneous double element outages.

1000MW Wheel

The impact of the VFT on the phase-shifted ties regulating the 1000MW wheel between PJM and NYC was evaluated for the summer peak case with the VFT transferring 300MW from PJM to NYC. The flows on the tie lines were assumed to be 450MW each on the Hudson-Farragut PARs and 100MW on the Linden-Goethals PAR, as specified at an April 2004 meeting with NYISO and ConEd.

Under pre-contingency conditions, the VFT had the effect of moving the Linden-Goethals PAR angle away from its negative limit (-25 degrees), which provided slightly more flexibility in controlling the flow through the PAR. There was no significant impact on the Hudson-Farragut PARs.

Both with and without the VFT project, the Linden-Goethals PAR was operating at or near its maximum negative limit in order to hold the pre-contingency power flow to 100MW. Therefore, any contingency that reduced other transmission between PJM and NYC or that tripped generation in NYC, drove this PAR to its angular limit and resulted in a power flow greater than 100MW. However, all post-contingency power flows were less than the LTE rating of the Linden-Goethals PAR, both with and without the VFT. Restoration of the outage or a reduction in the PJM-NYC transfer would be necessary to return the Linden-Goethals PAR flow to 100MW.

If the initial PAR schedules were set for more power flow through Linden-Goethals (e.g., 200MW) and less through Hudson-Farragut (e.g., 400MW each), the deviations from scheduled flows for the studied contingencies would be less, but the overall effect would be the same.

A brief evaluation of the impact of an assumed VFT overload capability of 120% of rated MW was also performed. The best use of this potential capability would be for the loss of one of the Hudson-Farragut PARs. The VFT could increase its power flow and thereby limit the flow through the Linden-Goethals PAR. However, since the Linden-Goethals PAR appears to have adequate thermal capacity to carry the post-contingency flows, there is little reason to increase the VFT power flow.

Transient Stability Analysis

Two types of transient stability analysis were performed – one focused on system response to a variety of fault disturbances and the other focused on evaluating the critical clearing time for local generating units.

Fourteen fault scenarios, including 5 normally cleared, 7 stuck breaker and 2 extreme contingencies were evaluated. System response to all disturbances under all study conditions was stable and damped. The addition of the VFT had no impact on system stability.

Similarly, the VFT project had no impact on the critical clearing times for any of the units (Arthur Kill, Liberty, and Linden Cogen) evaluated.

Short Circuit Analysis

The addition of the Linden VFT increased the fault currents at nearby buses. The fault current increase, however, was less than 625 Amps.

One bus was observed with a fault level increase that would place an additional breaker in an over-dutied condition. The Fresh Kills 138kV bus fault current was just below the lowest breaker rating (40kA) without the VFT, and just above this rating with the VFT. However, the increase due to the VFT only ranged from 47 to 61 Amps (0.12 to 0.15%). According to Attachment S of the NYISO tariff on the cost allocation methodology dated October 2004, anything less than 100A of short circuit contribution is "de minimus". Therefore, the VFT project would not be responsible for the cost of an upgrade to this breaker.

The Greenwood 138kV substation had an existing condition of a fault current approximately 5kA over breaker rating without the VFT. The VFT added approximately 50 Amps to it - a 0.1% increase.

Larger current increases were observed at the Fresh Kills, Goethals N, Goethals S, Gowanus N, Gowanus S 345kV and Linden 230kV buses. However, the fault currents were below the lowest breaker rating at these buses, both with and without the VFT.

Extreme Contingency Assessment

Two extreme contingencies (e.g., loss of Goethals 345kV substation, and loss of Fresh Kills 345kV substation) were evaluated as part of the extreme contingency assessment.

In the steady-state analysis, a few branches were slightly above their LTE loading limits in the pre-project case for the Goethals substation extreme contingency. The addition of the VFT increased the loading on these lines by 0.4% or less. However, these loading levels were well below the STE limits. In the transient stability analysis, system response to both extreme disturbances under all study conditions was stable and damped. Therefore, the addition of the VFT had no impact on system performance in response to either steady-state or dynamic extreme contingencies.

In conclusion, the proposed Linden VFT project has no significant adverse impact on thermal, voltage, power transfer, short circuit or stability performance of the interconnected power system.

1 Introduction

East Coast Power proposes to install a 300MW asynchronous bi-directional transmission tie between the PSE&G 230kV system and Con Edison's 345kV system via the existing Linden Cogeneration substation, using Variable Frequency Transformer (VFT) technology. A circuit breaker diagram, including the Linden VFT, Linden generating plant, local PSE&G substations (e.g., Tosco, Linden) and local ConEd substations (e.g., Goethals, Fresh Kills) is shown in the linked file, VFT Local Area Breaker Diagram.pdf.

A system reliability impact study (SRIS) is required to evaluate the impact of the 300MW tie on the bulk power transmission system in the southeast New York area, and the In-City load pocket. GE Energy's Energy Consulting group performed this interconnection study in accordance with the work scope, Linden VFT SRIS Scope 1-12-2004.doc, approved by the NYISO on January 12, 2004.

This study evaluated the impact of the proposed transmission tie on steady-state thermal, voltage, and transient stability performance. The effect on the short circuit fault currents and the interface power transfers in and around New York were also studied. The basic study approach was to first determine system performance without the proposed project to establish benchmark performance. The system performance with the VFT was then determined, and compared to the benchmark system performance and all applicable planning criteria.

The VFT is a new technology for interconnecting two asynchronous ac power systems. A detailed description of the VFT and documentation defining model structures appropriate for typical planning studies, covering load flow, short-circuit, and stability analysis are included in vft-model-rev2_2.pdf, "VFT Modeling for Planning Studies".

1.1 VFT Configuration and Operation

For this project, a single VFT module or channel, as illustrated in Figure 1-1, included the following major components:

1. A 100MW rotary transformer, which provides a continuously controllable phase shift for any angular or frequency difference between the two sides.
2. Drive system and control to adjust the angle and speed of the rotary transformer to regulate power flow through the VFT.
3. A 25MVAr shunt capacitor for reactive compensation on each side of the VFT, connected at the terminal buses.
4. Transformers to connect the terminals of the rotary transformer to the EHV transmission buses.

Power flow is proportional to the angle of the rotary transformer as with a conventional phase shifter. The impedance of the rotary and stationary transformers and the ac grid determine the amount of angle shift needed to obtain a given power transfer. The total impedance between the EHV buses is typically 32% of the VFT rating.

The power regulator senses power flow through the VFT and rapidly adjusts the angle until the actual power matches the power command. If the two grids have different frequencies, the rotary transformer will continuously rotate to maintain the appropriate effective power angle.

For reactive power flow, the VFT acts just as any transformer. The series impedance of the rotary and stationary transformers determines reactive flow through the system as a function of voltage difference between the two EHV buses. An area of lower voltage will naturally draw reactive support from the opposite system with no control action.

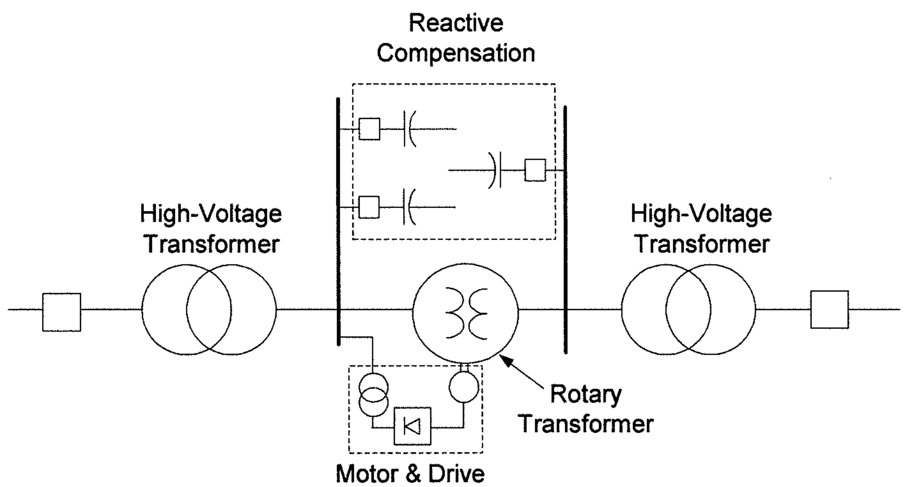


Figure 1-1. Typical Elements of a VFT Installation.

1.2 Linden VFT Load Flow Model

The proposed Linden VFT will consist of three VFT modules connected in parallel. The connection of the VFT to the system is illustrated with a one-line diagram in Figure 1-2. One side will be connected through approximately 2000 feet of cable to the Linden Cogen 345kV ring bus (COGNTECH 74315), which connects to the ConEd Goethals South bus (74335) through cables G23L and G23M. The other side will be connected by 100 feet of overhead line to a ring bus tap in the PSE&G Tosco-Warinanco (5190-5034) 230kV line.

For analysis purposes, the three parallel VFT modules can be combined into one equivalent 300MW unit. For load flow analysis, the rotary transformer is represented as a phase angle regulating transformer with a continuously adjustable angle. The phase angle limits are set as large as needed to obtain the desired power flow. The stationary transformers and shunt capacitors are conventionally represented. The proposed VFT project has one 25MVAr capacitor bank on each side of the rotary transformer for each channel. This is represented in the equivalent 3-channel model as a voltage-controlled, switchable 75MVAr bank on each side.

Figure 1-3 shows the VFT load flow model schematically. Parameter values are given in Table 1-1.

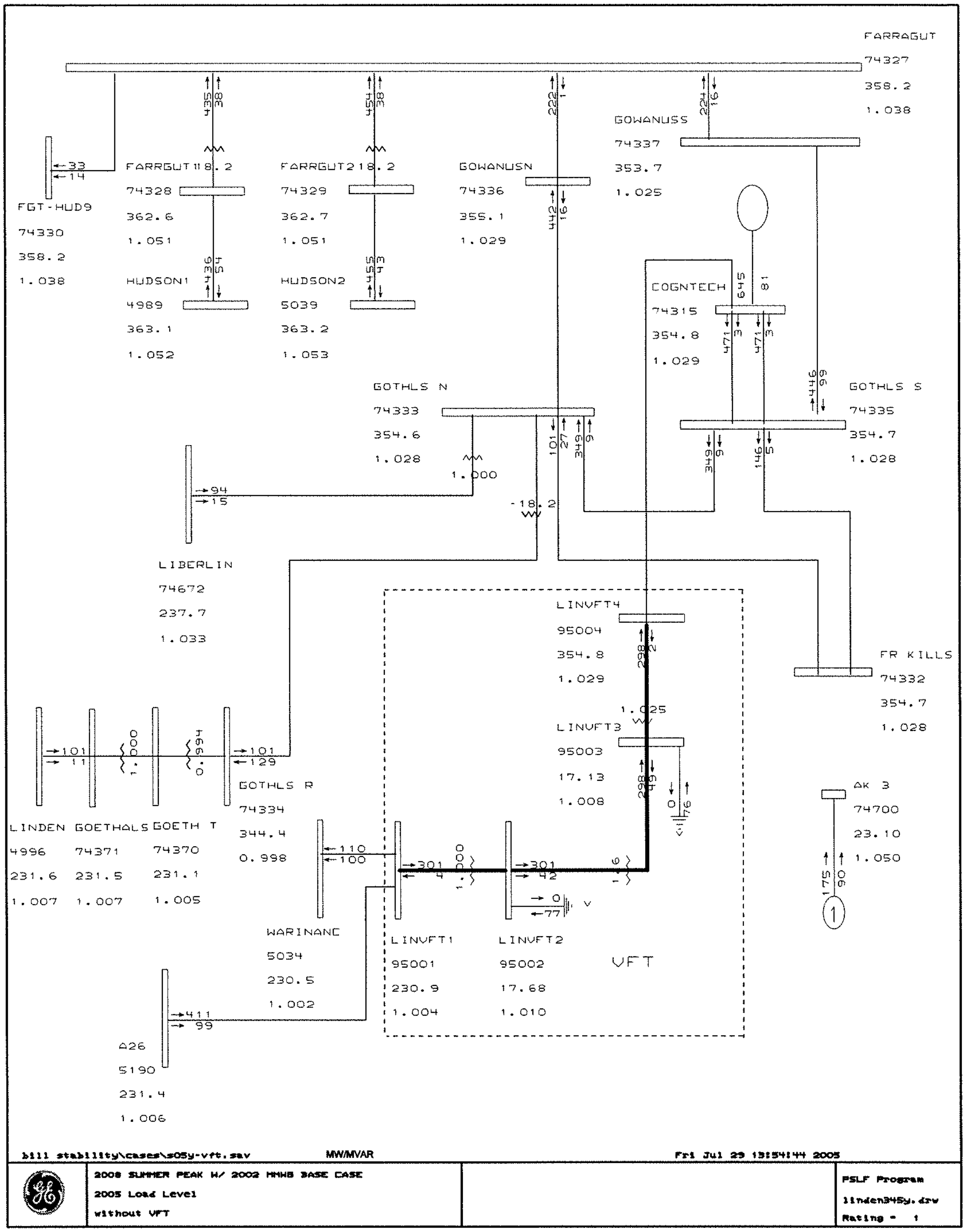


Figure 1-2. Linden VFT Connection to the Network

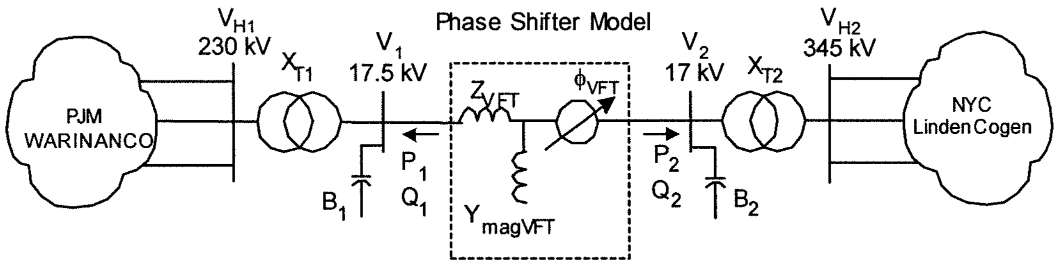


Figure 1-3. Linden VFT Model for Load flow Analysis.

Table 1-1. Linden VFT Load Flow Model Parameters

Parameter	**Value (Based on VFT rating of 300 MVA)**
Z_{VFT}	0.0042 + j 0.123 pu
Y_{magVFT}	0.0033 – j 0.18 pu
X_{t1} and X_{t2}	0.10 pu
B_1	3 Steps of 25 MVAR
B_2	3 Steps of 25 MVAR

1.3 Linden VFT Short-Circuit Model

The NYISO ASPEN database was modified to include the Linden VFT, as shown in Figure 1-4. The VFT project was connected to a new bus on the Warinanco-A26 230kV line in New Jersey and the reconfigured Goethals 345kV substation in New York. The VFT model consisted of two 300 MVA transformers of 10% reactance and one 300 MVA transformer with 12.3% reactance. The short circuit behavior of the VFT is the same as that of a transformer.

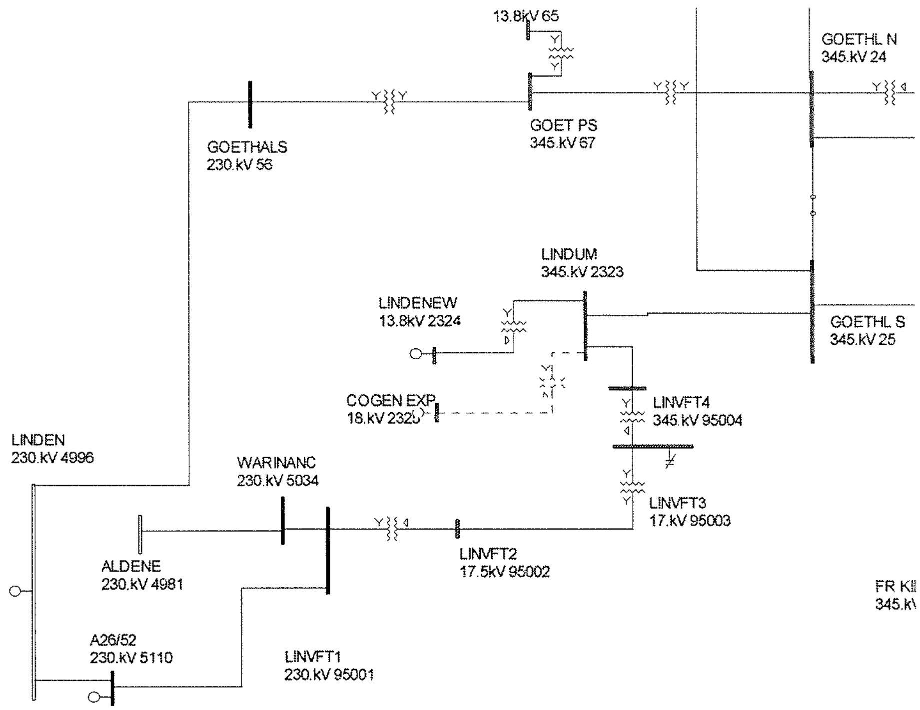


Figure 1-4. Linden VFT Short Circuit Model.

1.4 Linden VFT Dynamic Model

The dynamic model, described in detail in the previously reference report "VFT Modeling for Planning Studies", is suitable for studies of grid disturbances. Figure 1-5 shows an overview of the dynamic model for the VFT installation. An overview of the control system is provided in Appendix I. A detailed list of dynamic modeling parameters used in the study is also provided in Appendix I.

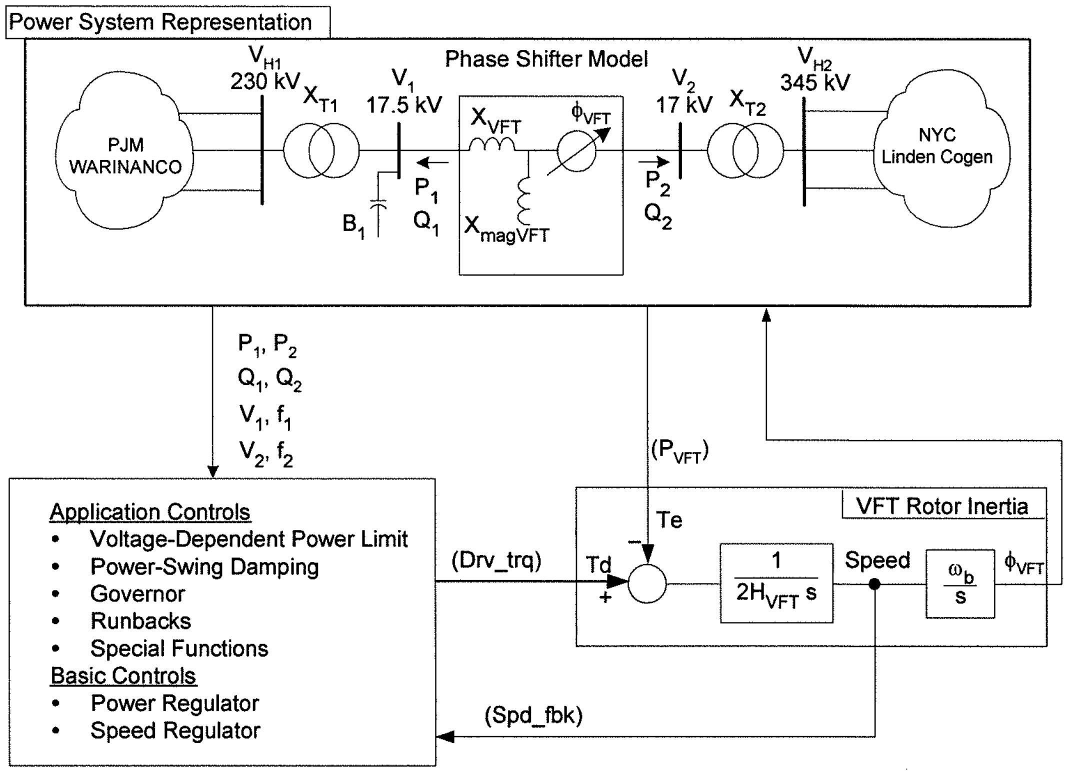


Figure 1-5. Overview of VFT Dynamics Model.

2 STUDY APPROACH

This study compared the performance of the system before and after the proposed VFT installation in order to demonstrate the system impact under a prescribed set of initial conditions and contingencies as established in cooperation with ConEd and NYISO.

The study demonstrates system performance with and without the VFT for pre-contingency and post-contingency bus voltages and branch loading, as well as for dynamic response to system disturbances.

2.1 Load Flow Analysis

Pre- and post-contingency voltage criteria are shown in Table 2-1.

The thermal criteria require branch loading to be less than 100% of normal rating for pre-contingency conditions and less than the long term emergency (LTE) rating for post-contingency conditions. Any branch loading greater than the LTE rating requires mitigation. Loading criteria for ConEd lines were set at 110% since they are rated in MW as opposed to MVA, assuming a power factor of 0.9.

Thermal criteria for N-2 testing of contingencies involving breaker failure and outages of lines sharing a common tower, requires mitigation for any branch loading greater than the short term (STE) rating.

Following a contingency, if the increase in loading on any line in the post-project case was less than 3% compared with the pre-project case, it was deemed a negligible impact due to VFT unless the specific line was not overloaded in the pre-project case and was overloaded in the post-project case.

The pre-contingency power flow solution allowed static VAr devices (SVDs, i.e., automatically switched capacitors), phase angle regulators (PARs), and load tap changing transformers (LTCs) to move. The post-contingency solution did not allow any of these regulating devices to move. Post-contingency swing bus power changes were reallocated to all generators in proportion to their MVA ratings to simulate an inertial load pickup.

Table 2-1. Voltage Performance Criteria for Power Flow Analysis.

kV	Pre-contingency Voltage Criteria	Post-contingency Voltage Criteria
100-200kV	0.942 pu < Vbus < 1.051 pu	0.942 pu < Vbus < 1.051 pu
200-300kV	0.944 pu < Vbus < 1.052 pu	0.944 pu < Vbus < 1.052 pu
300-400kV	0.951 pu < Vbus < 1.049 pu	0.951 pu < Vbus < 1.049 pu
>400kV	0.950 pu < Vbus < 1.1 pu	0.950 pu < Vbus < 1.1 pu

2.2 Dynamic Analysis Approach

Stable transmission system performance for normal contingencies (e.g., 3-phase faults cleared by primary protection), stuck breaker contingencies (e.g., 1-phase faults with breaker failure) and extreme contingencies (e.g., loss of substation) was defined such tat all generating units must be transiently stable with positive damping except for units tripped for fault clearing.

Selected bus voltages around the Goethals substation were monitored. The generator angles, terminal voltages, machine speeds, real and reactive power outputs of local units were also monitored. All units in the system was monitored for loss of synchronism. Plots of key variables were prepared for each contingency.

3 Base Case Development

3.1 Summer Base Case Development

A 2008 summer peak case was obtained from the NYISO. Using this case, a 2005 summer peak case was developed by scaling loads and generation to 2005 levels, per the SRIS project scope. This case was used as the peak load benchmark (pre-project) case.

The following proposed new projects were specified in the scope to be included in the study:

No.	Project Name	MW
1.	PG&E Athens	1080
2.	PSEG Bethlehem	350
3.	Cross Sound Cable (New Haven-Shoreham)	330
4.	Keyspan Ravenswood (138kV)	270
5.	NYPA Poletti Expansion	500
6.	NYC Energy Kent Avenue	79.9
7.	East River Repowering	288
8.	SCS Astoria Energy	1000
9.	ANP Brookhaven Energy	580
10.	Glenville Energy Park	540
11.	PP&L Global Kings Park	300
12.	LMA Lockport II	79.9
13.	BesiCorp Empire State Newsprint	660
14.	Fortistar VP	79.9
15.	Fortistar VAN	79.9
16.	Calpine Eastern JFK Expansion	45
17.	Calpine Wawayanda	500
18.	Reliant Astoria Repowering	546
19.	Neptune PJM-NYC DC	600
20.	PSEG Cross Hudson Project	550
21.	Spagnoli Road Combined Cycle	250
22.	Mirant Bowline Point 3	750
23.	Liberty Radial Interconnection to NYC	400
24.	Neptune PJM-LI HVDC	750
25.	TransGas Energy	1000
26.	Bay Energy	79.9

The case received from NYISO included all of these except Bay Energy, TransGas Energy and the Neptune PJM-NYC DC projects. The Neptune PJM-NYC DC project was included in the study with 600MW flowing into W. 49th Street. The Bay Energy and TransGas Energy projects were added to the base case with generation turned off at these sites. The resulting pre-project case is referred to as the **S05** case.

Since the Liberty Radial project was included, the reconfiguration of the Goethals 345kV substation proposed for that project was also included. A diagram of the new configuration and adjacent substations is shown in Figure 3-1. The Linden Cogen facility is identified in this figure by its new name, East Coast Power.

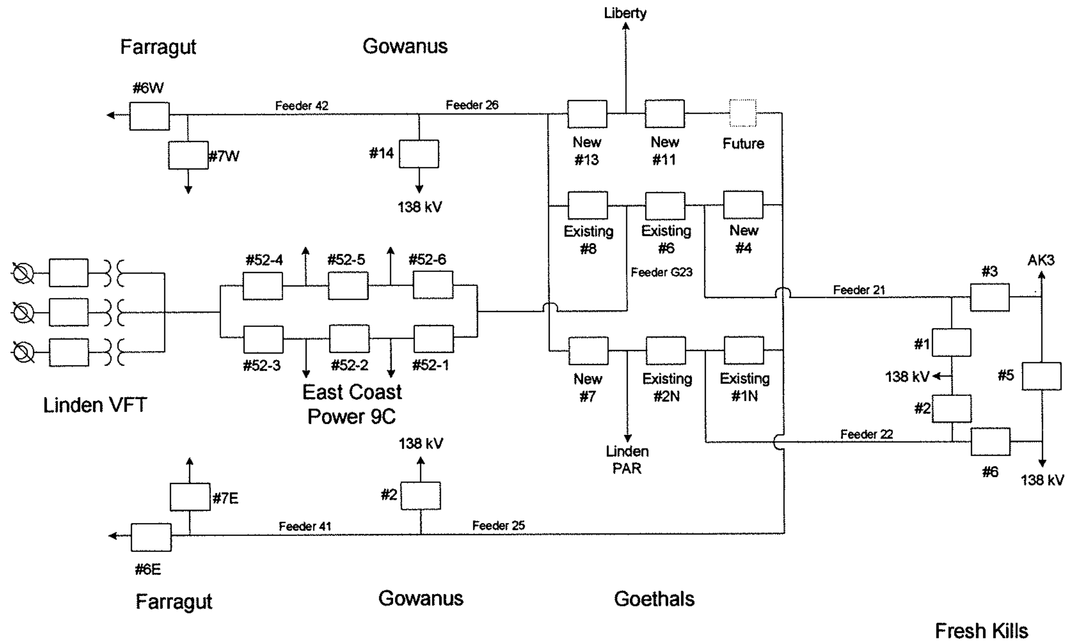


Figure 3-1. Goethals Substation Reconfiguration and Vicinity.

Using the above case, the post-project case was developed.

Type A Dispatch

In order to incorporate the VFT, Salem-G1 (1100MW rated) was turned on at 300MW. On the NYC side, this additional power was dispatched against the Liberty plant. The Liberty ST (147.4MW) was turned off and the output of the Liberty CT was reduced by (300-147.4) 152.6MW to 93.9MW.

This allowed the VFT to transfer 300MW of additional power from PJM to NYC compared to the pre-project case. This case is referred to as the **S05-VFT** case.

Type B Dispatch

This case was developed with VFT power flowing in the opposite direction of Dispatch A with 300MW flowing from NYC to PJM. To ensure comparable pre- and post-project cases, a separate pre-project case was developed (using the original 2005 summer peak case) with 300MW of Liberty generation turned off (ST off and CT at 93.9MW). The 300MW was then accommodated by increasing power output at Ravenswood, as follows:

74707	RAV 1	1	100.0
74708	RAV 2	1	100.0
74702	RAV 3	1	100.0

100 + 100 + 100 = 300MW Increase

This pre-project case is referred to as the **S05b** case. The VFT project case was developed from this case.

In order to incorporate the VFT with power flowing from NYC to PJM, Salem-G2 (1119MW rated) was turned down by 300MW to 819MW. On the NYC side, the Liberty plant was fully turned on, for a net increase of 300MW, as follows:

Liberty ST: 147.4MW (from 0MW)
Liberty CT: 246.5MW (from 93.9MW)

This allowed for the VFT to push 300MW of additional power from NYC to PJM compared to the pre-project case. This case is referred to as the **S05b-VFT** case.

3.2 Winter Base Case Development

The 2005 winter load base case received from NYISO had the Liberty plant turned off. In order to be consistent with the summer base case development, Ravenswood 1 (321.2MW) was turned off and the Liberty CT and ST were turned on at 246.5MW and 74.7MW, respectively. This case was used as the winter benchmark (pre-project) case and referred to as the **W05** case.

Using the above case, the post-project case was developed. In order to incorporate the VFT, Salem-G1 (1100MW rated) was turned on at 300MW. On the NYC side, the VFT was dispatched against the Liberty plant. The Liberty ST (74.7MW) was turned off and the output of the Liberty CT was reduced by (300-74.7) 225.3MW to 21.2MW.

This allowed the VFT to push 300MW of additional power from PJM to NYC compared to the pre-project case. Thus, this case is referred to as the **W05-VFT** case.

A second VFT case was developed with 300MW of power flow from NYC to PJM. This case was developed from the W05-VFT case by changing the set point of the VFT (i.e., a PAR transformer), increasing power output at the Liberty and Arthur Kill 3 plants, and decreasing power output at Salem. This case is referred to as the **W05b-VFT** case.

3.3 One Line Diagrams

One-line diagrams of each of the power flow study cases described in the preceding sections are available via the hyperlinks in Table 3-1.

Table 3-1. One-Line Diagrams of Power Flow Cases.

System Condition	Benchmark	300MW VFT PJM-NY	300MW VFT NY-PJM
Summer 2005	s05_base.pdf	s05-VFT_base.pdf	s05b-VFT_base.pdf
Winter 2005	w05_base.pdf	w05-VFT_base.pdf	w05b-VFT_base.pdf

4 TRANSFER ANALYSIS

The primary objective of both the normal and emergency transfer limit analysis was to estimate the thermal limits imposed by the transmission network on power transfer across the system. The transfer of power was implemented by increasing the output of generators in one part of the system and reducing the output of generators in another, in order to determine the maximum shift in generation that still met thermal criteria for a specified set of contingencies. AC, not DC, power flow analysis was used. Details of the study approach, as well as results, are described in the following subsections.

4.1 Study Approach

The thermal performance of a base case was compared with that of a transfer case using a conventional steady-state contingency analysis. A linear extrapolation was performed on those results to determine the maximum generation shift and thus the maximum interface flows.

The transfer case was developed from the base case by increasing and decreasing the output of selected generators to implement a specific power transfer. The same set of contingencies was evaluated for both the base and transfer cases.

For each contingency, a distribution factor was calculated as follows:

$$\mathbf{DF_{branch} = MVA_{rate} * (Tpu - Bpu) / MW_{shift}}$$

where: MVA_{rate} = branch rating (MVA)
Tpu = branch loading in transfer case (pu)
Bpu = branch loading in base case (pu)
MW_{shift} = generation shift implemented in transfer case (MW)

Current ratings were used for lines and MVA ratings were used for transformers. The direction of power flow on a given branch was also incorporated into the distribution factor. In addition, distribution factors were calculated for each interface.

Using a linear extrapolation, the generation shift required to drive a particular line to its MVA rating was then determined for each contingency as follows:

$$\mathbf{MW_{maxshift} = MVA_{rate} * (1 - Bpu) / DF_{branch}}$$

where: MVA_{rate} = branch rating (MVA)
Bpu = branch loading in base case (pu)
DF_{branch} = branch distribution factor (pu)

The direction of power flow and sign of the distribution factor were accommodated in this equation.

The output of the above analysis was a list of all monitored branches and their maximum generation shift values for all outages. The branch with the smallest maximum shift was deemed the limiting combination of element and outage. That maximum generation shift was then used to calculate the transfer limit of a particular interface, as follows:

$$\mathbf{MW_{maxiface} = MW_{base} + DF_{iface}^{*}\ MW_{maxshift}}$$

where: MW_{base} = interface power flow in base case (MW)

DF_{iface} = interface distribution factor (pu)

$MW_{maxshift}$ = maximum generation shift that met thermal criteria (MW)

4.1.1 Generation Shift Scenarios

The method for implementing the generation shift between the base and transfer cases was identified in the approved work scope as shown in Table 4-1.

Table 4-1. Generation Shift Scenarios from Approved Workscope.

Interface	Location(s) for Increasing Generation	Locations for Decreasing Generation
Internal NY: Central East Total East UPNY-ConEd UPNY-SENY NYC Cable	~ 30% Ontario ~70% Upstate New York	~93% New York City ~7% Long Island
NYISO-PJM	~70% Downstate New York ~30% Upstate New York	~70% Eastern PJM ~30% West/Central PJM
PJM-NYISO	~70% Eastern PJM ~30% West/Central PJM	~70% Downstate New York ~30% Upstate New York

All three generation-shift scenarios were used to evaluate the closed versions of the interfaces shown in the above table. The interface definitions are shown in Appendix A. Note that the VFT project is included in all of the studied interfaces except for Central East. Details of the generation shift scenarios are provided below.

Internal New York Interfaces:

The **S05** and **S05-VFT** cases were used to evaluate the Central East, Total East (closed), UPNY-ConEd (closed), UPNY-SENY (closed) and NY City Cable (closed) interfaces. The VFT was set for 300MW flow from PJM to NYC. A 500MW generation shift was implemented as follows:

- Increased 70% of 500MW (350MW) Generation in Upstate NY
  79530 GILBOA4 4 0 + 250 = 250
  79528 GILBOA2 2 0 + 4.8 = 4.8
  78951 JMCG113 1 0 + 95.2 = 95.2
  Increased 30% of 500MW (150MW) Generation in Ontario
  80899 LAKEVIEW 1 0 + 150 = 150
  (250 + 4.8 + 95.2 + 150 = 500MW Increase)
- Decreased 93% of 500MW (465MW) Generation in NYC
  74707 RAV 1 1 79.8 - 79.8 = 0
  74707 RAV 1 2 205.2 - 205.2 = 0
  74708 RAV 2 2 205.2 - 180.0 = 25.2
  Decreased 7% of 500MW (35MW) Generation in Long Island
  74926 TRIGEN 2 36 - 35 = 1
  (79.8 + 205.2 + 180 + 35 = 500MW Decrease)

The contingencies evaluated in the normal transfer limit analysis for these interfaces are listed in NY.txt and NY-VFT.txt. A reduced set of contingencies was used in the emergency transfer limit analysis – stuck breaker and tower outages were removed.

PJM-NY Interface:

The **S05** and **S05-VFT** cases were used to evaluate the PJM-NY interface. The VFT was set for 300MW of power flow from PJM to NYC. A 200MW generation shift was implemented as follows:

- Increased 70% of 200MW (140MW) Generation in Eastern PJM
  4969 BURLNGT7 2 0 + 19 = 19
  5060 HUDSON 3 1 0 + 120 = 120
  Increased 30% of 200MW (60MW) Generation in West / Central PJM
  9848 A13 CT1 1 0 + 30 = 30
  9849 A13 ST1 1 0 + 30 = 30
  (19 + 120 + 30 + 30 = 199MW Increase)
- Decreased 70% of 200MW (140MW) Generation in Downstate NY
  74701 IND PT 2 2 872.5 - 140 = 732.5
  Decreased 30% of 200MW (60MW) Generation in Upstate NY
  79527 GILBOA#1 1 250.0 - 60 = 190
  (140 + 60 = 200MW Decrease)

The contingencies evaluated in the normal transfer limit analysis for this interface are listed in PJM.txt and PJM-VFT.txt. A reduced set of contingencies was used in the emergency transfer limit analysis – stuck breaker and tower outages were removed.

NY-PJM Interface:

The **S05b** and **S05b-VFT** cases were used to evaluate the NY-PJM interface. The VFT was set for 300MW of power flow from NY to PJM. A 200MW generation shift was implemented as follows:

- Decreased 70% of 200MW (140MW) Generation in Eastern PJM
  5067 KEARNY11 1 134 – 134 = 0
  4538 BIOENRGY 1 5 – 5 = 0
  Decreased 30% of 200MW (60MW) Generation in West / Central PJM
  8400 MICK 1CT 1 59 – 59 = 0
  (134 + 5 + 59 = 198MW Decrease)
- Increased 70% of 200MW (140MW) Generation in Downstate NY
  74702 RAV 3 1 188 + 154 = 342
  Increased 30% of 200MW (60MW) Generation in Upstate NY
  78959 LGE-GT 1 0 + 44 = 44
  (154 + 44 = 198MW Increase)

The contingencies evaluated in the normal transfer limit analysis for this interface are listed in PJM.txt and PJM-VFT.txt. A reduced set of contingencies was used in the emergency transfer limit analysis – stuck breaker and tower outages were removed.

4.1.2 Evaluation Criteria

The pre-contingency power flow solution parameters for both the base and transfer cases allowed static VAr device (SVD), phase angle regulator (PAR), and load tap changing transformer (LTC) action. The post-contingency solution allowed no action, other than the VFT.

For the normal transfer limit analysis, acceptable pre-contingency thermal branch loading was defined as less than 100% of the normal continuous rating (Rate 1 in the power flow). Acceptable post-contingency loading was defined as less than 100% of the long-term emergency (LTE) rating (Rate 2 in the power flow) for all branches, except for selected ConEd cables. The loading on those cables was deemed acceptable up to 100% of the short-term emergency (STE) rating (Rate 3 in the power flow). The selected ConEd cables were:

Dunwoodie-Rainey 345kV (2 cables)
Sprainbrook-W 49th St 345kV (2 cables)
Sprainbrook-Tremont 345kV (1 cable)
Farragut-Rainey 345kV (3 cables)
E 15th St – Farragut 345kV (4 cables)
E 15th St – W 49th St 345kV (2 cables)
E 15th St – Astoria 345kV (2 cables)
Farragut – Gowanus 345kV (2 cables)
Goethals – Gowanus 345kV (2 cables)

For the emergency transfer limit analysis, acceptable pre-contingency thermal branch loading was again defined as less than 100% of the normal continuous rating (Rate 1 in the power flow). Acceptable post-contingency loading was defined for all branches as less than 100% of the short-term emergency (STE) rating (Rate 3 in the power flow).

For the transfer limit analysis, the ratings of lines in ConEd were modified to reflect a MW limit rather than an MVA limit. Specifically, the ratings of all lines in ConEd were increased by 10%.

A minimum branch distribution factor of 3% was used. Only branches with an increase in post-contingency loading greater than 3% were included in the results.

A maximum generation shift of 10,000MW was used in the linear extrapolation. Any line, which was not overloaded at that shift level was excluded from the results.

A minimum power factor of 0.85 was used in order to account for changes on lines with a high reactive power to real power ratio. The MVA loading on all branches with a power factor less than 0.85 was calculated on the basis of the real power flow and the minimum power factor. Thus, if the real power changes direction, reactive power will follow it and the change will be noticed and included in the results.

4.2 Normal Transfer Limit Analysis Results

A complete list of the normal transfer limit analysis results, including combinations of limiting element and outage, maximum generation shift and interface are provided by linked Excel files in the following sections. The key results for the Central East, Total East (closed), UPNY-ConEd (closed), UPNY-SENY (closed) and NY City Cable (closed) interfaces are described in Section 4.2.1. The key results for the PJM-NY and NY-PJM interfaces are described in Section 4.2.2.

4.2.1 New York Interfaces

The normal transfer limits for the Central East, Total East (closed), UPNY-ConEd (closed), UPNY-SENY (closed) and NY City Cable (closed) interfaces are shown in Table 4-2.

Table 4-2. Normal Transfer Limits for New York Interfaces.

Interface	Benchmark System	VFT System	Δ
Central East	1933 MW	1946 MW	13 MW
Total East (closed)	3828 MW	4123 MW	295 MW
UPNY-ConEd (closed)	6940 MW	7194 MW	254 MW
UPNY-SENY (closed)	5363 MW	5635 MW	272 MW
NY City Cable (closed)	4203 MW	4922 MW	719 MW

As expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 250 to 300MW for the Total East, UPNY-ConEd and UPNY-SENY interfaces. There was no significant change in the Central East transfer limit due to the addition of the VFT, which was also not included in that interface definition.

The increase in the NY City Cable interface is a function of performing a linear analysis on a system with significant non-linear elements (i.e., PARs). The application of the 500MW generation shift to the benchmark case resulted in the loss of angular range on the Goethals PAR. The flow was about 140MW, with a PAR setting of 100MW. The application of the same shift to the VFT case also resulted in the loss of angular range on the Goethals PAR. However, the flow was about 120MW, still with a PAR setting of 100MW. Therefore the linear analysis showed a higher distribution factor and a lower maximum generation shift for the benchmark case than for the VFT case. The limiting elements and outages were also different. As a result, the increase in transfer limit due to the VFT is probably optimistic. A small parametric analysis was performed to determine the impact of the VFT on the NY City Cable interface, if the local PAR flows were similar in the benchmark and VFT transfer cases. The results showed an increase in the interface due to the VFT of approximately 300MW.

The transfer limits shown in the above table are somewhat different than previous NYISO Area Transmission Review reports. This is likely due to the different analytical technique – specifically, the PAR settings. For this analysis the PAR settings remained as provided in the power flow database. Therefore, the PARs may or may not be transferring maximum power in the same direction as the generation shift scenario. The key point is that the VFT project has either no impact or increases interface transfer limits.

The limiting element and outage for each interface under both benchmark and VFT system conditions are shown in Table 4-3 and Table 4-4, respectively. The only difference between the two tables is in the limiting element and outage for the NY City Cable interface. In general, the combination of the limiting element and outage matches recent NYISO Area Transmission Review reports. Differences are likely due to variations in the system approach and the non-linearity of the system as discussed above.

A complete list of all the branch flows and corresponding distribution factors and maximum shifts for all contingencies under benchmark system conditions is provided in the first tab of S05-UPNY-TA.xls. The second tab of S05-UPNY-TA.xls shows all of the interface flows for the base and transfer cases, also under benchmark system conditions.

Similar information is provided for the normal transfer analysis under VFT system conditions in the file S05-VFT-UPNY-TA.xls.

Table 4-3. Limiting Elements/Outages under Benchmark System Conditions for New York Interface Normal Transfer Limits.

Interface	**Limiting Element**	**Outage**
Central East	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
Total East (closed)	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
UPNY-ConEd (closed)	Rock Tavern-Ramapo 345kV	Loss of: Fishkill-Roseton 345kV Rock Tavern-Sugar Loaf 115kV
UPNY-SENY (closed)	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
NY City Cable (closed)	Goethals N –Gowanus N 345kV	None

Table 4-4. Limiting Elements/Outages under VFT System Conditions for New York Interface Normal Transfer Limits.

Interface	Limiting Element	Outage
Central East	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
Total East (closed)	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
UPNY-ConEd (closed)	Rock Tavern-Ramapo 345kV	Loss of: Fishkill-Roseton 345kV Rock Tavern-Sugar Loaf 115kV
UPNY-SENY (closed)	Pleasant Valley-Leeds 345kV	Stuck Breaker Loss of: Pleasant Valley-Athens 345kV Pleasant Valley-Millwood 345kV
NY City Cable (closed)	E 15th St – W 49th St 345kV	Stuck Breaker Loss of: W 49th St-E 15th St 345kV W 49th St 345kV/138kV Transformer

4.2.2 PJM-NY and NY-PJM Interfaces

The normal transfer limit results for the PJM-NY and NY-PJM interfaces are shown in Table 4-5.

Table 4-5. Normal Transfer Limits for PJM-NY and NY-PJM Interfaces.

Interface	Benchmark System	VFT System	Δ
PJM-NY	1770 MW	1992 MW	222 MW
NY-PJM	908 MW	1180 MW	272 MW

As expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 200 to 300MW for the two interfaces.

As previously noted, the transfer limits shown in the above table are somewhat different than previous NYISO Area Transmission Review reports. This is likely due to the different analytical technique and the impact of non-linear system elements. However, the difference (approximately 900MW) between PJM-NY and NY-PJM transfer limits is consistent. The key point remains that the VFT project increases interface transfer limits.

The limiting element and outage for each interface under both benchmark and VFT system conditions are shown in Table 4-6 and Table 4-7, respectively. There is no difference between the two tables in the limiting element and outage for each interface.

Table 4-6. Limiting Elements/Outages under Benchmark System Conditions for PJM-NY and NY-PJM Interface Normal Transfer Limits.

Interface	Limiting Element	Outage
PJM-NY	Homer City-Stolle Rd 345kV	Stuck Breaker Loss of: Dunkirk-Gardenville 230kV Dunkirk-S. Ripley 230kV Dunkirk 230kV/115kV Transformer
NY-PJM	Erie E-S Ripley 230kV	None

Table 4-7. Limiting Elements/Outages under VFT System Conditions for PJM-NY and NY-PJM Interface Normal Transfer Limits.

Interface	Limiting Element	Outage
PJM-NY	Homer City-Stolle Rd 345kV	Stuck Breaker Loss of: Dunkirk-Gardenville 230kV Dunkirk-S. Ripley 230kV Dunkirk 230kV/115kV Transformer
NY-PJM	Erie E-S Ripley 230kV	None

Details of the PJM-NY normal transfer limit analysis results under benchmark system conditions are shown in S05ph-PJMNY-TA.xls. Similar information is provided for the normal transfer analysis under VFT system conditions in the file S05ph-VFT-PJMNY-TA.xls.

Details of the NY-PJM normal transfer limit analysis results under benchmark system conditions are shown in S05b-NYPJM-TA.xls. Similar information is provided for the normal transfer analysis under VFT system conditions in the file S05b-VFT-NYPJM-TA.xls.

4.3 Emergency Transfer Limit Analysis Results

For the emergency transfer limit analysis, system performance in response to design contingencies was compared to the STE rating. A complete list of the emergency transfer limit analysis results, including combinations of limiting element and outage, maximum generation shift and interface are provided by linked Excel files in the following sections. The key results for the Central East, Total East (closed), UPNY-ConEd (closed), UPNY-SENY (closed) and NY City Cable (closed) interfaces are described in Section 4.3.1. The key results for the PJM-NY and NY-PJM interfaces are described in Section 4.3.2.

4.3.1 New York Interfaces

The emergency transfer limits for the Central East, Total East (closed), UPNY-ConEd (closed), UPNY-SENY (closed) and NY City Cable (closed) interfaces are shown in Table 4-8.

Table 4-8. Emergency Transfer Limits for New York Interfaces.

Interface	**Benchmark System**	**VFT System**	**Δ**
Central East	2042 MW	2079 MW	37 MW
Total East (closed)	4240 MW	4524 MW	284 MW
UPNY-ConEd (closed)	7948 MW	8177 MW	229 MW
UPNY-SENY (closed)	6502 MW	6712 MW	210 MW
NY City Cable (closed)	4203 MW	5463 MW	1260 MW

As expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 200 to 300MW for the Total East, UPNY-ConEd and UPNY-SENY interfaces. There was no significant change in the Central East transfer limit due to the addition of the VFT, which was also not included in that interface definition.

As discussed in Section 4.2.1, the increase in the NY City Cable interface is a function of performing a linear analysis on a system with significant non-linear elements (i.e., PARs). The application of the 500MW generation shift to the benchmark case resulted in the loss of angular range on the Goethals PAR. The flow was about 140MW, with a PAR setting of 100MW. The application of the same shift to the VFT case also resulted in the loss of angular range on the Goethals PAR. However, the flow was about 120MW, still with a PAR setting of 100MW. Therefore the linear analysis showed a higher distribution factor and a lower maximum generation shift for the benchmark case than for the VFT case. The limiting element was also different. As a result, the increase in transfer limit due to the VFT is probably optimistic.

The transfer limits shown in the above table are somewhat different than previous NYISO Area Transmission Review reports. This is likely due to the different analytical technique and the impact of non-linear system elements. The key point is that the VFT project has either no impact or increases interface transfer limits.

The limiting element and outage for each interface under both benchmark and VFT system conditions are shown in Table 4-9 and Table 4-10, respectively. The only difference between the two tables is in the limiting element and outage for the NY City Cable interface. In general, the combination of the limiting element and outage matches recent NYISO Area Transmission Review reports. Differences are likely due to variations in the system approach and the non-linearity of the system as discussed above.

Table 4-9. Limiting Elements/Outages under Benchmark System Conditions for New York Interface Emergency Transfer Limits.

Interface	Limiting Element	Outage
Central East	Pleasant Valley-Leeds 345kV	None
Total East (closed)	Pleasant Valley-Leeds 345kV	None
UPNY-ConEd (closed)	Rock Tavern-Ramapo 345kV	Loss of: Fishkill-Roseton 345kV Rock Tavern-Sugar Loaf 115kV
UPNY-SENY (closed)	Pleasant Valley-Leeds 345kV	None
NY City Cable (closed)	Goethals N –Gowanus N 345kV	None

Table 4-10. Limiting Elements/Outages under VFT System Conditions for New York Interface Emergency Transfer Limits.

Interface	Limiting Element	Outage
Central East	Pleasant Valley-Leeds 345kV	None
Total East (closed)	Pleasant Valley-Leeds 345kV	None
UPNY-ConEd (closed)	Rock Tavern-Ramapo 345kV	Loss of: Fishkill-Roseton 345kV Rock Tavern-Sugar Loaf 115kV
UPNY-SENY (closed)	Pleasant Valley-Leeds 345kV	None
NY City Cable (closed)	Dunwoodie-Shore Rd 345kV	None

A complete list of all the branch flows and corresponding distribution factors and maximum shifts for all contingencies under benchmark system conditions is provided in the first tab of S05-UPNY-TA-emer.xls. The second tab of S05-UPNY-TA-emer.xls shows all of the interface flows for the base and transfer cases, also under benchmark system conditions.

Similar information is provided for the emergency transfer analysis under VFT system conditions in the file S05-VFT-UPNY-TA-emer.xls.

4.3.2 PJM-NY and NY-PJM Interfaces

The emergency transfer limit results for the PJM-NY and NY-PJM interfaces are shown in Table 4-11.

Table 4-11. Emergency Transfer Limits for PJM-NY and NY-PJM Interfaces.

Interface	Benchmark System	VFT System	Δ
PJM-NY	2587 MW	2937 MW	350 MW
NY-PJM	908 MW	1180 MW	272 MW

As expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 300MW for the NY-PJM interface. There is no difference between this emergency transfer limit and the corresponding normal transfer limit since the limiting condition was with all lines in-service. The increase in emergency transfer limit for the PJM-NY interface was about 350MW.

As previously noted, the transfer limits shown in the above table are somewhat different than previous NYISO Area Transmission Review reports. This is likely due to the different analytical technique and the impact of non-linear system elements. The key point remains that the VFT project increases interface transfer limits.

The limiting element and outage for each interface under both benchmark and VFT system conditions are shown in Table 4-12 and Table 4-13, respectively. There is no difference between the two tables in the limiting element and outage for each interface.

Table 4-12. Limiting Elements/Outages under Benchmark System Conditions for PJM-NY and NY-PJM Interface Emergency Transfer Limits.

Interface	Limiting Element	Outage
PJM-NY	Homer City-Watercure 345kV	None
NY-PJM	Erie E-S Ripley 230kV	None

Table 4-13. Limiting Elements/Outages under VFT System Conditions for PJM-NY and NY-PJM Interface Emergency Transfer Limits.

Interface	Limiting Element	Outage
PJM-NY	Homer City-Watercure 345kV	None
NY-PJM	Erie E-S Ripley 230kV	None

Details of the PJM-NY emergency transfer limit analysis results under benchmark system conditions are shown in S05ph-PJMNY-TA-emer.xls. Similar information is provided for the emergency transfer analysis under VFT system conditions in the file S05ph-VFT-PJMNY-TA-emer.xls.

Details of the NY-PJM emergency transfer limit analysis results under benchmark system conditions are shown in S05b-NYPJM-TA-emer.xls. Similar information is provided for the emergency transfer analysis under VFT system conditions in the file S05b-VFT-NYPJM-TA-emer.xls.

4.4 Stability and Voltage Transfer Limits

An investigation was made to determine whether thermal, voltage, or stability was the most limiting for power transfer from upstate NY to NYC. The thermal transfer limit analysis described above used a summer case (S05T) with transfer from upstate NY to NYC increased by 500MW from the base summer case. This transfer level was shown to exceed the thermal transfer limit by about 200MW.

Voltage and stability analyses were conducted for the S05T case and showed no significant violations of criteria. Therefore, it was concluded that the thermal constraints were the most limiting for power transfer into NYC.

5 Thermal and Voltage Analysis

5.1 Load Pocket Analysis

Evaluation of thermal and voltage performance for contingencies in and around the Staten Island and In-City load pockets was performed using the contingencies listed in Appendix B. There were a total of 51 contingencies, including:

- Load pocket contingency list from the Liberty SRIS.
- All stuck breaker contingencies for Goethals 345kV and Fresh Kills 345kV with reconfiguration of Goethals 345kV proposed for Liberty project.
- Extreme contingencies for loss of all connections to Goethals 345kV and for loss of all connections to Fresh Kills 345kV
- Loss of VFT; loss of Linden-Goethals PAR; loss of one Hudson-Farragut PAR.

This analysis was performed for pre- and post-project cases for summer 2005 system with VFT flow into NYC and flow out of NYC, and for winter 2005 system with flow into NYC.

A detailed tabulation of results is provided in Appendix C. The headings of the cases, below, are linked to the corresponding sections of Appendix C. These results are summarized below:

S05 Case – VFT Flow from PJM to NYC

No voltage violations were observed in either the pre-project or post-project cases, except for slightly high voltages at Farragut 345kV in both cases.

A few 138kV branches were at or near their loading limits in the pre-project case. The addition of the VFT did not increase any of these loadings by more than 1.6% of rating.

S05b Case – VFT Flow from NYC to PJM

No voltage violations were observed in either the pre-project or post-project cases, except for slightly high voltages at Farragut 345kV in both cases.

The Freshkills-Willowbrook 138kV lines were overloaded in the pre-project case for contingencies in that area. The addition of the VFT decreased the loading on these lines slightly.

W05 Case – VFT Flow from PJM to NYC

No voltage violations were observed for either the pre-project or post-project case.

A few branches were slightly above their LTE loading limits in the pre-project case for the Goethals substation extreme contingency. The addition of the VFT increased the loading on these lines by 0.4% or less. These loading levels were well below the STE limit of 394 MVA.

Overall, the addition of the VFT had no significant adverse impact on the voltage and thermal violations for the load pockets.

5.2 Non-Simultaneous Double Element Contingency Analysis

Based on ConEd input, six contingencies were specified for analysis of non-simultaneous double element outages. These contingencies are listed in Appendix D. Contingencies E (Linden-Goethals radial Feeder G23L/M) and F (Inter-Tie PSEG-ConEd Feeder A2253) were selected to develop two corresponding N-1 base cases, with adjustment of generation dispatch, if necessary, to return branch flows to within normal limits. Following this, the other contingencies in Appendix D were tested on each of these cases.

5.2.1 First-Contingency Power Flow Development

The development of the databases representing the initial post-contingency conditions is described in the following paragraphs.

Contingency E, Loss of Linden to Goethals radial feeder G23l/M

Under benchmark conditions, the outage caused the Cogen plant's 645MW of generation to be isolated. This lost generation was added to Gowanus and Astoria West generators to obtain the base case for the second contingency. This case was solved with phase shifters, taps, and area interchange control allowed to operate. This case was saved as **S05-E**. The same was done for the other summer benchmark case, **S05b-E**, and for the W05 case, **W05-E**.

Under post-project conditions, the outage caused the loss of the Cogen plant's 645MW of generation and the Linden VFT's 300MW of transfer. The lost 645MW was added to the Gowanus and Astoria West generators. The 300MW of lost import from the VFT was dispatched to Liberty units and the Salem unit was turned off. This case was then solved with phase shifters, taps, and area interchange control allowed to operate. This case was saved as **S05-VFT-E**. The same was done for NY to PJM flow case, **S05b-VFT-E,** and for the W05 case and saved as **W05-VFT-E**

Contingency F, Loss of Inter-Tie PSEG-ConEd Feeder A2253

Under benchmark conditions, the outage case was solved with phase shifters, taps, and interchange control allowed to operate. This case was saved as **S05-F**. The same was done for the other summer benchmark case, **S05b-F**, and for the W05 case,**W05-F**.

Under post-project conditions, the outage case was solved with phase shifters, taps, and area interchange control allowed to operate. This case was saved as **S05-VFT-F**. The same was done for the other summer benchmark case, **S05b-VFT-F**, and for the W05 case, **W05-VFT-F.**

5.2.2 Results

Results for each case are given in Appendix E, and are summarized as follows:

S05 Case – VFT Flow from PJM to NYC

No voltage or thermal violations were observed in either the pre-project or post-project cases, for Contingency E or Contingency F, followed by one of the other contingencies.

S05b Case – VFT Flow from NYC to PJM

No voltage violations were observed in either the pre-project or post-project cases, except for slightly high voltages at a few buses for both cases for Contingency E followed by Contingency B or F.

No thermal violations were observed for any of the cases.

W05 Case – VFT Flow from PJM to NYC

No voltage violations were observed in either the pre-project or post-project cases, except for slightly high voltages at a few buses for both cases for Contingency F followed by Contingency E.

No thermal violations were observed for any of the cases.

Overall, the addition of the VFT had no significant adverse impact on the voltage and thermal violations for the non-simultaneous double element outages that were studied.

5.3 Impact on Phase-Shifted Ties

The impact of the VFT on the "ABC" phase-shifted ties between PJM and NYC was evaluated using a two-step approach, as follows:

1. After solution of the contingencies run for the Load Pocket Analysis and before any adjustment of the PARs, the flows and angles were noted to evaluate the impact of the VFT on the flows through the ties immediately after a contingency.
2. The post-contingency cases were resolved allowing adjustment of the PARs to evaluate the impact of the VFT on the PARs' ability to restore the desired flow.

This analysis was run using the S05 cases with the VFT transferring 300MW from PJM to NYC. The complete results are tabulated in Appendix F. Results for significant cases are summarized below, comparing the response after PAR adjustment for cases with and without the VFT in service.

5.3.1 Pre-Contingency PAR Conditions

The pre-contingency angles and flows for the PARs and VFT were as follows:

	with VFT		without VFT	
PAR angles and P flow	deg	MW	deg	MW
Linden Goethals	-18.2	101.3	-21.2	83.6
Hudson-Faragut1	-18.2	434.9	-18.2	437.3
Hudson-Faragut2	-18.2	453.6	-18.2	456.1
Linden VFT	1.6	300.5		

The VFT, with 300MW flowing into NYC, has the effect of moving the Linden-Goethals PAR angle away from its negative limit (-25 degrees), which provides a bit more flexibility in controlling the flow through the PAR. There is no significant impact on the Hudson-Farragut PARs

5.3.2 Post-Contingency PAR Conditions

Detailed post-contingency results are described below:

1. Loss of the VFT only (Contingency 2) – The 300MW initially flowing through the VFT is redistributed to other paths, primarily the Linden-Goethals PAR. After PAR adjustment, the Hudson-Farragut ties have sufficient angle range to return their flows to the desired values (450MW). The Linden-Goethals goes to its maximum negative phase shift and continues to carry about 250MW, significantly more than its desired flow of 100MW, but less than its continuous rating of 499MW.

   Contingency Number: 2 Linden 300MW VFT Outage

	with VFT		without VFT	
PAR angles and P flow	deg	MW	deg	MW
Linden Goethals	-25.0	249.0	-21.2	83.6
Hudson-Faragut1	-23.6	433.6	-18.2	437.3
Hudson-Faragut2	-23.6	451.1	-18.2	456.1
Linden VFT	1.6	0.0		

   Restoration of the VFT tie or reduction of the PJM-NYC transfer would be necessary to return the Linden-Goethals PAR flow to 100MW.

2. Loss of the VFT plus Linden Cogen (Contingencies 1, 37, 43) – After PAR adjustment, all three of the ABC PARs go to essentially their maximum negative phase shift. This tends to return the flows on the Hudson-Farragut ties to the desired values (450MW). The Linden-Goethals tie continues to carry significantly more than its desired flow of 100MW, but less than its LTE rating of 699MW. Pre-project cases without the VFT also result in the Linden Goethals PAR going to its angle limit and conducting more than the desired power.

   Contingency Number: 1 Outage of LINDEN COGEN-GOTHLS S ck 1&2 (G23L/M)

	with VFT		without VFT	
PAR angles and P flow	deg	MW	deg	MW
Linden Goethals	-25.0	544.2	-25.0	400.9
Hudson-Faragut1	-29.1	474.7	-29.1	417.2
Hudson-Faragut2	-30.0	448.2	-29.1	434.6
Linden VFT	-180.0	0.0		

   Contingency Number: 37 GOETHALS SB-8 - Outage of GOWANUS S & COGEN CABLE

	with VFT		without VFT	
PAR angles and P flow	deg	MW	deg	MW
Linden Goethals	-25.0	478.7	-25.0	287.6
Hudson-Faragut1	-30.0	445.0	-27.3	440.5
Hudson-Faragut2	-30.0	461.7	-27.3	457.9
Linden VFT	-180.0	0.0		

   Contingency Number: 43 GOETHALS SB-6 - Outage of COGEN CABLE & FRKLS 21

	with VFT		without VFT	
PAR angles and P flow	deg	MW	deg	MW
Linden Goethals	-25.0	544.2	-25.0	382.1
Hudson-Faragut1	-29.1	474.7	-27.3	457.0
Hudson-Faragut2	-30.0	448.1	-27.3	474.3
Linden VFT	180.0	-0.0		

   Restoration of the VFT and Linden Cogen or redispatching other generation would be necessary to return the Linden-Goethals PAR flow to 100MW.

3. Loss of the Linden-Goethals PAR (Contingencies 3, 34, 39, 44) – The 100MW initially flowing through the PAR is redistributed to other paths. After PAR adjustment, the Hudson-Farragut ties have sufficient angle range to return their flows to the desired values (450MW). The VFT continues to regulate its flow at 300MW.

Contingency Number: 3 Outage of Inter-Tie PSEG-ConEd Fdr A2253 (PAR)

PAR angles and P flow	with VFT deg	with VFT MW	without VFT deg	without VFT MW
Linden Goethals	-18.2	0.0	-21.2	0.0
Hudson-Faragut1	-21.8	436.0	-21.8	445.8
Hudson-Faragut2	-21.8	454.1	-21.8	463.9
Linden VFT	7.5	301.7		

Contingency Number: 34 Outage of FR KILLS-GOTHLS (21 & 22) & PAR Tie (A2253)

PAR angles and P flow	with VFT deg	with VFT MW	without VFT deg	without VFT MW
Linden Goethals	-18.2	0.0	-21.2	0.0
Hudson-Faragut1	-21.8	435.6	-21.8	448.1
Hudson-Faragut2	-21.8	453.7	-21.8	466.2
Linden VFT	5.2	302.4		

Contingency Number: 39 GOETHALS SB-7 - Outage of GOWANUS S & LINDEN PAR

PAR angles and P flow	with VFT deg	with VFT MW	without VFT deg	without VFT MW
Linden Goethals	-18.2	0.0	-21.2	0.0
Hudson-Faragut1	-20.0	460.8	-20.0	444.2
Hudson-Faragut2	-20.0	478.9	-20.0	462.6
Linden VFT	-0.7	295.9		

Contingency Number: 44 GOETHALS SB-2N - Outage of LINDEN PAR & FRKLS 22

PAR angles and P flow	with VFT deg	with VFT MW	without VFT deg	without VFT MW
Linden Goethals	-18.2	0.0	-21.2	0.0
Hudson-Faragut1	-21.8	438.9	-21.8	446.8
Hudson-Faragut2	-21.8	457.0	-21.8	464.9
Linden VFT	7.6	301.0		

4. Loss of one Hudson-Farragut PAR (Contingency 26) – After PAR adjustment, both of the remaining PARs are at their angle limit. The other Hudson-Farragut tie is close to its desired flow. The Linden-Goethals tie is at about 200MW, more than its desired flow of 100MW, but less than its continuous rating of 499MW. The VFT continues to regulate its flow at 300MW. For the pre-project case without the VFT, the flow on the Linden-Goethals PAR is even greater than with the VFT.

Contingency Number: 26 Outage of HUDSON - FARRAGUT PAR

PAR angles and P flow	with VFT deg	with VFT MW	without VFT deg	without VFT MW
Linden Goethals	-25.0	191.5	-25.0	235.9
Hudson-Faragut1	-30.0	483.4	-30.0	475.5
Hudson-Faragut2	-18.2	0.0	-18.2	0.0
Linden VFT	10.9	300.1		

For the benchmark summer system condition without the VFT project, the Linden-Goethals PAR is operating close to its maximum negative limit in order to hold the power flow through it down to 100MW. Therefore, any contingency that reduces other transmission between PJM and NYC or that trips generation in NYC, will tend to drive the PAR to its angle limit and result in greater than the 100MW flow through the PAR.

The only noticeable impact of the VFT is for loss of the VFT when transferring power into NYC. The VFT power will tend to flow through the Linden-Goethals PAR since the PAR does not have enough angle range to limit the flow. However, if the power did not flow through this PAR, it would have to flow through some other path into NYC until the VFT is restored or the power transfer is cut to recognize the loss of the VFT. Since the Linden-Goethals PAR appears to have sufficient thermal capacity to carry the additional flow, this does not represent an adverse impact. This behavior is similar to that observed for the loss of a Hudson-Farragut PAR.

If the initial schedule of the ABC PARs were set for more power to flow through Linden-Goethals and less through Hudson-Farragut, the deviations from scheduled flows for the above contingencies would be less, but the overall effect would be the same.

The project scope requested analysis of the impact of an assumed VFT overload capability of 120% of rated MW for certain contingencies. The only case where this might be considered is for the loss of one of the Hudson-Farragut PARs to limit the flow through the Linden-Goethals PAR. However, since the Linden-Goethals PAR appears to have adequate thermal capacity to carry this flow, there does not appear to be any justification for increasing the flow through the VFT.

6 TRANSIENT STABILITY ANALYSIS

Transient stability analysis was performed to evaluate the impact of the 300MW Linden VFT. Two types of analysis were performed – one focused on system response to a variety of fault disturbances and the other focused on evaluating the critical clearing time for local generating units.

6.1 Transient Stability Results

Fourteen fault scenarios, including 5 normally cleared, 7 stuck breaker and 2 extreme contingencies were evaluated. The file Linden Stability Cases.xls describes the switching sequence used for each contingency as well as the following:

1. Circuit breaker diagrams for each of the contingencies showing the individual breaker opening times.
2. Links to plots of selected variables for the stability runs. Each set of plots shows the benchmark case with solid lines and the VFT case with dotted lines.

The results of the stability analysis are summarized in Table 6-1 and Table 6-2, for summer and winter conditions, respectively. The addition of the VFT had no impact on system stability under any of the study conditions.

Table 6-1. Stability Results Summary for Summer Cases.

Fault	**Summer 2005 Benchmark**	**Summer 2005 300 MW to NYC**	**Summer 2005 300 MW to PJM**
nc3pl22	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3pl25	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3pl26	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3plib	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3plcog	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbfrkl3	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth1n	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth6a	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth6b	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth7	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth8	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth11	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
ecfrkill	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
ecgothall	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*

Table 6-2. Stability Results Summary for Winter Cases.

Fault	Winter 2005 Benchmark	Winter 2005 300 MW to NYC	Winter 2005 300 MW to PJM
nc3pl22	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3pl25	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3pl26	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3plib	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
nc3plcog	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbfrkl3	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth1n	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth6a	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth6b	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth7	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth8	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
sbgoth11	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
ecfrkill	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*
ecgothall	*Stable, Damped*	*Stable, Damped*	*Stable, Damped*

6.2 Critical Clearing Time Evaluation

An evaluation was performed to determine the critical clearing times for the generating units near the proposed VFT project. This included the Arthur Kill, Liberty, and Linden Cogen units. To test the first-swing stability of the Arthur Kill 3 unit, a 3-phase bolted fault was applied to the Fresh Kills 345kV bus. The fault was removed a specified time later without tripping any power system elements. Similarly, the stability of the Liberty and Linden Cogen units was tested with a 3-phase bolted fault applied to the Goethals 345kV substation. This fault was also removed without tripping any power system elements. These tests were performed on the benchmark system without the VFT and on two systems with the VFT – 300MW of power transfer from PJM to NY and 300MW of power transfer from NY to PJM. Both summer and winter conditions were evaluated.

The results of this analysis are shown in Table 6-3. The critical clearing times shown are minimum values. The actual critical clearing times may be higher, since the evaluation began with a 20-cycle fault application time and used a 5-cycle decrement. The Linden Cogen steam turbines were less stable than the gas turbines due to a smaller inertia. The steam turbine inertia was 3.39 sec, compared to 5.92 sec for the gas turbines.

The VFT project had no impact on the critical clearing times for any of the units (Arthur Kill, Liberty, and Linden Cogen) evaluated.

Table 6-3. Minimum Critical Clearing Times for Local Generation.

Unit	Minimum Critical Clearing Time
Arthur Kill 3	20 cycles
Liberty	10 cycles
Linden Cogen Gas Turbines	15 cycles
Linden Cogen Steam Turbines	10 cycles

7 SHORT CIRCUIT ANALYSIS

The objective of the short circuit analysis was to assess the impact of the VFT project on the adequacy of existing circuit breakers and related equipment on the Con Edison system. The analysis, using the NYISO Fault Current Assessment Guideline, considered three-phase-to-ground, two-phase-to-ground, single-phase-to ground faults and covered all Con Edison 69kV, 138kV and 345kV substations for summer peak conditions only.

The short circuit analysis was performed using the ASPEN Short Circuit Program. A database called "Class 2002 ATRA – 3% reactor – VFT.olr" was provided by NYISO. The approved study work scope included the project list shown in Table 7-1. Several of the projects listed were not included in the provided database. In addition, several of the projects were withdrawn from the NYISO interconnection queue since the work scope was developed. These withdrawn projects were not included in the short-circuit database. In addition, several projects remote from the study area that were not in the provided database were not added. The Liberty project, which is interconnected into the reconfigured Goethals substation, was added to the study database.

Table 7-1. Project List from Approved Workscope.

Scope Appendix A #	Project	Comment
1	PG&E Athens	Included
2	PSEG Bethlehem	Included
3	Cross Sound Cable (New Haven-Shoreham)	Included
4	Keyspan Ravenswood (138kV)	Not included – Withdrawn from queue
5	NYPA Poletti Expansion	Included
6	NYC Energy Kent Avenue	Included
7	East River Repowering	Included
8	SCS Astoria Energy	Included
9	ANP Brookhaven Energy	Included
10	Glenville Energy Park	Not included – No influence on results
11	PP&L Global Kings Park	Not included – Withdrawn from queue
12	LMA Lockport II	Included
13	BesiCorp Empire State Newsprint	Not included – No influence on results
14	Fortistar VP	Included
15	Fortistar VAN	Included
16	Calpine Eastern JFK Expansion	Included
17	Calpine Wawayanda	Included
18	Reliant Astoria Repowering	Included
19	Neptune PJM-NYC DC	Removed - Withdrawn from queue
20	PSEG Cross Hudson Project	Included
21	Spagnoli Road Combined Cycle	Included
22	Mirant Bowline Point 3	Included
23	Liberty Radial Interconnection to NYC	Added
24	Neptune PJM-LI HVDC	Added
25	TransGas Energy	Not included – No interconnection identified
26	Bay Energy	Included

The benchmark database for this analysis was then further modified to incorporate the VFT project. The VFT project was connected to a new bus on the Warinanco-A26 230kV line in NJ and the reconfigured Goethals 345kV substation in New York. The VFT model consisted of two 240 MVA transformers of 8% reactance and one 300 MVA transformer with 12.3% reactance, as shown in Figure 1-4.

7.1 Study Approach

The fault calculation procedure used in this analysis followed the NYISO Operations Engineering "Procedure for Developing and Maintaining the NYISO Short-Circuit Representation" and draft "NYISO Fault Duty Assessment Summer 2005". The calculated fault currents were determined from the "classical method" as used by Con Edison. These fault currents were compared to the 'Lowest Breaker Rating' as given in "NYISO Fault Duty Assessment Summer 2005" Attachment 1. The short-circuit tables in this report also include the ANSI fault point X/R ratio that can be used to determine the total rms fault current based on the breaker contact parting time.

Three-phase, double-line-to ground and line-to-line fault currents were calculated for all 69kV, 138kV and 345kV buses in the Con Edison system. All the buses in the above referenced Attachment 1 were also tested. Both a benchmark case (with the VFT project) and a Linden VFT project case were evaluated. The results were compared to each other and to the breaker interrupting ratings.

The 5% reactor at Corona 138kV substation between the North and South buses was open. The breaker between those North and South buses was closed.

7.2 Results

The ASPEN summaries from the short circuit analysis are provided in Appendices G and H, for the benchmark and VFT systems, respectively.

The key results of the fault calculations are shown in Table 7-2 to Table 7-5. Benchmark results are shown in Table 7-2. In the column labeled "Lowest Breaker Rating", "None" indicates that no value was provided in the "NYISO Fault Duty Assessment Summer 2005" report. A "-" indicates that a rating is unknown, since a new bus was added to accommodate one of the projects listed in Table 7-1.

The results shown in Table 7-2 are similar to those given in the "NYISO Fault Duty Assessment Summer 2005" Attachment 1. One noticeable difference in the Con Edison system was the Vernon East and West buses. These were lower due to the withdrawal of the Keyspan Ravenswood project. From the comparison of Attachment 1 to these results, it appears that some of the fault currents given in the NYISO document could be individual maximum breaker fault currents rather than bus fault currents.

All buses in the Con Edison system (ASPEN Area 2) were checked to determine the influence of the Linden VFT on the 69kV and higher voltage buses. None of the buses at 69kV had fault current increases greater than 50 amperes. The buses greater than 69kV are included in the tables below.

Table 7-3 shows the fault levels with the Linden VFT in service. The addition had little impact on most of the buses, except those close to the VFT installation.

Table 7-4 shows the buses where the fault level was increased by 50 Amps or more due to the addition of the VFT. In comparing the fault levels before and after the installation, one bus was observed with a fault level increase that would place an additional breaker in an over-dutied condition. The Fresh Kills 138kV bus fault current was just below (3-phase=38.46kA, LLG=39.99kA, 1-phase=39.80kA) the lowest breaker rating (40kA) without the VFT, and just above the breaker rating (3-phase=38.51kA, LLG=40.04kA, 1-phase=39.87kA) with the VFT. However, the increase due to the VFT only ranged from 47 to 61 Amps. According to Attachment S of the NYISO tariff, anything less than 100A of short circuit contribution is "de minimus". The Greenwood 138kV substation had an existing over breaker duty condition of approximately 5.0kA without the VFT. The VFT added approximately 50 Amps to it - a 0.1% increase. Larger current increases were observed at the Fresh Kills, Goethals N, Goethals S, Gowanus N, Gowanus S 345kV and Linden 230kV buses. However, the fault currents were below the lowest breaker rating at these buses both with and without the VFT.

For buses that had total bus fault currents higher than the lowest breaker rating, individual breaker duty calculations were performed. These are shown in Table 7-5 for the case with the VFT in service. Bowline Mid had a total bus fault current greater than the breaker rating. However, individual breaker duties appear to be within the breaker ratings. Individual breakers with excessive duty were identified at the Astoria East W, Corona S, and Fresh Kills 138kV buses. The remaining substations have breakers with various ratings, and the data was insufficiently clear to determine how many breakers could be over dutied. However, as shown in the previous tables, the high fault currents at these buses was observed with or without the VFT.

Table 7-2. Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Adirondack	-	ADIRONDACK	230	25	8.300	9.0	7.900	8.6	6.287	7.2	
AES Somerset	-	AES SOMERSET	345	40	14.034	26.6	17.111	30.6	17.686	29.8	
Alps	-	ALPS	345	40	15.390	18.1	14.678	15.9	11.622	7.0	
Astoria East	62	AST-EAST-E	138	63	57.649	36.4	61.162	33.8	58.886	31.4	
Astoria East	-	AST-EAST-W	138	63	60.127	37.4	64.896	35.4	65.242	34.0	**Bus kA>Bkr kA**
Astoria West	64	AST-WEST	138	45	36.012	54.1	39.854	49.4	41.513	46.5	
Athens	3850	ATHENS	345	50	32.991	47.2	32.192	60.4	29.711	68.1	
Barrett	5032	BARRETT	138	57.8	47.142	14.0	47.847	14.2	47.262	14.4	
Bowline	365	BOWLINE MID	345	-	31.129	26.4	34.374	25.3	36.707	24.7	
Bowline 1	2814	BOWLINE1	345	40	29.424	24.2	32.583	26.4	34.617	26.9	
Bowline 2	2813	BOWLINE2	345	40	27.191	26.8	29.271	29.9	30.841	30.9	
Brookhaven	5035	BRKHAVEN	138	35.4	27.143	24.8	26.388	21.2	22.924	9.6	
Buchanan N.	8	BUCHAN N	345	40	29.505	34.2	29.138	31.9	27.510	27.7	
Buchanan S	9	BUCHAN S	345	40	39.071	35.9	38.556	33.2	35.339	27.7	
Buchanan	66	BUCHANAN	138	40	15.550	36.0	15.011	33.9	13.820	29.6	
Clay	-	CLAY	345	40	34.131	21.1	33.323	17.8	28.024	5.9	
Coopers Corners	12	COOPERS CRN		37	16.349	20.3	15.027	20.0	11.201	19.0	
Corona	70	CORONA NORTH	138	45	60.787	20.4	70.700	15.4	62.940	4.5	**Bus kA>Bkr kA**
Corona	-	CORONA SOUTH	138	45	60.793	20.4	70.711	15.4	62.947	4.5	**Bus kA>Bkr kA**
Dewitt	-	DEWITT	345	40	19.431	19.2	18.557	16.7	15.296	7.4	
Dunwoodie No.	72	DUN NO	138	40	31.906	39.9	31.875	34.3	28.649	21.0	
Dunwoodie So	73	DUN SO	138	40	29.915	42.3	30.229	35.8	28.715	21.6	
Dunkirk	-	DUNKIRK	230	37	15.053	32.7	15.061	-192.3	15.048	67.8	
Dunwoodie	12	DUNWODIE	345	63	49.840	27.9	48.916	23.9	40.730	10.0	

Table 7-2 (continued). Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
East 13th	78	E 13 ST	138	63	44.936	44.6	46.185	41.4	46.619	38.0	
East 179th	82	E 179 ST	138	63	41.452	25.8	43.331	21.0	39.404	9.1	
East Fishkill	202	E FISHKILL	345	63	38.587	26.7	36.911	23.8	28.706	12.6	
East Garden City	5038	E.G.C. 5038	138	63	69.946	17.7	72.741	23.7	70.547	24.5	
East Garden City	5001	E.G.G. PAR	345	63	9.691	45.2	9.950	61.0	9.826	63.1	
East Garden City	5002	E.G.C.-1	345	63	7.976	54.5	8.208	72.9	8.225	74.8	
East Garden City	5003	E.G.C.-2	345	63	7.976	54.5	8.208	72.9	8.225	74.8	
East 15th Street	13	E15ST 45	345	None	47.725	25.4	49.814	21.6	47.062	14.1	
East 15th Street	14	E15ST 46	345	None	47.725	25.4	49.954	21.4	46.990	13.8	
East 15th Street	15	E15ST 47	345	None	46.942	26.3	48.994	22.5	46.326	15.5	
East 15th Street	16	E15ST 48	345	None	46.800	25.7	48.998	22.7	46.018	17.7	
Eastview	76	EASTVIEW	138	63	36.019	48.5	35.626	40.6	32.471	17.7	
Edic	0	EDIC	345	37	32.305	21.9	31.210	20.4	26.774	16.4	
Elbridge	-	ELBRIDGE	345	40	16.556	18.7	15.921	16.1	13.364	6.7	
Eastview	1227	EV 56-1	345	None	30.733	28.3	29.415	24.7	23.151	10.2	
Eastview	501	EV 56-2	345	None	33.881	27.5	32.499	24.1	25.165	9.4	
Eastview	502	EV 61-1	345	None	33.231	28.1	32.081	24.4	25.280	9.3	
Eastview	116	EV61-2	345	None	33.197	27.5	31.891	24.0	25.124	9.7	
Farragut	18	FARRAGUT	345	63	51.484	39.6	53.933	33.2	53.315	22.6	
Fitzpatrick	26	FITZPATRICK	345	39	39.458	51.8	42.543	43.0	42.725	30.9	**Bus kA>Bkr kA**
Fox Hills	89	FOXHLS 1	138	40	33.905	10.8	34.573	9.1	26.806	3.2	
Fresh Kills	91	FR KILLS	138	40	38.461	29.1	39.986	28.6	39.804	28.2	
Fresh Kills	22	FR KILLS	345	63	24.673	39.2	25.630	36.3	25.476	32.9	

Table 7-2 (continued). Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Fraser	11	FRASER	345	37	17.358	16.8	16.472	16.5	13.671	15.6	
Freeport	5071	FREEPORT	138	63	32.988	10.4	32.977	10.0	32.059	9.4	
Gardenville		GARDENVILLE2	230	37	22.530	16.7	21.761	16.8	19.786	17.1	
Gilboa	31	GILBOA 345	345	40	22.078	43.7	22.102	42.3	21.509	40.4	
Goethals N.	24	GOETHL N	345	40	25.612	41.1	26.931	35.5	27.182	28.0	
Goethals S.	25	GOETHL S	345	63	25.592	41.0	26.926	35.4	27.185	28.0	
Gowanus N.	26	GOW N	345	40	20.495	40.1	20.878	33.6	18.885	17.1	
Gowanus S.	27	GOW S	345	40	20.496	40.0	20.886	33.4	18.769	16.6	
Greenwood	94	GRENWOOD	138	45	48.662	30.1	51.999	26.1	51.683	21.1	**Bus kA>Bkr kA**
Hillside	0	HILL 230	230	37	12.827	14.3	12.702	15.1	12.341	15.8	
Holbrook	5044	HOLBROOK	138	52.2	47.859	30.0	47.816	27.6	45.800	23.6	
Huntley	0	HUNTLEY	230	37	27.103	23.2	26.716	33.0	25.451	35.1	
Hurley Avenue	216	HURLEY AVE.	345	40	16.892	15.0	16.044	20.5	12.078	27.0	
Independence	-	INDEPENDENCE	345	50	37.261	47.9	39.025	41.4	39.348	32.5	
Jamaica	108	JAMAICA	138	40	49.157	15.2	50.680	12.9	45.713	7.6	**Bus kA>Bkr kA**
Ladentown	2846	LADENTOWN	345	63	41.667	33.7	43.467	27.5	40.399	10.9	
Lafayette	-	LAFAYETTE	345	40	18.288	18.4	17.405	16.1	13.712	6.5	
Leeds	-	LEEDS	345	37	33.565	41.2	32.758	43.9	30.072	47.2	
Linden	4996	LINDEN	230	-	49.086	46.1	53.052	42.3	55.235	39.6	
Lake Success	5046	LKE SCSS	138	57.8	39.879	10.1	37.847	9.5	31.804	7.8	
Marcy	69	MARCY 345	345	63	31.552	23.2	30.465	25.4	25.588	28.9	
Marcy	70	MARCY 765	765	63	9.784	31.1	9.573	34.6	8.448	38.9	

Table 7-2 (continued). Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Massena	79	MASSENA 765	765	63	8.182	33.8	8.482	32.6	8.028	31.3	
Meyer	195	MEYER	230	37	6.210	7.8	5.837	8.7	5.042	10.0	
Middletown Tap	-	MIDDLETN TAP	345	63	17.781	27.6	16.850	36.8	15.198	43.0	
Millwood	114	MILLWOOD	138	20	19.004	41.4	18.582	37.0	17.031	26.8	
Millwood	32	MILLWOOD	345	63	44.478	30.2	42.897	26.7	33.195	12.3	
New Scotland	-	NEW SCOTLAND	345	37	29.976	21.5	28.758	18.5	23.025	6.8	
Newbridge Road	5050	NEWBRID	138	63	72.484	24.7	75.018	24.2	74.600	23.7	**Bus kA>Bkr kA**
New Goethals S	143	NEWGOW 1	138	-	45.222	23.5	48.044	20.7	46.533	16.8	
New Goethals N	144	NEWGOW2	138	-	45.221	23.5	48.044	20.6	46.532	16.8	
Niagara	120	NIAGARA 345	345	63	29.984	32.0	31.758	39.7	32.515	40.3	
Niagara	123	NIAGRA E 230	230	63	49.041	27.0	54.019	32.7	55.496	32.6	
Niagara	125	NIAGRA W 230	230	63	49.041	31.9	54.018	33.7	55.495	34.1	
Nine Mile Point 1	0	NMP#1	345	39	40.378	60.1	44.126	54.5	45.008	50.1	**Bus kA>Bkr kA**
Northport	5077	NRTHPRT1	138	57.8	58.563	22.6	60.071	23.2	60.719	23.6	**Bus kA>Bkr kA**
Oakdale	5	OAKDALE	230	None	6.635	9.5	6.509	10.7	6.205	11.7	
Oakdale	10	OAKDALE 345	345	37	12.826	16.5	12.339	17.2	11.002	18.3	
Oswego	0	OSWEGO	345	37	30.866	50.9	32.950	48.0	33.738	45.9	
Packard	0	PACKARD	230	37.6	42.677	24.5	42.921	21.2	39.251	14.0	**Bus kA>Bkr kA**
Pilgrim	5056	PILGRIM	138	57.8	58.441	17.7	59.973	14.6	51.504	5.4	**Bus kA>Bkr kA**
Pleasant Valley	0	PLEASANT VAL	345	63	39.358	24.4	37.176	31.5	25.763	44.1	
Poletti	165	POLETTI	345	63	40.698	29.8	42.051	28.2	38.824	26.0	
Porter	0	PORTER	230	25	18.380	29.2	18.693	26.3	18.563	22.2	

Table 7-2 (continued). Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Port Jefferson	5057	PT JEFF1	138	63	15.616	17.3	15.507	18.1	15.390	18.8	
Port Jefferson	5048	PT JEFF2	138	63	15.448	17.0	15.372	17.7	15.280	18.4	
Pleasantville	127	PVILLE-1	345	63	21.369	25.2	20.095	22.8	15.083	12.3	
Queensbridge	129	QUEENSBG	138	45	35.192	48.7	40.130	38.0	38.857	21.2	
Rainey	41	RAINEY	345	63	49.294	37.3	51.176	34.0	49.177	29.4	
Ramapo	45	RAMAPO	345	40	44.636	31.4	44.826	26.8	39.281	13.1	**Bus kA>Bkr kA**
Ramapo	2	RAMAPO	500	None	11.080	42.5	10.913	36.1	9.767	17.4	
Reynolds Road	0	REYNOLDS	345	None	11.833	19.0	11.424	16.3	10.037	8.3	
Riverhead	5058	RIVERHD	138	36.1	15.834	14.2	15.599	14.7	15.128	15.2	
Robinson Road	210	ROBINSON RD.	230	43	14.375	12.9	13.565	13.1	11.340	13.5	
Rock Tavern	24	ROCK TAVERN	345	38	28.963	24.2	27.651	21.6	22.510	12.6	
Roseton	210	ROSETON	345	38	34.948	30.6	33.992	30.2	30.712	29.4	
Rotterdam	-	ROTTERDAM	230	25	12.544	12.8	12.023	10.7	11.288	5.1	
Ruland	5080	RULND RD	138	57.8	45.542	44.5	44.599	42.0	42.747	38.1	
South Ripley	-	S RIPLEY	230	40	9.464	34.5	9.044	30.3	7.595	16.3	
South Mahwah	49	S.MAH-A	345	40	34.903	22.0	34.170	24.7	27.926	28.8	
South Mahwah	618	S.MAH-B	345	40	34.927	20.4	34.014	20.3	27.529	20.0	
Station 122	312	S122 1T MID	345	40	12.988	12.1	13.022	9.7	12.951	4.3	
Station 122	320	S122 2T MID	345	40	12.988	12.1	13.022	9.7	12.951	4.3	
Station 122	-	S122 3T MID	345	40	5.404	19.8	5.646	15.3	5.746	6.2	
Station 80	-	S80	345	25	16.560	12.9	16.238	10.8	14.825	4.6	
Scriba	-	SCRIBA	345	50	42.239	63.3	47.035	51.6	48.586	39.3	
Sherman Creek	134	SHM CRK	138	63	38.307	18.6	39.439	15.4	33.780	6.0	

Table 7-2 (continued). Fault Currents under Benchmark System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Shore Road	5041	SHORE RD	138	57.8	49.764	16.3	48.833	14.6	42.742	10.3	
Shore Road	5000	SHORE RD	345	63	27.741	12.8	27.321	11.6	20.427	8.0	
Shoreham	5062	SHOREHAM	138	52.2	24.623	73.0	24.497	72.7	23.770	72.4	
Sills Road	-	SILLS ROAD	138	-	35.178	31.8	35.714	31.4	35.563	31.1	
Sprain Brook	48	SPRN BRK	345	63	50.857	29.1	49.871	24.9	41.369	9.9	
St. Lawrence	189	ST LAWRN 230	230	37	28.015	42.7	31.903	52.1	33.018	51.0	
Stolle Road	173	STOLLE ROAD	230	37	12.989	11.3	12.147	10.8	9.789	9.3	
Stolle Road	14	STOLLE ROAD	345	40	3.892	12.8	3.714	13.3	3.306	14.1	
Tremont	120	TREMNT11	138	63	37.275	18.3	38.464	15.3	33.439	7.7	
Tremont	121	TREMNT12	138	63	37.275	18.3	38.480	15.3	33.522	7.7	
Tremont	36	TREMONT	345	none	32.174	12.8	31.751	11.2	24.200	5.3	
Vernon East	139	VERNON E	138	40	22.148	60.1	21.994	54.0	20.572	42.2	
Vernon West	140	VERNON W	138	40	23.041	56.0	23.360	47.9	22.651	32.6	
Valley Stream	5066	VLY STRM	138	57.8	51.774	10.5	53.110	9.4	50.130	7.3	
Volney	-	VOLNEY	345	37	37.283	37.0	37.837	30.2	32.661	7.2	**Bus kA>Bkr kA**
West 49th Street	438	W 49 ST	345	63	45.962	24.5	47.656	22.4	44.315	19.0	
West Haverstraw	3011	W.HAV345	345	None	31.345	31.4	34.631	29.0	36.984	27.4	
Watercure	-	WATERCURE 71	230	33	12.683	14.8	12.567	15.0	12.166	15.2	
Watercure	-	WATERCURE345	345	37	8.015	16.6	7.622	17.5	6.650	19.0	
Willis	214	WILLIS 230	230	37	9.603	11.1	9.363	17.6	7.888	19.7	
Wood Street A	407	WOOD ST A	345	None	21.443	35.9	20.473	46.6	16.412	58.6	
Wood Street B	408	WOOD ST B	345	None	24.652	34.0	23.478	43.8	18.448	56.1	

Table 7-3. Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Adirondack	-	ADIRONDACK	230	25	8.300	9.0	7.900	8.6	6.287	7.2	
AES Somerset	-	AES SOMERSET	345	40	14.034	26.6	17.111	30.6	17.686	29.8	
Alps	-	ALPS	345	40	15.390	18.1	14.678	15.9	11.622	7.0	
Astoria East	62	AST-EAST-E	138	63	57.649	36.4	61.163	33.8	58.886	31.4	
Astoria East	-	AST-EAST-W	138	63	60.127	37.4	64.896	35.4	65.242	34.0	**Bus kA>Bkr kA**
Astoria West	64	AST-WEST	138	45	36.014	54.1	39.855	49.4	41.514	46.5	
Athens	3850	ATHENS	345	50	32.991	47.2	32.192	60.4	29.711	68.1	
Barrett	5032	BARRETT	138	57.8	47.142	14.0	47.847	14.2	47.262	14.4	
Bowline	365	BOWLINE MID	345	-	31.128	26.4	34.374	25.3	36.707	24.7	
Bowline 1	2814	BOWLINE1	345	40	29.423	24.2	32.583	26.4	34.617	26.9	
Bowline 2	2813	BOWLINE2	345	40	27.191	26.8	29.271	29.9	30.841	30.9	
Brookhaven	5035	BRKHAVEN	138	35.4	27.143	24.8	26.388	21.2	22.924	9.6	
Buchanan N.	8	BUCHAN N	345	40	29.505	34.2	29.138	31.9	27.510	27.7	
Buchanan S	9	BUCHAN S	345	40	39.071	35.9	38.556	33.2	35.339	27.7	
Buchanan	66	BUCHANAN	138	40	15.550	36.0	15.011	33.9	13.820	29.6	
Clay	-	CLAY	345	40	34.131	21.1	33.323	17.8	28.024	5.9	
Coopers Corners	12	COOPERS CRN		37	16.349	20.3	15.027	20.0	11.201	19.0	
Corona	70	CORONA NORTH	138	45	60.788	20.4	70.701	15.4	62.940	4.5	**Bus kA>Bkr kA**
Corona	-	CORONA SOUTH	138	45	60.794	20.4	70.711	15.4	62.948	4.5	**Bus kA>Bkr kA**
Dewitt	-	DEWITT	345	40	19.431	19.2	18.557	16.7	15.296	7.4	
Dunwoodie No.	72	DUN NO	138	40	31.906	39.9	31.876	34.3	28.649	21.0	
Dunwoodie So	73	DUN SO	138	40	29.915	42.3	30.229	35.8	28.715	21.6	
Dunkirk	-	DUNKIRK	230	37	15.053	32.7	15.061	-192.3	15.048	67.8	
Dunwoodie	12	DUNWODIE	345	63	49.843	27.9	48.919	23.9	40.734	10.0	

Table 7-3 (continued). Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
East 13th	78	E 13 ST	138	63	44.944	44.6	46.195	41.4	46.629	38.0	
East 179th	82	E 179 ST	138	63	41.452	25.8	43.332	21.0	39.404	9.1	
East Fishkill	202	E FISHKILL	345	63	38.587	26.7	36.911	23.8	28.706	12.6	
East Garden City	5038	E.G.C. 5038	138	63	69.946	17.7	72.741	23.7	70.548	24.5	
East Garden City	5001	E.G.G. PAR	345	63	9.691	45.2	9.950	61.0	9.826	63.1	
East Garden City	5002	E.G.C.-1	345	63	7.976	54.5	8.208	72.9	8.225	74.8	
East Garden City	5003	E.G.C.-2	345	63	7.976	54.5	8.208	72.9	8.225	74.8	
East 15th Street	13	E15ST 45	345	None	47.752	25.4	49.851	21.5	47.097	14.0	
East 15th Street	14	E15ST 46	345	None	47.752	25.4	49.990	21.4	47.025	13.8	
East 15th Street	15	E15ST 47	345	None	46.969	26.3	49.030	22.5	46.361	15.5	
East 15th Street	16	E15ST 48	345	None	46.827	25.7	49.034	22.7	46.052	17.7	
Eastview	76	EASTVIEW	138	63	36.019	48.5	35.627	40.6	32.472	17.7	
Edic	0	EDIC	345	37	32.305	21.9	31.210	20.4	26.774	16.4	
Elbridge	-	ELBRIDGE	345	40	16.556	18.7	15.921	16.1	13.364	6.7	
Eastview	1227	EV 56-1	345	None	30.734	28.3	29.416	24.7	23.152	10.2	
Eastview	501	EV 56-2	345	None	33.882	27.5	32.500	24.1	25.165	9.4	
Eastview	502	EV 61-1	345	None	33.232	28.1	32.082	24.4	25.281	9.3	
Eastview	116	EV61-2	345	None	33.198	27.5	31.892	24.0	25.125	9.7	
Farragut	18	FARRAGUT	345	63	51.517	39.5	53.979	33.2	53.363	22.6	
Fitzpatrick	26	FITZPATRICK	345	39	39.458	51.8	42.543	43.0	42.725	30.9	**Bus kA>Bkr kA**
Fox Hills	89	FOXHLS 1	138	40	33.934	10.8	34.603	9.1	26.826	3.2	
Fresh Kills	91	FR KILLS	138	40	38.508	29.1	40.041	28.6	39.865	28.2	**Bus kA>Bkr kA**
Fresh Kills	22	FR KILLS	345	40	24.933	39.0	26.017	36.0	25.932	32.7	

Table 7-3 (continued). Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Fraser	11	FRASER	345	37	17.358	16.8	16.472	16.5	13.671	15.6	
Freeport	5071	FREEPORT	138	63	32.988	10.4	32.977	10.0	32.059	9.4	
Gardenville		GARDENVILLE2	230	37	22.530	16.7	21.761	16.8	19.786	17.1	
Gilboa	31	GILBOA 345	345	40	22.078	43.7	22.102	42.3	21.509	40.4	
Goethals N.	24	GOETHL N	345	40	25.899	40.9	27.407	36.1	27.793	30.6	
Goethals S.	25	GOETHL S	345	63	25.885	40.8	27.412	36.0	27.807	30.6	
Gowanus N.	26	GOW N	345	40	20.645	39.8	21.076	33.3	19.072	17.0	
Gowanus S.	27	GOW S	345	40	20.649	39.7	21.087	33.2	18.954	16.4	
Greenwood	94	GRENWOOD	138	45	48.711	30.0	52.055	26.1	51.735	21.1	**Bus kA>Bkr kA**
Hillside	0	HILL 230	230	37	12.827	14.3	12.702	15.1	12.341	15.8	
Holbrook	5044	HOLBROOK	138	52.2	47.859	30.0	47.816	27.6	45.800	23.6	
Huntley	0	HUNTLEY	230	37	27.103	23.2	26.716	33.0	25.451	35.1	
Hurley Avenue	216	HURLEY AVE.	345	40	16.892	15.0	16.044	20.5	12.078	27.0	
Independence	-	INDEPENDENCE	345	50	37.261	47.9	39.025	41.4	39.348	32.5	
Jamaica	108	JAMAICA	138	40	49.158	15.2	50.681	12.9	45.713	7.6	**Bus kA>Bkr kA**
Ladentown	2846	LADENTOWN	345	63	41.667	33.7	43.466	27.5	40.399	10.9	
Lafayette	-	LAFAYETTE	345	40	18.288	18.4	17.405	16.1	13.712	6.5	
Leeds	-	LEEDS	345	37	33.565	41.2	32.758	43.9	30.072	47.2	
Linden	4996	LINDEN	230	-	49.411	45.9	53.565	42.3	55.814	39.8	
Lake Success	5046	LKE SCSS	138	57.8	39.879	10.1	37.847	9.5	31.804	7.8	
Marcy	69	MARCY 345	345	63	31.552	23.2	30.465	25.4	25.588	28.9	
Marcy	70	MARCY 765	765	63	9.784	31.1	9.573	34.6	8.448	38.9	

Table 7-3 (continued). Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Massena	79	MASSENA 765	765	63	8.182	33.8	8.482	32.6	8.028	31.3	
Meyer	195	MEYER	230	37	6.210	7.8	5.837	8.7	5.042	10.0	
Middletown Tap	-	MIDDLETN TAP	345	63	17.781	27.6	16.850	36.8	15.198	43.0	
Millwood	114	MILLWOOD	138	20	19.004	41.4	18.582	37.0	17.031	26.8	
Millwood	32	MILLWOOD	345	63	44.479	30.2	42.898	26.7	33.195	12.3	
New Scotland	-	NEW SCOTLAND	345	37	29.976	21.5	28.758	18.5	23.025	6.8	
Newbridge Road	5050	NEWBRID	138	63	72.484	24.7	75.018	24.2	74.600	23.7	**Bus kA>Bkr kA**
New Goethals S	143	NEWGOW 1	138	-	45.263	23.5	48.090	20.7	46.573	16.8	
New Goethals N	144	NEWGOW2	138	-	45.263	23.5	48.089	20.6	46.572	16.8	
Niagara	120	NIAGARA 345	345	63	29.984	32.0	31.758	39.7	32.515	40.3	
Niagara	123	NIAGRA E 230	230	63	49.041	27.0	54.019	32.7	55.496	32.6	
Niagara	125	NIAGRA W 230	230	63	49.041	31.9	54.018	33.7	55.495	34.1	
Nine Mile Point 1	0	NMP#1	345	39	40.378	60.1	44.126	54.5	45.008	50.1	**Bus kA>Bkr kA**
Northport	5077	NRTHPRT1	138	57.8	58.563	22.6	60.071	23.2	60.719	23.6	**Bus kA>Bkr kA**
Oakdale	5	OAKDALE	230	None	6.635	9.5	6.509	10.7	6.205	11.7	
Oakdale	10	OAKDALE 345	345	37	12.826	16.5	12.339	17.2	11.002	18.3	
Oswego	0	OSWEGO	345	37	30.866	50.9	32.950	48.0	33.738	45.9	
Packard	0	PACKARD	230	37.6	42.677	24.5	42.921	21.2	39.251	14.0	**Bus kA>Bkr kA**
Pilgrim	5056	PILGRIM	138	57.8	58.441	17.7	59.973	14.6	51.504	5.4	
Pleasant Valley	0	PLEASANT VAL	345	63	39.358	24.4	37.176	31.5	25.763	44.1	
Poletti	165	POLETTI	345	63	40.718	29.7	42.075	28.2	38.845	26.0	
Porter	0	PORTER	230	25	18.380	29.2	18.693	26.3	18.563	22.2	

Table 7-3 (continued). Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Port Jefferson	5057	PT JEFF1	138	63	15.616	17.3	15.507	18.1	15.390	18.8	
Port Jefferson	5048	PT JEFF2	138	63	15.448	17.0	15.372	17.7	15.280	18.4	
Pleasantville	127	PVILLE-1	345	63	21.370	25.2	20.095	22.8	15.083	12.3	
Queensbridge	129	QUEENSBG	138	45	35.193	48.7	40.132	38.0	38.858	21.2	
Rainey	41	RAINEY	345	63	49.321	37.3	51.211	34.0	49.209	29.4	
Ramapo	45	RAMAPO	345	40	44.636	31.4	44.826	26.8	39.281	13.1	**Bus kA>Bkr kA**
Ramapo	2	RAMAPO	500	None	11.081	42.5	10.913	36.1	9.767	17.4	
Reynolds Road	0	REYNOLDS	345	None	11.833	19.0	11.424	16.3	10.037	8.3	
Riverhead	5058	RIVERHD	138	36.1	15.834	14.2	15.599	14.7	15.128	15.2	
Robinson Road	210	ROBINSON RD.	230	43	14.375	12.9	13.565	13.1	11.340	13.5	
Rock Tavern	24	ROCK TAVERN	345	38	28.963	24.2	27.651	21.6	22.510	12.6	
Roseton	210	ROSETON	345	38	34.948	30.6	33.992	30.2	30.712	29.4	
Rotterdam	-	ROTTERDAM	230	25	12.544	12.8	12.023	10.7	11.288	5.1	
Ruland	5080	RULND RD	138	57.8	45.542	44.5	44.599	42.0	42.747	38.1	
South Ripley	-	S RIPLEY	230	40	9.464	34.5	9.044	30.3	7.595	16.3	
South Mahwah	49	S.MAH-A	345	40	34.902	22.0	34.170	24.7	27.926	28.8	
South Mahwah	618	S.MAH-B	345	40	34.926	20.4	34.014	20.3	27.529	20.0	
Station 122	312	S122 1T MID	345	40	12.988	12.1	13.022	9.7	12.951	4.3	
Station 122	320	S122 2T MID	345	40	12.988	12.1	13.022	9.7	12.951	4.3	
Station 122	-	S122 3T MID	345	40	5.404	19.8	5.646	15.3	5.746	6.2	
Station 80	-	S80	345	25	16.560	12.9	16.238	10.8	14.825	4.6	
Scriba	-	SCRIBA	345	50	42.239	63.3	47.035	51.6	48.586	39.3	
Sherman Creek	134	SHM CRK	138	63	38.307	18.6	39.439	15.4	33.781	6.0	

Table 7-3 (continued). Fault Currents under Linden VFT System Conditions.

Substation Name	Database Bus #	Database Name	Bus kV	Lowest Breaker Rating (kA)	3 Phase kA	3 Phase X/R	L-L-G kA	L-L-G X/R	1 Phase kA	1 Phase X/R	Comment
Shore Road	5041	SHORE RD	138	57.8	49.765	16.3	48.834	14.6	42.743	10.3	
Shore Road	5000	SHORE RD	345	63	27.742	12.8	27.322	11.6	20.428	8.0	
Shoreham	5062	SHOREHAM	138	52.2	24.623	73.0	24.497	72.7	23.770	72.4	
Sills Road	-	SILLS ROAD	138		35.178	31.8	35.714	31.4	35.563	31.1	
Sprain Brook	48	SPRN BRK	345	63	50.859	29.1	49.875	24.9	41.372	9.9	
St. Lawrence	189	ST LAWRN 230	230	37	28.015	42.7	31.903	52.1	33.018	51.0	
Stolle Road	173	STOLLE ROAD	230	37	12.989	11.3	12.147	10.8	9.789	9.3	
Stolle Road	14	STOLLE ROAD	345	40	3.892	12.8	3.714	13.3	3.306	14.1	
Tremont	120	TREMNT11	138	63	37.275	18.3	38.465	15.3	33.439	7.7	
Tremont	121	TREMNT12	138	63	37.275	18.3	38.481	15.3	33.523	7.7	
Tremont	36	TREMONT	345	None	32.175	12.8	31.753	11.2	24.201	5.3	
Vernon East	139	VERNON E	138	40	22.151	60.1	21.997	54.0	20.574	42.2	
Vernon West	140	VERNON W	138	40	23.044	56.0	23.362	47.9	22.653	32.6	
Valley Stream	5066	VLY STRM	138	57.8	51.774	10.5	53.110	9.4	50.130	7.3	
Volney	-	VOLNEY	345	37	37.283	37.0	37.837	30.2	32.661	7.2	**Bus kA>Bkr kA**
West 49th Street	438	W 49 ST	345	63	45.986	24.5	47.687	22.4	44.343	19.0	
West Haverstraw	3011	W.HAV345	345	None	31.345	31.4	34.631	29.0	36.984	27.4	
Watercure	-	WATERCURE 71	230	33	12.683	14.8	12.567	15.0	12.166	15.2	
Watercure	-	WATERCURE345	345	37	8.015	16.6	7.622	17.5	6.650	19.0	
Willis	214	WILLIS 230	230	37	9.603	11.1	9.363	17.6	7.888	19.7	
Wood Street A	407	WOOD ST A	345	None	21.443	35.9	20.474	46.6	16.412	58.6	
Wood Street B	408	WOOD ST B	345	None	24.653	34.0	23.478	43.8	18.448	56.1	

Table 7-4 Fault Current Increases (> 50 Amps) due to Linden VFT.

Bus Name	kV	3 Phase Δ Amps	L-L-G Δ Amps	L-G Δ Amps	Comment
Fresh Kills	138	47	55	61	Bus kA over Breaker kA with VFT
Fresh Kills	345	260	387	456	
Goethals N	345	287	476	610	
Goethals S	345	293	488	622	
Gowanus N	345	150	198	187	
Gowanus S	345	153	201	185	
Greenwood	138	50	56	53	Bus kA over Breaker kA with and without VFT
Linden	230	325	513	579	

Table 7-5. ConEd Individual Breaker Duty Calculation Results with VFT.

BUS NAME	kV	Lowest Breaker Rating kA	Highest Breaker Current kA	Fault Type	Comments on Individual Breaker Duty
Astoria-East-W	138	63	64.7	LLG	Tie to Astoria East East over duty with or without VFT
Bowline Mid	345	40	36.4	L-G	Okay with or without VFT
Corona N	138	45	40.8	LLG	Tie breaker okay with or without VFT
Corona S	138	45	45.7	LLG	Same tie breaker over duty with or without VFT
Fresh Kills	138	40	40.0	LLG	Tie to WDRW over duty with VFT
Greenwood	138	45	52.0	LLG	Several breakers over duty with or without VFT
Jamaica	138	40	47.7	LLG	Several breakers over duty with or without VFT
Ramapo	345	40	44.6	LLG	Several breakers over duty with or without VFT

8 CONCLUSIONS

The overall conclusion from this study is that the proposed Linden VFT project has no significant adverse impact on thermal, voltage, power transfer, short circuit or stability performance of the interconnected power system.

Transfer Limit Analysis

An AC transfer limit analysis was performed in order to evaluate the VFT's impact on interface power transfers within New York and between PJM and New York. Both the summer normal and the summer emergency transfer limits were evaluated.

Both analyses showed that the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 250 to 300MW for the Total East, UPNY-ConEd, UPNY-SENY and NY City Cable interfaces. There was no significant change in the Central East transfer limit due to the addition of the VFT, which was also not included in that interface definition. Also as expected, the addition of the VFT project and its inclusion in the interface definitions resulted in a transfer limit increase of approximately 200 to 300MW for the PJM-NY and NY-PJM interfaces.

Voltage and transient stability analyses were performed for a summer system condition with power transfer that exceeded the calculated thermal transfer limit. Both voltage and stability performance met criteria for this condition. Therefore, the thermal limit was the most constraining of the thermal, voltage, and stability limits.

Thermal and Voltage Analysis

An evaluation of thermal and voltage performance for contingencies in and around the Staten Island and In-City load pockets was performed. This analysis was performed for pre- and post-project cases for summer 2005 system with VFT flow into NYC and flow out of NYC, and for winter 2005 system with flow into NYC. The addition of the VFT had no adverse impact on the voltage and thermal violations for the load pockets.

Six contingencies were specified for analysis of non-simultaneous double element outages. Two N-1 base cases were developed (e.g., Linden-Goethals radial Feeder G23L/M out, and Inter-Tie PSEG-ConEd Feeder A2253 out), with adjustment of generation dispatch, as necessary, to return branch flows to within normal limits. The remaining contingencies were tested on each of these cases. The addition of the VFT had no adverse impact on voltage and thermal performance for these non-simultaneous double element outages.

1000MW Wheel

The impact of the VFT on the phase-shifted ties regulating the 1000MW wheel between PJM and NYC was evaluated for the summer peak case with the VFT transferring 300MW from PJM to NYC. The flows on the tie lines were assumed to be 450MW each on the Hudson-Farragut PARs and 100MW on the Linden-Goethals PAR, as specified at an April 2004 meeting with NYISO and ConEd.

Under pre-contingency conditions, the VFT had the effect of moving the Linden-Goethals PAR angle away from its negative limit (-25 degrees), which provided slightly more flexibility in controlling the flow through the PAR. There was no significant impact on the Hudson-Farragut PARs.

Both with and without the VFT project, the Linden-Goethals PAR was operating at or near its maximum negative limit in order to hold the pre-contingency power flow to 100MW. Therefore, any contingency that reduced other transmission between PJM and NYC or that tripped generation in NYC, drove this PAR to its angular limit and resulted in a power flow greater than 100MW. However, all post-contingency power flows were less than the LTE rating of the Linden-Goethals PAR, both with and without the VFT. Restoration of the outage or a reduction in the PJM-NYC transfer would be necessary to return the Linden-Goethals PAR flow to 100MW.

If the initial PAR schedules were set for more power flow through Linden-Goethals (e.g., 200MW) and less through Hudson-Farragut (e.g., 400MW each), the deviations from scheduled flows for the studied contingencies would be less, but the overall effect would be the same.

A brief evaluation of the impact of an assumed VFT overload capability of 120% of rated MW was also performed. The best use of this potential capability would be for the loss of one of the Hudson-Farragut PARs. The VFT could increase its power flow and thereby limit the flow through the Linden-Goethals PAR. However, since the Linden-Goethals PAR appears to have adequate thermal capacity to carry the post-contingency flows, there is little reason to increase the VFT power flow.

Transient Stability Analysis

Two types of transient stability analysis were performed – one focused on system response to a variety of fault disturbances and the other focused on evaluating the critical clearing time for local generating units.

Fourteen fault scenarios, including 5 normally cleared, 7 stuck breaker and 2 extreme contingencies were evaluated. System response to all disturbances under all study conditions was stable and damped. The addition of the VFT had no impact on system stability.

Similarly, the VFT project had no impact on the critical clearing times for any of the units (Arthur Kill, Liberty, and Linden Cogen) evaluated.

Short Circuit Analysis

The addition of the Linden VFT increased the fault currents at nearby buses. The fault current increase, however, was less than 625 Amps.

One bus was observed with a fault level increase that would place an additional breaker in an over-dutied condition. The Fresh Kills 138kV bus fault current was just below the lowest breaker rating (40kA) without the VFT, and just above this rating with the VFT. However, the increase due to the VFT only ranged from 47 to 61 Amps (0.12 to 0.15%). According to Attachment S of the NYISO tariff on the cost allocation methodology dated October 2004, anything less than 100A of short circuit contribution is "de minimus".

Therefore, the VFT project would not be responsible for the cost of an upgrade to this breaker.

The Greenwood 138kV substation had an existing condition of a fault current approximately 5kA over breaker rating without the VFT. The VFT added approximately 50 Amps to it - a 0.1% increase.

Larger current increases were observed at the Fresh Kills, Goethals N, Goethals S, Gowanus N, Gowanus S 345kV and Linden 230kV buses. However, the fault currents were below the lowest breaker rating at these buses, both with and without the VFT.

Extreme Contingency Assessment

Two extreme contingencies (e.g., loss of Goethals 345kV substation, and loss of Fresh Kills 345kV substation) were evaluated as part of the extreme contingency assessment.

In the steady-state analysis, a few branches were slightly above their LTE loading limits in the pre-project case for the Goethals substation extreme contingency. The addition of the VFT increased the loading on these lines by 0.4% or less. However, these loading levels were well below the STE limits. In the transient stability analysis, system response to both extreme disturbances under all study conditions was stable and damped. Therefore, the addition of the VFT had no impact on system performance in response to either steady-state or dynamic extreme contingencies.

In conclusion, the proposed Linden VFT project has no significant adverse impact on thermal, voltage, power transfer, short circuit or stability performance of the interconnected power system.

APPENDIX A. Interface Definitions

Interface	Branch Definition
Central East	75447 "E.SPR115" - 79136 "INGHAM-E" 115.00 "1 " 78450 "EDIC " - 78702 "N.SCOT77" 345.00 "1 " 78460 "PORTER 2" - 78980 "ROTRDM.2" 230.00 "1 " 78460 "PORTER 2" - 78980 "ROTRDM.2" 230.00 "2 " 78478 "INGMS-CD" - 79136 "INGHAM-E" 115.00 "1 " 78478 "INGMS-CD" - 78552 "INGHAMS " 115.00/46.00 "1 " 79583 "MARCY T1" - 78703 "N.SCOT99" 345.00 "1 " 79602 "PLAT T#3" - 70511 "GRAND IS" 115.00 "1 "
Total East (closed)	2 "BRANCHBG" - 74300 "RAMAPO 5" 500.00 "1 " 4989 "HUDSON1 - 74328 "FARRGUT1" 345.00 "1 " 4996 "LINDEN " - 74371 "GOETHALS" 230.00 "1 " 5028 "WALDWICK" - 79302 "SMAHWAH1" 345.00 "1 " 5028 "WALDWICK" - 79303 "SMAHWAH2" 345.00 "1 " 5039 "HUDSON2 " - 74329 "FARRGUT2" 345.00 "1 " 75400 "COOPC345" - 75420 "CALPINE " 345.00 "2 " 75400 "COOPC345" - 74001 "ROCK TAV" 345.00 "2 " 75400 "COOPC345" - 79304 "SHOEMTAP" 345.00 "1 " 75403 "FRASR345" - 79581 "GILB 345" 345.00 "1 " 75512 "W.WDB115" - 76210 "W.WDBR69" 115.00/69.00 "1 " 79334 "CLOSTER " - 79357 "SPARKILL" 69.00 "1 " 79338 "HAR.CORN" - 79362 "W.NYACK " 69.00 "1 " 79314 "H.CORNER" - 79311 "BURNS 1" 138.00 "1 " 79346 "MONTVALE" - 79349 "PEARL RV" 69.00 "1 " 79346 "MONTVALE" - 79347 "NANUET " 69.00 "1 " 79370 "HAR.CO34" - 79376 "PEARL 34" 34.50 "1 " 79320 "S.MAHWAH" - 79319 "RAMAPO 1" 138.00 "1 " 79356 "SO.MAHWA" - 79340 "HILLBURN" 69.00 "1 " 79320 "S.MAHWAH" - 79302 "SMAHWAH1" 138.00/345.00 "1 " 74387 "NEPTUNDC" - 74354 "W 49 ST " 345.00 "1 " 75447 "E.SPR115" - 79136 "INGHAM-E" 115.00 "1 " 78450 "EDIC " - 78702 "N.SCOT77" 345.00 "1 " 78460 "PORTER 2" - 78980 "ROTRDM.2" 230.00 "1 " 78460 "PORTER 2" - 78980 "ROTRDM.2" 230.00 "2 " 78478 "INGMS-CD" - 79136 "INGHAM-E" 115.00 "1 " 78478 "INGMS-CD" - 78552 "INGHAMS " 115.00/46.00 "1 " 79583 "MARCY T1" - 78703 "N.SCOT99" 345.00 "1 " 79602 "PLAT T#3" - 70511 "GRAND IS" 115.00 "1 " {95002 "LINVFT2 " - 95003 "LINVFT3 " 17.50/17.00 "1 "}

Interface	Branch Definition
UPNY-ConEd (closed)	74002 "ROSETON " - 74331 "FISHKILL" 345.00 "1 " 74022 "E FISH I" - 74331 "FISHKILL" 115.00/345.00 "1 " 74026 "FISHKILL" - 75762 "SYLVN115" 115.00 "1 " 74340 "LADENTWN" - 74313 "BUCH S " 345.00 "1 " 74344 "PLTVLLEY" - 74331 "FISHKILL" 345.00 "1 " 74344 "PLTVLLEY" - 74331 "FISHKILL" 345.00 "2 " 74344 "PLTVLLEY" - 74341 "MILLWOOD" 345.00 "1 " 74344 "PLTVLLEY" - 74356 "WOOD B " 345.00 "1 " 74347 "RAMAPO " - 74312 "BUCH N " 345.00 "1 " 4989 "HUDSON1 " - 74328 "FARRGUT1" 345.00 "1 " 4996 "LINDEN " - 74371 "GOETHALS" 230.00 "1 " 5039 "HUDSON2 " - 74329 "FARRGUT2" 345.00 "1 " 73166 "NORHR138" - 75053 "NRTHPT P" 138.00 "1 " 75078 "SHMHVDCL" - 75062 "SHOREHAM" 191.5/138.00 "1 " 74387 "NEPTUNDC" - 74354 "W 49 ST " 345.00 "1 " {95002 "LINVFT2 " - 95003 "LINVFT3 " 17.50/17.00 "1 "}
UPNY-SENY (closed)	2 "BRANCHBG" - 74300 "RAMAPO 5" 500.00 "1 " 73117 "CTNY398 " - 74344 "PLTVLLEY" 345.00 "1 " 75400 "COOPC345" - 75420 "CALPINE " 345.00 "2 " 75400 "COOPC345" - 74001 "ROCK TAV" 345.00 "2 " 75400 "COOPC345" - 79304 "SHOEMTAP" 345.00 "1 " 75512 "W.WDB115" - 76210 "W.WDBR69" 115.00/69.00 "1 " 78701 "LEEDS 3 " - 74000 "HURLEY 3" 345.00 "1 " 78701 "LEEDS 3 " - 74344 "PLTVLLEY" 345.00 "2 " 78705 "ATHENS " - 74344 "PLTVLLEY" 345.00 "1 " 78730 "ADM " - 74043 "PL.VAL 1" 115.00 "1 " 78739 "BL STR E" - 74043 "PL.VAL 1" 115.00 "1 " 78742 "BLUES-8 " - 74043 "PL.VAL 1" 115.00 "1 " 78757 "BOC 2T " - 74040 "N.CAT. 1" 115.00 "1 " 73337 "SALISBRY" - 74127 "SMITHFLD" 69.00 "1 " 4989 "HUDSON1 " - 74328 "FARRGUT1" 345.00 "1 " 4996 "LINDEN " - 74371 "GOETHALS" 230.00 "1 " 5028 "WALDWICK" - 79302 "SMAHWAH1" 345.00 "1 " 5028 "WALDWICK" - 79303 "SMAHWAH2" 345.00 "1 " 5039 "HUDSON2 " - 74329 "FARRGUT2" 345.00 "1 " 73166 "NORHR138" - 75053 "NRTHPT P" 138.00 "1 " 75078 "SHMHVDCL" - 75062 "SHOREHAM" 191.5/138.00 "1 " 79334 "CLOSTER " - 79357 "SPARKILL" 69.00 "1 " 79338 "HAR.CORN" - 79362 "W.NYACK " 69.00 "1 " 79314 "H.CORNER" - 79311 "BURNS 1" 138.00 "1 " 79346 "MONTVALE" - 79349 "PEARL RV" 69.00 "1 " 79346 "MONTVALE" - 79347 "NANUET " 69.00 "1 " 79370 "HAR.CO34" - 79376 "PEARL 34" 34.50 "1 " 79320 "S.MAHWAH" - 79319 "RAMAPO 1" 138.00 "1 " 79356 "SO.MAHWA" - 79340 "HILLBURN" 69.00 "1 " 79320 "S.MAHWAH" - 79302 "SMAHWAH1" 138.00/345.00 "1 " 74387 "NEPTUNDC" - 74354 "W 49 ST " 345.00 "1 " {95002 "LINVFT2 " - 95003 "LINVFT3 " 17.50/17.00 "1 "}

Interface	Branch Definition
NY City Cable (closed)	4989 "HUDSON1 " - 74328 "FARRGUT1" 345.00 "1 " 4996 "LINDEN " - 74371 "GOETHALS" 230.00 "1 " 5039 "HUDSON2 " - 74329 "FARRGUT2" 345.00 "1 " 74348 "SPRBROOK" - 74351 "TREMONT " 345.00 "1 " 74420 "DUN NO1R" - 74533 "S CREEK " 138.00 "1 " 74421 "DUN NO2R" - 74533 "S CREEK " 138.00 "1 " 74424 "DUN SO1R" - 74435 "E179 ST " 138.00 "1 " 75047 "L SUCSPH" - 74505 "JAMAICA " 138.00 "1 " 75067 "V STRM P" - 74505 "JAMAICA " 138.00 "1 " 74387 "NEPTUNDC" - 74354 "W 49 ST " 345.00 "1 " 74650 "REAC71 " - 74345 "RAINEY " 345.00 "3 " 74651 "REAC72 " - 74345 "RAINEY " 345.00 "4 " 74567 "REACM51 " - 74354 "W 49 ST " 345.00 "1 " 74568 "REACM52 " - 74354 "W 49 ST " 345.00 "2 " {95002 "LINVFT2 " - 95003 "LINVFT3 " 17.50/17.00 "1 "}
PJM-NY	2 "BRANCHBG" - 74300 "RAMAPO 5" 500.00 "1 " 281 "WARREN " - 76527 "FALCONER" 115.00 "1 " 382 "E.TWANDA" - 75413 "HILSD230" 230.00 "1 " 383 "E.SAYRE " - 75486 "N.WAV115" 115.00 "1 " 361 "ERIE E " - 76501 "S RIPLEY" 230.00 "1 " 479 "HOMER CY" - 75406 "STOLE345" 345.00 "1 " 479 "HOMER CY" - 75407 "WATRC345" 345.00 "1 " 387 "LAUREL L" - 75457 "GOUDY115" 115.00 "1 " 4989 "HUDSON1 " - 74328 "FARRGUT1" 345.00 "1 " 4996 "LINDEN " - 74371 "GOETHALS" 230.00 "1 " 5028 "WALDWICK" - 79302 "SMAHWAH1" 345.00 "1 " 5028 "WALDWICK" - 79303 "SMAHWAH2" 345.00 "1 " 5039 "HUDSON2 " - 74329 "FARRGUT2" 345.00 "1 " 79334 "CLOSTER " - 79357 "SPARKILL" 69.00 "1 " 79338 "HAR.CORN" - 79362 "W.NYACK " 69.00 "1 " 79314 "H.CORNER" - 79311 "BURNS 1" 138.00 "1 " 79346 "MONTVALE" - 79349 "PEARL RV" 69.00 "1 " 79346 "MONTVALE" - 79347 "NANUET " 69.00 "1 " 79370 "HAR.CO34" - 79376 "PEARL 34" 34.50 "1 " 79320 "S.MAHWAH" - 79319 "RAMAPO 1" 138.00 "1 " 79356 "SO.MAHWA" - 79340 "HILLBURN" 69.00 "1 " 79320 "S.MAHWAH" - 79302 "SMAHWAH1" 138.00/345.00 "1 " 74387 "NEPTUNDC" - 74354 "W 49 ST " 345.00 "1 " {95002 "LINVFT2 " - 95003 "LINVFT3 " 17.50/17.00 "1 "}
NY-PJM	Reverse of the above

APPENDIX B. Load Pocket Analysis Contingencies

```
# SINGLE CONTINGENCIES

1 "LINDEN COGEN-GOTHLS S ck 1&2 (G23L/M)"
line    "COGNTECH 345"    "GOTHLS S 345"    "1"    1    0
line    "COGNTECH 345"    "GOTHLS S 345"    "2"    1    0
gens    "COGENST3 13.8"   "1"    0
gens    "COGENST2 13.8"   "1"    0
gens    "COGENST1 13.8"   "1"    0
gens    "COGENGT5 13.8"   "1"    0
gens    "COGENGT4 13.8"   "1"    0
gens    "COGENGT3 13.8"   "1"    0
gens    "COGENGT2 13.8"   "1"    0
gens    "COGENGT1 13.8"   "1"    0
isol    "COGENST3 13.8"
isol    "COGENST2 13.8"
isol    "COGENST1 13.8"
isol    "COGENGT5 13.8"
isol    "COGENGT4 13.8"
isol    "COGENGT3 13.8"
isol    "COGENGT2 13.8"
isol    "COGENGT1 13.8"
isol    "COGNTECH 345"
isol    95001
isol    95002
isol    95003
isol    95004
epcl redispatch.p
0
2 "Linden 300MW VFT"
isol    95001
isol    95002
isol    95003
isol    95004
epcl solution.p
0
3 "Inter-Tie PSEG-ConEd Fdr A2253"
isol    "GOTHLS R 345"
isol    "GOETH T 230"
isol    "GOETH 13 13"
isol    "GOETHALS 230"
0
4 "Liberty Radial Interconnection"
isol    74671
isol    74672
gens    "LIBLINCT 16"  "1"    0
isol    "LIBLINCT 16"
gens    "LIBLINST 13.8"       "1"    0
isol    "LIBLINST 13.8"
epcl redispatch.p
0
5 "FARRAGUT-GOWANUS N-GOETHALS N (41,25)"
line    "FARRAGUT 345"    "GOWANUSN 345"    "1"    1    0
line    "GOTHLS N 345"    "GOWANUSN 345"    "1"    1    0
```

```
tran    "GOWANUSN 345"    "GOWNUS1T 138"    "1"    0
isol    "GOWANUSN 345"
0
6 "FARRAGUT-GOWANUS S-GOETHALS S (42,26)"
line    "FARRAGUT 345"    "GOWANUSS 345"    "1"    1    0
line    "GOTHLS S 345"    "GOWANUSS 345"    "1"    1    0
tran    "GOWANUSS 345"    "GOWNUS2T 138"    "1"    0
isol    "GOWANUSS 345"
0
7 "FR KILLS-GOTHLS N (21)"
line    "FR KILLS 345" "GOTHLS N 345"    "1"    1    0
0
8 "FR KILLS-GOTHLS S (22)"
line    "FR KILLS 345" "GOTHLS S 345"    "1"    1    0
0
9 "FR-KILLS-FRKILL R2 "
isol    "FRKILLR2 138"
0
10 "FR-KILLS-FRKILLS R"
isol    "FRKILLSR 138"
0
11 "FR-KILLS-WAINWRT1"
line    "FR-KILLS 138" "WAINWRT1 138"    "1"    1    0
0
12 "FR-KILLS-WAINWRT2"
line    "FR-KILLS 138" "WAINWRT2 138"    "1"    1    0
0
13 "FR-KILLS-WDROW-1"
line    "FR-KILLS 138" "WDROW-1 138"    "1"    1    0
0
14 "FR-KILLS-WDROW-2"
line    "FR-KILLS 138" "WDROW-2 138"    "1"    1    0
0
15 "FR-KILLS-WILOWBK1"
line    "FR-KILLS 138" "WILOWBK1 138"    "1"    1    0
0
16 "FR-KILLS-WILOWBK2"
line    "FR-KILLS 138" "WILOWBK2 138"    "1"    1    0
0
17 "FOXHLLS1-GRENWOOD"
line    "FOXHLLS1 138"    "GRENWOOD 138"    "1"    1    0
0
18 "FOXHLLS1-FOXHIL33 TRANSFORMER ck 2"
tran    "FOXHLLS1 138"    "FOXHIL33 33" "2"    0
0
19 "FOXHLLS1-FOXHIL33 TRANSFORMER ck 3"
tran    "FOXHLLS1 138"    "FOXHIL33 33" "3"    0
0
20 "FOXHLLS2-GRENWOOD"
line    "FOXHLLS2 138"    "GRENWOOD 138"    "1"    1    0
0
21 "FOXHLLS2-FOXHIL33 TRANSFORMER"
tran    "FOXHLLS2 138"    "FOXHIL33 33" "1"    0
0
22 "WILOWBK1-FOXHLLS2"
line    "WILOWBK1 138"    "FOXHLLS2 138"    "1"    1    0
```

```
0
23 "WILOWBK1-WILOWBRK TRANSFORMER"
tran    "WILOWBK1 138"      "WILOWBRK 13"       "1"     0
0
24 "WILOWBK2-FOXHLLS1"
line    "WILOWBK2 138"      "FOXHLLS1 138"      "1"     1       0
0
25 "WILOWBK2-WILOWBRK TRANSFORMER"
tran    "WILOWBK2 138"      "WILOWBRK 13"       "1"     0
0
26 "HUDSON-FARAGUT PAR"
isol    74329
isol    5039
0
#
# MULTIPLE CONTINGENCIES
#
27 "FOXHLLS1-GRENWOOD/FOXHIL33 ck2"
line    "FOXHLLS1 138"      "GRENWOOD 138"      "1"     1       0
tran    "FOXHLLS1 138"      "FOXHIL33 33" "2"   0
0
28 "FOXHLLS2-GRENWOOD/FOXHIL33 ck1"
line    "FOXHLLS2 138"      "GRENWOOD 138"      "1"     1       0
tran    "FOXHLLS2 138"      "FOXHIL33 33" "1"   0
0
29 "FR KILLS-GOTHLS S/FRKILLSR"
line    "FR KILLS 345" "GOTHLS S 345"     "1"     1       0
tran    "FR-KILLS 138" "FRKILLSR 138"     "1"     0
0
30 "FR KILLS-FRKILLSR/GOTHLS S/GOTHLS N-GOTHLS R"
line    "FR KILLS 345" "GOTHLS S 345"     "1"     1       0
line    "FR KILLS 345" "GOTHLS N 345"     "1"     1       0
tran    "GOTHLS N 345"      "GOTHLS R 345"      "1"     0
tran    "FR-KILLS 138" "FRKILLSR 138"     "1"     0
tran    "FRKILLSR 138"      "FR KILLS 345" "1"  0
0
31 "FR-KILLS-WILOWBK1/FRKILLSR"
tran    "FR-KILLS 138" "FRKILLSR 138"     "1"     0
line    "FR-KILLS 138" "WILOWBK1 138"     "1"     1       0
tran    "WILOWBK1 138"      "WILOWBRK 13"       "1"     0
line    "WILOWBK1 138"      "FOXHLLS2 138"      "1"     1       0
0
32 "FR-KILLS-WILOWBK1-WILOWBRK/FOXHLLS2"
line    "FR-KILLS 138" "WILOWBK1 138"     "1"     1       0
tran    "WILOWBK1 138"      "WILOWBRK 13"       "1"     0
line    "WILOWBK1 138"      "FOXHLLS2 138"      "1"     1       0
0
33 "FR-KILLS-WILOWBK2-WILOWBRK"
line    "FR-KILLS 138" "WILOWBK2 138"     "1"     1       0
tran    "WILOWBK2 138"      "WILOWBRK 13"       "1"     0
line    "WILOWBK2 138"      "FOXHLLS1 138"      "1"     1       0
tran    "FOXHLLS1 138"      "FOXHIL33 33" "3"   0
0
34 "FR KILLS-GOTHLS S/GOTHLS N (21, 22) & PAR Tie (A2253, 21191/R1)"
line    "FR KILLS 345" "GOTHLS N 345"     "1"     1       0
line    "FR KILLS 345" "GOTHLS S 345"     "1"     1       0
```

```
tran    "FR-KILLS 138" "FRKILLSR 138"       "1"     0
isol    "GOTHLS R 345"
isol    "GOETH T 230"
isol    "GOETH 13 13"
isol    "GOETHALS 230"
0
35 "GOTHLS N-GOWANUSN-FARRAGUT (25,41) & 1T-1R-GREENWOOD (42231)"
# trip PAGTGOW generators
gens    "PAGTGOW2 13.8"     "2"     0
isol    "PAGTGOW2 13.8"
gens    "PAGTGOW1 13.8"     "1"     0
isol    "PAGTGOW1 13.8"
isol    "GOWNUS1R 138"
isol    "GOWNUS1T 138"
isol    "GOWANUSN 345"
epcl redispatch.p
0
36 "GOTHLS S-GOWANUSS-FARRAGUT (26,42) & 2T-2R-GREENWOOD (42232)"
isol    "GOWANUSS 345"
isol    "GOWNUS2R 138"
isol    "GOWNUS2T 138"
gens    74675  "1"     0
gens    74676  "1"     0
isol    74675
isol    74676
epcl redispatch.p
0
#
# STUCK BREAKER CONTINGENCIES
#
37 "GOETHALS SB-8 - GOWANUS S & COGEN CABLE"
# Trip Linden Cogen generators
line    "GOTHLS S 345"      "COGNTECH 345"      "1"     1       0
line    "GOTHLS S 345"      "COGNTECH 345"      "2"     1       0
isol    "COGENST3 13.8"
gens    "COGENST3 13.8"     "1"     0
isol    "COGENST2 13.8"
gens    "COGENST2 13.8"     "1"     0
isol    "COGENST1 13.8"
gens    "COGENST1 13.8"     "1"     0
isol    "COGENGT5 13.8"
gens    "COGENGT5 13.8"     "1"     0
isol    "COGENGT4 13.8"
gens    "COGENGT4 13.8"     "1"     0
isol    "COGENGT3 13.8"
gens    "COGENGT3 13.8"     "1"     0
isol    "COGENGT2 13.8"
gens    "COGENGT2 13.8"     "1"     0
isol    "COGENGT1 13.8"
gens    "COGENGT1 13.8"     "1"     0
isol    "COGNTECH 345"
isol    95001
isol    95002
isol    95003
isol    95004
epcl redispatch.p
```

```
epcl 54a.p
isol    "GOWANUSS 345"
epcl 54b.p
0
38 "GOETHALS SB-13 - GOWANUS S & LIBERTY"
isol    "GOWANUSS 345"
isol    74671
isol    74672
gens    "LIBLINCT 16"  "1"      0
isol    "LIBLINCT 16"
gens    "LIBLINST 13.8"         "1"     0
isol    "LIBLINST 13.8"
epcl redispatch.p
0
39 "GOETHALS SB-7 - GOWANUS S & LINDEN PAR"
isol    "GOWANUSS 345"
isol    "GOTHLS R 345"
isol    "GOETH T 230"
isol    "GOETH 13 13"
isol    "GOETHALS 230"
0
40 "GOETHALS SB-3 (1N) - GOWANUS N & FRKLS 22"
isol    "GOWANUSN 345"
line    "FR KILLS 345" "GOTHLS N 345"       "1"     1       0
0
41 "GOETHALS SB-4 - GOWANUS N & FRKLS 21"
isol    "GOWANUSN 345"
line    "FR KILLS 345" "GOTHLS S 345"       "1"     1       0
0
42 "GOETHALS SB-11 - GOWANUS N & LIBERTY"
isol    "GOWANUSN 345"
isol    74671
isol    74672
gens    "LIBLINCT 16"  "1"      0
isol    "LIBLINCT 16"
gens    "LIBLINST 13.8"         "1"     0
isol    "LIBLINST 13.8"
epcl redispatch.p
0
43 "GOETHALS SB-6 - COGEN CABLE & FRKLS 21"
line    "FR KILLS 345" "GOTHLS S 345"       "1"     1       0
line    "GOTHLS S 345"      "COGNTECH 345"      "1"     1       0
line    "GOTHLS S 345"      "COGNTECH 345"      "2"     1       0
isol    "COGENST3 13.8"
gens    "COGENST3 13.8"     "1"     0
isol    "COGENST2 13.8"
gens    "COGENST2 13.8"     "1"     0
isol    "COGENST1 13.8"
gens    "COGENST1 13.8"     "1"     0
isol    "COGENGT5 13.8"
gens    "COGENGT5 13.8"     "1"     0
isol    "COGENGT4 13.8"
gens    "COGENGT4 13.8"     "1"     0
isol    "COGENGT3 13.8"
gens    "COGENGT3 13.8"     "1"     0
isol    "COGENGT2 13.8"
```

```
gens    "COGENGT2 13.8"     "1"     0
isol    "COGENGT1 13.8"
gens    "COGENGT1 13.8"     "1"     0
isol    "COGNTECH 345"
isol    95001
isol    95002
isol    95003
isol    95004
epcl redispatch.p
0
44 "GOETHALS SB-5 (2N) - LINDEN PAR & FRKLS 22"
line    "FR KILLS 345" "GOTHLS N 345"     "1"     1     0
isol    "GOTHLS R 345"
isol    "GOETH T 230"
isol    "GOETH 13 13"
isol    "GOETHALS 230"
0
45 "FRESHKILLS SB-1 - GOETHALS 21 & TRAN R1"
line    "FR KILLS 345" "GOTHLS S 345"     "1"     1     0
isol    "FRKILLSR 138"
0
46 "FRESHKILLS SB-2 - GOETHALS 22 & TRAN R1"
line    "FR KILLS 345" "GOTHLS N 345"     "1"     1     0
isol    "FRKILLSR 138"
0
47 "FRESHKILLS SB-3 - GOETHALS 21 & AK3"
line    "FR KILLS 345" "GOTHLS S 345"     "1"     1     0
gens    74700 "1"     0
isol    74700
epcl redispatch.p
0
48 "FRESHKILLS SB-5 - TRAN R2 & AK3"
isol    "FRKILLR2 138"
gens    74700 "1"     0
isol    74700
epcl redispatch.p
0
49 "FRESHKILLS SB-5 - TRAN R2 & GOETHALS 22"
isol    "FRKILLR2 138"
line    "FR KILLS 345" "GOTHLS N 345"     "1"     1     0
0
#
# EXTREME CONTINGENCIES
#
50 "ISOLATE GOETHALS"
isol    "COGENST3 13.8"
gens    "COGENST3 13.8"     "1"     0
isol    "COGENST2 13.8"
gens    "COGENST2 13.8"     "1"     0
isol    "COGENST1 13.8"
gens    "COGENST1 13.8"     "1"     0
isol    "COGENGT5 13.8"
gens    "COGENGT5 13.8"     "1"     0
isol    "COGENGT4 13.8"
gens    "COGENGT4 13.8"     "1"     0
isol    "COGENGT3 13.8"
```

```
gens    "COGENGT3 13.8"      "1"     0
isol    "COGENGT2 13.8"
gens    "COGENGT2 13.8"      "1"     0
isol    "COGENGT1 13.8"
gens    "COGENGT1 13.8"      "1"     0
isol    "COGNTECH 345"
isol    74671
isol    74672
gens    "LIBLINCT 16"  "1"     0
isol    "LIBLINCT 16"
gens    "LIBLINST 13.8"      "1"     0
isol    "LIBLINST 13.8"
epcl redispatch.p
isol    "GOTHLS N 345"
isol    "GOTHLS S 345"
0
51 "ISOLATE FR-KILLS 345"
isol "FR KILLS 345"0
gens    74700 "1"      0
isol    74700
epcl redispatch.p
end
```

APPENDIX C. Load Pocket Analysis Results

S05 Case – VFT Flow from PJM to NY

Voltage Violations

Bus	Name	kV	Area	Zone	Outage	S05	S05-VFT	Outage description
74328	FARRGUT1	345	10	15	base	1.051	1.051	Base system (n-0)
74329	FARRGUT2	345	10	15	base	1.052	1.051	Base system (n-0)

Thermal Violations (Limit is 110%) – LTE limits

From	Name	kV	To	Name	kV	ck	Type	Rated MVA	Outage	S05y	S05y-VFT	Delta %	Outage description
74402	ASTE-WRG	138	74492	HG 1	138	1	line	161	base	1.09	1.106	1.6	Base system (n-0)
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	15	1.197	1.211	1.4	FR-KILLS-WILOWBK1
74468	FR-KILLS	138	74570	WILOWBK1	138	1	line	271	16	1.185	1.198	1.3	FR-KILLS-WILOWBK2
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	22	1.091	1.104	1.3	WILOWBK1-FOXHLLS2
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	28	1.148	1.16	1.2	FOXHLLS2-GRENWOOD/FOXHIL33 ck1
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	32	1.231	1.244	1.3	FR-KILLS-WILOWBK1-WILOWBRK/FOXHLLS2
74468	FR-KILLS	138	74570	WILOWBK1	138	1	line	271	33	1.235	1.248	1.3	FR-KILLS-WILOWBK2-WILOWBRK
74484	GRENWOOD	138	74504	KENTTAP	138	1	line	240	50	1.136	1.133	-0.3	ISOLATE GOETHALS
74484	GRENWOOD	138	74556	VERNON-E	138	1	line	240	50	1.154	1.151	-0.3	ISOLATE GOETHALS
74478	GOWNUS2R	138	74484	GRENWOOD	138	1	line	301	51	1.093	1.101	0.8	ISOLATE FR-KILLS 345

S05b Case - VFT flow from NYC to PJM

Voltage Violations

Bus	Name	kV	Area	Zone	Outage	S05	S05-VFT	Outage description
74328	FARRGUT1	345	10	15	base	1.051	1.051	Base system (n-0)
74329	FARRGUT2	345	10	15	base	1.052	1.051	Base system (n-0)

Thermal Violations (Limit is 110%) – LTE limits

From	Name	kV	To	Name	kV	ck	Type	Rated MVA	Contingency	S05y	S05y-VFT	Delta %	Outage description
74468	FR-KILLS	138	74570	WILOWBK1	138	1	line	271	16	1.205	1.203	-0.2	FR-KILLS-WILOWBK2
74468	FR-KILLS	138	74570	WILOWBK1	138	1	line	271	33	1.254	1.252	-0.2	FR-KILLS-WILOWBK2-WILOWBRK
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	15	1.217	1.215	-0.2	FR-KILLS-WILOWBK1
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	22	1.11	1.108	-0.2	WILOWBK1-FOXHLLS2
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	28	1.165	1.163	-0.2	FOXHLLS2-GRENWOOD/FOXHIL33 ck1
74468	FR-KILLS	138	74571	WILOWBK2	138	1	line	271	32	1.25	1.248	-0.2	FR-KILLS-WILOWBK1-WILOWBRK/FOXHLLS2

W05 Case – VFT Flow from PJM to NY

Voltage Violations

None

Thermal Violations (limit is 110%) – LTE Limits

From	Name	kV	To	Name	kV	ck	Type	Rated MVA	Contingency	S05y	S05y-VFT	Delta %	Outage description
74484	GRENWOOD	138	74504	KENTTAP	138	1	line	254	50	1.151	1.154	0.3	ISOLATE GOETHALS
74484	GRENWOOD	138	74556	VERNON-E	138	1	line	254	50	1.147	1.15	0.3	ISOLATE GOETHALS
74504	KENTTAP	138	74557	VERNON-W	138	1	line	254	50	1.146	1.15	0.4	ISOLATE GOETHALS

APPENDIX D. Contingencies for Non-Simultaneous Double Element Outage Analysis

A "Linden 300MW VFT"
Isol 95002
Isol 95003

B "FR KILLS-GOTHLS S/GOTHLS N (21, 22) & PAR Tie (A2253, 21191/R1)"

Line	74332	74333	"1"	1	0
Line	74332	74335	"1"	1	0
Tran	74468	74470	"1"	0	

Isol 74334
Isol 74370
Isol 74774
Isol 74371

C "GOTHLS N-GOWANUSN-FARRAGUT (25,41) & 1T-1R-GREENWOOD (42231)"
Trip PAGTGOW generators

Gens	79562	"2"	0
Gens	79561	"1"	0

Isol 74476
Isol 74477
Isol 74336

D "GOTHLS S-GOWANUSS-FARRAGUT (26,42) & 2T-2R-GREENWOOD (42232)"
Isol 74337
Isol 74478
Isol 74479

E "Linden-Goethals radial Fdr G23L/M"
Trip Linden Cogen generators and VFT
Isol 74716
Isol 74715
Isol 74714
Isol 74713
Isol 74712
Isol 74711
Isol 74710
Isol 74709
Isol 74315
Isol 95002
Isol 95003

F "Inter-Tie PSEG-ConEd Fdr A2253"
Isol 74334
Isol 74370
Isol 74774
Isol 74371

G "Liberty Radial Interconnection"
Isol 74671
Isol 74672
Isol 74673
Isol 74674

APPENDIX E. Non-Simultaneous Double Element Contingency Analysis Results

S05 – VFT Flow from PJM to NYC

Contingency E (Linden-Goethals radial Feeder G23L/M) followed by another contingency

Voltage Violations

NONE

Thermal Violations

NONE

Contingency F (Inter-Tie PSEG-ConEd Feeder A2253) followed by another contingency

Voltage Violations

NONE

Thermal Violations

NONE

S05b - VFT flow from NYC to PJM

Contingency E (Linden-Goethals radial Feeder G23L/M) followed by another contingency

Voltage Violations

Bus	Name	kV	Area	Zone	Outage	S05b-E	S05b-VFT-E	Outage description
74333	GOTHLS N	345	10	15	B	1.057	1.057	FR KILLS-GOTHLS S/GOTHLS N (21, 22) & PAR Tie (A2253, 21191/R1)
74336	GOWANUSN	345	10	15	B	1.059	1.059	FR KILLS-GOTHLS S/GOTHLS N (21, 22) & PAR Tie (A2253, 21191/R1)
74336	GOWANUSN	345	10	15	F	1.051	1.049	Inter-Tie PSEG-ConEd Fdr A2253

Thermal Violations

NONE

Contingency F (Inter-Tie PSEG-ConEd Feeder A2253) followed by another contingency

Voltage Violations

NONE

Thermal Violations

NONE

W05 – VFT Flow from PJM to NYC

Contingency E (Linden-Goethals radial Feeder G23L/M) followed by another contingency

Voltage Violations

NONE

Thermal Violations

NONE

Contingency F (Inter-Tie PSEG-ConEd Feeder A2253) followed by another contingency

Voltage Violations

Bus	Name	kV	Area	Zone	Outage	W05-F	W05-VFT-F	Outage description
74332	FR KILLS	345	10	15	E	1.068	1.07	Linden-Goethals radial Fdr G23L/M
74333	GOTHLS N	345	10	15	E	1.069	1.071	Linden-Goethals radial Fdr G23L/M
74336	GOWANUSN	345	10	15	E	1.07	1.072	Linden-Goethals radial Fdr G23L/M
74671	LIBERLIN	230	10	15	E	1.049	1.058	Linden-Goethals radial Fdr G23L/M
74672	LIBERLIN	230	10	15	E	1.048	1.058	Linden-Goethals radial Fdr G23L/M

Thermal Violations

NONE

APPENDIX F. Impact on Phase-Shifted Ties

```
Contingency Number:     1
Contingency Description:LINDEN COGEN-GOTHLS S ck 1&2 (G23L/M)

Before PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -18.2      459.6
   Hudson-Faragut1           -18.2      534.4
   Hudson-Faragut2           -18.2      552.9
   Linden VFT               -180.0        0.0

After  PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -25.0      544.2
   Hudson-Faragut1           -29.1      474.7
   Hudson-Faragut2           -30.0      448.2
   Linden VFT               -180.0        0.0

Contingency Number:     2
Contingency Description:Linden 300MW VFT

Before PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -18.2      265.4
   Hudson-Faragut1           -18.2      466.7
   Hudson-Faragut2           -18.2      486.3
   Linden VFT                  1.6        0.0

After  PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -25.0      249.0
   Hudson-Faragut1           -23.6      433.6
   Hudson-Faragut2           -23.6      451.1
   Linden VFT                  1.6        0.0

Contingency Number:     3
Contingency Description:Inter-Tie PSEG-ConEd Fdr A2253

Before PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -18.2        0.0
   Hudson-Faragut1           -18.2      459.5
   Hudson-Faragut2           -18.2      478.5
   Linden VFT                  4.0      300.1

After  PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -18.2        0.0
   Hudson-Faragut1           -21.8      436.0
   Hudson-Faragut2           -21.8      454.1
   Linden VFT                  7.5      301.7

Contingency Number:     4
Contingency Description:Liberty Radial Interconnection

Before PAR adjustment

  PAR angles and P flow       deg        MW
   Linden Goethals           -18.2      131.0
   Hudson-Faragut1           -18.2      444.7
   Hudson-Faragut2           -18.2      463.2
   Linden VFT                  2.3      300.3

After  PAR adjustment
```

PAR angles and P flow	deg	MW
Linden Goethals	-21.2	99.1
Hudson-Faragut1	-20.0	442.5
Hudson-Faragut2	-20.0	460.8
Linden VFT	4.6	301.3

Contingency Number: 5
Contingency Description:FARRAGUT-GOWANUS N-GOETHALS N (41,25)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	10.5
Hudson-Faragut1	-18.2	453.5
Hudson-Faragut2	-18.2	472.4
Linden VFT	-0.7	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-9.1	88.3
Hudson-Faragut1	-16.4	450.8
Hudson-Faragut2	-16.4	469.5
Linden VFT	-8.4	301.1

Contingency Number: 6
Contingency Description:FARRAGUT-GOWANUS S-GOETHALS S (42,26)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	12.9
Hudson-Faragut1	-18.2	454.1
Hudson-Faragut2	-18.2	473.0
Linden VFT	-0.5	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-9.1	95.5
Hudson-Faragut1	-16.4	451.4
Hudson-Faragut2	-16.4	470.1
Linden VFT	-7.8	297.3

Contingency Number: 7
Contingency Description:FR KILLS-GOTHLS N (21)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	101.0
Hudson-Faragut1	-18.2	435.0
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	300.5

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	101.0
Hudson-Faragut1	-18.2	435.0
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	300.5

Contingency Number: 8
Contingency Description:FR KILLS-GOTHLS S (22)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	101.2

Hudson-Faragut1	-18.2	435.0
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	300.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	101.2
Hudson-Faragut1	-18.2	435.0
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	300.4

Contingency Number: 9
Contingency Description:FR-KILLS-FRKILL R2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	86.6
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7
Linden VFT	1.4	299.5

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	92.9
Hudson-Faragut1	-18.2	434.4
Hudson-Faragut2	-18.2	453.0
Linden VFT	-0.2	302.4

Contingency Number: 10
Contingency Description:FR-KILLS-FRKILLS R

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	87.1
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7
Linden VFT	1.4	299.6

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	92.8
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	-0.2	302.3

Contingency Number: 11
Contingency Description:FR-KILLS-WAINWRT1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.1

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.1

Contingency Number: 12
Contingency Description:FR-KILLS-WAINWRT2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 13
Contingency Description:FR-KILLS-WDROW-1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 14
Contingency Description:FR-KILLS-WDROW-2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.6
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 15
Contingency Description:FR-KILLS-WILOWBK1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	97.5
Hudson-Faragut1	-18.2	435.4
Hudson-Faragut2	-18.2	454.0
Linden VFT	1.6	299.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.7
Hudson-Faragut1	-18.2	434.7

Hudson-Faragut2	-18.2	453.4
Linden VFT	1.6	300.2

Contingency Number: 16
Contingency Description:FR-KILLS-WILOWBK2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	97.3
Hudson-Faragut1	-18.2	435.3
Hudson-Faragut2	-18.2	454.0
Linden VFT	1.6	299.1

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.7
Hudson-Faragut1	-18.2	434.6
Hudson-Faragut2	-18.2	453.2
Linden VFT	1.6	300.3

Contingency Number: 17
Contingency Description:FOXHLLS1-GRENWOOD

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	99.6
Hudson-Faragut1	-18.2	434.9
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	299.8

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.8
Hudson-Faragut1	-18.2	434.7
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 18
Contingency Description:FOXHLLS1-FOXHIL33 TRANSFORMER ck 2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.2
Linden VFT	1.6	300.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	300.2

Contingency Number: 19
Contingency Description:FOXHLLS1-FOXHIL33 TRANSFORMER ck 3

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	300.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	300.1

Contingency Number: 20
Contingency Description:FOXHLLS2-GRENWOOD

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	99.5
Hudson-Faragut1	-18.2	434.9
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	299.8

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.7
Hudson-Faragut1	-18.2	434.6
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 21
Contingency Description:FOXHLLS2-FOXHIL33 TRANSFORMER

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	300.1

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.2
Hudson-Faragut1	-18.2	434.4
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	300.1

Contingency Number: 22
Contingency Description:WILOWBK1-FOXHLLS2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	98.2
Hudson-Faragut1	-18.2	435.1
Hudson-Faragut2	-18.2	453.8
Linden VFT	1.6	299.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.5
Hudson-Faragut1	-18.2	434.6
Hudson-Faragut2	-18.2	453.3
Linden VFT	1.6	300.2

Contingency Number: 23
Contingency Description:WILOWBK1-WILOWBRK TRANSFORMER

Before PAR adjustment

PAR angles and P flow	deg	MW

Linden Goethals	-18.2	100.9
Hudson-Faragut1	-18.2	434.8
Hudson-Faragut2	-18.2	453.4
Linden VFT	1.6	300.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.9
Hudson-Faragut1	-18.2	434.8
Hudson-Faragut2	-18.2	453.4
Linden VFT	1.6	300.3

Contingency Number: 24
Contingency Description:WILOWBK2-FOXHLLS1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	97.9
Hudson-Faragut1	-18.2	435.1
Hudson-Faragut2	-18.2	453.8
Linden VFT	1.6	299.3

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.4
Hudson-Faragut1	-18.2	434.6
Hudson-Faragut2	-18.2	453.2
Linden VFT	1.6	300.2

Contingency Number: 25
Contingency Description:WILOWBK2-WILOWBRK TRANSFORMER

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.9
Hudson-Faragut1	-18.2	434.8
Hudson-Faragut2	-18.2	453.4
Linden VFT	1.6	300.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.9
Hudson-Faragut1	-18.2	434.8
Hudson-Faragut2	-18.2	453.4
Linden VFT	1.6	300.4

Contingency Number: 26
Contingency Description:HUDSON-FARAGUT PAR

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	170.4
Hudson-Faragut1	-18.2	594.3
Hudson-Faragut2	-18.2	0.0
Linden VFT	3.1	300.9

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-25.0	191.5
Hudson-Faragut1	-30.0	483.4
Hudson-Faragut2	-18.2	0.0
Linden VFT	10.9	300.1

Contingency Number: 27

Contingency Description:FOXHLLS1-GRENWOOD/FOXHIL33 ck2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	98.3
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.2
Linden VFT	1.6	299.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	100.1
Hudson-Faragut1	-18.2	434.1
Hudson-Faragut2	-18.2	452.8
Linden VFT	1.6	300.0

Contingency Number: 28
Contingency Description:FOXHLLS2-GRENWOOD/FOXHIL33 ck1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	97.7
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.2
Linden VFT	1.6	299.2

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	99.9
Hudson-Faragut1	-18.2	434.0
Hudson-Faragut2	-18.2	452.7
Linden VFT	1.6	299.9

Contingency Number: 29
Contingency Description:FR KILLS-GOTHLS S/FRKILLSR

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	87.2
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7
Linden VFT	1.4	299.3

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	86.9
Hudson-Faragut1	-18.2	431.2
Hudson-Faragut2	-18.2	450.0
Linden VFT	-0.5	305.2

Contingency Number: 30
Contingency Description:FR KILLS-FRKILLSR/GOTHLS S/GOTHLS N-GOTHLS R

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-18.2	456.2
Hudson-Faragut2	-18.2	475.2
Linden VFT	2.7	300.4

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0

Hudson-Faragut1	-21.8	433.4
Hudson-Faragut2	-21.8	451.5
Linden VFT	5.0	302.4

Contingency Number: 31
Contingency Description:FR-KILLS-WILOWBK1/FRKILLSR

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	84.7
Hudson-Faragut1	-18.2	436.5
Hudson-Faragut2	-18.2	455.3
Linden VFT	1.4	299.0

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	89.1
Hudson-Faragut1	-18.2	433.0
Hudson-Faragut2	-18.2	451.8
Linden VFT	-0.4	303.8

Contingency Number: 32
Contingency Description:FR-KILLS-WILOWBK1-WILOWBRK/FOXHLLS2

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	97.4
Hudson-Faragut1	-18.2	434.9
Hudson-Faragut2	-18.2	453.6
Linden VFT	1.6	299.0

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	99.9
Hudson-Faragut1	-18.2	434.3
Hudson-Faragut2	-18.2	452.9
Linden VFT	1.6	300.4

Contingency Number: 33
Contingency Description:FR-KILLS-WILOWBK2-WILOWBRK

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	96.5
Hudson-Faragut1	-18.2	434.4
Hudson-Faragut2	-18.2	453.1
Linden VFT	1.6	298.6

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	99.2
Hudson-Faragut1	-18.2	433.6
Hudson-Faragut2	-18.2	452.3
Linden VFT	1.6	300.4

Contingency Number: 34
Contingency Description:FR KILLS-GOTHLS S/GOTHLS N (21, 22) & PAR Tie (A2253, 21191/

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-18.2	457.0
Hudson-Faragut2	-18.2	476.0
Linden VFT	2.8	300.6

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-21.8	435.6
Hudson-Faragut2	-21.8	453.7
Linden VFT	5.2	302.4

Contingency Number: 35
Contingency Description:GOTHLS N-GOWANUSN-FARRAGUT (25,41) & 1T-1R-GREENWOOD (42231)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	10.3
Hudson-Faragut1	-18.2	453.4
Hudson-Faragut2	-18.2	472.4
Linden VFT	-0.7	299.8

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-10.6	81.8
Hudson-Faragut1	-18.2	432.8
Hudson-Faragut2	-18.2	451.5
Linden VFT	-7.2	305.3

Contingency Number: 36
Contingency Description:GOTHLS S-GOWANUSS-FARRAGUT (26,42) & 2T-2R-GREENWOOD (42232)

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	12.7
Hudson-Faragut1	-18.2	454.0
Hudson-Faragut2	-18.2	473.0
Linden VFT	-0.5	299.8

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-9.1	121.5
Hudson-Faragut1	-18.2	423.1
Hudson-Faragut2	-18.2	441.8
Linden VFT	-7.2	295.2

Contingency Number: 37
Contingency Description:GOETHALS SB-8 - GOWANUS S & COGEN CABLE

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	437.1
Hudson-Faragut1	-18.2	537.3
Hudson-Faragut2	-18.2	555.8
Linden VFT	-180.0	0.0

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-25.0	478.7
Hudson-Faragut1	-30.0	445.0
Hudson-Faragut2	-30.0	461.7
Linden VFT	-180.0	0.0

Contingency Number: 38
Contingency Description:GOETHALS SB-13 - GOWANUS S & LIBERTY

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	49.8
Hudson-Faragut1	-18.2	462.0
Hudson-Faragut2	-18.2	480.8
Linden VFT	0.3	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-12.1	123.0
Hudson-Faragut1	-18.2	485.2
Hudson-Faragut2	-20.0	407.1
Linden VFT	-4.0	295.1

Contingency Number: 39
Contingency Description:GOETHALS SB-7 - GOWANUS S & LINDEN PAR

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-18.2	457.9
Hudson-Faragut2	-18.2	476.9
Linden VFT	0.2	299.6

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-20.0	460.8
Hudson-Faragut2	-20.0	478.9
Linden VFT	-0.7	295.9

Contingency Number: 40
Contingency Description:GOETHALS SB-3 (1N) - GOWANUS N & FRKLS 22

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	9.6
Hudson-Faragut1	-18.2	453.7
Hudson-Faragut2	-18.2	472.6
Linden VFT	-0.7	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-9.1	87.9
Hudson-Faragut1	-16.4	450.9
Hudson-Faragut2	-16.4	469.6
Linden VFT	-8.4	301.2

Contingency Number: 41
Contingency Description:GOETHALS SB-4 - GOWANUS N & FRKLS 21

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	10.3
Hudson-Faragut1	-18.2	453.5
Hudson-Faragut2	-18.2	472.5
Linden VFT	-0.7	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-9.1	88.5
Hudson-Faragut1	-16.4	450.8
Hudson-Faragut2	-16.4	469.5
Linden VFT	-8.4	301.1

Contingency Number: 42
Contingency Description:GOETHALS SB-11 - GOWANUS N & LIBERTY

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	47.3
Hudson-Faragut1	-18.2	461.4
Hudson-Faragut2	-18.2	480.2
Linden VFT	0.1	299.7

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-12.1	106.2
Hudson-Faragut1	-18.2	454.0
Hudson-Faragut2	-18.2	472.5
Linden VFT	-4.6	296.7

Contingency Number: 43
Contingency Description:GOETHALS SB-6 - COGEN CABLE & FRKLS 21

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	459.5
Hudson-Faragut1	-18.2	534.4
Hudson-Faragut2	-18.2	552.8
Linden VFT	180.0	-0.0

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-25.0	544.2
Hudson-Faragut1	-29.1	474.7
Hudson-Faragut2	-30.0	448.1
Linden VFT	180.0	-0.0

Contingency Number: 44
Contingency Description:GOETHALS SB-5 (2N) - LINDEN PAR & FRKLS 22

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-18.2	459.5
Hudson-Faragut2	-18.2	478.5
Linden VFT	4.0	300.1

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	0.0
Hudson-Faragut1	-21.8	438.9
Hudson-Faragut2	-21.8	457.0
Linden VFT	7.6	301.0

Contingency Number: 45
Contingency Description:FRESHKILLS SB-1 - GOETHALS 21 & TRAN R1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	87.1
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7
Linden VFT	1.4	299.6

After PAR adjustment

PAR angles and P flow	deg	MW

Linden Goethals	-16.7	92.8
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	-0.2	302.3

Contingency Number: 46
Contingency Description:FRESHKILLS SB-2 - GOETHALS 22 & TRAN R1

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	87.0
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7
Linden VFT	1.4	299.6

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	92.7
Hudson-Faragut1	-18.2	434.5
Hudson-Faragut2	-18.2	453.1
Linden VFT	-0.2	302.3

Contingency Number: 47
Contingency Description:FRESHKILLS SB-3 - GOETHALS 21 & AK3

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	155.0
Hudson-Faragut1	-18.2	452.8
Hudson-Faragut2	-18.2	471.2
Linden VFT	2.7	300.5

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-24.2	103.9
Hudson-Faragut1	-21.8	456.0
Hudson-Faragut2	-21.8	473.9
Linden VFT	8.0	297.3

Contingency Number: 48
Contingency Description:FRESHKILLS SB-5 - TRAN R2 & AK3

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	141.2
Hudson-Faragut1	-18.2	454.8
Hudson-Faragut2	-18.2	473.3
Linden VFT	2.5	299.5

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-22.7	89.6
Hudson-Faragut1	-21.8	451.7
Hudson-Faragut2	-21.8	469.6
Linden VFT	6.0	300.6

Contingency Number: 49
Contingency Description:FRESHKILLS SB-5 - TRAN R2 & GOETHALS 22

Before PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-18.2	86.5
Hudson-Faragut1	-18.2	437.0
Hudson-Faragut2	-18.2	455.7

Linden VFT	1.4	299.5

After PAR adjustment

PAR angles and P flow	deg	MW
Linden Goethals	-16.7	92.8
Hudson-Faragut1	-18.2	434.4
Hudson-Faragut2	-18.2	453.0
Linden VFT	-0.2	302.4

APPENDIX G. Short Circuit Results – Benchmark System Summary

```
                         -- ASPEN Batch Short Circuit Module (Tm) --
                                       VERSION 10.2

DATE AND TIME:     Wed Jul 13 10:27:39 2005

INPUT FILE NAME:   C:\PSLF\LINDEN VFT\SHORT CIRCUIT\CLASS 2002 ATRA-3% REACTORS-VFT-CSP-ZONE-VFT OUT.OLR

NAME OF THIS FILE: C:\Documents and Settings\bennetwa\My Documents\Linden\Linden VFT Out.OUT

BASE MVA = 100

BASE CASE HAS:
              14846 BUSES
               1312 GENERATORS
                  0 LOADS
               1001 SHUNTS
                 18 SWITCHED SHUNTS
              12485 LINES
               5338 2-W TRANSFORMERS
                235 3-W TRANSFORMERS
                 13 PHASE SHIFTERS
                  1 SWITCHES
                  0 BREAKERS
                845 MUTUAL GROUPS

FILE COMMENTS:
   NYISO 2007 REPRESENTATION PREPARED FOR CLASS 2002 COST ALLOCATION STUDIES  (CLA
   SS 2002 ATRA CASE WITH 3% SERIES REACTORS AT SPRAINBROOK AND DUNWOODIE) . RESTR
   ICTED, NON-PUBLIC INFORMATION.  DO NOT COPY.  DISTRIBUTE ONLY TO AUTHORIZED REC

PREFAULT VOLTAGE PROFILE: FLAT BUS VOLTAGES. PREFAULT V=1 P.U.
GENERATOR IMPEDANCE: SUBTRANSIENT
IGNORE PHASE SHIFT                               [X]
IGNORE LOADS                                     [X]
IGNORE TRANSMISSION LINE G+jB                    [X]
IGNORE SHUNTS WITH + SEQUENCE IMPEDANCE          [ ]
ACTIVATE OUT-OF-SERVICE EQUIPMENT                [ ]
FAULT TAP BUSES                                  [ ]
IN X-ONLY NETWORK WHEN X=0 USE X=0.0001 P.U.
IN R-ONLY NETWORK WHEN R=0 USE R IN METHOD 3
  WITH:  RC= 0.0001, X/R =80 FOR GENERATORS; =50 FOR XFORMERS; =10 FOR OTHERS
```

```
FAULTS APPLIED TO BUSES IN ZONE 999
     WITH BUS NUMBERS BETWEEN      0 AND 999999, INCLUSIVE, AND
     WITH NOMINAL KV BETWEEN    0.00 AND 9999.00, INCLUSIVE, AND
     WITH BUS NAME BETWEEN  AND zzzzzzzzzzzz, INCLUSIVE.

A TOTAL OF 408 FAULTS SIMULATED.

NOTE: ALL X/R RATIOS ARE ANSI X/R RATIOS.
```

BUS			3LG(A)	X/R	2LG(A)	X/R	1LG(A)	X/R	Z+(OHM)		Z2(OHM)		Z0(OHM)	
0	ADIRONDACK	230.kV	8300.5	9.0	7900.2	8.6	6287.4	7.2	1.99268	15.8734	1.99451	15.8879	8.63395	30.3291
0	AES SOMERSET	345.kV	14034.2	26.6	17110.8	30.6	17686.0	29.8	0.82596	14.1689	0.82791	14.2097	0.25863	5.35431
0	ALPS	345.kV	15390.1	18.1	14677.8	15.9	11621.5	7.0	0.84818	12.9147	0.84804	12.9095	5.82351	25.0412
62	AST-EAST-E	138.kV	57648.9	36.4	61162.4	33.8	58885.7	31.4	0.07341	1.38011	0.09614	1.35031	0.33175	1.2976
0	AST-EAST-W	138.kV	60127.0	37.4	64896.0	35.4	65242.0	34.0	0.06208	1.32365	0.08635	1.29127	0.18795	1.03324
64	AST-WEST	138.kV	36012.4	54.1	39853.9	49.4	41512.8	46.5	0.04506	2.21195	0.08811	2.20844	0.07942	1.3335
3850	ATHENS	345.kV	32991.4	47.2	32191.6	60.4	29711.2	68.1	0.35698	6.02695	0.35815	6.0063	1.00554	8.00522
5032	BARRETT	138.kV	47142.2	14.0	47847.3	14.2	47262.2	14.4	0.21348	1.67655	0.21961	1.67635	0.29728	1.65146
365	BOWLINE MID	345.kV	31128.5	26.4	34374.1	25.3	36707.0	24.7	0.33997	6.38979	0.27761	5.66799	0.36238	4.19182
2814	BOWLINE1	345.kV	29423.5	24.2	32583.1	26.4	34616.8	26.9	0.37776	6.75906	0.30354	5.98852	0.47096	4.47599
2813	BOWLINE2	345.kV	27190.6	26.8	29270.8	29.9	30841.4	30.9	0.38648	7.31534	0.29345	6.38888	0.47846	5.6363
5035	BRKHAVEN	138.kV	27142.5	24.8	26388.3	21.2	22923.7	9.6	0.18548	2.92954	0.23234	2.94654	0.96484	4.45874
8	BUCHAN N	345.kV	29505.0	34.2	29137.7	31.9	27510.3	27.7	0.28259	6.74501	0.27357	6.60012	0.82372	8.33219
9	BUCHAN S	345.kV	39071.0	35.9	38555.7	33.2	35339.1	27.7	0.23817	5.09248	0.22329	4.88499	0.89001	6.87766
66	BUCHANAN	138.kV	15549.7	36.0	15010.9	33.9	13819.7	29.6	0.176	5.12083	0.17516	5.10216	0.5359	7.05007
0	CLAY	345.kV	34130.8	21.1	33322.7	17.8	28024.0	5.9	0.35739	5.82499	0.37095	5.82678	2.34832	9.44819
12	COOPERS CRN	345.kV	16349.0	20.3	15026.7	20.0	11200.9	19.0	0.75822	12.1597	0.79038	12.1187	3.85473	28.7962
70	CORONA NORTH	138.kV	60787.2	20.4	70700.4	15.4	62939.5	4.5	0.06811	1.30894	0.09016	1.28085	0.80951	1.08249
0	CORONA SOUTH	138.kV	60793.3	20.4	70710.5	15.4	62947.4	4.5	0.06799	1.30881	0.09005	1.28072	0.80952	1.08232
0	DEWITT	345.kV	19430.6	19.2	18556.9	16.7	15295.5	7.4	0.63844	10.2312	0.64839	10.2323	3.58745	18.2987
72	DUN NO	138.kV	31905.6	39.9	31875.0	34.3	28648.8	21.0	0.09343	2.49544	0.09763	2.48691	0.6715	3.31613
73	DUN SO	138.kV	29915.1	42.3	30228.6	35.8	28714.7	21.6	0.08911	2.66186	0.09255	2.65297	0.42204	2.98731
0	DUNKIRK	230.kV	15053.3	32.7	15061.1	-192.3	15048.2	67.8	0.63207	8.79868	0.63131	8.80875	0.65156	8.79631
12	DUNWODIE	345.kV	49839.9	27.9	48915.9	23.9	40730.0	10.0	0.16668	3.99304	0.17025	3.92466	1.596	6.62561
78	E 13 ST	138.kV	44936.3	44.6	46185.0	41.4	46618.6	38.0	0.04612	1.77245	0.05275	1.76748	0.09051	1.58377
82	E 179 ST	138.kV	41451.7	25.8	43330.9	21.0	39403.7	9.1	0.08258	1.92033	0.0983	1.91282	0.6913	2.16983
202	E FISHKILL	345.kV	38587.0	26.7	36910.5	23.8	28705.7	12.6	0.25527	5.15568	0.25733	5.11012	2.42977	10.3419
5038	E.G.C. 5038	138.kV	69946.0	17.7	72741.1	23.7	70547.3	24.5	0.09414	1.13519	0.10004	1.13434	0.23765	1.09096
5001	E.G.C. PAR	345.kV	9690.6	45.2	9950.2	61.0	9826.2	63.1	0.50521	20.5483	0.52245	20.5244	1.85792	19.6716
5002	E.G.C.-1	345.kV	7975.7	54.5	8207.5	72.9	8225.0	74.8	0.47277	24.9695	0.49549	24.9532	1.43824	22.6888
5003	E.G.C.-2	345.kV	7975.7	54.5	8207.5	72.9	8225.0	74.8	0.47277	24.9695	0.49549	24.9532	1.43824	22.6888
13	E15ST 45	345.kV	47724.9	25.4	49814.2	21.6	47061.6	14.1	0.20924	4.16838	0.22581	4.15214	1.0426	4.29055
14	E15ST 46	345.kV	47724.5	25.4	49953.7	21.4	46989.7	13.8	0.20927	4.16841	0.22583	4.15217	1.10994	4.30198
15	E15ST 47	345.kV	46941.5	26.3	48994.2	22.5	46326.4	15.5	0.22512	4.2373	0.24094	4.2214	1.06153	4.3494

16	E15ST 48	345.kV	46800.3	25.7	48998.2	22.7	46017.8	17.7	0.22841	4.24995	0.24422	4.23403	1.1667	4.39749
76	EASTVIEW	138.kV	36018.7	48.5	35626.2	40.6	32471.0	17.7	0.05169	2.21142	0.05164	2.19619	0.40645	2.93584
0	EDIC	345.kV	32305.4	21.9	31209.7	20.4	26773.5	16.4	0.39947	6.15276	0.40673	6.15489	1.91111	9.84534
0	ELBRIDGE	345.kV	16556.4	18.7	15920.5	16.1	13363.5	6.7	0.75842	12.0068	0.76818	12.0078	4.08315	20.3478
1227	EV 56-1	345.kV	30733.4	28.3	29415.0	24.7	23151.1	10.2	0.28013	6.47504	0.27937	6.3819	2.70498	12.747
501	EV 56-2	345.kV	33881.1	27.5	32499.4	24.1	25164.7	9.4	0.25871	5.87327	0.25847	5.7773	2.7843	11.8647
502	EV 61-1	345.kV	33231.4	28.1	32081.3	24.4	25280.3	9.3	0.25836	5.98834	0.25813	5.89247	2.78933	11.5241
116	EV61-2	345.kV	33197.4	27.5	31891.3	24.0	25124.1	9.7	0.26319	5.99426	0.26301	5.89833	2.62031	11.6826
18	FARRAGUT	345.kV	51483.8	39.6	53933.0	33.2	53315.2	22.6	0.13639	3.8665	0.15219	3.85074	0.48916	3.46376
26	FITZPATRICK	345.kV	39458.2	51.8	42542.8	43.0	42724.6	30.9	0.18538	5.04462	0.22275	5.0457	0.57668	3.86123
89	FOXHLS 1	138.kV	33904.5	10.8	34573.3	9.1	26806.0	3.2	0.22936	2.33874	0.23567	2.32982	2.25819	3.82217
91	FR KILLS	138.kV	38460.7	29.1	39985.7	28.6	39803.7	28.2	0.13935	2.06689	0.14444	2.05654	0.26954	1.85608
22	FR KILLS	345.kV	24673.0	39.2	25630.3	36.2	25476.0	32.9	0.25724	8.06893	0.30571	8.03923	0.83311	7.30598
11	FRASER	345.kV	17358.1	16.8	16471.6	16.5	13670.7	15.6	0.80231	11.447	0.80754	11.4314	3.5669	20.5248
5071	FREEPORT	138.kV	32988.2	10.4	32977.1	10.0	32058.8	9.4	0.31005	2.39525	0.31631	2.39467	0.46477	2.58556
0	GARDENVILLE1	230.kV	22529.6	16.7	21761.1	16.8	19785.7	17.1	0.55536	5.86782	0.55717	5.91117	1.30515	8.20967
31	GILBOA 345	345.kV	22078.1	43.7	22102.3	42.3	21509.4	40.4	0.49694	9.00816	0.49585	8.96845	0.99906	9.73308
24	GOETHL N	345.kV	25611.6	41.1	26930.8	35.5	27182.4	28.0	0.22719	7.77384	0.27672	7.74365	0.62237	6.43693
25	GOETHL S	345.kV	25591.5	41.0	26925.7	35.4	27185.3	28.0	0.22715	7.77996	0.27739	7.74943	0.62231	6.42261
26	GOW N	345.kV	20495.2	40.1	20877.5	33.6	18885.3	17.1	0.5481	9.70317	0.59115	9.67746	3.21704	11.9594
27	GOW S	345.kV	20496.1	40.0	20885.6	33.4	18769.4	16.6	0.54747	9.70279	0.59107	9.67683	3.40716	12.131
94	GRENWOOD	138.kV	48661.9	30.1	51998.9	26.1	51682.7	21.1	0.07108	1.63576	0.0785	1.62736	0.22842	1.34622
0	HILL 230	230.kV	12827.3	14.3	12702.2	15.1	12340.5	15.8	1.14964	10.2881	1.14992	10.2887	1.61454	11.4666
5044	HOLBROOK	138.kV	47858.5	30.0	47815.6	27.6	45800.2	23.6	0.08838	1.66244	0.1279	1.67043	0.27412	1.86286
0	HUNTLEY	230.kV	27103.1	23.2	26715.6	33.0	25451.2	35.1	0.34817	4.88708	0.35088	4.94478	0.70584	5.75731
216	HURLEY AVE.	345.kV	16892.4	15.0	16043.5	20.5	12078.4	27.0	0.88703	11.758	0.88985	11.7304	6.86493	25.2243
0	INDEPENDENCE	345.kV	37261.1	47.9	39025.3	41.4	39347.9	32.5	0.20727	5.34166	0.23333	5.34295	0.44864	4.47585
108	JAMAICA	138.kV	49157.4	15.2	50679.9	12.9	45712.5	7.6	0.11779	1.61651	0.12198	1.61406	0.62337	1.92653
2846	LADENTOWN	345.kV	41667.1	33.7	43466.5	27.5	40398.8	10.9	0.23351	4.77471	0.1894	4.26436	1.27547	5.65457
0	LAFAYETTE	345.kV	18287.5	18.4	17405.0	16.1	13711.7	6.5	0.6926	10.8698	0.70174	10.8707	4.89727	21.3831
0	LEEDS	345.kV	33565.3	41.2	32758.2	43.9	30072.3	47.2	0.34879	5.92402	0.34999	5.90343	1.05613	7.96561
4996	LINDEN	230.kV	49085.9	46.1	53052.0	42.3	55234.9	39.6	0.15635	2.70075	0.15705	2.6999	0.11758	1.79878
5046	LKE SCSS	138.kV	39879.0	10.1	37847.1	9.5	31803.5	7.8	0.22029	1.98572	0.22546	1.98355	0.71524	3.45613
69	MARCY 345	345.kV	31552.2	23.2	30465.2	25.4	25587.7	28.9	0.38502	6.30116	0.39216	6.30371	2.23673	10.5531
70	MARCY 765	765.kV	9783.9	31.1	9573.2	34.6	8448.2	38.9	1.89109	45.1031	1.92077	45.1522	11.5077	65.8352
79	MASSENA 765	765.kV	8182.5	33.8	8482.4	32.6	8028.1	31.3	2.16954	53.9343	2.19894	54.1772	11.8376	56.1386
195	MEYER	230.kV	6209.6	7.8	5837.5	8.7	5041.6	10.0	3.09805	21.159	3.09849	21.1699	6.59649	35.6451
0	MIDDLETN TAP	345.kV	17780.8	27.6	16850.4	36.8	15198.3	43.0	0.68934	11.1811	0.71441	11.1105	1.32826	16.9308
114	MILLWOOD	138.kV	19004.3	41.4	18581.7	37.0	17031.1	26.8	0.11354	4.19091	0.11279	4.1718	0.59942	5.64749
32	MILLWOOD	345.kV	44477.7	30.2	42896.8	26.7	33194.7	12.3	0.19831	4.47393	0.19461	4.3506	2.1804	8.99219
0	NEW SCOTLAND	345.kV	29975.7	21.5	28757.9	18.5	23025.0	6.8	0.43289	6.63079	0.43414	6.61865	3.00045	12.4134
5050	NEWBRID	138.kV	72484.1	24.7	75017.8	24.2	74600.3	23.7	0.08037	1.09626	0.08702	1.09544	0.14796	0.9968
143	NEWGOW 1	138.kV	45221.7	23.5	48043.7	20.7	46532.7	16.8	0.09557	1.75927	0.10312	1.75039	0.36932	1.59551
144	NEWGOW2	138.kV	45221.2	23.5	48043.6	20.6	46531.8	16.8	0.09559	1.75929	0.10314	1.75041	0.36943	1.59556
120	NIAGARA 345	345.kV	29984.4	32.0	31758.1	39.7	32514.9	40.3	0.30398	6.63603	0.31586	6.7715	0.34455	4.94513
123	NIAGRA E 230	230.kV	49041.3	27.0	54018.5	32.7	55495.6	32.6	0.12895	2.70466	0.13673	2.811	0.11785	1.65252
125	NIAGRA W 230	230.kV	49040.7	31.9	54017.7	33.7	55494.9	34.1	0.12895	2.70469	0.13673	2.81104	0.11785	1.65255

0	NMP#1	345.kV	40378.2	60.1	44126.3	54.5	45008.1	50.1	0.17746	4.92981	0.20828	4.93101	0.40313	3.3924
5077	NRTHPRT1	138.kV	58562.5	22.6	60071.4	23.2	60719.2	23.6	0.09469	1.3572	0.12477	1.35608	0.13619	1.20716
5	OAKDALE	230.kV	6635.3	9.5	6508.5	10.7	6205.2	11.7	2.40204	19.868	2.4026	19.8681	3.76677	23.8893
10	OAKDALE 345	345.kV	12826.2	16.5	12339.2	17.2	11001.8	18.3	1.26484	15.478	1.26781	15.4758	3.54682	23.0196
0	OSWEGO	345.kV	30866.2	50.9	32949.5	48.0	33738.1	45.9	0.26198	6.44788	0.27582	6.44899	0.40864	4.78946
0	PACKARD	230.kV	42676.9	24.5	42920.6	21.2	39251.2	14.0	0.17018	3.10687	0.17691	3.199	0.84285	3.77341
5056	PILGRIM	138.kV	58441.4	17.7	59972.9	14.6	51504.3	5.4	0.10043	1.35962	0.12604	1.35927	0.75914	1.81608
0	PLEASANT VAL	345.kV	39358.2	24.4	37176.0	31.5	25763.3	44.1	0.26903	5.05369	0.26975	5.00913	3.6582	12.7485
165	POLETTI	345.kV	40698.3	29.8	42051.0	28.2	38824.2	26.0	0.34527	4.88201	0.36054	4.86589	1.55629	5.47632
0	PORTER	230.kV	18380.2	29.2	18692.8	26.3	18563.4	22.2	0.51284	7.20643	0.51469	7.20881	0.78947	6.9678
5057	PT JEFF1	138.kV	15616.0	17.3	15507.2	18.1	15389.9	18.8	0.41058	5.08556	0.50283	5.08783	0.525	5.29101
5048	PT JEFF2	138.kV	15447.9	17.0	15371.5	17.7	15280.2	18.4	0.43015	5.13965	0.52413	5.13795	0.53288	5.2942
127	PVILLE-1	345.kV	21369.2	25.2	20094.5	22.8	15082.7	12.3	0.40474	9.31238	0.4073	9.25257	4.04028	20.7555
129	QUEENSBG	138.kV	35192.1	48.7	40130.1	38.0	38856.6	21.2	0.05504	2.26331	0.09706	2.26003	0.53145	1.58997
41	RAINEY	345.kV	49294.1	37.3	51176.0	34.0	49177.3	29.4	0.15924	4.03763	0.17378	4.02265	0.75328	4.04214
45	RAMAPO	345.kV	44636.0	31.4	44825.9	26.8	39280.7	13.1	0.25515	4.45514	0.22941	4.17026	1.47248	6.46067
2	RAMAPO	500.kV	11080.4	42.5	10912.8	36.1	9767.2	17.4	0.81449	26.0402	0.79062	25.8175	5.73572	36.5043
0	REYNOLDS	345.kV	11832.8	19.0	11423.9	16.3	10037.0	8.3	1.05836	16.8	1.05834	16.7953	4.13538	25.6109
5058	RIVERHD	138.kV	15834.0	14.2	15599.4	14.7	15128.4	15.2	0.45174	5.01154	0.49844	5.02425	0.68673	5.67883
210	ROBINSON RD.	230.kV	14374.7	12.9	13564.6	13.1	11339.7	13.5	0.88159	9.19562	0.88761	9.27549	3.00206	16.3341
24	ROCK TAVERN	345.kV	28963.0	24.2	27650.9	21.6	22510.2	12.6	0.42171	6.86431	0.44622	6.78536	2.50507	12.6813
210	ROSETON	345.kV	34948.2	30.6	33992.3	30.2	30712.1	29.4	0.29226	5.69195	0.29743	5.65025	1.08167	8.04259
0	ROTTERDAM	230.kV	12543.8	12.8	12023.0	10.7	11287.7	5.1	1.32709	10.5027	1.32753	10.5026	1.73201	14.0137
5080	RULND RD	138.kV	45542.0	44.5	44599.2	42.0	42746.6	38.1	0.15455	1.74263	0.16614	1.73869	0.25051	2.08106
0	S RIPLEY	230.kV	9463.6	34.5	9043.7	30.3	7595.0	16.3	1.24159	13.9767	1.24129	13.9793	4.92614	23.9698
49	S.MAH-A	345.kV	34902.6	22.0	34170.4	24.7	27926.4	28.8	0.42231	5.69126	0.39854	5.43653	2.55804	10.0014
618	S.MAH-B	345.kV	34926.7	20.4	34014.3	20.3	27528.8	20.0	0.50712	5.68038	0.4803	5.42898	2.70026	10.2817
312	S122 1T MID	345.kV	12988.1	12.1	13021.6	9.7	12950.6	4.3	3.35236	14.9651	3.35375	14.9788	3.1661	15.1289
320	S122 2T MID	345.kV	12988.1	12.1	13021.6	9.7	12950.6	4.3	3.35236	14.9651	3.35375	14.9788	3.1661	15.1289
0	S122 3T MID	345.kV	5403.5	19.8	5646.2	15.3	5745.8	6.2	4.01565	36.643	4.01814	36.6582	4.26331	29.9686
0	S80	345.kV	16560.2	12.9	16237.6	10.8	14824.8	4.6	1.08203	11.9793	1.08556	12.0055	2.98158	15.993
0	SCRIBA	345.kV	42239.1	63.3	47035.4	51.6	48586.0	39.3	0.16243	4.71287	0.19398	4.71406	0.25902	2.85663
134	SHM CRK	138.kV	38306.7	18.6	39438.9	15.4	33780.2	6.0	0.11778	2.07657	0.13275	2.06919	1.11634	2.79679
5041	SHORE RD	138.kV	49764.2	16.3	48833.2	14.6	42742.2	10.3	0.12873	1.59586	0.13436	1.59332	0.5514	2.34339
5000	SHORE RD	345.kV	27741.2	12.8	27320.7	11.6	20427.1	8.0	0.64001	7.15157	0.64782	7.09592	6.34653	13.9919
5062	SHOREHAM	138.kV	24622.9	73.0	24496.5	72.7	23769.8	72.4	0.19482	3.22991	0.24854	3.23758	0.41702	3.55138
0	SILLS ROAD	138.kV	35177.6	31.8	35714.1	31.4	35563.4	31.1	0.11392	2.26205	0.16319	2.28612	0.22413	2.15416
48	SPRN BRK	345.kV	50856.6	29.1	49871.4	24.9	41368.5	9.9	0.16587	3.91311	0.1692	3.84123	1.58705	6.56195
189	ST LAWRN 230	230.kV	28014.8	42.7	31903.0	52.1	33017.8	51.0	0.22831	4.73451	0.23356	4.79207	0.20692	2.52023
173	STOLLE ROAD	230.kV	12988.7	11.3	12147.4	10.8	9789.4	9.3	1.05363	10.1691	1.05619	10.2138	3.7758	19.8833
14	STOLLE ROAD	345.kV	3891.6	12.8	3713.6	13.3	3306.0	14.1	4.59139	50.9765	4.59206	51.0335	11.0216	77.6071
120	TREMNT11	138.kV	37274.8	18.3	38464.3	15.3	33438.8	7.7	0.13416	2.13327	0.14949	2.12585	1.06783	2.76004
121	TREMNT12	138.kV	37274.8	18.3	38480.0	15.3	33522.1	7.7	0.13416	2.13327	0.14949	2.12585	1.05493	2.74442
36	TREMONT	345.kV	32173.9	12.8	31751.4	11.2	24200.1	5.3	0.57755	6.16392	0.58296	6.09415	5.08778	11.6307
139	VERNON E	138.kV	22148.0	60.1	21994.2	54.0	20571.5	42.2	0.09291	3.59616	0.1029	3.59117	0.52788	4.40923
140	VERNON W	138.kV	23041.4	56.0	23359.7	47.9	22650.5	32.6	0.08935	3.45673	0.11518	3.45416	0.40648	3.62405
5066	VLY STRM	138.kV	51774.3	10.5	53109.5	9.4	50130.3	7.3	0.17271	1.52916	0.17833	1.52876	0.44629	1.64298

0	VOLNEY	345.kV	37282.7	37.0	37836.6	30.2	32660.6	7.2	0.21479	5.33827	0.23582	5.3395	2.35232	7.40221
438	W 49 ST	345.kV	45962.1	24.5	47656.0	22.4	44314.7	19.0	0.23708	4.32721	0.25522	4.31015	1.24672	4.73445
3011	W.HAV345	345.kV	31344.6	31.4	34631.1	29.0	36984.4	27.4	0.29836	6.3477	0.23628	5.62622	0.33388	4.15973
0	WATERCURE 71	230.kV	12682.5	14.8	12567.2	15.0	12166.3	15.2	1.12051	10.4102	1.12081	10.4108	1.67781	11.6873
0	WATERCURE345	345.kV	8014.7	16.6	7621.6	17.5	6649.6	19.0	1.83222	24.785	1.83351	24.785	5.42179	39.833
214	WILLIS 230	230.kV	9602.8	11.1	9362.9	17.6	7887.7	19.7	1.57765	13.7381	1.57945	13.7723	6.57538	22.0483
407	WOOD ST A	345.kV	21442.9	35.9	20473.3	46.6	16411.9	58.6	0.39019	9.28095	0.39206	9.22784	3.43526	17.6562
408	WOOD ST B	345.kV	24652.4	34.0	23478.2	43.8	18447.9	56.1	0.33567	8.0728	0.33354	7.9792	3.16277	16.1121

APPENDIX H. Short Circuit Results – VFT System Summary

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                          -- ASPEN Batch Short Circuit Module (Tm) --
                                        VERSION 10.2

DATE AND TIME:     Wed Jul 13 10:25:57 2005

INPUT FILE NAME:   C:\DOCUMENTS AND SETTINGS\BENNETWA\MY DOCUMENTS\LINDEN\CLASS 2002 ATRA-3% REACTORS-VFT-CSP-ZONE-VFT IN.OLR

NAME OF THIS FILE: C:\Documents and Settings\bennetwa\My Documents\Linden\Linden in.OUT

BASE MVA = 100

BASE CASE HAS:
               14846 BUSES
                1312 GENERATORS
                   0 LOADS
                1001 SHUNTS
                  18 SWITCHED SHUNTS
               12485 LINES
                5338 2-W TRANSFORMERS
                 235 3-W TRANSFORMERS
                  13 PHASE SHIFTERS
                   1 SWITCHES
                   0 BREAKERS
                 845 MUTUAL GROUPS

FILE COMMENTS:
   NYISO 2007 REPRESENTATION PREPARED FOR CLASS 2002 COST ALLOCATION STUDIES  (CLA
   SS 2002 ATRA CASE WITH 3% SERIES REACTORS AT SPRAINBROOK AND DUNWOODIE) . RESTR
   ICTED, NON-PUBLIC INFORMATION.  DO NOT COPY.  DISTRIBUTE ONLY TO AUTHORIZED REC

PREFAULT VOLTAGE PROFILE: FLAT BUS VOLTAGES. PREFAULT V=1 P.U.
GENERATOR IMPEDANCE: SUBTRANSIENT
IGNORE PHASE SHIFT                          [X]
IGNORE LOADS                                [X]
IGNORE TRANSMISSION LINE G+jB               [X]
IGNORE SHUNTS WITH + SEQUENCE IMPEDANCE     [ ]
ACTIVATE OUT-OF-SERVICE EQUIPMENT           [ ]
FAULT TAP BUSES                             [ ]
IN X-ONLY NETWORK WHEN X=0 USE X=0.0001 P.U.
IN R-ONLY NETWORK WHEN R=0 USE R IN METHOD 3
  WITH:  RC= 0.0001, X/R =80 FOR GENERATORS; =50 FOR XFORMERS; =10 FOR OTHERS

FAULTS APPLIED TO BUSES IN ZONE 999
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WITH BUS NUMBERS BETWEEN      0 AND 999999, INCLUSIVE, AND
WITH NOMINAL KV BETWEEN    0.00 AND 9999.00, INCLUSIVE, AND
WITH BUS NAME BETWEEN  AND zzzzzzzzzzzz, INCLUSIVE.
```

A TOTAL OF 408 FAULTS SIMULATED.

NOTE: ALL X/R RATIOS ARE ANSI X/R RATIOS.

BUS			3LG(A)	X/R	2LG(A)	X/R	1LG(A)	X/R	Z+(OHM)		Z2(OHM)		Z0(OHM)	
0	ADIRONDACK	230.kV	8300.5	9.0	7900.2	8.6	6287.4	7.2	1.99268	15.8734	1.99451	15.8879	8.63395	30.3291
0	AES SOMERSET	345.kV	14034.2	26.6	17110.8	30.6	17686.0	29.8	0.82596	14.1689	0.82791	14.2097	0.25863	5.35431
0	ALPS	345.kV	15390.1	18.1	14677.8	15.9	11621.5	7.0	0.84818	12.9147	0.84804	12.9095	5.82351	25.0412
62	AST-EAST-E	138.kV	57649.1	36.4	61162.6	33.8	58885.9	31.4	0.07341	1.38011	0.09614	1.35031	0.33175	1.2976
0	AST-EAST-W	138.kV	60127.2	37.4	64896.2	35.4	65242.2	34.0	0.06208	1.32364	0.08635	1.29127	0.18795	1.03324
64	AST-WEST	138.kV	36013.7	54.1	39855.2	49.4	41514.0	46.5	0.04506	2.21187	0.08811	2.20836	0.07943	1.33348
3850	ATHENS	345.kV	32991.4	47.2	32191.7	60.4	29711.2	68.1	0.35698	6.02694	0.35815	6.00629	1.00554	8.00522
5032	BARRETT	138.kV	47142.3	14.0	47847.4	14.2	47262.3	14.4	0.21348	1.67654	0.21961	1.67635	0.29728	1.65146
365	BOWLINE MID	345.kV	31128.4	26.4	34374.0	25.3	36706.9	24.7	0.33997	6.38982	0.27761	5.66801	0.36238	4.19182
2814	BOWLINE1	345.kV	29423.4	24.2	32583.0	26.4	34616.7	26.9	0.37776	6.75909	0.30354	5.98854	0.47096	4.47599
2813	BOWLINE2	345.kV	27190.5	26.8	29270.7	29.9	30841.3	30.9	0.38648	7.31536	0.29345	6.3889	0.47846	5.6363
5035	BRKHAVEN	138.kV	27142.5	24.8	26388.3	21.2	22923.7	9.6	0.18548	2.92954	0.23234	2.94654	0.96484	4.45874
8	BUCHAN N	345.kV	29504.9	34.2	29137.6	31.9	27510.4	27.7	0.28259	6.74501	0.27356	6.60012	0.82373	8.33218
9	BUCHAN S	345.kV	39071.2	35.9	38555.9	33.2	35339.3	27.7	0.23817	5.09245	0.22329	4.88497	0.89003	6.87762
66	BUCHANAN	138.kV	15549.7	36.0	15010.9	33.9	13819.7	29.6	0.176	5.12082	0.17516	5.10216	0.5359	7.05007
0	CLAY	345.kV	34130.8	21.1	33322.7	17.8	28024.0	5.9	0.35739	5.82499	0.37095	5.82678	2.34832	9.44819
12	COOPERS CRN	345.kV	16349.0	20.3	15026.7	20.0	11200.9	19.0	0.75822	12.1597	0.79038	12.1187	3.85473	28.7962
70	CORONA NORTH	138.kV	60787.5	20.4	70700.7	15.4	62939.7	4.5	0.06811	1.30893	0.09016	1.28084	0.80951	1.08249
0	CORONA SOUTH	138.kV	60793.6	20.4	70710.7	15.4	62947.6	4.5	0.06799	1.30881	0.09005	1.28071	0.80952	1.08232
0	DEWITT	345.kV	19430.6	19.2	18556.9	16.7	15295.5	7.4	0.63844	10.2312	0.64839	10.2323	3.58745	18.2987
72	DUN NO	138.kV	31905.9	39.9	31875.5	34.3	28649.4	21.0	0.09343	2.49542	0.09763	2.48689	0.6715	3.31602
73	DUN SO	138.kV	29915.4	42.3	30229.1	35.8	28715.3	21.6	0.08911	2.66183	0.09255	2.65294	0.42205	2.98721
0	DUNKIRK	230.kV	15053.3	32.7	15061.1	-192.3	15048.2	67.8	0.63207	8.79868	0.63131	8.80875	0.65156	8.79631
12	DUNWODIE	345.kV	49842.5	27.9	48919.4	23.9	40733.5	10.0	0.16667	3.99283	0.17024	3.92445	1.59609	6.62474
78	E 13 ST	138.kV	44944.2	44.5	46194.9	41.4	46628.9	38.0	0.04612	1.77214	0.05274	1.76717	0.09055	1.58326
82	E 179 ST	138.kV	41452.2	25.8	43331.5	21.0	39404.3	9.1	0.08258	1.9203	0.0983	1.91279	0.6913	2.16979
202	E FISHKILL	345.kV	38587.3	26.7	36910.8	23.8	28705.9	12.6	0.25526	5.15564	0.25733	5.11008	2.42978	10.3418
5038	E.G.C. 5038	138.kV	69946.3	17.7	72741.3	23.7	70547.5	24.5	0.09414	1.13518	0.10004	1.13434	0.23765	1.09096
5001	E.G.C. PAR	345.kV	9690.7	45.2	9950.2	61.0	9826.2	63.1	0.50521	20.5482	0.52244	20.5243	1.85796	19.6714
5002	E.G.C.-1	345.kV	7975.8	54.4	8207.6	72.9	8225.0	74.8	0.47276	24.9694	0.49548	24.9532	1.43826	22.6887
5003	E.G.C.-2	345.kV	7975.8	54.4	8207.6	72.9	8225.0	74.8	0.47276	24.9694	0.49548	24.9532	1.43826	22.6887
13	E15ST 45	345.kV	47752.4	25.4	49850.7	21.5	47096.8	14.0	0.20923	4.16597	0.22574	4.14976	1.04289	4.28576
14	E15ST 46	345.kV	47752.0	25.4	49990.4	21.4	47024.8	13.8	0.20925	4.166	0.22576	4.14979	1.11024	4.29719
15	E15ST 47	345.kV	46968.5	26.3	49029.9	22.5	46360.5	15.5	0.2251	4.23486	0.24086	4.21899	1.06186	4.34464
16	E15ST 48	345.kV	46827.1	25.7	49034.0	22.7	46051.8	17.7	0.22839	4.2475	0.24414	4.23161	1.16701	4.39267

76	EASTVIEW	138.kV	36019.0	48.5	35626.7	40.6	32471.5	17.7	0.05169	2.2114	0.05163	2.19617	0.40646	2.93577
0	EDIC	345.kV	32305.4	21.9	31209.7	20.4	26773.5	16.4	0.39947	6.15276	0.40673	6.15489	1.91111	9.84534
0	ELBRIDGE	345.kV	16556.4	18.7	15920.5	16.1	13363.5	6.7	0.75842	12.0068	0.76818	12.0078	4.08315	20.3478
1227	EV 56-1	345.kV	30733.9	28.3	29415.6	24.7	23151.7	10.2	0.28013	6.47493	0.27936	6.38179	2.70503	12.7466
501	EV 56-2	345.kV	33881.9	27.5	32500.2	24.1	25165.4	9.4	0.25871	5.87314	0.25846	5.77717	2.78436	11.8642
502	EV 61-1	345.kV	33232.1	28.1	32082.2	24.4	25281.1	9.3	0.25836	5.98821	0.25812	5.89234	2.78939	11.5237
116	EV61-2	345.kV	33198.2	27.5	31892.2	24.0	25124.9	9.7	0.26319	5.99413	0.26301	5.89819	2.62037	11.6821
18	FARRAGUT	345.kV	51516.7	39.5	53978.7	33.2	53363.2	22.6	0.13637	3.86403	0.1521	3.84829	0.48925	3.45858
26	FITZPATRICK	345.kV	39458.2	51.8	42542.8	43.0	42724.6	30.9	0.18538	5.04462	0.22275	5.0457	0.57668	3.86123
89	FOXHLS 1	138.kV	33934.0	10.8	34603.2	9.1	26825.7	3.2	0.22939	2.33669	0.23565	2.3278	2.25795	3.81946
91	FR KILLS	138.kV	38507.5	29.1	40040.7	28.6	39865.2	28.2	0.13931	2.06437	0.14435	2.05406	0.26883	1.85185
22	FR KILLS	345.kV	24933.1	39.0	26016.8	36.0	25931.6	32.7	0.25861	7.98461	0.30595	7.95551	0.81829	7.06197
11	FRASER	345.kV	17358.1	16.8	16471.6	16.5	13670.7	15.6	0.80231	11.447	0.80754	11.4314	3.5669	20.5248
5071	FREEPORT	138.kV	32988.2	10.4	32977.2	10.0	32058.9	9.4	0.31005	2.39525	0.31631	2.39467	0.46477	2.58556
0	GARDENVILLE1	230.kV	22529.6	16.7	21761.1	16.8	19785.7	17.1	0.55536	5.86782	0.55717	5.91117	1.30515	8.20967
31	GILBOA 345	345.kV	22078.1	43.7	22102.3	42.3	21509.4	40.4	0.49694	9.00816	0.49585	8.96844	0.99906	9.73308
24	GOETHL N	345.kV	25898.8	40.9	27406.5	36.1	27792.5	30.6	0.22836	7.68753	0.27674	7.65795	0.57953	6.12786
25	GOETHL S	345.kV	25884.9	40.8	27411.9	36.0	27806.9	30.6	0.22836	7.69167	0.27742	7.66176	0.57926	6.10871
26	GOW N	345.kV	20644.9	39.8	21075.9	33.3	19072.2	17.0	0.55142	9.63241	0.59349	9.60719	3.24095	11.7832
27	GOW S	345.kV	20649.1	39.7	21086.5	33.2	18954.2	16.4	0.55088	9.6305	0.59348	9.60504	3.43462	11.9566
94	GRENWOOD	138.kV	48711.4	30.0	52054.9	26.1	51735.3	21.1	0.07116	1.63409	0.07854	1.62572	0.22859	1.34479
0	HILL 230	230.kV	12827.3	14.3	12702.2	15.1	12340.5	15.8	1.14964	10.2881	1.14992	10.2887	1.61454	11.4666
5044	HOLBROOK	138.kV	47858.5	30.0	47815.6	27.6	45800.2	23.6	0.08838	1.66244	0.1279	1.67043	0.27412	1.86286
0	HUNTLEY	230.kV	27103.1	23.2	26715.6	33.0	25451.2	35.1	0.34817	4.88708	0.35088	4.94478	0.70584	5.75731
216	HURLEY AVE.	345.kV	16892.4	15.0	16043.5	20.5	12078.4	27.0	0.88703	11.758	0.88985	11.7304	6.86493	25.2243
0	INDEPENDENCE	345.kV	37261.1	47.9	39025.3	41.4	39347.9	32.5	0.20727	5.34166	0.23333	5.34295	0.44864	4.47585
108	JAMAICA	138.kV	49158.1	15.2	50680.7	12.9	45713.2	7.6	0.11779	1.61649	0.12198	1.61403	0.62337	1.9265
2846	LADENTOWN	345.kV	41666.8	33.7	43466.3	27.5	40398.7	10.9	0.23351	4.77474	0.1894	4.26438	1.27547	5.65456
0	LAFAYETTE	345.kV	18287.5	18.4	17405.0	16.1	13711.7	6.5	0.6926	10.8698	0.70174	10.8707	4.89727	21.3831
0	LEEDS	345.kV	33565.4	41.2	32758.2	43.9	30072.3	47.2	0.34879	5.92401	0.34999	5.90343	1.05613	7.96561
4996	LINDEN	230.kV	49410.7	45.9	53565.2	42.3	55814.2	39.8	0.15536	2.68299	0.15613	2.68209	0.11447	1.75965
5046	LKE SCSS	138.kV	39879.3	10.1	37847.4	9.5	31803.8	7.8	0.22029	1.98571	0.22546	1.98354	0.71524	3.4561
69	MARCY 345	345.kV	31552.2	23.2	30465.2	25.4	25587.7	28.9	0.38502	6.30116	0.39216	6.30371	2.23673	10.5531
70	MARCY 765	765.kV	9783.9	31.1	9573.2	34.6	8448.2	38.9	1.89109	45.1031	1.92077	45.1522	11.5077	65.8352
79	MASSENA 765	765.kV	8182.5	33.8	8482.4	32.6	8028.1	31.3	2.16954	53.9343	2.19894	54.1772	11.8376	56.1386
195	MEYER	230.kV	6209.6	7.8	5837.5	8.7	5041.6	10.0	3.09805	21.159	3.09849	21.1699	6.59649	35.6451
0	MIDDLETN TAP	345.kV	17780.8	27.6	16850.4	36.8	15198.3	43.0	0.68934	11.1811	0.71441	11.1105	1.32826	16.9308
114	MILLWOOD	138.kV	19004.3	41.4	18581.7	37.0	17031.1	26.8	0.11354	4.1909	0.11278	4.17179	0.59943	5.64746
32	MILLWOOD	345.kV	44478.5	30.2	42897.6	26.7	33195.3	12.3	0.19831	4.47385	0.1946	4.35052	2.18044	8.99202
0	NEW SCOTLAND	345.kV	29975.7	21.5	28757.9	18.5	23025.0	6.8	0.43289	6.63079	0.43414	6.61865	3.00045	12.4134
5050	NEWBRID	138.kV	72484.3	24.7	75018.1	24.2	74600.4	23.7	0.08037	1.09625	0.08702	1.09544	0.14796	0.9968
143	NEWGOW 1	138.kV	45263.3	23.5	48089.5	20.7	46573.1	16.8	0.09566	1.75764	0.10317	1.74879	0.36955	1.59421
144	NEWGOW2	138.kV	45262.8	23.5	48089.3	20.6	46572.2	16.8	0.09567	1.75766	0.10318	1.74881	0.36966	1.59426
120	NIAGARA 345	345.kV	29984.4	32.0	31758.1	39.7	32514.9	40.3	0.30398	6.63603	0.31586	6.7715	0.34455	4.94513
123	NIAGRA E 230	230.kV	49041.3	27.0	54018.5	32.7	55495.6	32.6	0.12895	2.70466	0.13673	2.811	0.11785	1.65252
125	NIAGRA W 230	230.kV	49040.7	31.9	54017.7	33.7	55494.9	34.1	0.12895	2.70469	0.13673	2.81104	0.11785	1.65255
0	NMP#1	345.kV	40378.2	60.1	44126.3	54.5	45008.1	50.1	0.17746	4.92981	0.20828	4.93101	0.40313	3.3924

5077	NRTHPRT1	138.kV	58562.6	22.6	60071.4	23.2	60719.2	23.6	0.09469	1.3572	0.12477	1.35608	0.13619	1.20716
5	OAKDALE	230.kV	6635.3	9.5	6508.5	10.7	6205.2	11.7	2.40204	19.868	2.4026	19.8681	3.76677	23.8893
10	OAKDALE 345	345.kV	12826.2	16.5	12339.2	17.2	11001.8	18.3	1.26484	15.478	1.26781	15.4758	3.54682	23.0196
0	OSWEGO	345.kV	30866.2	50.9	32949.5	48.0	33738.1	45.9	0.26198	6.44788	0.27582	6.44899	0.40864	4.78946
0	PACKARD	230.kV	42676.9	24.5	42920.6	21.2	39251.2	14.0	0.17018	3.10687	0.17691	3.199	0.84285	3.77341
5056	PILGRIM	138.kV	58441.4	17.7	59972.9	14.6	51504.4	5.4	0.10043	1.35962	0.12604	1.35927	0.75914	1.81608
0	PLEASANT VAL	345.kV	39358.4	24.4	37176.2	31.5	25763.3	44.1	0.26902	5.05366	0.26974	5.0091	3.65821	12.7485
165	POLETTI	345.kV	40718.0	29.7	42075.3	28.2	38845.3	26.0	0.34527	4.87964	0.36048	4.86354	1.55705	5.47249
0	PORTER	230.kV	18380.2	29.2	18692.8	26.3	18563.4	22.2	0.51284	7.20643	0.51469	7.20881	0.78947	6.9678
5057	PT JEFF1	138.kV	15616.0	17.3	15507.2	18.1	15389.9	18.8	0.41058	5.08556	0.50283	5.08783	0.525	5.29101
5048	PT JEFF2	138.kV	15447.9	17.0	15371.5	17.7	15280.2	18.4	0.43015	5.13965	0.52413	5.13795	0.53288	5.2942
127	PVILLE-1	345.kV	21369.5	25.2	20094.8	22.8	15083.0	12.3	0.40474	9.31225	0.40729	9.25244	4.04035	20.7551
129	QUEENSBG	138.kV	35193.4	48.7	40131.5	38.0	38857.9	21.2	0.05504	2.26323	0.09706	2.25995	0.53144	1.58994
41	RAINEY	345.kV	49321.1	37.3	51210.7	34.0	49208.9	29.4	0.15925	4.03541	0.17374	4.02046	0.75405	4.03866
45	RAMAPO	345.kV	44635.6	31.4	44825.5	26.8	39280.5	13.1	0.25515	4.45519	0.22941	4.1703	1.47249	6.46066
2	RAMAPO	500.kV	11080.5	42.5	10912.9	36.1	9767.3	17.4	0.81449	26.0399	0.79063	25.8172	5.73575	36.5042
0	REYNOLDS	345.kV	11832.8	19.0	11423.9	16.3	10037.0	8.3	1.05836	16.8	1.05834	16.7953	4.13538	25.6109
5058	RIVERHD	138.kV	15834.0	14.2	15599.4	14.7	15128.4	15.2	0.45174	5.01154	0.49844	5.02425	0.68673	5.67883
210	ROBINSON RD.	230.kV	14374.7	12.9	13564.6	13.1	11339.7	13.5	0.88159	9.19562	0.88761	9.27549	3.00206	16.3341
24	ROCK TAVERN	345.kV	28963.0	24.2	27650.9	21.6	22510.2	12.6	0.4217	6.86431	0.44622	6.78536	2.50507	12.6813
210	ROSETON	345.kV	34948.3	30.6	33992.4	30.2	30712.2	29.4	0.29226	5.69194	0.29743	5.65024	1.08168	8.04259
0	ROTTERDAM	230.kV	12543.8	12.8	12023.0	10.7	11287.7	5.1	1.32709	10.5027	1.32753	10.5026	1.73201	14.0137
5080	RULND RD	138.kV	45542.1	44.5	44599.2	42.0	42746.6	38.1	0.15455	1.74263	0.16614	1.73869	0.25051	2.08106
0	S RIPLEY	230.kV	9463.6	34.5	9043.7	30.3	7595.0	16.3	1.24159	13.9767	1.24129	13.9793	4.92614	23.9698
49	S.MAH-A	345.kV	34902.3	22.0	34170.1	24.7	27926.3	28.8	0.42231	5.69131	0.39854	5.43657	2.55805	10.0013
618	S.MAH-B	345.kV	34926.3	20.4	34014.0	20.3	27528.7	20.0	0.50712	5.68044	0.4803	5.42903	2.70027	10.2817
312	S122 1T MID	345.kV	12988.1	12.1	13021.6	9.7	12950.6	4.3	3.35236	14.9651	3.35375	14.9788	3.1661	15.1289
320	S122 2T MID	345.kV	12988.1	12.1	13021.6	9.7	12950.6	4.3	3.35236	14.9651	3.35375	14.9788	3.1661	15.1289
0	S122 3T MID	345.kV	5403.5	19.8	5646.2	15.3	5745.8	6.2	4.01565	36.643	4.01814	36.6582	4.26331	29.9686
0	S80	345.kV	16560.2	12.9	16237.6	10.8	14824.8	4.6	1.08203	11.9793	1.08556	12.0055	2.98158	15.993
0	SCRIBA	345.kV	42239.1	63.3	47035.4	51.6	48586.0	39.3	0.16243	4.71287	0.19398	4.71406	0.25902	2.85663
134	SHM CRK	138.kV	38307.1	18.6	39439.4	15.4	33780.6	6.0	0.11778	2.07654	0.13275	2.06916	1.11635	2.79675
5041	SHORE RD	138.kV	49764.6	16.3	48833.7	14.6	42742.7	10.3	0.12873	1.59584	0.13436	1.59331	0.55141	2.34336
5000	SHORE RD	345.kV	27741.8	12.8	27321.5	11.6	20427.7	8.0	0.64001	7.1514	0.64781	7.09575	6.34674	13.9914
5062	SHOREHAM	138.kV	24622.9	73.0	24496.5	72.7	23769.8	72.4	0.19482	3.22991	0.24854	3.23758	0.41702	3.55138
0	SILLS ROAD	138.kV	35177.6	31.8	35714.1	31.4	35563.4	31.1	0.11392	2.26205	0.16319	2.28612	0.22413	2.15416
48	SPRN BRK	345.kV	50859.2	29.1	49874.8	24.9	41372.1	9.9	0.16586	3.91291	0.16919	3.84103	1.58713	6.56108
189	ST LAWRN 230	230.kV	28014.8	42.7	31903.0	52.1	33017.8	51.0	0.22831	4.73451	0.23356	4.79207	0.20692	2.52023
173	STOLLE ROAD	230.kV	12988.7	11.3	12147.4	10.8	9789.4	9.3	1.05363	10.1691	1.05619	10.2138	3.7758	19.8833
14	STOLLE ROAD	345.kV	3891.6	12.8	3713.6	13.3	3306.0	14.1	4.59139	50.9765	4.59206	51.0335	11.0216	77.6071
120	TREMNT11	138.kV	37275.2	18.3	38464.8	15.3	33439.2	7.7	0.13416	2.13325	0.14949	2.12583	1.06783	2.75999
121	TREMNT12	138.kV	37275.2	18.3	38480.5	15.3	33522.5	7.7	0.13416	2.13325	0.14949	2.12583	1.05494	2.74438
36	TREMONT	345.kV	32174.9	12.8	31752.7	11.2	24201.2	5.3	0.57755	6.16372	0.58295	6.09395	5.0879	11.6299
139	VERNON E	138.kV	22151.3	60.1	21997.4	54.0	20574.0	42.2	0.09294	3.59562	0.10291	3.59064	0.52798	4.40889
140	VERNON W	138.kV	23044.2	56.0	23362.4	47.9	22652.8	32.6	0.08938	3.4563	0.11519	3.45374	0.40656	3.62385
5066	VLY STRM	138.kV	51774.4	10.5	53109.6	9.4	50130.4	7.3	0.17271	1.52915	0.17833	1.52875	0.44629	1.64298
0	VOLNEY	345.kV	37282.7	37.0	37836.6	30.2	32660.6	7.2	0.21479	5.33827	0.23582	5.3395	2.35232	7.40221

438	W 49 ST	345.kV	45986.2	24.5	47686.9	22.4	44342.9	19.0	0.23709	4.32493	0.25517	4.30789	1.24725	4.73027
3011	W.HAV345	345.kV	31344.5	31.4	34631.0	29.0	36984.3	27.4	0.29836	6.34773	0.23628	5.62624	0.33388	4.15973
0	WATERCURE 71	230.kV	12682.5	14.8	12567.2	15.0	12166.3	15.2	1.12051	10.4102	1.12081	10.4108	1.67781	11.6873
0	WATERCURE345	345.kV	8014.7	16.6	7621.6	17.5	6649.6	19.0	1.83222	24.785	1.83351	24.785	5.42179	39.833
214	WILLIS 230	230.kV	9602.8	11.1	9362.9	17.6	7887.7	19.7	1.57765	13.7381	1.57945	13.7723	6.57538	22.0483
407	WOOD ST A	345.kV	21443.0	35.9	20473.5	46.6	16412.0	58.6	0.39019	9.28087	0.39205	9.22776	3.43529	17.6561
408	WOOD ST B	345.kV	24652.6	34.0	23478.4	43.8	18448.0	56.1	0.33567	8.07273	0.33354	7.97913	3.1628	16.1121

APPENDIX I. VFT Dynamic Modeling

VFT model parameters for both the physical system and basic controls.

Physical System Parameters

Parameter	*Units*	*Value*	*Comments*
Base MVA	MW rating	100	Nameplate rating of VFT System
H	pu-VFT-sec	26.2	
Xvft	pu-VFT	0.12	
Rvft	pu-VFT	0.004	
Bmagvft	pu-VFT	-0.18	
Xtfmr	pu-VFT	0.1	

Speed Regulator

Parameter	*Units*	*Value*	*Comments*
Kwp	pu T/pu Spd	500	speed base for model is system frequency
Kwi	pu T/sec/pu Spd	500	
Tdrv	sec	0.02	
TrqRate	pu/sec	75	Rate limit on Drv_Trq

Power Regulator

Parameter	*Units*	*Value*	*Comments*
Kpp	pu freq/pu P	0.02	
Kpi	pu freq/sec/pu P	0.003	
Fplimi	pu Spd	0.02	
Fplim	pu Spd	0.052	
Fsrlim	pu freq	0.055	Maximum frequency difference
Fratelim	pu freq/sec	0.06	
Tfsr	sec	0.1	
Tdfpstab	sec	0.05	
Kpstab	-	1.0	
Wpstab	Rad/sec	0.1	
Fpstablim	pu Spd	0.05	

Transducer Parameters

Parameter	*Units*	*Value*	*Comments*
Xth1	pu VFT	0.15	XT1 + average short-circuit impedance at side 1 HV bus
Xth2	pu VFT	0.3	XT2 + average short-circuit impedance at side 2 HV bus
Tfx	Sec	0.02	Filter time constant on frequency measurement

Voltage-Dependent Torque Limit

Parameter	*Units*	*Value*	*Comments*
Trq_vdtl_max	pu T	4.0	
Trq_vdtl_min	pu T	0.2	
Tvdtl	sec	0.025	

VFT model parameters for additional basic controls and application functions.

Drive Motor Torque Limits

Parameter	Units	Value	Comments
Spd_rpst_bas	rpm	1800.	
Spd_mtr_bas	rpm	48.	
Spd_taper	pu	2.50	
Imtr_max	pu	3.15	
Imtr_taper	pu	2.73	

Final Torque Limits

Parameter	Units	Value	Comments
Trq_acel_lim	pu	5.0	

Voltage-Dependent Power Limit

Parameter	Units	Value	Comments
Plimo	pu P	1.15	Maximum power limit
Vp1	pu V	0.95	Voltage below which power limit is lowered
Vpx	pu V	0.7	Voltage where Pvdlim=0
Tvd_dn	sec	0.3	Rate for reducing power limit
Tvd_up	sec	3.0	Rate for increasing power limit

Governor

Parameter	Units	Value	Comments
Tgov	sec	0.3	
fdb1_lo	pu Freq	-0.01	Deadband for under-frequency on side 1
R1_lo	pu freq/ 1pu P	0.01	Droop for under-frequency on side 1
fdb1_hi	pu Freq	0.01	Deadband for over-frequency on side 1
R1_hi	pu freq/ 1pu P	0.01	Droop for over-frequency on side 1
Dpgmax1	pu P	1.5	Limit on power change due to frequency deviation on side 1
fdb2_lo	pu Freq	-0.01	Deadband for under-frequency on side 2
R2_lo	pu freq/ 1pu P	0.01	Droop for under-frequency on side 2
fdb2_hi	pu Freq	0.01	Deadband for over-frequency on side 2
R2_hi	pu freq/ 1pu P	0.01	Droop for over-frequency on side 2
Dpgmax2	pu P	1.5	Limit on power change due to frequency deviation on side 2

Power Swing Damping Control

Parameter	Units	Value	Comments
Kpsdc1	pu P/pu F	0	
Wpsdc1	sec	5	
A0psdc1	pu	1	
A1psdc1	pu	0	
A2psdc1	pu	0	
B0psdc1	pu	1	
B1psdc1	pu	0	
B2psdc1	pu	0	
Ppsdc1_lim	pu	0.1	
Side 2 PSDC parameters are the same as above			

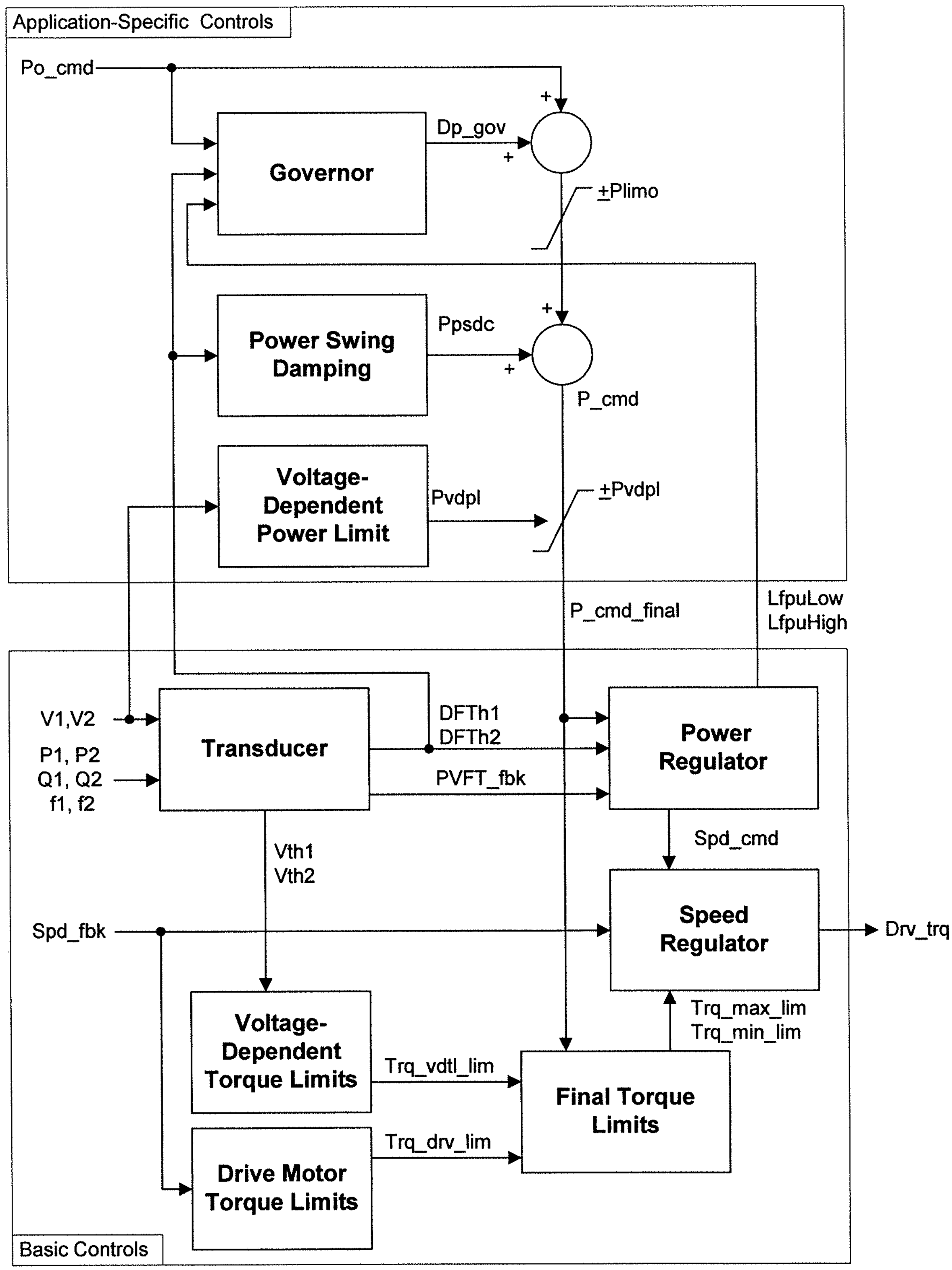

Figure I-1. Overview of VFT Controls.

EXHIBIT NO. 8

PROPOSED INTERCONNECTIONS/NEW YORK CONTROL AREA (12/18/2003)

PROPOSED INTERCONNECTIONS / NEW YORK CONTROL AREA

Site #	Project Name	Owner/Developer	Size (MW)	Date of Study Application	S	Interconnection Point	Utility	Status of Article X or VII	C	Proposed In-Service
2	Athens Gen	Athens Gen Co./ PG&E	1080	04/27/98	C	Leeds-Pl.Val. 91 Line	NM-NG	Certified 6/15/00	Y	2003/12
3	Bethlehem Energy Center	PSEG Power NY	350	04/27/98	C	Albany	NM-NG	Certified 2/28/02	Y	2005/Sp
4	CT-LI DC Tie-line	TransEnergie US, Ltd	330	07/20/98	C	Shoreham, Long Island	LIPA	Certified 6/27/01	Y	I/S
~~5~~	~~Torne Valley Station~~	~~Sithe Energies~~	~~860~~	~~01/28/99~~	W	Ramapo	CONED	Withdrawn	N	N/A
6	Sunset Energy Fleet	Sunset Energy Fleet LLC	520	02/17/99	C	Gowanus	CONED	Appl filed 7/26/00	N	*None*
~~7~~	~~Ramapo Energy~~	~~American National Power~~	~~1100~~	~~02/23/99~~	W	Ramapo	CONED	Withdrawn	N	N/A
~~8~~	~~Grassy Point~~	~~Columbia Electric Corp.~~	~~1100~~	~~02/23/99~~	W	West Haverstraw	CONED	Inactive	N	N/A
9	Millennium 1	Millennium Power Gen Co. LLC	160	02/23/99	I	Hell Gate/Bruckner	CONED	(No Filing)	N	*None*
10	Millennium 2	Millennium Power Gen Co. LLC	320	02/23/99	I	Hell Gate/Bruckner	CONED	(No Filing)	N	*None*
13	Linden 7	East Coast Power, LLC	100	03/25/99	P	Goethals	CONED	N/A	N	*None*
14	Linden Plant Improvements	East Coast Power, LLC	20	03/25/99	P	Goethals	CONED	N/A	N	*None*
~~15~~	~~CT-LI AC Tie-line~~	~~AEP Resources Service Corp.~~	~~600~~	~~04/13/99~~	W	Shoreham, Long Island	LIPA	(No Filing)	N	N/A
16	ABB Oak Point Yard	ABB Development Corp.	1075	04/15/99	C	Hell Gate/Bruckner	CONED	Inactive	N	*None*
17	KeySpan Ravenswood	KeySpan Energy, Inc.	270	04/21/99	C	Vernon	CONED	Certified 9/07/01	Y	2004/Sp
18	Poletti Expansion	NYPA	500	04/30/99	C	Astoria	CONED	Certified 10/02/02	Y	2005/01
19	NYC Energy LLC	NYC Energy LLC	79.9	05/07/99	C	Kent Ave	CONED	N/A	Y	2004/Q4
20	Spagnoli Road CC Unit	KeySpan Energy, Inc.	250	05/17/99	C	Spagnoli Road	LIPA	Certified 5/8/03	N	2004/S
21	Shoreham Gen Station	KeySpan Energy, Inc.	250	05/17/99	I	Shoreham	LIPA	(No Filing)	N	*None*
22	Wawayanda Energy Center	Calpine Eastern Corporation	500	06/10/99	C	Coop Corn-Rock Tav Lines	NYPA	Certified 10/22/02	N	2005
23	Sullivan County Power Project	Calpine Eastern Corporation	1080	06/25/99	I	Coop Corn-Rock Tav Lines	NYPA	(No Filing)	N	*None*
24	Astoria Repowering-Phase 1	Reliant Energy	499	07/13/99	C	Astoria	CONED	Certified 6/25/03	N	2007
25	East River Repowering	Consolidated Edison of NY	288	08/10/99	C	E. 13th St.	CONED	Certified 8/30/01	Y	2004/09
26	Twin Tier Power	Twin Tier Power, LLC	520	08/20/99	I	Watercure-Oakdale 31 Line	NYSEG	Inactive	N	*None*
~~27~~	~~Far Rockaway Barge~~	~~ENRON~~	~~60~~	~~09/08/99~~	W	Far Rockaway	LIPA	N/A	N	N/A
28	Spagnoli Road GT Unit	KeySpan Energy, Inc.	79.9	09/08/99	I	Spagnoli Road	LIPA	N/A	N	*None*
29	Bowline Point Unit 3	Mirant	750	10/13/99	C	W. Haverstraw	CONED	Certified 3/25/02	Y	2006/06
~~30~~	~~Heritage Station~~	~~Sithe Energies~~	~~800~~	~~10/29/99~~	W	Independence (Oswego)	NM-NG	Cancelled	N	N/A
31	Astoria Energy	SCS Energy, LLC	1000	11/16/99	C	Astoria	CONED	Certified 11/21/01	Y	2006
32	Brookhaven Energy	American National Power	580	11/22/99	C	Holbrook-Brookhaven Line	LIPA	Certified 8/14/02	N	2005
33	Glenville Energy Park	Glenville Energy Park, LLC	540	11/30/99	C	Rotterdam	NM-NG	Appl accepted 4/9/02	N	2006/S

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PROPOSED INTERCONNECTIONS / NEW YORK CONTROL AREA

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~~34~~	~~North First Street~~	~~York Research Corp.~~	~~500~~	~~01/11/00~~	W	Con Ed System	CONED	(No Filing)	N	N/A
35	Gotham Power - Bronx I	1st Rochdale Coop Group	79.9	01/12/00	I	Parkchester/Tremont	CONED	N/A	N	*None*
36	Project Neptune DC NB-NYC	Atlantic Energy, LLC	1200	01/21/00	C	Farragut	CONED	(No Filing)	N	2008
~~37~~	~~Kitchen~~	~~Caithness Energy, LLC~~	~~750~~	~~01/28/00~~	W	Riverh'd-Brookh'n-Holb'k	LIPA	Inactive	N	N/A
38	Far Rochaway Gen Ext.	KeySpan Energy, Inc.	79	02/01/00	I	Far Rockaway	LIPA	N/A	N	*None*
39	E. F. Barrett Gen Ext	KeySpan Energy, Inc.	79	02/01/00	I	Barrett	LIPA	N/A	N	*None*
40	Riverhead Gen Station	KeySpan Energy, Inc.	79	02/01/00	I	Riverhead	LIPA	N/A	N	*None*
41	Southampton Gen Ext.	KeySpan Energy, Inc.	79	02/01/00	I	Southampton	LIPA	N/A	N	*None*
42	Holbrook Energy	PP&L Global, Inc.	300	02/01/00	I	Holbrook	LIPA	(No Filing)	N	*None*
43	PPL Kings Park	PP&L Global, Inc.	300	02/01/00	C	Pilgrim	LIPA	Appl accepted 3/22/02	N	2006
44	Ruland Energy	PP&L Global, Inc.	300	02/01/00	I	Ruland Road	LIPA	(No Filing)	N	*None*
~~45~~	~~Freeport Energy~~	~~PP&L Global, Inc.~~	~~400~~	~~02/01/00~~	W	Freeport	LIPA	(No Filing)	N	N/A
46	Brookhaven Energy	PP&L Global, Inc.	300	02/03/00	I	Brookhaven	LIPA	(No Filing)	N	*None*
47	GenPower DC Tie-line	GenPower, LLC	800	02/09/00	C	West 49th Sreet	CONED	Inactive	N	2009
~~48~~	~~PPL Kings Park Ext.~~	~~PP&L Global, Inc.~~	~~300~~	~~02/10/00~~	W	Pilgrim	LIPA	(No Filing)	N	N/A
49	Brookhaven Energy Ext.	PP&L Global, Inc.	300	02/10/00	I	Brookhaven	LIPA	(No Filing)	N	*None*
~~50~~	~~AES Smithtown Gen~~	~~AES Long Island, LLC~~	~~510~~	~~02/10/00~~	W	LIPA System	LIPA	(No Filing)	N	N/A
51	Wading River Gen Ext.	KeySpan Energy, Inc.	150	02/15/00	I	Wading River	LIPA	(No Filing)	N	*None*
~~52~~	~~Fort Drum Gen Exp.~~	~~Nia Mo Energy/Black River Power~~	~~50~~	~~03/06/00~~	W	Fort Drum	NM-NG	N/A	N	N/A
53	CT-Ruland, LI DC Tie	TransEnergie US, Ltd	300	03/07/00	I	Ruland Road	LIPA	(No Filing)	N	2006
54	CT-Pilgrim, LI DC Tie	TransEnergie US, Ltd	300	03/07/00	I	Pilgrim	LIPA	(No Filing)	N	2006
~~56~~	~~Gotham Power - Brooklyn~~	~~1st Rochdale Coop Group~~	~~79~~	~~03/17/00~~	W	Kent Ave	CONED	N/A	N	N/A
57	Flat Rock Windpower	Flat Rock Windpower, LLC	100	03/21/00	C	Lowville-Boonville	NM-NG	N/A	N	*None*
58	Lovett #3 Repowering	Mirant	180	03/23/00	I	Lovett	CONED	(No Filing)	N	*None*
59	Hillburn Unit #2	Mirant	79.9	03/23/00	I	Hillburn	CONED	N/A	N	*None*
60	Hillburn #2 Conversion	Mirant	40	03/23/00	I	Hillburn	CONED	N/A	N	*None*
~~61~~	~~Greenpoint Energy Park~~	~~GTM Energy, LLC~~	~~500~~	~~04/19/00~~	W	Rainey-Farragut Lines	CONED	(No Filing)	N	N/A
~~62~~	~~Project Orange~~	~~Project Orange Associates, LP~~	~~420~~	~~05/08/00~~	W	Temple St.	NM-NG	(No Filing)	N	N/A
63	LSA Station A	Lewis Staley Associates, Inc.	650	05/11/00	I	Homer City-Stolle Rd Line	NYSEG	(No Filing)	N	*None*
64	LSA Station B	Lewis Staley Associates, Inc.	600	05/12/00	I	Dunkirk-Gardenville Line	NM-NG	(No Filing)	N	*None*
65	Lockport II Gen Station	Fortistar-Lockport Merchant Associates	79.9	05/15/00	C	Harrison Station	NYSEG	N/A	N	2005
66	Langlois Converter	TransEnergie HQ	100	06/02/00	C	Langlois, Quebec	NM-NG	N/A	Y	2004

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PROPOSED INTERCONNECTIONS / NEW YORK CONTROL AREA

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67	Wallkill Energy	Titan Development, LLC	1080	06/21/00	I	Coop Corn-Rock Tav Lines	NYPA	(No Filing)	N	*None*
68	Ruland Energy Ext.	PP&L Global, Inc.	300	06/23/00	I	Ruland Road	LIPA	(No Filing)	N	*None*
69	Empire State Newsprint	Besicorp/Empire State	660	07/14/00	C	Reynolds Road	NM-NG	Appl accepted 5/28/02	N	2005/Q1
70	Astoria Repowering-Phase 2	Reliant Energy	800	08/18/00	C	Astoria	CONED	Certified 6/25/03	N	2007
~~71~~	~~Mill Creek Wind Plant~~	~~Mill Creek Wind Plant, LLC~~	~~50~~	~~08/08/00~~	W	Lowville	NM-NG	N/A	N	N/A
72	Island Generating Station	Fortistar Power Marketing, LLC	79.9	09/08/00	I	Fresh Kills	CONED	N/A	N	*None*
73	Island Generating Station #2	Fortistar Power Marketing, LLC	500	09/08/00	I	Fresh Kills	CONED	(No Filing)	N	*None*
74	Oceanside Energy Center	FPL Energy, LLC	330	10/10/00	I	Barrett	LIPA	(No Filing)	N	*None*
~~75~~	~~Gotham Power – Bronx II~~	~~1st Rochdale Coop Group~~	~~79~~	~~10/17/00~~	W	Hell Gate/Bruckner	CONED	N/A	N	N/A
76	Waterford	Calpine Eastern Corporation	530	10/30/00	I	NM-NG 230 or 115 kV	NM-NG	(No Filing)	N	*None*
77	Dover Energy	Titan Development, LLC	1000	11/17/00	I	Pl. Valley-Long Mt. Tie-Line	CONED	(No Filing)	N	*None*
78	Ravenswood Repowering Ph I	KeySpan Ravenswood Services, LLC	440	12/04/00	I	Vernon	CONED	(No Filing)	N	*None*
86	Berrians GT Replacement	NRG/ Berrians I GT Power, LLC	79.9	01/15/01	I	Astoria	CONED	N/A	N	2004/05
87	Buchanan Energy	Titan Development, LLC	500	02/26/01	I	Buchanan	CONED	(No Filing)	N	*None*
88	Halfmoon Energy	Titan Development, LLC	500	02/26/01	I	Rotterdam-Bear Swamp line	NM-NG	(No Filing)	N	*None*
89A	Project Neptune DC PJM-NYC	Atlantic Energy, LLC	600	03/15/01	C	W49th St	CONED	Appl accepted 2/14/02	N	2004/Q4
89B	Project Neptune DC PJM-NYC	Atlantic Energy, LLC	600	03/15/01	C	W49th St	CONED	(No Filing)	N	2008
90	Fortistar VP	Fortistar, LLC	79.9	03/20/01	C	Fresh Kills	CONED	N/A	N	2005/S
91	Fortistar VAN	Fortistar, LLC	79.9	03/20/01	C	Goethals/Fresh Kills	CONED	N/A	N	2005/S
92	Redhook Energy	Amerada Hess Corp.	79.9	05/01/01	I	ConEd 138 kV (tbd)	CONED	N/A	N	2005
93	Cross Hudson Project	PSEG Power In-City I, LLC	550	05/11/01	C	W49th Street	CONED	Certified 4/17/03	N	2005/03
94	Project Neptune DC PJM-LI	Atlantic Energy, LLC	750	05/22/01	C	Newbridge Road	LIPA	Appl accepted 2/14/02	N	2004/Q4
96	CPN 3rd Turbine, Inc. (JFK)	Calpine Eastern Corporation	45	05/29/01	C	Jamaica	CONED	N/A	N	2004
97	South Glens Falls Expansion	NYSEG Solutions	40	06/15/01	I	Mohican-Butler#18 line	NM-NG	N/A	N	*None*
98	PJM-New York City HVDC	TransEnergie US Ltd.	990	06/22/01	I	W49th St and/or Farragut	CONED	(No Filing)	N	*None*
100	Blooming Grove Power	Titan Development, LLC	500	07/02/01	I	Rock Tavern-Ramapo line	CONED	(No Filing)	N	*None*
101	NU CT-LI HVDC Cable	Northeast Utilities Service Company	660	07/13/01	I	Shore Road	LIPA	(No Filing)	N	*None*
102	Indian Point Energy Center	Entergy Power Generation Corp.	400	07/23/01	C	Buchanan	CONED	Prelim filed 3/18/02	N	2005/S
103	East Coast HVDC	Arcadian Mercantile Holding Ltd.	2400	08/15/01	I	Marcy - W49th Street	NYPA/CONED	(No Filing)	N	2007
104	Jupiter PJM-NYC Cable	PG&E/Liberty Generating Company, LL	1200	08/24/01	I	W49th St or Farragut	CONED	(No Filing)	N	*None*
105	Titan Smith Street	Calpine Eastern Corporation	79.9	10/05/01	I	Gowanus 138 or 345 kV	CONED	N/A	N	*None*
106	TransGas Energy	TransGas Energy, LLC	1100	10/05/01	C	E13St, Rainey, or Farragut	CONED	Appl accepted 6/5/03	N	2006

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107	Suffolk Power-Yaphank	Suffolk Power I, LLC	255	10/09/01	I	Brookhaven-Holbrook or H'ville	LIPA	(No Filing)	N	2005/11
108	SE Long Island	Sempra Energy Resources	575	11/29/01	I	Shoreham-Holbrook lines	LIPA	(No Filing)	N	2006
109	Maspeth	Calpine Eastern Corporation	79.9	01/25/02	I	Vernon-Glendale line	CONED	N/A	N	2005
110	Liberty Generation	PG&E/Liberty Generating Company, LL	400	02/04/02	C	Goethals	CONED	N/A	N	2006
111	River Hill Project	River Hill Power Company, LLC	520	02/05/02	A	Homer City-Watercure line	NYSEG	N/A	N	2006
112	PJM-Rainey HVDC	TransEnergie US Ltd.	660	04/09/02	C	Rainey	CONED	(No Filing)	N	2005/12
113	Prattsburgh Wind Park	Global Winds Harvest, Inc.	75	04/22/02	R	Eelpot Rd-Flat St. line	NYSEG	N/A	N	2004/Q4
114	Cherry Valley Wind Park	Global Winds Harvest, Inc.	40.5	04/22/02	A	East Springfield	NYSEG	N/A	N	2004/Q4
115	East Fishkill Transformer	Central Hudson Gas & Electric	N/A	04/24/02	I	East Fishkill	CONED/CHG&E	N/A	N	2007/06
116	Liberty Gen Co, LLC	PG&E/Liberty Generating Company, LL	600	04/29/02	I	Goethals	CONED	N/A	N	*None*
117	Chautauqua Windpower Project	Chautauqua Windpower, LLC	50	05/14/02	P	Dunkirk-S. Ripley line	NM-NG	N/A	N	*None*
118	Prattsburgh Wind Park II	Global Winds Harvest, Inc.	75	05/15/02	I	Eelpot Rd-Flat St. line	NYSEG	N/A	N	*None*
119	Prattsburgh Wind Farm	ECOGEN, LLC	79.5	05/20/02	A	Eelpot Rd-Flat St. line	NYSEG	N/A	N	2005/02
120	Springwater Wind Farm	ECOGEN, LLC	79.5	05/20/02	I	Eelpot Rd	NYSEG	N/A	N	*None*
124	Bay Energy Project	Bay Energy, LLC	79.9	07/01/02	C	Gowanus	CONED	N/A	N	2004/Q4
125	Linden VFT Inter-Tie Project	East Coast Power, LLC	300	07/18/02	A	Goethals	CONED	N/A	N	2005
126	PJM-Newbridge Rd HVDC	TransEnergie US Ltd.	350	09/10/02	C	Newbridge Road	LIPA	(No Filing)	N	2005/S
127	Northport-Norwalk Upgrade	KeySpan Energy for LIPA	150	09/19/02	I	Northport	LIPA	Withdrawn	N	2005
128	Flat Rock Wind Power 230 kV	Flat Rock Wind Power, LLC	240	11/20/02	C	Adirondack-Porter line	NM-NG	(see #141 below)	N	*None*
130	Grace Corona Generation	Electrotek Concepts, Inc.	79.9	01/14/03	P	Corona	CONED	N/A	N	2005
131	Cody Road Wind Farm	Green Power Energy, LLC	10.5	03/05/03	P	Oneida-Cortland line	NM-NG	N/A	N	2005
132	Munnsville Windpower	SeaWest Windpower, Inc.	40	05/11/03	N/A	NYSEG Ckt 806	NYSEG	N/A	N	2004/Q3
135	Canandaigua Wind Farm	Global Winds Harvest, Inc.	79.9	05/30/03	P	Avoca	NYSEG	N/A	N	2005/10
136	Rochester Transmission Project	Rochester Gas & Electric	N/A	06/12/03	C	RG&E System	RG&E	Art VII filed 9/30/03	N	2008/F
137	Empire Connection	Conjunction, LLC	2000	06/16/03	R	N. Scotland/Leeds, ConEd	NM-NG/CONED	Art VII filed 11/03	N	2005/S
138	Indian Point 2 Uprate	Entergy Nuclear Operations, Inc.	36	07/23/03	A	Indian Point	CONED	N/A	N	2004/F
139	Indian Point 3 Uprate	Entergy Nuclear Operations, Inc.	38	07/23/03	A	Indian Point	CONED	N/A	N	2005/Sp
140	Leeds-PV Reconductoring	National Grid	N/A	08/26/03	A	Leeds/Athens-Pl. Valley	NM-NG	N/A	N	2006
141	Flat Rock Wind Power 300 MW	Flat Rock Wind Power, LLC	300	08/27/03	R	Adirondack-Porter line	NM-NG	Art VII filed 3/28/03	N	2005
142	Hartsville Wind Farm	Airtrcity Developments, LLC	50	10/30/03	P	Bannett-Palmiter	NYSEG	N/A	N	2005/12
		Grand Total	**41,476**							
		In-State Generation	**25,596**							

NOTES: The column labeled 'S' refers to the status of the NYISO System Reliability Impact Study. Key: P=Pending, A=Active, I=Inactive, R=Under Review, C=Completed, W=Withdrawn
The column labeled 'C' refers to construction status. Key: Y=Yes, N=No, C=Completed
Proposed in-service dates are shown in format Year/Qualifier, where Qualifier may indicate the month, season, or quarter.

Updated: 12/18/2003

EXHIBIT NO. 9

LIST OF PROJECT/FACILITY CHANGES SUBMITTED TO NYISO AND DETERMINED TO BE NON-MATERIAL UNDER THE NYISO INTERCONNECTION PROCEDURES (UPDATED AS OF 03/12/2012)

List of Project / Facility Changes Submitted to NYISO and Determined to Be Non-Material Under the NYISO Interconnection Procedures
(Updated as of 3/8/2012 – updates since previous posting are highlighted)

Queue Pos. (1)	Project/Facility Name	Owner/Developer	Date SRIS approved by OC	Description of Change(s)	Date NYISO Received Request / Notification	Date of TPAS Review
n/a	Indian Pt. 3 Nuclear Unit	Entergy	n/a	Increase size to 1,042 MW	9/12/02	10/17/02
n/a	East 74th St. GTs	Con Edison	n/a	Change interconnection of existing units.	2/14/03	3/4/03
n/a	Indian Pt. 2 Nuclear Unit	Entergy	n/a	Increase size to 1,042 MW	4/2/03	4/30/03
n/a	Fitzpatrick Nuclear Unit	Entergy	n/a	Increase plant size from 883 MW to 896 MW	8/10/04	9/14/04
n/a	Black River Plant	Black River Generation	n/a	Increase plant size by about 7 MW	2/6/06	2/22/06
n/a	Seymour Gas Turbines	NYPA	n/a	Change interconnection of existing GTs from Gowanus-Greenwood line to Greenwood bus.	3/13/06	4/10/06
n/a	Jamaica Upgrades	Con Edison	n/a	Two new breakers, 30 MVAR Cap, relocate connection of KIAC generator.	8/21/07	10/3/07
n/a	Niagara Gen Facility	Niagara Generation	n/a	Change in fuel and related equipment (no change to generator)	2/26/08	4/8/08
16	Oak Point Yard	KeySpan Energy	2/21/02	Reduce size from 1100 MW to 500 MW	7/15/05	10/19/05
17	Ravenswood	KeySpan	1/17/01	Change interconnection from the Rainey 345 kV bus to the Vernon 138 kV bus	11/13/04-5/10/02	5/15/02
18	Poletti	NYPA	4/23/01	Change interconnection to Astoria West	1/13/03-3/25/03	3/26/03
69	Empire State Newsprint	Besicorp-Empire Power	11/14/01	Small changes to interconnection plans	12/22/03	1/8/04
93	In-City I (Cross Hudson)	PSEG Power	12/12/01	Reduce size from 1200 MW to 550 MW	8/19/02	9/13/02
107	Caithness Bellport	Caithness Long Island	6/30/05	Increase size from 290 MW to 309.6 MW	10/13/04	11/9/04
113	Prattsburgh Wind Park	Windfarm Prattsburgh	2/19/04	Reduce size from 75 MW to 55.5 MW	11/10/06	5/3/07
115	E. Fishkill Transformer	Central Hudson	n/a	Request to install for standby operation	6/14/06	6/19/06
119	Prattsburgh Wind Farm	Ecogen LLC	4/29/04	Potential change of turbines.	9/10/07-9/13/07	10/3/07
119	Prattsburgh Wind Farm	Ecogen LLC	"	Change of proposed I/S date to 09/2010	2/24/09	12/22/09
119	Prattsburgh Wind Farm	ECOGEN, LLC	"	Change of proposed I/S date to 05/2012	8/23/10	9/30/10
125	Linden VFT	East Coast Power	3/9/06	Remove NY-side capacitor banks.	3/30/09	5/29/09
125	Linden VFT	Linden VFT LLC	3/9/06	Alternative configuration for Goethals ring bus	1/21/11	2/17/11
127A	Munnsville	Airtricity	6/15/06	Change I/S date for the last 6 MW of the project to 12/31/2012	4/22/08	12/22/09
135&199	Canandaigua I & II	UPC Wind Management	2/27/07	Change in Developer Attachment Facilities	3/7/06	5/3/07
135&199	Canandaigua I & II	UPC Wind Management	"	Change machines	7/13/06	5/3/07
135&199	Canandaigua I & II	UPC Wind Management	"	Increase size of projects by 0.5 MW each.	8/30/06	5/3/07
141	Flat Rock Wind Power	Flat Rock Wind Power	1/22/04	Change machines	3/3/04	3/9/04

(1) A Queue Position of "n/a" indicates that the change involved an existing facility, and in this case, a determination of non-material means that the change was not required to go through the NYISO interconnection process.

Queue Pos. (1)	Project/Facility Name	Owner/Developer	Date SRIS approved by OC	Description of Change(s)	Date NYISO Received Request / Notification	Date of TPAS Review
141	Flat Rock Wind Power	Flat Rock Wind Power	"	Increase size from 300 MW to 321 MW	3/30/06	4/10/06
142	Steuben Wind (formerly Hartsville)	EC&R Northeast, LLC	6/15/06	Change COD to 11/2010	5/27/08	12/22/09
144	High Sheldon Windfarm	Sheldon Energy	6/15/06	Potential changes: Reduce size from 129 MW to 112.5 MW, elimination of 20 MVAr fixed capacitor due to increased machine VAr cap.	2/15/08-5/28/08	6/12/08
144	High Sheldon Windfarm	Sheldon Energy	"	Notice of decision to implement changes.	6/16/08	n/a
147	West Hill Windfarm	NY Windpower	6/27/06	Change machines and reduce size to 37.5 MW	1/19/07	5/3/07
147	West Hill Windfarm	NY Windpower	"	Reduce size from 37.5 MW to 31.5 MW, change transformer. (Potential impact of changes on design of SUFs to be evaluated in engineering design studies conducted under the Interconnection Agreement.)	3/3/09	12/22/09
147	West Hill Windfarm	West Hill Windpower, LLC	6/27/06	Change of proposed I/S date to 09/2012	8/31/10	9/30/10
152	Moresville Energy Ctr	Moresville Energy	6/15/06	Potential changes: change turbines to Vestas V90, reduce size from 129 MW to 99 MW	3/26/08-5/29/08	12/22/09
156	Fairfield Wind Project	PPM Energy/Atlantic Wind	6/15/06	Potential modifications: 1) Change proposed COD to 01/2011; 2) Reduce size from 120 MW to 74 MW; 3) Change of turbines to Gamesa 2.0 MW units; 4) Reduce 34.5 kV collection system and 34.5/115 kV step-up transformer to match reduced project size; 5) Move POI 1.6 miles west, but on same line.	9/23/09	4/29/10
156	Fairfield Wind Project	PPM Energy/Atlantic Wind	"	Confirmation of the above changes	4/26/10	n/a
157	NY I Project	BP Wind Energy NA, Inc.	12/18/08	Change of proposed I/S date to 12/15/2013	7/17/10	7/29/10
160	Jericho Rise Wind Farm	Jericho Rise Wind Farm	2/27/07	Change machines, reduce size from 101.2 MW to 79.2 MW, and change POI to Willis 115 kV Substation	10/22/07-11/14/07	12/20/07
161&171	Marble River & Clinton County Wind Farms	Marble River, LLC	6/15/06	Increase in combined size of projects from 208 MW to 218 MW	8/10/06	8/21/06
161&171	Marble River	Marble River, LLC	"	Change turbines, change size to 216.3 MW	5/1/08-10/8/08	10/14/08
161&171	Marble River	Marble River, LLC	"	Change of COD to 10/31/2011	12/11/08-11/6/09	12/22/09
161&171	Marble River	Marble River, LLC	"	Change of COD to 10/31/2012	1/27/11	2/17/11
161&171	Marble River	Marble River, LLC	"	Contemplated change of turbines to Vestas V112, resultant reduction in size from 216.3 MW to 215.3 MW, and elimination of capacitor banks	8/17/11	1/23/12
161&171	Marble River	Marble River, LLC	"	Confirmation of the above changes.	12/27/11	n/a
166	St. Lawrence Wind Farm	Acciona Windpower	2/27/07	Change machines	3/5/08	6/12/08

(1) A Queue Position of "n/a" indicates that the change involved an existing facility, and in this case, a determination of non-material means that the change was not required to go through the NYISO interconnection process.

Queue Pos. (1)	Project/Facility Name	Owner/Developer	Date SRIS approved by OC	Description of Change(s)	Date NYISO Received Request / Notification	Date of TPAS Review
166	St. Lawrence Wind Farm	Acciona Windpower	"	Potential size reduction from 130 to 79.5 MW	6/9/08	6/12/08
166	St. Lawrence Wind Farm	Acciona Windpower	"	Notice of size reduction to 79.5 MW	8/6/09	n/a
166	St. Lawrence Wind Farm	Acciona Windpower	"	Potential extension of COD to 12/2011	8/11/08	12/22/09
166	St. Lawrence Wind Farm	Acciona Wind Energy	"	Potential change of COD to 9/2012	1/19/10	2/19/10
166	St. Lawrence Wind Farm	St. Lawrence Windpower	2/27/07	Change of in-service date to 09/2013 and change of COD to 12/2013.	5/4/11	7/5/11
168	Dairy Hills Wind Farm	Dairy Hills Wind Farm	6/15/06	Reduce size from 132 MW to 120 MW	6/11/07	6/26/07
169	Alabama Ledge Wind Farm	Alabama Ledge Wind Farm	2/27/07	Change of POI, change turbines, change in size	7/11/08-10/3/08	10/14/08
169	Alabama Ledge Wind Farm	Alabama Ledge Wind Farm	"	Change of turbines to Suzlon S88, increase size from 79.2 MW to 79.8 MW	2/2/09	12/22/09
169	Alabama Ledge Wind Farm	Alabama Ledge Wind Farm	"	Extension of the COD to October 2013	6/16/11	2/16/12
172	Clinton Windfield	Noble Envir. Power	6/15/06	Potential size reduction from 80.0 to 79.5 MW	12/5/07	12/20/07
175	Ellenburg Windfield	Noble Envir. Power	6/15/06	Potential size increase from 79.5 to 81.0 MW	12/5/07	12/20/07
177	Wethersfield Windfield	Noble Envir. Power	2/27/07	Potential size reduction from 127.5 to 126.0 MW	12/11/07	12/20/07
178	Allegany Windpark	Noble Envir. Power	2/27/07	Potential increase in size from 99 MW to 100.5 MW	6/23/08	9/8/08
178	Allegany Windpark	Noble Envir. Power	"	Notice of change in size.	9/19/08	n/a
178	Allegany Windpark	Noble Envir. Power	"	Change of POI	9/30/08	12/22/09
182	Howard Wind	Everpower Global	2/27/07	Change machines and reduce size to 62.5 MW	6/11/07	6/26/07
182	Howard Wind	Howard Wind, LLC	"	Change machines and reduce size to 57.4 MW	3/3/11	8/2/11
182	Howard Wind	Howard Wind, LLC	"	Change of COD to December 2011.	3/3/11	12/5/11
186	Jordanville Wind	Community Energy	6/15/06	Reduce size from 150 MW to 136 MW.	9/18/07	10/3/07
186	Jordanville Wind Project	Iberdrola	"	Reduce size from 136 MW to 80 MW, replace 230 kV line with 34.5 kV feeders	4/11/08	6/12/08
186	Jordanville Wind Project	Iberdrola	"	Potential change of proposed in-service date to 12/2011	12/23/08	12/22/09
198	New Grange Wind Farm	New Grange	2/28/08	Change turbines, reduce size from 79.8 MW to 79.2 MW	4/10/08-8/11/08	9/8/08
198	Arkwright Summit Wind (formerly New Grange)	New Grange	"	Change of turbines to Suzlon S88, increase size from 79.2 to 79.8 MW, change proposed I/S date to 2010. (Developer proposal to change from 6-breaker ring to 3-breaker ring yet to be evaluated by NYISO and TO.)	1/20/09-6/23/09	12/22/09
198	Arkwright Summit Wind	New Grange	"	Developer proposal to change from 6-breaker ring to 3-breaker ring interconnection.	1/20/09-1/26/10	4/29/10
198	Arkwright Summit Wind	New Grange	"	Extension of the COD to 9/30/2013	12/20/11	1/23/12
201	Berrians GT	NRG Energy	2/27/09	Change machines (no change in size), change in-service date to 2010/06	10/25/07	12/20/07

(1) A Queue Position of "n/a" indicates that the change involved an existing facility, and in this case, a determination of non-material means that the change was not required to go through the NYISO interconnection process.

Queue Pos. (1)	Project/Facility Name	Owner/Developer	Date SRIS approved by OC	Description of Change(s)	Date NYISO Received Request / Notification	Date of TPAS Review
201	Berrians GT	NRG Energy	"	Potential change of machine to GE 7FA CC	11/11/09	12/22/09
201	Berrians GT	NRG Energy	"	Notice of change of machine.	12/31/09	n/a
201	Berrians GT	NRG Energy	"	Change of in-service date to June 2014.	4/27/11	7/5/11
206	Hudson Transmission	Hudson Trans. Partners	2/28/08	Change of COD to 5/31/2013	3/17/11	4/4/11
207	Cape Vincent	BP Alternative Energy	2/28/08	Change turbines and transformers	7/23/08	9/8/08
207	Cape Vincent	Cape Vincent Wind Power	"	Change of in-service date to 09/2013 and change of COD to 12/2013.	5/23/11	7/5/11
210	Fortran	Canadian Niagara Power	2/27/09	Change of proposed I/S date to Q4 2012	1/13/10	2/19/10
212	Bliss II Windfield	Noble Envir. Power	2/27/07	Potential size reduction from 30.0 to 28.5 MW	12/5/07	12/20/07
213	Ellenburg II Windpark	Noble	2/27/07	Change of COD to 10/10/2011	5/12/10	5/26/10
214	Chateaugay Windpark	Noble Envir. Power	2/27/07	Increase size from 100 MW to 106.5 MW	5/30/07	6/26/07
216	Nine Mile Point 2 Uprate	Nine Mile Point Nuclear	2/28/08	Change of proposed I/S date to Q2/2012	1/15/09	12/22/09
216	Nine Mile Point 2 Uprate	Nine Mile Point Nuclear	"	Change of COD for full capacity uprate to June 2014. Partial capacity uprate (115 MW) expected by June 2012.	3/28/11	5/4/11
219	Huntley	NRG Energy	n/a	Change machines and increase size from 630 to 661 MW	8/27/07	10/3/07
222	Ball Hill Windpark	Noble Envir. Power	6/19/08	Potential reduction in size from 99 MW to 93 MW	6/24/08	9/8/08
222	Ball Hill Windpark	Noble Envir. Power	"	Reduce size to 90 MW.	9/29/08	10/14/08
224	Berrians GT II	NRG Energy	n/a	Change machines, reduce size from 322.5 MW to 256/280 MW summer/winter.	10/25/07	12/20/07
224	Berrians GT II	NRG Energy	n/a	Potential changes: reduce size from 256/280 MW to 50/90 MW summer/winter, use excess capacity of Q201 rather than new units.	11/11/09	12/22/09
224	Berrians GT II	NRG Energy	n/a	Notice of size reduction to 50/90 MW summer/winter.	12/31/09	n/a
224	Berrians GT II	NRG Energy	n/a	Change of in-service date to June 2014.	4/27/11	7/5/11
231	Seneca	Seneca Energy II, LLC	2/28/08	Change of in-service date to 10/1/2012.	11/30/11	1/23/12
232	Bayonne Energy Center	Bayonne Energy Center	10/23/08	Change machines (no change in size)	11/21/07	11/28/07
234	Steel Winds II	Steel Winds	2/28/08	Reduce size from 60 MW to 45 MW, change in-service date to 9/30/09	3/13/08	4/8/08
234	Steel Winds II	Steel Winds, LLC	"	Reduce size from 45 MW to 15 MW	1/27/10	2/19/10
251	CPV Valley Energy Center	CPV Valley, LLC	2/27/09	Potential change of in-service date to May 2016.	8/8/11-11/11/11	11/16/11
251	CPV Valley Energy Center	CPV Valley, LLC	"	Confirmation of above change of in-service date.	12/6/11	n/a
251	CPV Valley Energy Center	CPV Valley, LLC	"	Increase in maximum output for ERIS from 656 MW Summer/753 MW Winter to 678 MW Summer/784 MW Winter.	1/13/12	2/16/12

(1) A Queue Position of "n/a" indicates that the change involved an existing facility, and in this case, a determination of non-material means that the change was not required to go through the NYISO interconnection process.

Queue Pos. (1)	Project/Facility Name	Owner/Developer	Date SRIS approved by OC	Description of Change(s)	Date NYISO Received Request / Notification	Date of TPAS Review
254	Ripley-Westfield Wind	Ripley-Westfield Wind, LLC	2/27/09	Change to Siemens 2.3 MW turbines. Reduced size from 124.8 MW to 124.2 MW.	3/29/10	5/26/10
260	Stephentown Flywheel	Beacon Power	n/a	Potential change in transformer size.	4/12/10	n/a
261	South Pier Improvement	Astoria Generating Co.	2/26/10	Change of in-service date to January 2015.	10/17/11	11/16/11
263	Stony Creek Wind Farm	Stony Creek Wind Farm	2/26/10	Potential reduction in size from 142.5 MW to 88.5 MW	4/21/10	4/29/10
263	Stony Creek Wind Farm	Stony Creek Wind Farm	"	Notice of size reduction from 142.5 MW to 88.5 MW	4/29/10	n/a
263	Stony Creek Wind Farm	Stony Creek Wind Farm	"	Increase in maximum output for ERIS from 88.5 MW to 94.4 MW	1/30/12	2/16/12
266	Berrians GT III	NRG Energy	2/27/09	Potential change of machines to GE 7FA CC	11/11/09	12/22/09
266	Berrians GT III	NRG Energy	"	Notice of change of machine.	12/31/09	n/a
266	Berrians GT III	NRG Energy	"	Potential reduction in size from 744 MW Summer/789 MW Winter to 250 MW Summer/290 MW Winter, and potential change of in-service date to June 2014.	9/12/11	11/16/11
266	Berrians GT III	NRG Energy	"	Above change of in-service confirmed on 12/9/11. Above reduction in size confirmed on 2/17/12.	12/9/11 2/17/12	n/a
266	Berrians GT III	NRG Energy	"	Potential change of in-service date to June 2016. Change of in-service date confirmed on 3/2/12.	2/24/12 3/2/12	3/7/12
267	Winergy NYV Wind Farm	Winergy Power	n/a	Change of turbines to Siemens SWT-6.0-154 and extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2.	1/12/12	2/16/12
270	Hounsfield Wind	Wind Development Contract Company	2/27/09	Change of COD to 12/2015.	12/22/11	1/23/12
291	LI Cable – Phase 1	Long island Cable	n/a	Change of turbines to Siemens SWT-6.0-154 and extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2.	1/12/12	2/16/12
292	LI Cable – Phase 2a	Long island Cable	n/a	Change of turbines to Siemens SWT-6.0-154 and extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2.	1/12/12	2/16/12
310	Cricket Valley Energy Center	Cricket Valley Energy Center	2/28/11	Increase in maximum output for ERIS from 1,002 MW Summer/1,115 MW Winter to 1,019.9 MW Summer/ 1,136 MW Winter.	1/27/12	2/16/12
330	Upton Solar Farms	BP Solar	2/26/10	Change of inverter vendor to SMA Sunny Central with small reduction in size from 32.0 MW to 31.5 MW.	4/13/10	5/26/10

(1) A Queue Position of "n/a" indicates that the change involved an existing facility, and in this case, a determination of non-material means that the change was not required to go through the NYISO interconnection process.

EXHIBIT NO. 10

NYISO OPERATING COMMITTEE MINUTES
MEETING OF SEPTEMBER 2, 2010

NYISO Operating Committee
Meeting Minutes
September 2, 2010
Teleconference
10:00 a.m. to 11:30 a.m.

1. Introduction

John Marczewski (Chairman of the OC / EIG) called the meeting to order at 10:00 a.m. and welcomed the members of the Operating Committee. Meeting participants introduced themselves and their affiliations. A quorum was confirmed.

2. Approval of the Meeting Minutes

The meeting minutes for the August 5, 2010 meeting were reviewed and approved.

> <u>Motion # 1</u>
> The Operating Committee hereby approves the minutes of the August 5, 2010 Operating Committee meeting.
>
> ***The motion passed unanimously.***

3. Chairman's Report

Mr. Marczewski reported that he had received no correspondence from OC members. Mr. Lemme noted that the NYISO was seeking Chairperson candidates for the Operating Committee and its associated working groups and task forces, and asked interested members to contact him.

4. NYISO Operations Report

Wes Yeomans (NYISO) reviewed the July Operations Performance Metrics Monthly Report and explained that the August report was not yet available. He noted that the peak load for July 2010 was 33,452 MW and it occurred on July 6 for Hour Beginning 16. He reported that Special Case Resources and the Emergency Demand Response Program for Zone J had been activated on July 6 and July 7, and that UPNY/Con Ed interface transfers were also limited in real-time on July 6 and 7 to maintain the Sprainbrook 345kV voltage. Mr. Yeomans also reported that outages at Beck-Niagara were scheduled to begin in November and that the outages would last for five weeks. He added that the outage conditions would not be contiguous and recommended that interested parties check the NYISO OASIS to determine the outage conditions in place at a given point in time during the outage.

Mr. Yeomans reviewed details of the SCR / EDRP activation of July 6 and July 7 noting that several market participants had requested an overview of the operational need for the activation. He explained that the ISO is required to maintain pre-contingency Sprainbrook voltages at or above pre-contingency limits and to maintain a certain level of NYC Zone capacity in order to return the Sprainbrook voltage back to pre-contingency voltage limits if the system were to incur a contingency involving a significant generator or transmission element in the NYC zone. He reviewed the timing of the activations for July 6 and July 7 and referred to charts depicting voltages at the affected interfaces.

Mark Younger (Slater Consulting) commented that he agreed that the calls were necessary to maintain the reliability of the system and noted that the pricing rules related to such actions needed to be discussed at the Market Issues Working Group. Mr. Yeomans indicated that Mr. Younger could bring this issue to MIWG if he chooses to.

5. Q#307 New York Wire SRIS scope
Clint Plummer (Deepwater Wind) reported that the New York Wire project is a stand alone merchant transmission system that future off-shore wind farms would be able to connect into. He explained that the project will involve the construction of a nominal +/- 150 kV, 550 MW bipolar HVdc overhead/underwater/underground merchant transmission line originating from Jersey Central Power & Light's Larrabee 230 kV Substation in New Jersey and terminating at Con Edison's Gowanus 345 kV Substation. He noted that the project will have a maximum expected summer and winter transfer level of 550 MW into NYC and added that it includes construction of approximately 97 miles of underground/underwater HVdc transmission lines. Mr. Plummer said that the proposed in-service date is October 2014.

Bharath Annabathina (NYISO) noted that the study would be based on the system represented in 2015 power flow base cases from the NYISO Class Year 2010 ATBA cases and reviewed the scope document.

Motion # 2
The Operating Committee hereby approves the Study Scope for Q#307 New York Wire.

The motion was approved unanimously.

6. Proposed changes to Schedules A and B of the NYISO – PJM Joint Operating Agreement
Mr. Yeomans noted that the NYISO – PJM Coordination Agreement was part of the NYISO OATT and, as such, required a Section 205 filing to facilitate changes to the document. He explained that PJM had recently contacted the NYISO in an effort to add the Linden VFT to the list of interconnection facilities that cross the PJM-New York boundary. Mr. Yeomans added that, upon review, it was discovered that two other cross border facilities (S. Mahwah – Waldwick J3410 and S. Mahwah – Waldwick K3411) were absent from the list and noted that those facilities were to be added in the same filing. During the discussion it was noted that there were a few typographical errors in the spelling of facility names and Mr. Yeomans said that they would be corrected for the filing.

Motion # 3
Motion to approve changes to Schedules A and B of the Joint Operating Agreement among and between the New York Independent System Operator Inc. and PJM Interconnection, L.L.C. as presented to the Operating Committee on September 2, 2010.

The motion was approved unanimously.

7. Subcommittee Items

SOAS Update

Mr. Lemme reported that the SOAS had met on August 24. He noted that the SOAS had discussed the following items:

- SOAS reviewed the System Restoration Manual and recommended it for approval by the OC at the October OC meeting.
- Greg Campoli (NYISO) asked the Transmission Owner representatives to perform their annual reviews of the Exceptions to the NYSRC Reliability Rules.
- Scott Leuthauser (HQ-US) led a discussion on the ramp limits assigned to external interfaces and asked for an explanation of how the limits are calculated and a validation of the existing limits.
- Mr. Ellis discussed NYSRC PRR-004 (Proposed reliability rule for VAr testing) and suggested that interested parties submit comments during the comment period. NYISO staff will return to the SOAS with Ancillary Services Manual changes required to align the manual with the NYSRC rule.

Mr. Lemme added that the next SOAS meeting was scheduled for September 21, 2010.

RWG Update

Mr. Lemme reported that the next RWG teleconference was scheduled for September 8, 2010 to discuss preparations for an upcoming NPCC Interregional Restoration Exercise scheduled for October 27, 2010. The group will also discuss proposed changes to the Emergency Operations Manual and the Restoration Switching Procedure/Restoration Diagram.

CDAS Update

Mr. Lemme reported that the CDAS met on August 12 and continues to follow a number of NYISO projects that would impact data interchange and telemetry. The projects include the PMU project, the Hotline Replacement project, and a project to re-route Phase 1 data. He added that the CDAS is also looking into the implications of replacing analog instruments with digital instruments as field equipment is replaced. The next CDAS meeting is scheduled for September 16, 2010.

RPWG

Mr. Lemme reported that the Reactive Power Working Group had met on August 6 and that the group is continuing to work on developing guidelines and criteria for zonal load power factor and reactive reserves. He added that the next meeting is scheduled for September 9, 2010.

ESPWG Update

Mr. Lemme reported that the ESPWG had met on August 27 and had discussed CARIS database updates and extensions for fuel price forecasts, load forecasts, and emissions cost forecasts. The group also discussed scenarios for CARIS 2. He added that the next ESPWG meeting is scheduled for September 7, 2010.

IITF Update

Mr. Lemme reported that the IITF met on August 26 and Scott Leuthauser presented an HQ-US proposal for the transfer of external CRIS rights. Mr. Leuthauser will address concerns raised at an upcoming meeting. Mr. Lemme added that the group had also discussed the allocation of Class Year facilities studies costs.

<u>TPAS Update</u>

Mr. Leuthauser reported that the TPAS had met on August 26 and had reviewed the Study Scope for Q#307 – New York Wire. He added that Mr. Corey had also discussed the Caithness winter rating and Attachment X of the OATT with respect to alternative interconnection points. The next TPAS meeting is scheduled for September 30, 2010.

Expanding on the Caithness winter rating topic, Mr. Corey reported that the summer peak study for the Caithness Energy Long Island SRIS (Q#107) was performed for the project operating at 309.6 MW and the Interconnection Agreement for the plant lists the plants maximum capability at 309.6 MW. He explained that, in the fall of 2009, Caithness requested an increase to a maximum winter capability rating up to 375.5 MW, but added that the NYISO had objected to the rating increase because the project had not been studied at that level, and had not been studied under winter conditions.

Mr. Corey noted that Caithness had since conducted a winter peak study for the Caithness Energy Long Island Plant at the request of LIPA and the NYISO. He explained that the purpose of the study was to evaluate the impact of operating the plant at an increased winter capability of 375.7 MW compared to its previously approved summer capability of 309.6 MW. Mr. Corey reported that the study had been completed and reviewed by NYISO and LIPA on 8/18/2010 and that the results of the study confirmed that the Caithness Long Island facility can be operated at up to 375.7 MW during the winter capability period, without causing any adverse impact to System Reliability.

8. New York State Reliability Council

Ed Schrom (NYSDPS) reported that the NYSRC Executive Committee has posted PRR #104 for comment and advised the members that comments on the proposed reliability rule should be submitted to Don Raymond of the NYSRC by October 1, 2010.

9. Open Issues

No open issues were raised at the meeting.

13. New Business

No new business was raised at the meeting.

EXHIBIT NO. 11

NYISO SUMMARY OF PROJECT CHANGES DETERMINED TO BE NON-MATERIAL (FEBRUARY 16, 2012 TPAS MEETING)

Summary of Project Changes Determined to Be Non-Material
February 16, 2012 TPAS Meeting

Queue Pos.	Project/Facility Name	Owner/Developer	Status in Queue Process	Description of Change(s)
263	Stony Creek Wind Farm	Stony Creek Wind Farm, LLC	Completed Class 2010 Study. IA in progress.	Increase in maximum output for ERIS from 88.5 MW (1.5 MW per turbine) to 94.4 MW (1.6 MW per turbine).
169	Alabama Ledge Wind Farm	Alabama Ledge Wind Farm, LLC	Project in Class 2011 Study	Extension of COD to October 2013. (Original proposed in service date December 2009.)
251	CPV Valley Energy Center	CPV Valley, LLC	Project in Class 2011 Study	Increase in maximum output for ERIS from 656 MW to 678 MW Summer / 753 MW to 784 MW Winter.
310	Cricket Valley Energy Center	Cricket Valley Energy Center, LLC	Project in Class 2011 Study	Increase in maximum output for ERIS from 1,002 MW to 1,019.9 MW Summer / 1,115 MW to 1,136 MW Winter.
267	Winergy NYC Wind Farm	Winergy Power, LLC (DeepwaterWind)	SRIS in progress	a) Change of turbines b) Extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2 (Original I/S date Jan 2015)
291	LI Cable – Phase 1	Long Island Cable, LLC (DeepwaterWind)	SRIS in progress	a) Change of turbines b) Extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2 (Original I/S date Jan 2013)
292	LI Cable – Phase 2a	Long Island Cable,LLC (DeepwaterWind)	SRIS in progress	a) Change of turbines b) Extension of COD to Jan 2019 for Stage 1 and Jan 2020 for Stage 2 (Original I/S date June 2013)

EXHIBIT NO. 12

SCOPE OF WORK FOR PROJECT INTERCONNECTION STUDY (JANUARY 12, 2004)

SCOPE OF WORK
INTERCONNECTION STUDY OF EAST COAST POWER'S
PROPOSED 300 MW ASYNCHRONOUS TRANSMISSION TIE INTERCONNECTION
WITH
CON EDISON'S 345 kV SYSTEM VIA THE LINDEN COGEN SUBSTATION
January 12, 2004

1. Purpose

Evaluate the impact of East Coast Power's proposed 300 MW asynchronous bi-directional transmission tie interconnection (the "Linden VFT" or the "Project") with Con Edison's 345 kV system via the existing Linden Cogeneration substation on the power system supplying the In-City load pocket and, primarily, on the bulk power transmission system in the southeast New York area. The Project is expected to be operational in 2005.

2. Analysis

The study will evaluate the impact of the Project on the Con Edison transmission system and the NYISO bulk power system in southeast New York with other projects listed in Appendix A that meet the criteria for baseline study assumptions as stipulated in the NYISO *System Reliability Impact Study Criteria and Procedures*.

The Project will be evaluated under two operating scenarios:

- Maximum delivery into NYISO from PJM
- Maximum delivery into PJM from NYISO

2.1 Interconnection Plan

A preliminary Interconnection Plan and One Line Diagram have been developed for the Linden VFT using existing 345 kV facilities located at Linden Cogen No. 9C substation. The study will consider up to 300 MW of controllable power flow between the PJM system and the NYISO system via an interconnection at the 345 kV substation at Linden Cogen No. 9C and associated 345 kV cables connecting to Goethals No. 70 substation.

2.2 Evaluation of Impact on Transfer Limits and Transfer Capability

Analyses will be conducted to assess the performance of the bulk power system with and without the proposed Project in service by determining the incremental impact of the Project on normal and emergency transfer limits of transmission interfaces within the study area. The interfaces to be evaluated are as follows:

For scenarios with maximum delivery from PJM to NYISO:

- PJM-NYISO
- New York City Cable system
- UPNY-Con Edison, UPNY-SENY
- Total East, Central East

For scenarios with maximum delivery from NYISO to PJM:

- NYISO-PJM

In each case, sufficient analyses will be conducted to determine the most limiting of thermal, voltage, or stability limits.

It should be noted that the Project will become part of the definitions of these interfaces with the exception of Central-East, and will also effectively increase transfer limits by the maximum capability of the Project. To illustrate this situation, both pre-project and post-project interface limits will be tabulated so that the effective increase can be clearly identified.

2.3 Thermal Analysis

2.3a **-** Evaluate the impact of the Project on the transmission system supplying Goethals Substation, the Staten Island load pocket and the In-City load pocket.

2.3.b **-** Evaluate the effect of the Project on the phase-shifted tie-lines regulating the 1000MW wheeling contract between Con Edison and PSE&G.

2.4 Voltage Analysis

Perform a voltage analysis of the In-City transmission system in accordance with Con Edison Engineering Specification No. EP-7000. Perform bulk power system voltage analysis as necessary in accordance with NYISO Transmission Planning Guideline #2-0 (Voltage Analysis Guideline).

2.5 Stability Analysis

Perform a stability analysis to determine the impact of the Project on Con Edison's as well as on neighboring utilities' bulk power transmission systems. The analysis will evaluate the transient stability performance of the systems for normal and extreme criteria contingencies in accordance with Con Edison, NPCC and NYSRC reliability rules and standards, and NYISO Transmission Planning Guideline #3-0 (Stability Analysis Guideline). In addition, the proposed testing will evaluate the critical clearing time for existing generating units and new projects included in Appendix A.

2.6 Short Circuit Analysis

Assess the impact of the Project on the adequacy of existing circuit breakers and related equipment on the Con Edison system. The analysis, using the NYISO Fault Current Assessment Guideline, will consider three-phase-to-ground, two-phase-to-ground, single-phase-to ground faults and will cover all Con Edison's 69 kV, 138kV and 345kV substations and selected substations in neighboring utilities for summer peak conditions only. Whenever breaker upgrading is not feasible or prohibitively costly, alternate mitigating measures will be investigated. The analysis will include existing generation and new projects as indicated in Appendix A.

2.7 Extreme Contingency Analysis Assessment

2.7a - Discuss significant load flow studies showing the base case and post-fault conditions for the contingencies specified in Section 7.0 of NPCC's Basic Criteria, entitled "Extreme Contingency Assessment". Include the most severe contingencies tested in the study's report.

2.7.b - Discuss significant stability studies showing the effect of contingencies as specified in Section 7.0 of NPCC's Basic Criteria, entitled "Extreme Contingency Assessment". Report on the most severe contingencies tested.

3. <u>Load Flow Base Cases</u>

Load flow base cases used in the study shall be the summer and winter peak cases for the year 2004, as follows:

Case A - Summer peak of 2005 with proposed projects according to Appendix A.
Case B1 – Case A with Linden VFT Project included, VFT delivering into NYISO.
Case B2 – Case A with Linden VFT Project included, VFT exporting to PJM.
Case C – Winter peak of 2005/2006 with proposed projects according to Appendix A.
Case D1 – Case C with Linden VFT Project included, VFT delivering into NYISO.
Case D2 – Case C with Linden VFT Project included, VFT exporting to PJM.

Cases A and C will be dispatched within NYISO and Con Edison operating limits and the NYSRC Reliability Rules.

4. <u>Assumptions</u>

4.1 Re-dispatching of Generation

The Project is expected to displace generation by offsetting amounts from units located inside the Con Edison system to obtain the requisite power transfer for scenarios delivering maximum power from PJM into NYISO. For scenarios delivering power from NYISO to PJM, the Project is expected to require additional generation on the Con Edison system to be dispatched to support delivery to PJM.

4.2 Modeling of Control Devices

Phase angle regulators (PARs), switched shunts, and LTC transformers will be modeled as regulating facilities under pre-contingency conditions, and as non-regulating facilities under post transient contingency conditions. HVDC facilities will maintain their designated dispatch levels under both pre-contingency and post-contingency conditions. The Linden VFT itself will also be modeled to hold pre-contingency dispatch level under post-contingency conditions. In addition, several significant contingencies (to be determined with NYISO and Con Edison input) will be studied with VFT controls modeled to allow power flows to adjust to accommodate post-contingency system conditions bounded by an assumed VFT overload level of 20% (1.2 per unit).

4.3 Transfer Locations

In order to determine transfer limits, it is necessary to vary the power flow across the interface(s) under study by adjusting generation at one or more locations on one side of the interface, and adjusting generation by a like amount at one or more locations on the other side of the interface. The assumed locations for adjusting generation for evaluating transfer limits of the various interfaces will be as follows:

Interface	**Location(s) for Increasing Generation**	**Locations for Decreasing Generation**
Internal NYISO: Central East, Total East, UPNY-ConEd, UPNY-SENY, NYC Cable	~ 30% Ontario ~70% Upstate NY	~93% New York City ~7% Long Island
NYISO-PJM	~70% Downstate New York ~30% Upstate New York	~70% Eastern PJM ~30% West/Central PJM
PJM-NYISO	~70% Eastern PJM ~30% West/Central PJM	~70% Downstate New York ~30% Upstate New York

Modifications to these transfer locations may be required to avoid base case (pre-transfer condition) overloads.

5. Results & Recommendations

A report will be prepared, following the report outline specified in the NYISO Transmission Planning Guideline No. 1.0.

This report will also offer a discussion of potential power system benefits that may be realized by using VFT control functionality triggered by certain system contingencies, such as fast run-up or run-back of the VFT's power flow level for loss of lines or generation within the Con Edison system and possibly beyond. Use of the VFT for these types of contingency situations can be investigated in more detail during the Facility Study process and design phase of the Project.

APPENDIX A

Baseline Assumptions for Linden VFT Project SRIS Analysis

The following proposed new projects will be included in the baseline assumptions for this study:

No.	Project Name	MW
1.	PG&E Athens	1080
2.	PSEG Bethlehem	350
3.	Cross Sound Cable (New Haven-Shoreham)	330
4.	Keyspan Ravenswood (138 kV)	270
5.	NYPA Poletti Expansion	500
6.	NYC Energy Kent Avenue	79.9
7.	East River Repowering	288
8.	SCS Astoria Energy	1000
9.	ANP Brookhaven Energy	580
10.	Glenville Energy Park	540
11.	PP&L Global Kings Park	300
12.	LMA Lockport II	79.9
13.	BesiCorp Empire State Newsprint	660
14.	Fortistar VP	79.9
15.	Fortistar VAN	79.9
16.	Calpine Eastern JFK Expansion	45
17.	Calpine Wawayanda	500
18.	Reliant Astoria Repowering	546
19.	Neptune PJM-NYC DC	600
20.	PSEG Cross Hudson Project	550
21.	Spagnoli Road Combined Cycle	250
22.	Mirant Bowline Point 3	750
23.	Libert Radial Interconnection to NYC	400
24.	Neptune PJM-LI HVDC	750
25.	TransGas Energy	1000
26.	Bay Energy	79.9

EXHIBIT NO. 13

NYISO LETTER
(JUNE 13, 2008)

NEW YORK INDEPENDENT SYSTEM OPERATOR
Building the Energy Markets of Tomorrow . . . Today℠
10 Krey Boulevard • Rensselaer, NY 12144

June 13, 2008

Mr. Andrew Kelemen
Senior Vice President
GE Energy Financial Services
120 Long Ridge Road
Stamford, CT 06927

Dear Mr. Kelemen:

Pursuant to ICAP Manual Section 4.14.2, the NYISO has reviewed General Electric's request for 300MW of UDRs associated with the Linden VFT facility. The UDR's requested are granted upon commercial operation which is currently quoted as December 2009, The specifics of this action are required to be released to the ICAPWG. The NYISO will present this information at their next scheduled meeting on June 17, 2008 in the form of Attachment B of the ICAP Manual.

If you have any questions or require additional information, please do not hesitate to contact me directly at (518) 356-6111.

Sincerely,

Henry Chao

Henry Chao
Director,
System & Resource Planning

cc: Mr. Kurt Schreder – GE Energy Financial Services

EXHIBIT NO. 14

NYISO COMPLIANCE FILING LETTER
(AUGUST 5, 2008)

ORIGINAL

HUNTON & WILLIAMS LLP
1900 K STREET, NW
SUITE 1200
WASHINGTON, DC 20006-1109

DEWEY & LEBOEUF LLP
1101 NEW YORK AVENUE, NW
SUITE 1100
WASHINGTON, DC 20005-4213

1 of 7

August 5, 2008

By Hand

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Re: Joint Compliance Filing of the New York Independent System Operator, Inc. and the New York Transmission Owners on Consensus Deliverability Plan, Docket No. ~~ER04-449-007, ER04-449-008, and~~ ER04-449-~~016~~ 017

Dear Secretary Bose:

Pursuant to the Commission's August 6, 2004, June 2, 2005, and March 21, 2008 orders in the above-captioned proceedings,[1] as well as the Notice of Extension of Time issued on May 19, 2008 and the Notice of Extension of Time issued on July 17, 2008,[2] the New York Independent System Operator, Inc. ("NYISO") and the New York Transmission Owners[3] (collectively, the "Joint Filing Parties") hereby respectfully submit to the Commission amendments to the NYISO's Open Access Transmission Tariff ("OATT") and the NYISO's Market Administration and Control Area Services Tariff ("Services Tariff") necessary to implement the directives of the March 21 Order, which approved, in principle, the conceptual framework reflected in the Consensus Deliverability Plan of the New York Independent System Operator, Inc. and New York Transmission Owners ("Deliverability Plan") that the NYISO and

[1] *New York Independent System Operator, Inc., et al.*, 108 FERC ¶ 61,159 at P 28 (August 6, 2004) ("August 6 Order"); *New York Independent System Operator, Inc., et al.*, 111 FERC ¶ 61,347 at P 14 (June 2, 2005) ("June 2 Order"); *New York Independent System Operator, Inc., et al.*, 122 FERC ¶ 61,267 at P 1 and Ordering Paragraph (B) (2008) ("March 21 Order").

[2] The Commission's July 17 Notice directed the Joint Filing Parties to submit this filing by August 4, 2008. As ie explained in the NYISO's concurrently submitted *Motion for Leave to Submit Joint Compliance Filing One Day Out of Time* ("Motion") in these proceedings, the Joint Filing Parties fully expected to meet this deadline. In the event, however, all of the Joint Filing Parties did not give their final approval to this filing until late in the afternoon on August 4 . Despite the best efforts of all of the Joint Filing Parties it was not possible to incorporate all final revisions and deliver the filing to the Commission until shortly after the 5 p.m. filing deadline. Therefore, the Motion requests that the Commission accept the instant filing one day out of time. The tariff revisions included in the instant filing are identical to the revisions that the NYISO attempted to file on August 4.

[3] Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc. ("Con Edison"), LIPA, New York Power Authority, New York State Electric & Gas Corporation, Orange & Rockland Utilities, Inc. ("O&R"), Rochester Gas and Electric Corporation, and Niagara Mohawk Power Corporation d/b/a National Grid. The NYTOs reserve the right to comment separately on this filing. While LIPA and NYPA are not "public utilities" as defined under Section 201 of the Federal Power Act, and thus are exempt from the requirement to file these tariff amendments, LIPA and NYPA were integrally involved with the FERC-jurisdictional NYTOs in the development of the instant filing and support its filing.

NYTOs filed on October 5, 2007. The Deliverability Plan outlines a framework for implementing a second level of interconnection service with a deliverability component in the New York Control Area ("NYCA"),[4] and the March 21 Order directed the Joint Filing Parties to develop tariff language implementing that proposed framework. The Joint Filing Parties have used the past five months to develop a set of tariff amendments based on the framework set forth in the Deliverability Plan, which had broad consensus among the NYISO's stakeholders. The NYISO respectfully requests that the Commission to approve the tariff sheets proposed herein because they are just and reasonable, are not unduly discriminatory, and would accomplish the goals of Order No. 2003.[5] The New York Transmission Owners generally agree but believe that certain limited modifications to the proposed tariff sheets are necessary and, therefore, reserve the right to file comments individually or collectively proposing such modifications.

I. LIST OF DOCUMENTS SUBMITTED

The NYISO submits the following documents:[6]

1. This filing letter;

2. Clean and redlined versions of the amendments to Attachment S of the NYISO OATT necessary to implement the Deliverability Plan ("Attachment I");

3. Clean and redlined versions of the amendments to Attachment X of the NYISO OATT necessary to implement the Deliverability Plan ("Attachment II");

4. Clean and redlined versions of the amendments to Attachment Y of the NYISO OATT necessary to implement the Deliverability Plan ("Attachment III");

5. Clean and redlined versions of the amendments to Attachment Z of the NYISO OATT necessary to implement the Deliverability Plan ("Attachment IV");

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[4] Capitalized terms that are not otherwise defined herein shall have the meaning specified in the NYISO Market Administration and Control Area Services Tariff and the NYISO Open Access Transmission Tariff.

[5] *See* March 21 Order at n.14 (stating that an "RTO or ISO proposing a variation [from the *pro forma* language in Order No. 2003] must demonstrate that the variation is just and reasonable and not unduly discriminatory, and would accomplish the purposes of Order No. 2003.").

[6] The blacklined tariff sheets attached hereto are marked to indicate the proposed tariff revisions contrasted against the most recent version of the tariff sheets being considered by the Commission. The NYISO respectfully requests waiver of 18 C.F.R. § 35.10(c) (2008) to the extent the blacklined tariff sheets deviate from the requirements of the Commission's regulations. The NYISO notes that many of the tariff sheets affected by this filing contain changes currently pending before the Commission. For example, several of the OATT Attachment Y tariff sheets contain language from the NYISO's earlier Order No. 890 planning compliance filing that was submitted on June 18, 2007. In addition, several of the OATT Attachment S tariff sheets contain pending language that was submitted on July 15, 2008 in an unrelated proceeding. Again, in this filing, the NYISO is filing tariff sheets contrasted against the most recent version pending before the Commission, and it requests waiver to the extent necessary from the Commission's regulations.

6. Clean and redlined versions of Schedule 10 of the NYISO OATT necessary to implement the Deliverability Plan ("Attachment V");

7. Clean and redlined versions of the body of the NYISO OATT to reflect revisions necessary to implement the Deliverability Plan;

8. Clean and redlined versions of Section 5.12 of the NYISO Services Tariff necessary to implement the Deliverability Plan ("Attachment VI").

9. The Deliverability Plan conditionally approved by the Commission in the March 21 Order ("Attachment VII").

II. BACKGROUND

A. Order No. 2003

Order No. 2003 required "all public utilities that own, control, or operate facilities used for transmitting electric energy in interstate commerce" to file standard interconnection procedures and a standard interconnection agreement for interconnecting generators larger than 20 MW.[7] Order No. 2003 contemplated two levels of interconnection service. The first is Energy Resource Interconnection Service ("ERIS"), which is "Interconnection Service that allows the Interconnection Customer to connect its Generating Facility to the Transmission Provider's Transmission System to be eligible to deliver the Generating Facility's electric output using the existing firm or nonfirm capacity of the Transmission Provider's Transmission System on an as available basis."[8] The second type, Network Resource Interconnection Service ("NRIS"), would provide an Interconnection Customer with a "higher level of service" that would provide the basic network connection and "the infrastructure necessary for the Interconnection Customer's power to flow to multiple places on the network."[9]

B. The Joint Filing Parties' Initial Compliance Filing

On January 20, 2004, the Joint Filing Parties submitted a filing in compliance with Order No. 2003. That filing contained certain modifications to the *pro forma* interconnection procedures and agreement reflecting both regional differences within the NYCA and then-

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[7] *Standardization of Generator Interconnection Agreements and Procedures*, Order No. 2003, FERC Stats. & Regs. P 31,146 (2003), *order on reh'g*, Order No. 2003-A, FERC Stats. & Regs. P 31,160, *order on reh'g*, Order No. 2003-B, FERC Stats. & Regs. P 31,171 (2004), *order on reh'g*, Order No. 2003-C, FERC Stats. & Regs. P 31,190 (2005), *aff'd sub nom. Nat'l Ass'n of Regulatory Util. Comm'rs v. FERC*, 475 F.3d 1277 (D.C. Cir. 2007).

[8] Order No. 2003 at Appendix C, Standard Large Generator Interconnection Agreement, Article 1.

[9] *August 6 Order* at P 20, fn. 21. *See also* Order No. 2003 at Appendix C, Standard Large Generator Interconnection Agreement, Article 1 (NRIS permits an Interconnection Customer to "integrate its Large Generating Facility with the Transmission Provider's Transmission System (1) in a manner comparable to that in which the Transmission Provider integrates its generating facilities to serve native load customers; or (2) in an RTO or ISO with market based congestion management, in the same manner as all other Network Resources.").

existing NYISO practices.[10] The Joint Filing Parties proposed only a single type of interconnection service -- Network Access Interconnection Service ("NAIS") -- which is "different . . . than either NRIS or ERIS; it combines elements of both."[11] Although NAIS does not contain a deliverability component, the Joint Filing Parties proposed NAIS because it was consistent with the NYISO's then-existing tariffs and practices.

The August 6 Order conditionally accepted the procedures and agreement submitted by the Joint Filing Parties, including the proposed NAIS, but found "that offering two levels of interconnection service is a crucial component of Order No. 2003,"[12] and directed the NYISO to "offer a level of interconnection service that incorporates a deliverability component."[13] At the same time, the Commission also acknowledged that the Joint Filing Parties had to account for the unique regional differences within the NYCA.[14] The Commission, therefore, allowed the Joint Filing Parties to develop a consensus proposal through its stakeholder process, and "granted multiple requests from the Filing Parties for additional time to continue the stakeholder process."[15]

C. The Joint Filing Parties' Submission of the Deliverability Plan

On October 5, 2007, the Joint Filing Parties submitted the Deliverability Plan for Commission approval. The Deliverability Plan provides an interconnecting Generator with a choice of two categories of interconnection service: Energy Resource Interconnection Service ("ERIS") and Capacity Resource Interconnection Service ("CRIS").[16] ERIS is basic interconnection service and allows a Generator to participate only in the NYISO's Energy and Ancillary Services markets. By contrast, CRIS provides not only basic interconnection service, but also allows the Generator to participate in the NYISO's Installed Capacity market to the extent of the Generator's deliverable capacity. ERIS and CRIS are not mutually-exclusive services. A Generator may elect ERIS and partial CRIS service for its project. Moreover, a Generator that elects ERIS and partial CRIS may later ask the NYISO to reevaluate its eligibility for full CRIS service.

The initial analysis for both types of interconnection service is the analysis that the NYISO performs under its existing interconnection processes. Each "Developer pays: (1) the entire cost of Interconnection Facilities necessary to interconnect the Developer with the

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[10] *Docket No. RM02-1-000 Compliance Filing*, Docket No. ER04-449-000 (January 20, 2004) ("January 20 Filing"). The Joint Filing Parties submitted revised procedures and agreement on April 26, 2004, to reflect changes arising under Order No. 2003-A. *Docket No. ER04-449-002 Compliance Filing*, Docket No. ER04-449-002 (April 26, 2004).

[11] August 6 Order at P 25.

[12] *Id.* at P 24.

[13] *Id.*

[14] *Id.*

[15] March 21 Order at P 6.

[16] The NYISO's interconnection procedures accommodate merchant transmission projects as well as generation projects. As used herein, the term "Generator" includes a proposed new Generator, an increase in the capacity of an existing Generator, and a new controllable transmission facility seeking Unforced Capacity Deliverability Rights.

Transmission System, and (2) its share of the cost of any Network Upgrades that would not have been made 'but for' the interconnection, minus the cost of any facilities that the NYISO's Regional Plan dictates would have been necessary anyway for load growth and reliability purposes."[17] For ERIS customers, once these interconnection upgrade costs are determined and allocated, that is the end of the analysis. For CRIS customers, by contrast, there is an additional step. The NYISO must determine whether a specific CRIS customer is deliverable within the specific capacity region -- New York City, Long Island, or Rest-of-State -- in which the Generator intends to participate under summer peak load conditions.[18] If the Generator is not deliverable within the specific region in which it intends to participate, the Generator must agree to fund upgrades to the transmission system necessary to make the Generator deliverable within that region.

Cost allocations associated with upgrades needed to render a Generator deliverable within a particular capacity region vary depending on whether the upgrade is a "Highway" upgrade or a "Byway" upgrade. Highways are 115 kV or higher transmission facilities that comprise the interfaces between certain load zones within the NYISO control area,[19] although they do not include Interfaces between the three NYISO capacity regions or Interfaces between the NYISO and external control areas. Byways are transmission facilities within the NYCA that are not Highways.

For Highway upgrades, the allocation of costs turns on whether the portion of the smallest feasible upgrade needed to render the Generators deliverable is at least 90 percent of the total size of the upgrade. If so, then the Generators will bear the entire cost of that upgrade. If the portion of the smallest feasible upgrade required to make the Generators deliverable is less than 90 percent of the total size of the upgrade, the Generators will be allocated their proportionate share of the upgrade cost, although the upgrade will go forward only if the Generator (or Generators, if there is more than one) has agreed to fund at least 60 percent of the cost of the upgrade. In these cases, the remainder of the upgrade is funded by Load Serving Entities ("LSEs") based on their proportionate shares of the ICAP requirement in the Rest-of-State capacity region. LSEs funding such upgrades are eligible for reimbursement from interconnecting Generators in subsequent years. Upgrades to Byways are allocated solely to the interconnecting Generator.

In addition, if an interconnection seeking CRIS degrades the transfer capability for Interfaces between NYISO capacity regions or between the NYISO and external control areas, the interconnection customer will be responsible for the cost incurred to restore that transfer capability. A project seeking CRIS that degrades the transfer capability of a Highway facility

[17] August 6 Order at P 6.
[18] To the extent additional zones are established within the NYCA with Locational ICAP requirements, new Capacity Regions will be established and treated consistently for deliverability testing purposes with the current zones, zones J and K, that have Locational ICAP requirements.
[19] The NYCA has eleven zones. Highways are 115 kV and higher transmission facilities that comprise the following NYCA Interfaces: Dysinger East, West Central, Volney East, Moses South, Central East/Total East, UPNY-SENY, and UPNY-ConEd, and their immediately connected, in series, Bulk Power System facilities in New York State.

must also pay for upgrades to restore the original transfer capability, if the degradation would result in an increase in LOLE of 0.01 or more.

To the extent that incremental Transmission Congestion Contracts ("TCCs") are created by a System Deliverability Upgrade, the entities funding that upgrade would be awarded the TCCs commensurate with their share of cost responsibility for those upgrades. Furthermore, if an upgrade establishes Headroom -- that is, excess capability that can be used by interconnecting Generators in future years -- the entity or entities responsible for funding that portion of the upgrade that creates Headroom are eligible for Headroom payments from subsequent interconnecting Generators that make use of that excess capability. Any interconnecting Generator paying Headroom costs will be eligible for TCCs associated with the capacity that it uses.

Finally, the Deliverability Plan applies the deliverability requirement to all projects in Class Year 2007 and subsequent class years, as well as to controllable transmission projects that request Unforced-Capacity Deliverability Rights ("UDRs"). By contrast, the deliverability requirements will not apply to projects that completed the interconnection study process prior to the Class Year 2007, provided they enter service within a specified period, or were in-service as of the effective date.[20] Generators and Merchant Transmission Facilities that qualify for CRIS may retain their CRIS status provided that the unit remains capable of operating at the capacity level studied and is not deactivated. Also, capacity rights from an existing Generator can be transferred on a bilateral basis to a new Generator if the new Generator meets deliverability requirements. Transmission Owners will not be responsible for curing any pre-existing issues related to the deliverability of generators or Merchant Transmission Facilities.

D. The March 21 Order

The March 21 Order "approves, in principle, the conceptual framework proposed in the filed plan and provides further guidance to NYISO and its members in order to facilitate the development of revisions to the NYISO . . . OATT[] that will formally codify the Deliverability Plan."[21] The Commission's approval of the Deliverability Plan is based on the fact that it "meets the objectives of the prior Commission orders directing a second level of service that recognizes the need for new resources to be deliverable" and "is also the result of a comprehensive stakeholder process, shares support among affected market participants, and balances the competing interests of market participants."[22]

With respect to cost allocations, the March 21 Order holds "that the Filing Parties' proposed approach allocates the costs of transmission consistent with Commission policy and recognizes the competing interests of those involved."[23] The order finds that the allocation of Highway facility costs between Generators and LSEs reflects "reasonable compromises among

[20] *See* NYISO OATT, Attachment S, Section IX.B.
[21] March 21 Order at P 1.
[22] *Id.* at P 25.
[23] *Id.* at P 46.

competing interests of NYISO participants, giving market participants benefits directly related to and commensurate with any costs that they may be allocated."[24] The order also holds that "the highway/byway approach taken here by the Filing Parties is consistent with the established practice of differentiating between higher voltage transmission facilities that provide regional benefits and lower voltage transmission facilities that provide local benefits."[25]

The March 21 Order "accepts the proposal that the Deliverability Plan be applicable to Class Year 2007 projects" as "a reasonable application of the new requirements."[26] The Commission holds that "it is reasonable to apply the deliverability requirement and the new CRIS to [Class Year 2007] projects because stakeholders have been active in the development of these pending requirements and they have been aware that the NYISO intended to apply these requirements prospectively beginning with Class Year 2007" and because "Class Year 2007 projects have not yet made their schedule commitments."[27]

As a final matter, the March 21 Order directs that:

> Any future tariff revisions should provide sufficient detail to reduce uncertainties in implementing the CRIS. In addition, the tariff revisions need to provide sufficient specificity regarding procedures for dealing with headroom, to the extent it is created by an upgrade, both with respect to the allocation of benefits such as Transmission Congestion Contracts (TCCs) and costs, and with respect to any reallocation of these same benefits and costs, if required, should the headroom be used and paid for by a subsequent interconnection.[28]

E. Tariff Development Process

After the Commission issued the March 21 Order, the Joint Filing Parties worked diligently and within the NYISO's stakeholder and shared governance processes to put together tariff amendments necessary to implement the Deliverability Plan. The Joint Filing Parties collaborated with other NYISO stakeholders primarily through working group meetings in order to develop the necessary tariff language, and have drafted extensive amendments to Attachments S, X, Y, and Z of the NYISO's OATT, and Article 5 of the NYISO's Services Tariff. For the most part, the proposed tariff amendments reflect broad consensus among the NYISO, the NYTOs, and the NYISO's other stakeholders.

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[24] *Id.*
[25] *Id.*
[26] *Id.* at P 63.
[27] *Id.* at P 64.
[28] *Id.* at P 28 *See also* P 49 (directing the Joint Filing Parties to submit tariff sheets with additional details regarding the technical definition of Highway facilities and the allocation of upgrade costs).

III. TARIFF AMENDMENTS

The tariff language implements the two-tiered interconnection mechanism reflected in the Deliverability Plan. Subject to the reservation stated above, these tariff amendments should be approved because they are just and reasonable, are not unduly discriminatory, and would accomplish the goals of Order No. 2003.[29]

A. Attachment S

Attachment S of the NYISO OATT governs the allocation of cost responsibility for upgrades required to interconnect generation and merchant transmission projects to the New York State Transmission System. The implementation of the Deliverability Plan involves an extensive set of amendments to Attachment S.

1. New Definition of System Deliverability Upgrade

Attachment S currently defines only two types of interconnection upgrades -- Attachment Facilities and System Upgrade Facilities. Attachment Facilities are defined as "all facilities and equipment between the Large Generating Facility or Merchant Transmission Facility and the Point of Interconnection . . . that are necessary to physically and electrically interconnect the Large Facility to the New York State Transmission System."[30] System Upgrade Facilities, in turn, are defined as "the least costly configuration of commercially available components of electrical equipment that can be used . . . to make the modifications to the existing transmission system that are required to maintain system reliability due to" changes in load growth and proposed generation and transmission interconnections.

In order to accommodate the addition of CRIS, the Joint Filing Parties propose to add a third type of interconnection upgrade -- System Deliverability Upgrades -- to Attachment S. System Deliverability Upgrades are defined as:

> The least costly configuration of commercially available components of electrical equipment that can be used, consistent with Good Utility Practice and Applicable Reliability Requirements, to make the modifications or additions to Byways and Highways and Other Interfaces on the existing New York State Transmission System that are required for the proposed project to connect reliably to the system in a manner that meets the NYISO Deliverability Interconnection Standard for Capacity Resource Interconnection Service.

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[29] *See* March 21 Order at n.14 (stating that an "RTO or ISO proposing a variation [from the *pro forma* language in Order No. 2003] must demonstrate that the variation is just and reasonable and not unduly discriminatory, and would accomplish the purposes of Order No. 2003.").
[30] NYISO OATT Attachment S, Section I.

2. Deliverability Interconnection Standard

To implement the two types of interconnection service contemplated by the Deliverability Plan, the Joint Filing Parties propose to add a new interconnection standard -- the Deliverability Interconnection Standard -- to Attachment S. Currently, Attachment S defines only a single standard -- the Minimum Interconnection Standard -- which is applicable to every generation and transmission Developer in the NYCA. The Minimum Interconnection Standard "is designed to ensure reliable access by the proposed project to the New York State Power System," but "does not impose any deliverability test or deliverability requirement on the proposed project."[31]

The revised tariff language clarifies that the Minimum Interconnection Standard applies to all interconnecting generation and transmission Developers, "regardless of whether the Developer elects ERIS or CRIS,"[32] and establishes a new standard -- the *Deliverability Interconnection* Standard -- that applies to Developers electing CRIS. The Deliverability Interconnection Standard, defined in new Section III of Attachment S, "is designed to ensure that the proposed project is deliverable throughout the New York Capacity Region where the project will interconnect."[33] The revised tariff language establishes further that "a generation Developer or merchant transmission Developer must meet the ISO Deliverability Interconnection Standard before it can become a qualified Installed Capacity Supplier or receive Unforced Deliverability Rights"[34] and that such a Developer will receive such rights "up to the amount of its deliverable capacity, as that amount is determined in accordance with . . . Attachment S, once the Developer of the project has funded or committed to fund any required System Deliverability Upgrades in accordance with the rules in this Attachment S."[35]

3. Cost Allocation Methodology for CRIS

The Joint Filing Parties propose to add a new Section VII to Attachment S that details the manner in which CRIS-related costs will be determined and allocated.

a. Cost Allocation Among Projects in a Class Year

The language in new Section VII provides that the costs of System Deliverability Upgrades will be allocated to projects in a Class Year based on "the pro rata contribution of each project in the Class Year to each of the System Deliverability Upgrades identified in the Class Year Deliverability Study."[36] The new language provides further that "the cost of certain Highway upgrades will be shared with Load Serving Entities and subsequent Developers, as described . . . in Section VII.K of these rules."[37]

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[31] NYISO OATT Attachment S, Section II.A.1.
[32] NYISO OATT Attachment S, Section II.A.
[33] NYISO OATT, Attachment S, Section III.A.1.
[34] NYISO OATT, Attachment S, Section III.A.
[35] NYISO OATT, Attachment S, Section III.A.2.
[36] NYISO OATT, Attachment S, Section VII.A.
[37] *Id.*

b. Highways, Byways, and Other Interfaces

For the purposes of implementing the cost allocation methodology outlined in the Deliverability Plan, Attachment S adds new definitions of "Highway," "Byway," and "Other Interfaces." A Highway is defined as:

> 115 kV and larger transmission facilities that comprise the following NYCA interfaces: Dysinger East, West Central, Volney East, Moses South, Central East/Total East, UPNY-SENY and UPNY-ConEd, and their immediately connected, in series, Bulk Power System facilities in New York State. Each interface shall be evaluated to determine additional "in series" facilities, defined as any transmission facility larger than 115 kV that (a) is located in an upstream or downstream zone adjacent to the interface and (b) has a power transfer distribution factor (DFAX) equal to or greater than five percent when the aggregate of generation in zones or systems adjacent to the upstream zone or zones which define the interface is shifted to the aggregate of generation in zones or systems adjacent to the downstream zone or zones which define the interface. In determining "in series" facilities for Dysinger East and West Central interfaces, the 115 kV and 230 kV tie lines between NYCA and PJM located in LBMP Zones A and B shall not participate in the transfer. Highway transmission facilities are listed in ISO Procedures. [38]

A Byway, by contrast, is defined as "transmission facilities comprising the New York State Transmission System that are neither Highways nor Other Interfaces."[39] The definition of Byway provides further that all facilities located in New York City and Long Island are deemed to be Byways.[40] Finally, an Other Interface is any interface into New York City or Long Island, and any interface between the NYCA and other control areas.[41]

c. Participation in Capacity Markets

The new Section VII of Attachment S provides that the "deliverability test will be applied within each of the three (3) New York capacity regions: Rest of State, Long Island and New York City," and that "[t]o be declared deliverable, a generator or merchant transmission project must be deliverable throughout the ISO Capacity Region in which the project is interconnected."[42] The added language provides further that "in order to be eligible to become an Installed Capacity Supplier or receive Unforced Capacity Deliverability Rights, [a Developer] must elect CRIS," and that the "MW amount of CRIS requested by a Developer . . . cannot

[38] NYISO OATT Attachment S, Section I.
[39] *Id.*
[40] *Id.* ("transmission facilities in this capacity Zone J and capacity Zone K are Byways.").
[41] *Id.* (Defining Other Interfaces as "Interfaces into New York capacity regions, Zone J and Zone K, and external ties into the New York Control Area.").
[42] NYISO OATT, Attachment S, Section VII.C.

exceed the name plate capacity of its generation or merchant transmission project."[43] The language also makes clear that a Developer "need only address the incremental deliverability of its interconnecting generator or merchant transmission project, not the deliverability of the pre-existing system depicted in the Existing System Representation."[44]

d. Election of Both CRIS and ERIS

Section VII of Attachment S provides that a "Developer may elect partial CRIS for its project."[45] Any Generator electing to receive CRIS and ERIS "will have two CRIS values: one for the summer capability period and one for the winter capability period."[46] The summer capability period CRIS value will be set using the deliverability test methodology described elsewhere in Section VII, while the winter capability period CRIS value "will be set at a value that will maintain the same proportion of CRIS to ERIS as for the summer capability period."[47]

e. Deliverability Test Methodology for Highways and Byways

Section VII.H of Attachment S sets forth the methodology for determining deliverability over Highways and Byways. As an initial matter, it defines NYCA Deliverability as the ability "to deliver the aggregate of NYCA capacity resources to the aggregate of the NYCA load under summer peak load conditions."[48] The tariff makes clear that this "is accomplished through ensuring the deliverability of new Large Facilities, new Small Generators larger than 2 MWs, and any existing facility increasing its capacity by more than 2 MWs, in the three Capacity Regions in New York State".[49] Section VII provides further that all projects seeking CRIS will be evaluated on an aggregate Class Year basis, and that deliverability in "[e]ach Capacity Region will be tested on an individual basis."[50]

The capacity elected by a Developer for CRIS service is derated for purposes of the deliverability analysis, and the derating "is based on the unforced capacity or 'UCAP' of each resource" and is referred to "as the UCAP Deration Factor ('UCDF')."[51] At the "conclusion of the analysis, the ISO will reconvert the results and report them in terms of MWs of Installed Capacity."[52] The parameters and details of the analysis that the NYISO will perform to determine deliverability are set forth in Section VII.H.2 of Attachment S. In accordance with the March 21 Order, this section provides more details on the test methodology. Forthcoming ISO Procedures will provide a comprehensive description of all aspects of the test methodology.

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[43] NYISO OATT, Attachment S, Section VII.D.
[44] NYISO OATT, Attachment S, Section VII.E.
[45] NYISO OATT, Attachment S, Section VII.F.
[46] *Id.*
[47] *Id.*
[48] NYISO OATT, Attachment S, Section VII.H.1.
[49] *Id.*
[50] NYISO OATT, Attachment S, Section VII.H.2.a.
[51] NYISO OATT, Attachment S, Section VII.H.2.b.
[52] *Id.*

f. Deliverability Test Methodology for Other Interfaces and External Resources

Section VII provides that a Generator or Merchant Transmission Project in a Class Year "will not be considered deliverable if their aggregate impact degrades the transfer capability of any Other Interface more than the lesser of 25 MW or 2 percent of the transfer capability of the Other Interface identified in the [Annual Transmission Baseline Assessment]."[53] A Developer causing this level of degradation on an Other Interface will be responsible for 100 percent of the total System Deliverability Upgrades that must be constructed to restore transfer capability on the Other Interface. Deliverability of "external resources for the upcoming Capability Year will be considered through the annual process of setting import rights under the NYISO Services Tariff."[54]

g. Cost Allocation for Highway Upgrades

If the portion of a Highway System Deliverability Upgrade needed to make one or more projects in a Class Year deliverable is 90 percent or more of the total size of that upgrade, as measured in megawatts, then the Developer(s) of the project(s) "will be responsible for one hundred percent . . . of its pro rata Class Year share of the cost of the System Deliverability Upgrade[]."[55] If the portion of the Highway System Deliverability Upgrade required to make an interconnecting project deliverable is less than 90 percent of the total size of the upgrade, then "the Developer will be required to pay or commit to pay for its pro rata share of the Highway upgrade project cost," which in turn is determined based on the project's "contribution to the need for the System Deliverability Upgrades to be used for the Highway project."[56] Any costs of such Highway upgrades -- that is, upgrades for which the portion required to make an interconnecting facility deliverable is less than 90 percent of the total size of the upgrade -- that are not borne by interconnecting Developers "will be funded by Load Serving Entities . . . based on their proportionate share of the ICAP requirement in the statewide capacity market, reflecting locational capacity requirements."[57]

With one exception, System Deliverability Upgrades that fall below the 90 percent threshold will be constructed only "[w]hen . . . 60% of the most current cost estimate of the upgrade has been paid or posted as Security by Developers . . . ."[58] The one exception is the circumstance in which "the NYISO Comprehensive Reliability Planning Process ('CRPP') identifies a Reliability Need requiring a Highway facility to be constructed earlier than would be the case pursuant to [Attachment S] . . . ."[59] In this circumstance, "the facility will be constructed

[53] NYISO OATT, Attachment S, Section VII.I. When assessing the Other Interfaces into zones J and K, the Interfaces will be defined consistent with the Interfaces used by the New York State Reliability Council in performing reliability studies.
[54] NYISO OATT, Attachment S, Section VII.J.
[55] NYISO OATT, Attachment S, Section VII.K.1.
[56] NYISO OATT, Attachment S, Section VII.K.2.
[57] NYISO OATT, Attachment S, Section VII.K.3.b.
[58] NYISO OATT, Attachment S, Section VII.K.3.a.
[59] NYISO OATT, Attachment S, Section VII.K.3.c.

as determined in the CRPP."[60] Funds collected from Developers to fund such upgrades "will be used as an offset to the total reliability solution upgrade cost, with the remainder of the cost to be allocated per the requirements of the CRPP, as set forth in Sections 13, 14 and 16 of Attachment Y to the NYISO OATT."[61]

h. TCCs and Headroom Payments

Any TCCs resulting from System Deliverability Upgrades that have been constructed "will be distributed to the Developers and Load Serving Entities in proportion to their funding of the Highway project."[62] Further, as new interconnecting resources seeking CRIS "come on line and use the Headroom on System Deliverability Upgrades created by a prior Highway upgrade project, the Developers of those new Large Facilities will reimburse the prior Developers and Load Serving Entities who funded the System Deliverability Upgrades for use of the Headroom created by the prior Developers and Load Saving Entities in accordance with Sections VIII.G and VIII.H of these rules."[63] New Developers paying for Headroom under Attachment S will be transferred TCCs associated with that capacity.[64]

i. Cost Allocation for Byways

Developer(s) of a proposed generation or merchant transmission project(s) will pay one hundred percent of the cost of the System Deliverability Upgrades to any Byway needed to make those project(s) deliverable in accordance with these rules.[65] A "Developer paying to upgrade a Byway will receive any incremental TCC's created [by the Byway]."[66] Such a Developer is "eligible to receive Headroom payments in accordance with Attachment S," and any "subsequent Developer paying for use of Headroom on System Deliverability Upgrades will receive corresponding TCCs, if any."[67]

j. Retesting

A Developer may elect to be retested for deliverability prior to commencement of construction of an identified System Deliverability Upgrade. If a Developer elects to be retested, it also "may request to be placed in the then open Class Year."[68] A Developer's "cost responsibility for System Deliverability Upgrades shall not increase as a result of such retesting," and may "decrease or be eliminated."[69]

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[60] *Id.*
[61] *Id.*
[62] NYISO OATT, Attachment S, Section VII.K.5.
[63] NYISO OATT, Attachment S, Section VII.K.6.
[64] *Id.*
[65] NYISO OATT, Attachment S, Section VII.B.1.
[66] *Id.*
[67] *Id.*
[68] NYISO OATT, Attachment S, Section VII.K.4.
[69] *Id.*

k. Larger-Than-Required System Deliverability Upgrades

A Developer may "elect to construct upgrades that are larger and/or more expensive than the System Deliverability Upgrades identified to support the requested level of CRIS for the Developer's project in the Class Year Deliverability Study, provided that those upgrades are reasonably related to the Developer's project."[70] Under this circumstance, the Developer must "pay for the incremental cost of the upgrade; *i.e.*, the difference in cost between the cost of the System Deliverability Upgrades as determined by these rules, and the cost of the larger and/or more expensive upgrade."[71]

4. Decision Period for Accepting Upgrades

Under Attachment S, a Developer is required to submit either an Acceptance Notice or a Non-Acceptance Notice within 30 calendar days of "approval of the Annual Transmission Reliability Assessment and Class Year Deliverability Study by the Operating Committee (the "Initial Decision Period"), or within 7 calendar days following the NYISO's issuance of a revised Annual Transmission Reliability Assessment, Class Year Deliverability Study and accompanying Revised Project Cost Allocation and revised Deliverable MWs report."[72] At that point, the Developer may "accept the cost of both its system Deliverability Upgrades and System Upgrade Facilities, or the Developer may provide a Non-Acceptance Notice for the cost of its System Deliverability Upgrades and accept or not its Deliverable MWs, or the Developer may elect ERIS by providing an Acceptance Notice only for the cost of its System Upgrade Facilities."[73] In addition, a Developer that is seeking to increase its approved level of CRIS may provide an Acceptance Notice only for the cost of its System Deliverability Upgrades. A Developer "providing a Non-Acceptance Notice or Security Posting Default for the cost of its System Deliverability Upgrades, but providing an Acceptance Notice and posting the required Security for the cost of its System Upgrade Facilities, will interconnect taking ERIS and may later request to be placed in the then open Class Year and be evaluated for CRIS."[74] The Developer may also opt to accept a level of CRIS that can be provided without System Deliverability Upgrades.[75]

5. Developer Responsibility for Future Upgrades and Retention of CRIS Status

Once a Developer has "posted Security for its share of the System Upgrade Facilities required for its project, and paid cash or posted Security for its share of the System Deliverability Upgrades required for its project, then, except as provided in Section VIII.F of these rules, that Developer has no further responsibility for the cost of additional Attachment Facilities and System Upgrade Facilities and System Deliverability Upgrades that may be required in the

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[70] NYISO OATT, Attachment S, Section VII.K.7.
[71] *Id.*
[72] NYISO OATT, Attachment S, Section VIII.B.
[73] *Id.*
[74] NYISO OATT, Attachment S, Section VIII.B.3.
[75] *Id.*

future."[76] A facility that qualifies for CRIS will be permitted to take CRIS as long as (1) the facility begins commercial operation within three years of a specified date; (2) the facility's interconnection agreement is not terminated; and (3) the facility remains capable of operating at the capacity level studied, and is not deactivated.[77]

6. Establishment of CRIS for Existing Generators

Generators in Class Years that pre-date Class Year 2007 are eligible to receive CRIS. For these Generators, "the CRIS capacity level will be set at the maximum DMNC level achieved during . . . five summer capability periods . . . even if that DMNC value exceeds nameplate MWs."[78] The CRIS for intermittent resources pre-dating Class Year 2007 will be set at "nameplate MWs . . . and the CRIS capacity level for controllable lines pre-dating Class Year 2007 will be set at the MWs of Unforced Deliverability Rights awarded to them."[79]

7. Transfer of Deliverability Rights

The amendments to Attachment S permit the transfer of deliverability rights under certain circumstances. If a facility "deactivates an existing unit and commissions a new one at the same electrical location, CRIS status of the deactivated facility and its deliverable capacity level may be transferred to that same electrical location, provided that the new facility becomes operational within three years from the deactivation of the original facility."[80] Under this circumstance, the deliverability rights transfer only when the new facility becomes operational. Deliverability rights also may be transferred bilaterally between facilities at different locations, as a part of the Class Year Deliverability Study, if "the new facility is found to be deliverable after the existing facility assumes ERIS status or retires."[81]

B. Attachment X

Attachment X of the NYISO OATT sets forth the Standard Large Facility Interconnection Procedures ("LFIP") and the Standard Large Generator Interconnection Agreement ("LGIA") for interconnecting generating and merchant transmission facilities. Many of the changes in the LFIP and the LGIA are conforming amendments necessary to reflect the additional level of interconnection service adopted under the Deliverability Plan.

The primary substantive changes to Attachment X are contained in Section 3.2 of the LFIP, which set forth new provisions reflecting the core elements of the Deliverability Plan. Section 3.2.1 states that the NYISO offers two types of interconnection service -- ERIS for "interconnection in compliance with the . . . Minimum Interconnection Standard," and CRIS for

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[76] [76] NYISO OATT, Attachment S, Section IX.A.
[77] NYISO OATT, Attachment S, Section IX.B.
[78] *Id.*
[79] *Id.*
[80] NYISO OATT, Attachment S, Section IX.C.
[81] NYISO OATT, Attachment S, Section IX.D.

"for interconnection in compliance with the NYISO Deliverability Interconnection Standard." Section 3.2.2 provides that all interconnecting facilities "must interconnect in compliance with the NYISO Minimum Interconnection Standard," while facilities must conform to the NYISO's Deliverability Interconnection Standard before they "can become qualified Installed Capacity Suppliers and before Merchant Transmission Facilities can receive Unforced Capacity Deliverability Rights." Section 3.2.2 also provides that a Developer states its election to receive ERIS only, or both ERIS and CRIS, at the time it files its interconnection request, and that the NYISO "evaluates an Interconnection Request for compliance with the Deliverability Interconnection Standard formally during the Class Year Deliverability Study."

Section 3.2.3 of the LFIP provides that a facility "that elects ERIS, and not CRIS, will not be able to become an eligible Installed Capacity Supplier or to receive Unforced Capacity Deliverability Rights," but that such a facility "will be eligible to participate only in the energy and applicable ancillary service markets." Section 3.2.4 provides that the "amount of CRIS requested by a Developer shall be stated in MWs of Installed Capacity, and cannot exceed the nameplate capacity of the Developer's Large Facility." Section 3.2.5 of the LFIP provides that "Developer may elect partial CRIS, measured in whole MWs of Installed Capacity, for each unit of its Large Facility," while Section 3.2.6 states that a "facility with an established CRIS value may at a later date ask the NYISO to reevaluate the Large Facility for a higher level of MWs of Installed Capacity, not to exceed the nameplate rating of the Large Facility, by including the Large Facility in the then currently open Class Year Deliverability Study to identify the System Deliverability Upgrades, if any, needed for the Large Facility to be declared deliverable at the higher level of MWs."

C. Attachment Z

Attachment Z of the NYISO OATT contains the Small Generator Interconnection Procedures ("SGIP") and the Standard Small Generator Interconnection Agreement ("SGIP"). The amendments to Attachment Z are intended to reflect the fact that a "Small Generating Facility larger than 2 MW wishing to become a qualified Installed Capacity Supplier in accordance with the ISO Services Tariff and related ISO Procedures must first elect Capacity Resource Interconnection Service and satisfy the NYISO Deliverability Interconnection Standard in addition to the NYISO Minimum Interconnection Standard."[82] The standards for procuring CRIS by such facilities are the same as for generators with a capacity of 20 megawatts and higher. Section 1.1.7 of Attachment Z also provides that a "Small Generating Facility 2 MWs or smaller may elect Capacity Resource Interconnection Service without being evaluated for deliverability under Attachment S to the NYISO OATT."

D. Attachment Y and Rate Schedule 10

As outlined above, Highway System Deliverability Upgrades that are subsequently included as part of a Reliability Need identified through the CRPP are funded in a manner that

[82] NYISO OATT. Attachment Z, Section 1.1.7.

reflects amounts contributed by interconnecting Developers. Specifically, monies collected from Developers to fund such upgrades "will be used as an offset to the total reliability solution upgrade cost, with the remainder of the cost to be allocated per the requirements of the CRPP, as set forth in Sections 13, 14 and 16 of Attachment Y to the NYISO OATT."[83]

To implement this proposal, the Joint Filing Parties have adopted amendments to Attachment Y and Rate Schedule 10 of the NYISO OATT. Attachment Y sets forth the process under which the NYISO undertakes regional planning for reliability and economic upgrades to the transmission, generation, and local distribution system in the NYCA. Rate Schedule 10 of the NYISO OATT outlines the methodology by which the costs of regulated reliability upgrades identified through that planning process are to be allocated and recovered.

The introductory paragraph of Section 16.0 of Attachment Y is being amended to provide that "costs of a regulated reliability project to be recovered pursuant to this Section 16 will be reduced by any amounts that, pursuant to Section VII.K.3.c of Attachment S to the NYISO OATT, have been previously committed by or collected from Developers for the installation of System Deliverability Upgrades required for the interconnection of generation or merchant transmission projects." Section 2.2 of Rate Schedule 10, in turn, is being amended to state that "final project cost and resulting revenue requirement [for a regulated reliability solution identified pursuant to Attachment Y] will be reduced by any amounts that, pursuant to Section VII.K.3.c of Attachment S to the NYISO OATT, have been previously committed by or collected from Developers for the installation of System Deliverability Upgrades required for the interconnection of generation or merchant transmission projects" at the requested level of CRIS.

E. Addition of "Developer" Definition

The Joint Filing Parties propose to amend the definition of "Developer" in the body of the NYISO OATT in order to accommodate the other changes implementing the Deliverability Plan. Specifically, the Joint Filing Parties would define Developer to mean an "Eligible Customer developing a generation project larger than 20 megawatts, or a merchant transmission project, proposing to interconnect to the New York State Transmission System, in compliance with the ISO's Minimum Interconnection Standard and, depending on the Developer's interconnection service election, also in compliance with the ISO Deliverability Interconnection Standard.

F. Section 5.12 of the Services Tariff

Section 5.12 of the Services Tariff sets forth the requirements that a supplier must satisfy in order to be an Installed Capacity Supplier in the NYISO's ICAP market. The parties propose to amend Section 5.12 to establish that each interconnected supplier must elect CRIS and have been found to be deliverable, or must have been grandfathered as deliverable under the provisions of Attachments S, X, and Z, in order to be an Installed Capacity Supplier in the

[83] NYISO OATT, Attachment S, Section VII.K.3.c.

NYISO's ICAP market. . The parties also propose to amend Section 5.12.2 to establish that External Installed Capacity will be subject to the deliverability test for Interconnection Requests.

G. Additional Tariff Modifications

The Joint Filing Parties reserve the right to continue to develop and refine additional amendments to the NYISO tariffs with respect to the implementation of the Deliverability Plan regarding the following two matters.

1. LSE Upgrade Funding Mechanism

Subparagraph 10.f.2 of the Consensus Deliverability Plan, incorporated into Section VII.K.2b of Attachment S, deals with the deferred construction of System Deliverability Upgrades to transmission system Highways. The tariff provision states in part that "[t]he actual cost of the Highway upgrade project above that paid for by Developers will be funded by Load Serving Entities, based on their proportionate share of the ICAP requirement in the statewide capacity market, reflecting locational requirements." All such Highway upgrades will be constructed by one or more Transmission Owners, identified according to the physical location of the Highway upgrades.

The Consensus Deliverability Plan contains no mechanism to collect the required funds from the appropriate Load Serving Entities and distribute those collected funds to the appropriate Transmission Owners. The Filing Parties and stakeholders have resolved numerous complex implementation issues since the March 21 Order. However, they have not had sufficient time to develop the detailed mechanism needed to collect these Load Serving Entity funds and distribute the funds to the appropriate Transmission Owner(s).

Accordingly, the Joint Filing Parties ask that the Commission grant them six months of additional time to complete their analysis of this issue and make a subsequent compliance filing comprised of further tariff modifications describing the details of this funding mechanism. The Joint Filing Parties believe that this funding provision of the Consensus Deliverability Plan will not be needed for more than a year, so that this six-month period of time will not adversely impact any party.

2. Modeling Emergency Assistance

Paragraph 17.i of the Consensus Deliverability Plan states that when applying the deliverability test to new Interconnection Requests, "[e]xternal system imports will be adjusted as necessary to eliminate or minimize overloads, consistent with paragraph 18 . . . [of the Consensus Deliverability Plan]." Paragraph 18 states:

> The deliverability of external resources will be considered through the annual process of setting import rights. Under this process, grandfathered import contract rights and the emergency assistance benefits will be honored. Subject to

grandfathered import contract rights and the calculation of emergency assistance benefits, the remaining external ICAP import rights will be subject to the deliverability test.

The Joint Filing Parties and stakeholders have had extensive discussions about how to implement paragraph 17.i in the Class Year Deliverability Study for new Interconnection Requests while implementing paragraph 18 in the separate annual process conducted under the Market Services Tariff to set Installed Capacity import rights for resources not interconnected to the New York State Transmission System for the upcoming Capability Year. The Joint Filing Parties and stakeholders have sought to reconcile the implementation of each paragraph so that the treatment of external resources is "consistent" in the way intended by paragraph 17.i.

However, the parties have not reached agreement on how to treat, or model, external emergency assistance in the two processes in ways that are consistent, one with the other. These discussions have been extremely challenging, due to the differences in the power flow model used for the Class Year Deliverability Study and the probabilistic model used as a part of the process that sets import rights for external capacity resources. Accordingly, the Joint Filing Parties ask that the Commission grant them four months of additional time to complete their analysis of this issue and make an subsequent compliance filing comprised of further tariff modifications dealing with the modeling of emergency assistance.[84] In the interim, in the absence of an agreed-upon technical basis to model any particular MW level of emergency assistance in the Class Year Deliverability Study, and so as not to delay either the completion of the Class Year Deliverability Study for Class Year 2007, the Joint Filing Parties propose that the Class Year 2007 Deliverability Study will not explicitly represent any level of emergency assistance. The subsequent compliance filing will address the appropriate level of emergency assistance to be represented in Class Year Deliverability Studies for Class Year 2008 and subsequent Class Years.

IV. EFFECTIVE DATE AND APPLICABILITY TO CLASS YEAR 2007

In the March 21 Order, the Commission approved the proposal to apply the new tariff amendments to Generators beginning in Class Year 2007. Accordingly, the Joint Filing Parties respectfully request that the Commission approve the proposed tariff sheets with an effective date of August 4, 2008.

With respect to Class Year 2007, the NYISO is using a two-step process to apply the deliverability provisions as approved in the March 21 Order. The NYISO has completed the necessary study under the Minimum Interconnection Standard, and the NYISO's Operating Committee approved that study, which included Project Cost Allocations for each project in the

[84] Explicitly representing emergency assistance in the deliverability analysis may result in undeliverable capacity in certain Capacity Regions.

Class Year, on July 17, 2008. Those members have 30 days, *i.e.*, until August 18, 2008, to accept or reject their Project Cost Allocation.[85]

Once the Commission acts on the tariff revisions proposed in this filing, the NYISO will complete a Deliverability Study for Class Year 2007. A preliminary Deliverability Study for Class Year 2007 has been completed, and will be submitted for Operating Committee review and approval once the Commission acts on these tariff amendments. Once this Deliverability Study is finally approved, it will be presented to the members of Class Year 2007, and the procedures set forth in Section VIII.A. of Attachment S will apply -- that is, they will have 30 days to indicate whether they accept or reject cost responsibility for the System Deliverability Upgrades identified in the NYISO's report. Furthermore, the Interconnection Agreements for Class Year 2007 will explicitly condition participation in the Installed Capacity market on satisfaction of the new deliverability interconnection standard and, to the extent a project is found to be not deliverable, on funding, or committing to fund, any required deliverability upgrades.

V. COMMUNICATIONS AND CORRESPONDENCE

Copies of correspondence concerning this filing should be served on:

Robert E. Fernandez, General Counsel
Elaine D. Robinson, Director of Regulatory Affairs
Karen Georgenson Gach, Senior Attorney
New York Independent System Operator, Inc.
10 Krey Boulevard
Rensselaer, NY 12144
Tel: (518) 356-8875
Fax: (518) 356-7678
rfernandez@nyiso.com
erobinson@nyiso.com
kgach@nyiso.com

Ted J. Murphy, Esq.
Hunton & Williams LLP
1900 K Street, N.W.
Washington, D.C. 20006
Tel: (202) 955-1500
Fax: (202) 778-2201
tmurphy@hunton.com

J. Kennerly Davis, Esq.
Hunton & Williams LLP
951 East Byrd Street
Richmond, VA 23219
Tel: (804) 788-8200
Fax: (804) 788-8218
kdavis@hunton.com

[85] If any member of Class Year 2007 rejects its Project Cost Allocation, the NYISO will recalculate cost responsibility for the remaining members, and those remaining members will have to decide whether to accept or reject their revised Project Cost Allocation. This process continues -- with each round taking approximately 21 days -- until all remaining generators have accepted their cost responsibility for the Minimum Interconnection Level upgrades necessary to interconnect those generators.

Individual Company Representatives Listed in the Signature Blocks to This Filing[86]

Elias G. Farrah
Julia E. Richardson
Dewey & LeBoeuf LLP
1101 New York Avenue, N.W.
Suite 1100
Washington, DC 20005-4213

Paul L. Gioia
Dewey & LeBoeuf LLP
One Commerce Plaza, Suite 2020
99 Washington Avenue
Albany, NY 12210-2820

Counsel to the New York
Transmission Owners

VI. SERVICE

The NYISO will electronically send a link to this filing to the official representative of each of its customers, to each participant on its stakeholder committees, to the New York Public Service Commission, and to the electric utility regulatory agencies of New Jersey and Pennsylvania. In addition, the complete filing will be posted on the NYISO's website at www.nyiso.com. The NYISO will also make a paper copy available to any interested party that requests one. To the extent necessary, the NYISO requests waiver of the requirements of Section 35.2(d) of the Commission's Regulations (18 C.F.R. § 35.2(d) (2007)) to permit it to provide service in this manner.

[86] Waiver of the Commission's regulations (18 C.F.R. § 385.203(b)(3) (2007)) is requested to the extent necessary to permit service on counsel for the NYISO in both Washington, DC and Richmond, VA, as well as counsel for the NYTOs.

VII. CONCLUSION

Wherefore, for the foregoing reasons, the Joint Filing Parties respectfully request that the Commission accept the proposed revisions to the NYISO OATT and Services Tariff in order to implement the Deliverability Plan that the Commission approved in the March 21 Order..

Respectfully submitted,

NEW YORK TRANSMISSION OWNERS

By: Elias G. Farrah
Counsel

NEW YORK INDEPENDENT SYSTEM OPERATOR, INC.

By: Ted J. Murphy
Counsel

Elias G. Farrah, Esq.
Julia E. Richardson, Esq.
Dewey & LeBoeuf LLP
1101 New York Avenue, NW
Washington, DC 20005-4213

Paul L. Gioia, Esq.
Dewey & LeBoeuf LLP
One Commerce Plaza, Suite 2020
99 Washington Avenue
Albany, NY 12210-2820

Ted J. Murphy, Esq.
Hunton & Williams LLP
1900 K Street, N.W.
Washington, D.C. 20006

J. Kennerly Davis, Esq.
Hunton & Williams LLP
951 East Byrd Street
Richmond, VA 23219

/s/ Raymond B. Wuslich
Central Hudson Gas & Electric Corporation
Donald K. Dankner, Esq.
Raymond B. Wuslich, Esq.
Winston & Strawn LLP
1700 K Street, N.W.
Washington, DC 20006
Email: ddankner@winston.com
rwuslich@winston.com

/s/ Catherine P. McCarthy
New York State Electric & Gas Corporation
Rochester Gas and Electric Corporation
Catherine P. McCarthy, Esq.
Dewey & LeBoeuf LLP
1101 New York Avenue, N.W.
Suite 1100
Washington, DC 20005-4213
Email: catherine.mccarthy@dl.com

/s/ Neil H. Butterklee
Consolidated Edison Company of New York, Inc.
Orange and Rockland Utilities, Inc.
Neil H. Butterklee, Esq.
Consolidated Edison Company of New York, Inc.
4 Irving Place
Room 1815-s
New York, NY 10003
Email: butterkleen@coned.com

/s/ Roxane E. Maywalt
Niagara Mohawk Power Corporation
d/b/a/ National Grid
Roxane E. Maywalt, Esq.
National Grid USA Service Company, Inc.
300 Erie Boulevard – West
Syracuse, NY 13202-4250
Email: roxane.maywalt@us.ngrid.com

EXHIBIT NO. 15

VFT POWER AND PERFORMANCE TESTING PLAN
(JUNE 3, 2009)

From: Walsh, Daniel S (GE Comm Fin) [daniel.walsh@ge.com]
Sent: Monday, June 15, 2009 1:22 PM
To: pricer@pjm.com; MDonnelly@nyiso.com
Cc: Mostel, Jon R.
Subject: Draft Linden VFT power and performance testing plan
Attachments: VFT test plan rev3.pdf

MaryHelen and Rob,

Attached please find the draft Linden VFT power and performance testing plan. Kindly submit any comments or concerns to me by June 30, 2009.

Thanks for your support on the project.

Dan

Daniel Walsh
GE Energy Financial Services
800 Long Ridge Road
Stamford, CT 06927
Office: (203) 357- 4740
Facsimile: (203) 961-2606
E-mail: daniel.walsh@ge.com

GE Energy

Linden Transmission Project

for

GE Energy Financial Services

VFT Power and Performance Testing Plan

June 3, 2009

This document may contain non-public transmission information subject to the Federal Energy Regulatory Commission's Standards of Conduct for Transmission Providers. Disclosure of non-public transmission information must be restricted, on a need to know basis, to those persons who perform transmission planning and operations functions. Care must be taken to prevent disclosure of non-public transmission information to persons who submit offers or bids to buy or sell energy.

Linden VFT Power and Performance Test Plan

VFT Power and Performance Testing Plan

The test plan below is section 5 of the VFT Control System Startup and Commissioning Plan, and includes steps during which the power may flow between the 230 KV PJM tie and the 345 KV NYISO tie. This section also includes the following performance tests defined in Exhibit C of the Linden VFT contract:

Section 5.5.1	Performance Test - Run Period 1
Section 5.7.1	Performance Test – Run Period 2
Section 5.7.2	Performance Test – Run Period 1
Section 5.8	Continuous Operation Period

This document is provided to assist EFS in procuring the required power and permissions required to perform the tests herein.

Appendix A and B contains provides a detailed procedure for calculating the Actual Power Losses and Actual Power Transfer as defined by Exhibit C.

Appendix B contains power flow requirements to complete the VFT Power and Performance Test Plan. Entries in this table may be cross-referenced to activities on the overall project schedule, as well as steps within the VFT Power and Performance Test Plan. The MW, duration, and MWHr values are approximate, and are subject to actual conditions encountered during performance of each step.

Owner may conduct, or cause to be conducted, such additional testing of one or more VFT units and of the VFT Facility as a whole at such times as is reasonably practicable in order to determine, to Owner's satisfaction, the readiness of the VFT Facility for commercial operation.

5 Tying the PJM and Linden sides together

5.1 Verify controls during the first Synchronization

	The following procedure will cause power to flow between the two grids. Verify that it is okay to move the power	
	Start a trend display in Toolbox and record the following items: Pwr Stator Side: Pwr Rotor Side: Q Stator Side: Q Rotor Side: Vmag Stator: Vmag Rotor: RT Speed: DC Mtr Ia:	
	Close the Sync breaker test switches on the UVC cabinet.	
	The ventilation system should still be running	
	Using the Datapanel on the UVC command a Sync Sequence. The controls should start the drives and the motor field should ramp to 1PU. Then the controls should start rotating the RT to align the phases across the Sync Breaker. Using the sync scope or oscilloscope verify that the controls are operating properly. This time the sync breaker should close and the RT should regulate 0MW power flow.	
	Let the controls sit at 0 MW for 5 minutes to verify that it is operating properly. If any of the feedbacks are incorrect the power will start ramping one way or the other, so be prepared to hit the E-stop button if something is wrong	
	Set the power ramp to 10MW per minutes on the Datapanel	
	Set the power level to 5MW and push the "GO" button. Watch the controls to verify they are operating properly.	
	Set the power level to 0MW	
	Print the trends or save them electronically Trend names:	

5.2 VFT RPC Checkout

	Note: If the 17kV bus magnitude is too high the controls will switch to Voltage mode. It would be best if the 17kV bus is about 0.97PU. Since the testing is occurring with the grid, these test need to be coordinated with the Utility and they may need to be done at night.	
	Put the VFT local RPC in a Power Schedule mode using the Datapanel on the UVC	
	Start a trend display in Toolbox and record the following items: Pwr Stator Side:	

	Pwr Rotor Side: Q Stator Side: Q Rotor Side: Vmag Stator: Vmag Rotor: RT Speed: DC Mtr Ia: On the HMI start a trend monitoring the UCV UR relays 230kV voltage 345kV voltage Rotor side voltage Stator side voltage Rotor side Q Stator side Q	
	Energize the VFT and then sync it. Verify that no cap bank was put online. Note the change to the 17kV bus. Stator bus volts prior to being online:_______________ Rotor bus volts prior to being online: _______________ Stator bus volts once online: _______________ Rotor bus volts once online: _______________	
	Ramp the power to 32MW. The controls should have put a rotor cap bank online. If the 17kV bus voltage is greater than 1.03 PU then the RPC may switch into Voltage mode and take the cap bank back offline. Stator bus volts with cap bank online: ___________ Rotor bus volts with cap bank online: ___________	
	Ramp the power to 100MW. Verify that the controls did not put any more cap banks online	
	Print the trends or save them electronically Trend names:	

5.3 VFT Power Step Test

	Inform the Utility that the VFT power order will be stepped changed. The step size is +/- 5MW	
	Record the VFT power, voltage, DC motor current and rotor speed	
	Use the Runbacks to set up the Power steps.	
	Start a trend display in Toolbox and record the following items: Pwr Stator Side: Pwr Rotor Side: Q Stator Side: Q Rotor Side: Vmag Stator: Vmag Rotor: RT Speed: DC Mtr Ia: On the HMI start a trend monitoring the UCV UR relays 230kV voltage	

	345kV voltage Rotor side voltage Stator side voltage Rotor side Q Stator side Q	
	Run the VFT at a power order Rotor to Stator of 25MW and step the reference to 30MW. The step will need to be added in the PAC2100. Verify that the system is stable. Graph name: ___________	
	Remove the step reference and verify that the system is stable. Graph name: ___________	
	Ramp the power order to 90MW and then step the reference to 95MW. The step will need to be added in the PAC2100. Verify that the system is stable. Graph name: ___________	
	Remove the step reference and verify that the system is stable. Graph name: ___________	
	Set the power order back to 25MW with power flow Rotor to Stator	
	Step the reference to 30MW. The step will need to be added in the PAC2100. Verify that the system is stable. Graph name: ______	
	Remove the step reference and verify that the system is stable.	
	Ramp the power order to 90MW and then step the reference to 95MW. The step will need to be added in the PAC2100. Verify that the system is stable. Graph name: _________	
	Ramp the power order back to 0MW and step the power order to 50MW and then step the power order to 0MW.	
	Remove the step reference and verify that the system is stable. Graph name: ___________	
	Print the trends or save them electronically Trend names:	

5.4 Operation with the HMI

	Put the UVC into a Remote mode	
	Verify that the VFT can be operated complete from the HMI - VFT RPC functions work, voltage mode, power schedule and manual operation - Ability to energize, sync and change power order. - Ability to change the power direction - Ability to change the ramp rate - Ability to set the power order request limit	
	After verifying the operation of the VFT using the HMI, take the unit offline	

5.5 VFT Temperature Rise Test (Heat Run)

	This test needs to pass rated power through the RT machine to determine the temperature rise of the machine. The Utility needs to be informed of the test. There are 4 power levels for the heat runs, 25 50 75 and 100MW. It takes about 130 minutes to reach the steady state temperature at each level.	
	Set up a HMI trend screen with all the RTD from the DC motor and the RT. It should also include the DC motor current, the RT current and the power flow.	
	Put the VFT RPC into a voltage mode with a reference of 1PU	
	Make sure the HMI is logging the RTDs, air flows, RT power, current and revenue meter watts and energy into a database file. There may be several database files that need to be merges after the testing has been complete	
	Monitor the RTD with the live trender window to make sure all the RTD feedbacks are working properly and the machines don't get too hot.	
	Perform the Heat runs a described in GEH procedure P-1520-01.3V	
	Collect the following data, which should be in the HMI database Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current Save the above data as this is needed to calculate the loss data Comments:	

5.5.1 Performance Test – Run Period 1

	Since the machine heat run finishes at 100MW and the machine has reached a stabilized temperature, the heat run test flows into the performance testing. The contract calls for 3 Run periods of the machine operating at 100MW for a 2 hour time frame with a power order change of at least 10% in between run periods. The 2 hours time period starts after the machine temperature has been stable for 1 hour. The machine temperature time constant is about 1540 seconds, so it takes about 130 minutes to reach the stable temperature and then another hour needs to pass to confirm the stability. To reduce the testing time the first Run period should be done at the end of the 100MW heat run	
	Once the temperature stabilizes at 100MW continue the power flow for an additional 2 hours and collect the following data, which should be in the HMI database. During this time all the enclosure lights need to be off as well as any other loads that will not be on during operation of the VFT Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current	

	Save the above data as this is needed to calculate the loss data. Refer to document Appendix A for the Loss Calculation formula While waiting for this test to complete calculate the maximum stator RTD temperature at an ambient temperature of 35 deg C. Basically subtract the running ambient outside temperature from 35 deg C and add this value to the maximum stator RTD temperature. Max Stator RTD temperature: ____________	
	To validate the accuracy of the revenue meters the power flow needs to be reversed for about 10 minutes. This needs to be done while the machine is at a stabilized temperature. Inform the Utility that power flow will reverse for 10 minutes at 100MW. As the power is reversed, verify that once the power is below 30MW the controls remove one cap bank (rotor side). Once the power changes direction and if above 30MW a rotor side cap bank should be re-inserted. Collect the following data: Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current Save the above data as this is needed to calculate the loss data. Refer to Appendix A for the Loss Calculations formula.	
	After finishing the first Performance Run Period, shut off the machine and allow it to cool down. After the machine has cooled remove the instrumentation as this is not needed for the other 2 Run Periods.	
5.6 Checking/tuning the Enclosure Temperature Control		
	The following test require the RT to get up to full temperature and then change the enclosure operating temperature to verify the stability of the temperature regulator. The maximum temperature that shall be allowed as a set point is 35 deg C and the lowest is 20 deg C. However the temperature can not control the enclosure below ambient.	
	This test requires that the VFT to be operated at several power commands above 50MW , so the utility needs to be informed. The test will take about 4 hour, because the regulator is slow and the regulator needs to be verified at several output levels. If there is not enough time to perform this test then it can be combined with the System 300MW Power transfer test	
	Monitor the air flows, RTDs, RT return damper position, RT exhaust damper position and the power flow on the HMI trender.	
	Operate the VFT at 50MW from PJM to Linden	
	Allow the RT to operate at 50MW for 30 minutes	
	Change the enclosure temperature setpoint to 5 degrees above ambient temperature Note the following Ambient temperature: ________	

	RT return damper position before changing the setpoint: ________ New temperature setpoint: ________ Time for the enclosure temperature to reach new setpoint: ________ Is the regulator stable or unstable: ________ Print a trend of the change or save it electronically Comment:	
	Increase the enclosure temperature setpoint by another 5 degrees above the previous setpoint. (remember the max is 35 deg C) Note the following Ambient temperature: ________ RT return damper position before changing the setpoint: ________ New temperature setpoint: ________ Time for the enclosure temperature to reach new setpoint: ________ Is the regulator stable or unstable: ________ Print a trend of the change or save it electronically Comment:	
	If the regulator is stable increase the power order to 75MW. Print a trend of the regulator response to the power order change, allow 30 minutes of data. Comments:	
	Decrease the enclosure temperature setpoint by 5 degrees from the previous setpoint. (remember the min is 20 deg C) Note the following Ambient temperature: ________ RT return damper position before changing the setpoint: ________ New temperature setpoint: ________ Time for the enclosure temperature to reach new setpoint: ________ Is the regulator stable or unstable: ________ Print a trend of the change or save it electronically Comments:	
	Return the enclosure temperature setpoint to 20 deg C and take the unit offline	

5.7 Performance Testing

5.7.1 Performance Test – Run Period 2

	This test needs the VFT to operate at full load of 100MW, so make sure it is okay to operate the machine.	
	Make sure all the Heat Run test equipment has been removed from the RT pit area.	
	Run the VFT at 100 MW and allow it to reach it's operating temperature	
	Once the temperature stabilizes at 100MW continue the power flow for an additional	

	2 hours and collect the following data, which should be in the HMI database During this time all the enclosure lights need to be off as well as any other loads that will not be on during operation of the VFT Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current Save the above data as it is needed to calculate the loss data. Refer to document Appendix A for the Loss Calculation formula While waiting for this test to complete calculate the maximum stator RTD temperature at an ambient temperature of 35 deg C. Basically subtract the running ambient outside temperature from 35 deg C and add this value to the maximum stator RTD temperature. Max Stator RTD temperature: ____________	
	Bring the unit to 75 MW for 10 minutes to prepare for the next Performance test Run Period	

5.7.2 Performance Test – Run Period 3

	At the end of this test the machine will be place into the Continuous Operation Period for 168 hours preferable with all three units if possible	
	Run the VFT at 100 MW and allow it to reach it's operating temperature	
	Once the temperature stabilizes at 100MW continue the power flow for an additional 2 hours and collect the following data, which should be in the HMI database During this time all the enclosure lights need to be off as well as any other loads that will not be on during operation of the VFT Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current Save the above data as it is needed to calculate the loss data. Refer to document Appendix A for the Loss Calculation formula While waiting for this test to complete calculate the maximum stator RTD temperature at an ambient temperature of 35 deg C. Basically subtract the running ambient outside temperature from 35 deg C and add this value to the maximum stator RTD temperature. Max Stator RTD temperature: ____________	

5.8 Performance Test – Continuous Operation, 3 Units

	The contracts states that the VFTs must be able to transfer a total of 300MW as measured at the revenue meter on the Linden side with a maximum temperature of 35 degrees C. The VFT must demonstrate operation for 168 continuous hours total, 72 hour of which must be at 300 MW. The power will be ramped to approximately 285MW on each unit and then to 300MW and then to 306MW. At each point the	

	machine temperature needs to stabilize so losses and load flow data can be captured.	
	This test will push 300 MW into the Linden side for at least 72 hours with a possibility of 168 hours. The utilities need to be informed that this will occur.	
	Collect the following data on each unit, which should be in the HMI database During this time all the enclosure lights need to be off as well as any other loads that will not be on during operation of the VFT Machine RTD temperatures Enclosure temperatures Ambient temperatures The VSU MW, Mvar Voltage and temperature The Linden revenue meter data MW, energy, voltage and current The PJM revenue meter data MW, energy, voltage and current Save the above data as it is needed to calculate the loss data and power flow capabilities. Refer to Appendix A and B for calculation of Actual Power Losses and Actual Power Transfer capabilities.	
	Determine from the customer or utility the ramp rate that needs to be used and entered that into the HMI Ramp Rate: __________	

5.8.1 Power Transfer of 285MW Total

	Place all 3 units online and ramp to 95MW on each unit Note the time that the total output reached 285 MW Unit 1 at 95MW: _______ Unit 2 at 95MW: _______ Unit 3 at 95MW: _______	
	Monitor the Stator RTDs and if any of the temperature go over 110 deg C then the power will need to be reduced.	
	After the units reach their operating temperature about 130 minutes or <1 degree C change over an hour of operation. Take the following readings Time and Date: _______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: _______________ PJM revenue meter MW: ________ Linden revenue meter MW: ________	
	Once the temperature stabilize the power at the Linden revenue meter should be about 1 MWs below the VFT total	
	After the machine temperature stabilizes **inform the Utilities** that the cap banks are going to manual be tripped to gather load flow and loss data. Removing the cap bank on one unit will provide some dV to dT sensitivity data.	
	Trip unit 1 cap banks offline. Make sure the rotor bus does not drop below 0.97 pu. If it does put the cap banks back online. Unit 1 Rotor Voltage: __________ Unit 2 Rotor Voltage: __________ Unit 3 Rotor Voltage: __________	

	Allow the machine to thermal stabilize and take the following readings After the units reach their operating temperature about 130 minutes or <1 degree C change over an hour of operation. Take the following readings Time and Date: ______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: ______________ PJM revenue meter MW: ________ Linden revenue meter MW: ________	
	After the data has been collected, put the cap bank back online	

5.8.2 Power Transfer of 300MW Total

	Inform the utility and customer that the power will increase another 15 MW	
	Ramp the units to 100MW each. Note the time that the total output reached 300 MW Unit 1 at 100MW: _______ Unit 2 at 100MW: _______ Unit 3 at 100MW: _______	
	Monitor the Stator RTDs and if any of the temperature go over 110 deg C then the power will need to be reduced.	
	After the units reach their operating temperature about 130 minutes or <1 degree C change over an hour of operation. Take the following readings Time and Date: ______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: ______________ PJM revenue meter MW: ________ Linden revenue meter MW: ________	
	Once the temperature stabilize the power at the Linden revenue meter should be about 1 MWs below the VFT total	
	After the machine temperature stabilizes **inform the Utilities** that the cap banks are going to manual be tripped for 30 minutes to gather load flow and loss data	
	Allow the units to operate for 12 hours	

5.8.3 Power Transfer of 303 MW Total

	Inform the utility and customer that the power will increase another 3 MW	
	Increase the Power Order on each unit by 1 MW for a total of 101MW per unit	
	After the temperature on the RTD stabilize take the following readings Time and date: ______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: ______________ PJM revenue meter MW: ________	

	Linden revenue meter MW: ________ Collect the data from the D200/HMI database	
	Continue to monitor the equipment	
	Once all the temperatures stabilize and the RT RTDs are below 110 degrees C and the rotor current is below 3736A attempt to raise the output of the 3 units to the maximum output.	

5.8.4 Power Transfer of 306MW Total

	Increase the Power Order on each unit by 1 MW for a total of 102MW per unit	
	After the temperature on the RTD stabilize take the following readings Time and date: ______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: ______________ PJM revenue meter MW: ________ Linden revenue meter MW: ________	
	Continue to monitor the equipment, after the machine temperatures stabilize collect the data for calculating the losses and power flow.	

5.8.5 Maximum Power Transfer

	Inform the Utility and the customer that the output power will be increased to the maximum the VFT will allow. The maximum output is 110MVA per unit.	
	As long as the RT RTDs are below 110 degrees C and the rotor current is below 3736A attempt to raise the output of the 3 units to the maximum output.	
	Increase the power order of each unit until the rotor current reaches 3736 A or the stator current reaches 3633 A. At this point allow the machine temperature to stabilize.	
	After the temperature on the RTD stabilize take the following readings Time and date: ______________ Unit 1Power: Max RTD Temp Unit2 Power: Max RTD Temp Unit 3 Power: Max RTD Temp Ambient temp: ______________ PJM revenue meter MW: ________ Linden revenue meter MW: ________ Collect the data from the D200/HMI database	
	After the data has been captured, inform the Utilities and customer that the power will be dropped back to 100MW per unit.	
	After the 168 hours have been completed the HMI data needs to be exported to an Excel spreadsheet, so the data can be used to calculate the losses of the system and the load flow capabilities.	

Appendix A – Linden VFT Losses Calculation

The Actual Power Losses of the Linden VFT project will be determined by the difference in the readings of the revenue meters installed on the 345kV and 230kV lines as required by the contract. These meters are located in the VFT Protection and Control building on the first floor. Each of these meters will be calibrated before putting them in service. These meters are also connected to the D200 RTU through serial cable using the DNP 3.0 protocol. The data to calculate the losses will be collected during the Performance Testing, section 5.7, of the test plan. Each of the machines must perform three Run Period, where the machine temperature stabilizes while operating at 100MW for a period of two hour. During this time the energy of each unit will be collected and used to calculate the losses of the VFT. The energy initial value should be captured after the machine temperature stabilizes at 100MW and the end energy value should be captured just before ramping the units down. As a good validation, the power flow shall be reversed on one unit. If the CTs have any bias then this will show in the difference in the losses.

The following charts shows the PT and CT information connected to the revenue meters

Instrument	Ratio	Max Burden	Accuracy
345kV PT	345kV:120	200VA	0.15%
345kV CT	600:5	22.5VA	0.15%
230kV PT	230kV:120	200VA	0.15%
230kV CT	1000:5	22.5VA	0.15%
Nexus Meter	-----	0.33VA on Pt 0.0125VA on CT	0.02% on V 0.05% on I 0.06% on W – PF = 1.0 0.10% on W – PF = 0.5

Using the above data the Nexus meter accuracy can be calculated for each side:

345kV side
Power Error = sqrt3 * 345000*600*0.0006 = 215,120 watts
230kV side
Power Error = sqrt3 * 230000*1000*0.0006 = 239,023 watts

The DNP mapping to the D200 RTU uses 16 bit integers, the following table defines the meter scaling

345kV side

Analog Value	Scale Factor	Full Scale
I phase	1 bit = 0.1 amps	6553.5 Amps
V l-n	1 bit = 1 volt	65535 Volts
V l-l	1 bit = 1 volt	65535 Volts
Power Phase	1 bit = 1823.6 watts	11951 *10000 watts
Power Total	1 bit = 5470.3 watts	35850 *10000 watts

230kV side

Analog Value	Scale Factor	Full Scale
I phase	1 bit = 0.1 amps	6553.5 Amps
V l-n	1 bit = 1 volt	65535 Volts
V l-l	1 bit = 1 volt	65535 Volts
Power Phase	1 bit = 2026.2 watts	13279 *10000 watts

Power Total	1 bit = 6078.7 watts	39837 *10000 watts

The Nexus meter also provides several binary counters that can be used to monitor energy. The binary counter have a 32bit register, each of these registers have an x1000 scaling. So the lowest value is 1 kWh or 1kVarh. This data is also collected in the D200 RTU at a rate of one sample per 10 seconds.

During the required Run Periods after the machine has thermally stabilized, the energy counter data can be extracted from the D200/HMI database after an hour of running. The energy divided by the time between the end and beginning energy values, in hours, will determine the power used and power delivered. The difference between these power values is the losses.

Each unit has three Run Periods, so there should be nine data points for the losses. It also needs to be pointed out that there are two auxiliary transformers for the three VFTs and when three VFT are operating the core losses for the aux. Xfrmrs will be divided up between the VFTs. However, when only one VFT is in operation, the core losses of both auxiliary transformers will be measured. So when operating with only one unit, one of the auxiliary transformers should be de-energized.

The chart below shows the expected losses of each VFT at nominal voltage (17.5kV rotor).

	Off Line Losses	**Total Station Losses (kW)**							
MW Power Output		0	10	20	40	60	75	85	100
RT *	0	400.0	405.0	419.9	479.5	578.9	679.6	759.1	897.0
RT Fans (300HP) **	0	125.3	125.3	125.3	125.3	125.3	125.3	125.3	125.3
DM Fans (60HP) ***	0	29.8	29.8	29.8	29.8	29.8	29.8	29.8	29.8
Press Fans (60HP)	0	44.8	44.8	44.8	44.8	44.8	44.8	44.8	44.8
Transf. Core Rotor side	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9
Transf. Load Rotor side	0	0.0	3.3	13.1	52.6	118.3	184.8	237.4	328.6
Transf. Fan Rotor side	0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	4.5
Transf. Core Stator side	0	59.0	59.0	59.0	59.0	59.0	59.0	59.0	59.0
Transf. Load Stator side	0	0.0	2.8	11.2	44.7	100.6	157.2	201.9	279.4
Transf. Fan Stator side	0	0.0	0.0	0.0	0.0	0.0	2.2	2.2	4.5
Xfrmr Aux Fans (6)	0	22.4	22.4	22.4	22.4	22.4	22.4	22.4	22.4
Drive Motor	0	17.5	19.1	22.5	36.0	58.4	81.2	99.1	130.3
Drive Transformers	3.122	3.1	3.4	4.2	7.4	12.7	18.1	22.4	29.8
Reactors	0	0.0	0.0	0.1	0.3	0.6	1.0	1.2	1.7
Drives	4.19	4.2	4.2	4.3	4.7	5.4	6.0	6.5	7.4
Capacitor banks	0	0.0	0.0	0.0	32.0	32.0	32.0	32.0	32.0
Auxiliary xfrmrs	15.516	15.5	15.7	16.1	17.8	20.7	23.6	25.9	29.9
Auxiliary load	9.31	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
DM Heater	2.77	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RT Heaters	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pit Heater	1.732	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Station Losses	86.54	**177.9**	**781.7**	**819.6**	**1003.2**	**1255.8**	**1516.1**	**1718.3**	**2082.6**

Appendix B - Linden VFT Power Flow Capabilities Calculation

The Actual Power Transfer capabilities of the Linden VFT site, shall be determined by the revenue meter monitoring the 345kV line. This meter is located in the VFT Protection and Control building and is connected to the D200 for data collection. The VFT control system regulates the power flow at the Stator side CTs, so the power at the revenue meter will be lower by the losses in the step up transformer. During the final performance test with all units on line, the power order of each unit will be raised above 100 MW to a maximum of 102MW. During this test the D200/HMI system will be logging the pertinent data. The contract states that the power transfer requirements are 225KV on the 230kV system, 345kV on the Linden side and an ambient temperature of 95 degrees Fahrenheit. During the testing it is highly unlikely that all these conditions will be met, so the data from the test will needed to calculate the RT stator / rotor currents and the winding temperatures. Ideally there should be several power transfer data points to gather data from. One of the data points shall include operation at 285MW. The other data points should be at 300MW and an overload value of 306MW. While operating at 285MW the capacitor bank on unit one needs to tripped offline to determine how much the machine temperature changes with bus voltage.

The limiting factor of power flow of the VFT is the temperature of the stator winding of 110 degrees or a maximum of 3736Amp in the stator windings. During the heat run tests data will be gathered to generate a graph of the machine temperature rise verses the stator current. Knowing the dT/dI and the contract stated voltage of the each side of the RT machine, will allow the stator winding temperature rise to be calculated for a given MW of power flow. This temperature rise will be added to maximum ambient temperature of 35 degrees C (95 deg F) to determine the overall stator winding temperature.

Appendix C - Power Flow Requirements Table

Note: In addition to the power flow requirements shown below, the Linden VFT Facility will start drawing station service power continuously upon energization of the 230 KV VSUs. This is expected to be approximately 100 KW, but will fluctuate depending on the status of 345 KV VSUs, and drive, ventilation and auxiliary loads Owner may conduct, or cause to be conducted, such additional testing of one or more VFT units and of the VFT Facility as a whole at such times as is reasonably practicable in order to determine, to Owner's satisfaction, the readiness of the VFT Facility for commercial operation.

The MW, Duration and hourly MWHr values in this table represent best-case scenarios. Actual power flow requirements will be subject to actual conditions encountered during performance of individual tests.

Channel	Activity Description (Activity ID)	Test Plan Step	Approximate Power Required	Approximate Duration	Approximate MWHr per Hour	Comments
RT-1	RT-1 Energization (TSL051591)	5.1	5 MW	30 Min	2.5 MWHr	Unit will be synchronized across PJM-NYISO system during this step.
RT-2	RT-2 Energization (TSL051691)	5.1	5 MW	30 Min	2.5 MWHr	Unit will be synchronized across PJM-NYISO system during this step.
RT-3	RT-3 Energization (TSL051791)	5.1	5 MW	30 Min	2.5 MWHr	Unit will be synchronized across PJM-NYISO system during this step.
RT-1	RT-1 Energization (TSL05159)	5.2	32 MW / 100 MW	1 Hr	35 MWHr	
RT-2	RT-2 Energization (TSL051691)	5.2	32 MW / 100 MW	1 Hr	35 MWHr	
RT-3	RT-3 Energization (TSL051791)	5.2	32 MW / 100 MW	1 Hr	35 MWHr	
RT-1	RT-1 Energization (TSL051591)	5.3	25 stepped to 30 MW, 90 stepped to 95 MW, 0 stepped to 50 MW	1 Hr	35 MWHr	

Linden VFT Power and Performance Test Plan

Channel	Activity Description (Activity ID)	Test Plan Step	Approximate Power Required	Approximate Duration	Approximate MWHr per Hour	Comments
RT-2	RT-2 Energization (TSL051691)	5.3	25 stepped to 30 MW, 90 stepped to 95 MW, 0 stepped to 50 MW	1 Hr	35 MWHr	
RT-3	RT-3 Energization (TSL051791)	5.3	25 stepped to 30 MW, 90 stepped to 95 MW, 0 stepped to 50 MW	1 Hr	35 MWHr	
RT-1	RT-1 Energization (TSL051591)	5.4	Variable MWs	4 Hrs Total	15 MWHr x 4 Hrs	
RT-2	RT-2 Energization (TSL051691)	5.4	Variable MWs	4 Hrs Total	15 MWHr x 4 Hrs	
RT-3	RT-3 Energization (TSL051791)	5.4	Variable MWs	4 Hrs Total	15 MWHr x 4 Hrs	
RT-1	RT-1 Heat Runs (TSL051595)	5.5	25, 50, 75 & 100 MW	About 4 Hrs per power level	25 MWHr x 4 Hrs 50 MWHr x 4 Hrs 75 MWHr x 4 Hrs 100 MWHr x 4 Hrs	16 Hr Test Day
RT-2	RT-2 Heat Runs (TSL051695)	5.5	25, 50, 75 & 100 MW	About 4 Hrs per power level	25 MWHr x 4 Hrs 50 MWHr x 4 Hrs 75 MWHr x 4 Hrs 100 MWHr x 4 Hrs	16 Hr Test Day
RT-3	RT-3 Heat Runs (TSL051795)	5.5	25, 50, 75 & 100 MW	About 4 Hrs per power level	25 MWHr x 4 Hrs 50 MWHr x 4 Hrs 75 MWHr x 4 Hrs 100 MWHr x 4 Hrs	16 Hr Test Day
RT-1	RT-1 Heat Runs (TSL051595)	5.5.1	100 MW	2 Hrs	100 MWHr x 2 Hrs	Need to flow power (100 MW) into PJM for about 10 minutes for one of the channels.
RT-2	RT-2 Heat Runs (TSL051695)	5.5.1	100 MW	2 Hrs	100 MWHr x 2 Hrs	Need to flow power (100 MW) into PJM for about 10 minutes for one of the channels.

Linden VFT Power and Performance Test Plan

This document may contain non-public transmission information subject to the Federal Energy Regulatory Commission's Standards of Conduct for Transmission Providers. Disclosure of non-public transmission information must be restricted, on a need to know basis, to those persons who perform transmission planning and operations functions. Care must be taken to prevent disclosure of non-public transmission information to persons who submit offers or bids to buy or sell energy.

Channel	Activity Description (Activity ID)	Test Plan Step	Approximate Power Required	Approximate Duration	Approximate MWHr per Hour	Comments
RT-3	RT-3 Heat Runs (TSL051795)	5.5.1	100 MW	2 Hrs	100 MWHr x 2 Hrs	Performance Test - Run Period 1. Need to flow power (100 MW) into PJM for about 10 minutes for one of the channels.
RT-1	RT-1 Heat Runs (TSL051595)	5.6	50 MW	1 Hr	50 MWHr	
RT-2	RT-2 Heat Runs (TSL051695)	5.6	50 MW	1 Hr	50 MWHr	
RT-3	RT-3 Heat Runs (TSL051795)	5.6	50 MW	1 Hr	50 MWHr	
RT-1	RT-1 Heat Runs (TSL051595)	5.6	75 MW	1 Hr	75 MWHr	
RT-2	RT-2 Heat Runs (TSL051695)	5.6	75 MW	1 Hr	75 MWHr	
RT-3	RT-3 Heat Runs (TSL051795)	5.6	75 MW	1 Hr	75 MWHr	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.7.1	300 MW	4 Hrs	300 MWHr x 4 Hrs	Performance Test - Run Period 2
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.7.1	225 MW	10 Min	40 MWHr	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.7.2	300 MW	4 Hrs	300 MWHr x 4 Hrs	Performance Test - Run Period 3
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8.1	285 MW	4 Hrs	285 MWHr x 4 Hrs	Start of 168 Hr Continuous Operation Period

Linden VFT Power and Performance Test Plan

Channel	Activity Description (Activity ID)	Test Plan Step	Approximate Power Required	Approximate Duration	Approximate MWHr per Hour	Comments
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8.2	300 MW	12 Hrs	300 MWHr x 12 Hrs	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8.3	303 MW	4 Hrs	303 MWHr x 4 Hrs	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8.4	306 MW	4 Hrs	306 MWHr x 4 Hrs	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8.5	Max Power	4 Hrs	310 MWHr x 4 Hrs	
Combined	Combined RT's - VFT Performance Tests (TSL051810)	5.8	300 MW	140 Hrs	300 MWHr x 4 Hrs	May run at 300 MWHr between above tests (5.8.3, 5.8.4 and 5.8.5) to maintain continuous operation of the system.

EXHIBIT NO. 16

PROJECT LETTER
(NOVEMBER 13, 2009)

Linden VFT LLC

800 Long Ridge Road
Stamford, CT 06927

November 13, 2009

Henry Chao
Vice President, System & Resources Planning
New York Independent System Operator
10 Krey Boulevard
Rennsalear, NY 12144

Subject: Linden VFT - Actual Transmission Transfer Capability

Dear Mr. Chao:

In a letter dated June 13, 2008, NYISO in accordance with Section 4.14.2 of NYISO's ICAP Manual granted the Linden VFT facility 300 MW of Unforced Capacity Delivery Rights ("UDRs") upon commercial operation. NYISO's determination was based on Linden VFT's May 16, 2007 submission of technical information, including the nameplate rating of the rotary transformers, 100 MW each, as the limiting element.

On October 15, 2009, pursuant to the Interconnection Agreement among NYISO, Consolidated Edison Company of New York, Inc. and Linden VFT (filed with and accepted by the FERC on April 29, 2008 in docket no. ER08-618), Linden VFT tested the performance of the merchant transmission facility and verified the dependable maximum net transmission transfer capability of the facility. The dependable maximum net transmission transfer capability of the Linden VFT facility was demonstrated to be 315 MW over a ten (10) continuous hour period from 0700 to 1700 hours. A copy of the test report is attached for your information.

We understand that, pursuant to NYISO's OATT, Attachment S, Section IX.C, the capacity level for resources in Class Years that pre-date Class Year 2007 will be established initially at the nameplate MW or the maximum DMNC level achieved through initial and successive DMNC test levels. The interconnection of the Linden VFT project was evaluated in Class Year 2006. Further, pursuant to Section 4.14.2 of NYISO's ICAP Manual, UDRs are established through pertinent technical information and the actual physical characteristics of an associated project as the Installed Capacity Equivalent of the Unforced Capacity that can be delivered to the Interconnection Point in MW. Accordingly, Linden VFT requests that the UDRs granted to the project be updated to 315 MW effective with commercial operation.

Please contact me if you require additional information or clarification.

Regards,

Daniel S. Walsh
Asset Manager

Dependable Maximum Net Capability Test 10-15-2009

Time	NYISO Export kVARh	NYISO Import kVARh	NYISO Export kWh	NYISO Import kWh	PSEG Export kVARh	PSEG Import kVARh	PSEG Export kWh	PSEG Import kWh	Energy Imported	Energy Exported	Energy Loss	Average Energy Loss
10/15/2009 18:00	872537.6	657890.91	8493553	490180.8	319572.71	5570370.2	396787.68	9900390.1				
10/15/2009 17:00	872537.6	550640.61	8177810	490180.8	319572.71	5537314.2	396787.68	9578237.32	322152.78	315742.94	6409.84	
10/15/2009 16:00	872537.6	440672.93	7862163	490180.8	319572.71	5507572.8	396787.68	9256518.07	321719.25	315647.21	6072.04	
10/15/2009 15:00	872537.6	329933.13	7546419	490180.8	319572.71	5478711.6	396787.68	8934347.79	322170.28	315743.77	6426.51	
10/15/2009 14:00	872537.6	219194.53	7230761	490180.8	319572.71	5450411.1	396787.68	8612264.17	322083.62	315658.16	6425.46	
10/15/2009 13:00	872537.6	109115.68	6915263	490180.8	319572.71	5421551	396787.68	8290092.52	322171.65	315498.18	6673.47	
10/15/2009 12:00	872537.6	9998567.4	6599677	490180.8	319572.71	5392907.4	396787.68	7967920.54	322171.98	315585.62	6586.36	
10/15/2009 11:00	872537.6	9888812	6283775	490180.8	319572.71	5363541.5	396787.68	7646188.93	321731.61	315902.05	5829.56	
10/15/2009 10:00	872537.6	9778378.6	5968257	490180.8	319572.71	5334873.5	396787.68	7323823.54	322365.39	315518	6847.39	
10/15/2009 9:00	872537.6	9665432.8	5652499	490180.8	319572.71	5308236.3	396787.68	7001807.98	322015.56	315758.29	6257.27	
10/15/2009 8:00	872537.6	9557308.1	5337081	490180.8	319572.71	5276743.5	396787.68	6679804.41	322003.57	315417.35	6586.22	
10/15/2009 7:00	872537.6	9451808.8	5021394	490180.8	319572.71	5242619	396787.68	6357379.46	322424.95	315687.5	6737.45	6441.051818
10/15/2009 6:00	872537.6	9350948.7	4713309	490180.8	319572.71	5211801.8	396787.68	6043126.54	314252.92	308084.81	6168.11	

EXHIBIT NO. 17

NYISO LETTER
(JANUARY 15, 2010)

SENT VIA E-MAIL & USPS

January 15, 2010

Mr. Daniel S. Walsh
Linden VFT LLC
800 Long Ridge Road
Stamford, CT 06927

Re: Linden VFT—Request for Unforced Capacity Deliverability Rights

Dear Mr. Walsh:

The New York Independent System Operator, Inc. ("NYISO") has reviewed your letter dated November 13, 2009, requesting an additional 15 MW of Unforced Capacity Deliverability Rights ("UDR") for the Linden VFT facility. The NYISO has determined, pursuant to applicable requirements, that it cannot award the requested UDRs.

In order for the NYISO to recognize any increase in the capacity of the Linden VFT facility above 300 MW, the Linden VFT LLC must submit a separate Interconnection Request for the increase under the NYISO's Standard Large Facility Interconnection Procedures. That Interconnection Request will be evaluated under the requirements of Energy Resource Interconnection Service and Capacity Resource Interconnection Service, as applicable.

Please contact me if you have any questions regarding this matter.

Sincerely,

Henry Chao
Vice President,
System & Resource Planning

HC/ijd

cc: Mr. Steve Corey
Mr. Ricardo Gonzales
Mr. Dave Lawrence
Mr. Rana Mukerji

EXHIBIT NO. 18

NYISO II TF "DELIVERABILITY – IMPLEMENTATION ISSUES"
(JULY 2, 2008)

DELIVERABILITY -- IMPLEMENTATION ISSUES

["Proposed Resolution"]

I. Deliverability Test Methodology

A. Definition of Highway facilities (Plan P 10.a)
["Highway" shall mean (i) each of the NYCA interfaces listed in Plan P 10.a., (ii) any NYCA Bulk Power System facility immediately connected in series to one of those listed NYCA interfaces, and (iii) any transmission facility 115 kV and above that (a) is located in an upstream or downstream zone adjacent to one of those listed NYCA interfaces and (b) has a power transfer distribution factor (DFAX)equal to or greater than 5 percent. Highway transmission facilities will be listed in ISO Procedures.]

B. ROS Highway facilities, de minimis ATBA transfer capability degradation,and NYCA IRM (Plan P 17.l) [Lesser of 25 MW or 2 percent of the transfer limit of the interface as determined for the current ATBA case, <u>and</u> LOLE increase of .01 or more]

C. Relevant limit used when measuring transfer capability (Throughout, including Plan P 17.l and 16) [The binding limit observed in the analysis.]

D. Voltage limits as interface proxy (Plan P 17.h) [Voltage limits will be included in deliverability testing when the MIS voltage test in Attachment S determines that voltage limits are more binding than thermal limits.]

E. MWs of CRIS stated in ICAP or UCAP (Throughout, including Plan P 17) [ICAP, then derated for study and readjusted to ICAP for records. Converted to UCAP for transfers.]

F. Capacity derate factors used for each resource type (Plan P 17.b) [Reference resource averages in ISO Procedures.]

G. DFAX for "each monitored element" (Plan P 17.f) ["Each monitored element selected by NYISO staff."]

H. 4% DFAX threshold (Plan P 17.g) [Two references referring to 4% DFAX deleted.]

I. External resources (Plan P 17.i and 18) [When applying the deliverability test to a new Interconnection Request, external system imports, other than grandfathered import contracts identified in the ICAP Manual, will be reduced as necessary to eliminate or minimize overloads. When setting annual import rights, the deliverability test will be applied to external resources other than grandfathered import contracts identified in the ICAP Manual.]

1. Details of deliverability analysis for external resources, including timing of analysis and base case to be used. (Plan P 18)

2. No new grandfathered imports [Grandfathered import contracts are those specified as such in the ICAP Manual.]

J. Modeling of existing generators and other facilities in Interconnection Studies (Plan P 11 and 13) [Projects in CY 2007 and later will be modeled at the MWs of CRIS or ERIS that result from the CY process; DMNC values will not be used. Projects pre-dating CY 2007 will be modeled at their "grandfathered" MW value; *see* sections II.C and II.D of this outline.]

K. Modeling of other proposed projects in Interconnection Studies (Plan P 11 and 13) [Proposed projects will be modeled at the MWs of CRIS elected for evaluation, or at their nameplate MWs if ERIS is elected for evaluation.]

L. Modeling of controllable lines and intermittent resources (Plan P 11, 13 and 17.b) [Existing controllable lines, whether evaluated previously or grandfathered, will be modeled using the MWs of UDR awarded to them. Proposed controllable lines will be modeled at the MWs of CRIS elected for evaluation, or at their nameplate MWs if ERIS is elected for evaluation. Previously evaluated intermittent resources will be modeled at the MWs of CRIS or ERIS that result from the CY process. Proposed intermittent resources will be modeled at the MWs of CRIS elected for evaluation, or at their nameplate MWs if ERIS is elected for evaluation. Intermittent resources pre-dating CY 2007 will be modeled at their "grandfathered" MW value; *see* sections II.C and II.D of this outline.]

M. Description of base case and technical analysis in Interconnection Studies (LFIP 6.2, 7.3, 8.2) (Plan P1) [NYISO will conduct the deliverability analysis only as a part of the CY Facilities Study, not as a part of the Feasibility Study, and not as a part of the SRIS. Upon request, the NYISO will give any Developer with a valid Interconnection Request a copy of the Power Flow Base Case from the most recently completed CY deliverability study. (LFIP 2.3)]

N. Confirm that test methodology measures shared impact of adjacent CY projects (Plan P 17) [It does.]

O. De minimus impact threshold for deliverability test generally (Plan P 17) [No de minimus threshold]

P. De minimus threshold for degradation of Other Interfaces (Plan P 16) [Lesser of 25 MW or 2 percent of the transfer limit of the Other Interface as determined for current ATBA case.]

Q. De minimus threshold for testing deliverability of capacity increases to existing generators and MTs (Plan P 3) [2 MWs total, over the life of the facility. For previously evaluated generators, the baseline is the MWs of CRIS that result from the CY process. For generators pre-dating CY 2007, the baseline is their grandfathered DMNC value. For MTs, the baseline is their MWs of UDR awarded to them.]

R. Establishing winter CRIS level after test methodology sets summer CRIS level for the new project. Same process of different processes for different resource types? (Plan P 7) [Calculate percentage of CRIS/ERIS, apply percentage to winter DMNC to calculate winter CRIS value. For intermittent resources, apply percentage to nameplate MWs.]

S. Application of test methodology to controllable lines during the LFIP process, before request for UDRs. (Plan P 17) [Will be evaluated at requested CRIS.]

II. Grandfathering

A. Modeling of pre-CY 2007 units that are "deactivated" when deliverability requirement becomes effective (Plan P 12 and 13)

B. Definition of "deactivated" and "returns to service" (Plan P 12 and 13)

C. DMNC level measured over a "set period" (Plan P 13) [Highest DMNC measured during five historical summer capability periods. Prior to the establishment of the generator's first DMNC value for a summer capability period, the CRIS level will be set at nameplate MWs.]

D. DMNC level equivalent for intermittent resources and controllable lines with UDRs. [Wind resources will be grandfathered at their nameplate MWs. Controllable lines will be grandfathered at the MWs of UDR awarded to them.]

E. Treatment of units where maximum DMNC level exceeds nameplate rating [Maximum DMNC during five years, not to exceed nameplate MW.]

III. Small Generators

A. Threshold for deliverability test (Plan P 4) [Larger than 2 MW; smaller generators can elect CRIS with no test.]

1. Timing of Small Generator CRIS election [Same as LFIP]

2. Allocation of CY study costs

3. Deliverability analysis under SGIP prior to project placement in CY [None; same as LFIP. *See* section I.M of this outline.]]

4. Same 2 MW threshold for future additions to existing small generator capacity. *See* section I.Q of this outline.

5. SGIA or LGIA? [SGIA]

IV. SDU cost allocation within a CY

A. Threshold impact for cost allocation [No de minimus threshold]

B. Cost allocated in proportion to pro rata deliverability impact

C. Allocation of cost where actual cost exceeds CY estimate

1. Byway SDU [Existing Attachment S; pending 205 amendments.]

2. Highway SDU (construction not deferred) [Existing Attachment S; pending 205 amendments]

3. Deferred Highway SDU (construction deferred until threshold met); Reconcile existing Attachment S mechanism and Plan, to clarify what <u>cash or other</u> security locks in. (Plan P 10.e) [Developer's actual cost responsibility is not subject to adjustment under existing Attachment S rules. Interest earned and escalated security are applied to actual SDU cost.]

4. Disposition of cash or other security if deferred Highway SDU is "never" built. (Plan P 10.e and 10.f) [After 10 years, cash paid, or security drawn and paid, to LSEs who paid for capacity from the Developers who paid this cash or posted this security. Those Developer projects continue to be deliverable as if SDUs had been built.]

D. Allocation of Security to Affected TOs [Dollars of Security will follow dollars of SDUs.]

E. CRIS rejection followed by any later open CY. ERIS rejection subject to Attachment S re-entry rules.

V. Deferred Highway Construction: LSE Funding and Other Issues

A. Details of mechanism to move LSE funding to Affected TOs and connecting TO constructing SDUs (Plan P 10.f.2 and 10.h and 10.i) [TO Action Item. May defer to later compliance filing.]

B. Calculating the "portion" of the cost of a regulated reliability solution to be funded by Developer deposits and security (Plan P 10.f.3 and 10.i; OATT Attachment Y, sections 14 and 16) [Developer funding limited to cash or security for SDUs common to the reliability solution.]

C. Pre-construction refunds to Developers; any interest? (Plan P 10.g) [Yes, if cash deposit provided. Developer is retested in then current CY study.]

D. Is SDU fixed in CY study, or can a substitute SDU be identified later, perhaps reflecting system changes or additional projects? [A substitute SDU can be identified later, but this will not alter the earlier Developer's security requirement.]

VI. Multi-party Construction

A. Construction of SDUs involving one or more Affected TO in addition to Connecting TO (Plan P 10.f) [Bliss model that combines an IA with one or more EPC agreements]

VII. Headroom Accounting

A. Any system deliverability not created through the interconnection process is free for the taking.

B. Headroom accounting comes into play only when SDUs paid for by a Developer or LSE <u>and</u> actual system deliverability created. (Plan P 5 and 9.c and 10.j and generally for SDUs)

VIII. Procedure and Agreements

A. Developer modification of CRIS election (Plan P 1) [MWs of CRIS represent ICAP. Developer can elect any number of whole MWs, up to nameplate, at time of IR, may reduce MWs at time of IFSA; increasing MWs during LFIP is a Material Modification.]

B. Role of Optional Interconnection Study and CRIS election [None.]

C. Time periods for Interconnection Studies (Plan P 1) [No change.]

D. Size of deposits for Interconnection Studies [No change.]

E. Affected TO as an additional party to study agreements [No. NYISO will contract with Affected TO if necessary.]

IX. Transfer of Deliverability Rights

A. Can an "established" generator transfer rights before it becomes operational? (Plan P 13-15) [No, *see* last sentence in P 15.]

B. No deliverability analysis for transfers at same electrical location. Transferred MWs capped at CRIS level of established facility. (Plan P 14)

C. Three year time limit applies to transfers at same location or transfers between different locations (Plan P 13, 14 and 15)

D. Define "deactivation" and "return to service" and "operation" (Plan P 13, 14 and 15) ["operation" means Commercial Operation]

E. When to perform deliverability analysis for bilateral transfers between different locations, and how to relate this analysis to CY study and CY decision process (Plan P 15) ["New" generators are members of current CY. Bilateral deals completed, and noticed, prior to 3/1. "Existing generators" modeled in CY study at reduced levels reflecting their deals. All members of CY get deliverability benefits, as measured by the methodology, from all deals modeled in the CY study.]

F. Communication of CY results, including established generator reductions, to ICAP market administrator

EXHIBIT NO. 19

NYISO TPAS MINUTES
MEETING OF NOVEMBER 9, 2004

**Transmission Planning Advisory Subcommittee
(TPAS Meeting #69)**

November 9, 2004

NYISO
290 Washington Avenue Extension
Albany, NY 12203

Draft Notes

1. Administrative Matters

1.1 Introductions

Mr. Janos Hajagos, Chairman of the Transmission Planning Advisory Subcommittee (TPAS) called the meeting to order at 9:00 a.m. and welcomed the members of TPAS. Mr. Hajagos reminded members that the position of vice chair is open and he asked members to consider this.

1.2 Review of Agenda – Meeting Objectives

Mr. Hajagos reviewed the meeting agenda and stated the meeting objectives for the day.

1.3 Review of Previous Meeting Notes & Action Items

- October 13, 2004 TPAS Meeting

TPAS members reviewed and approved the October 13, 2004 meeting notes.

1.4 Action Items

TPAS members reviewed the action item list.

1.5 Vice Chair Position

Ralph Rufrano nominated Rich Felak for position of Vice Chair. Mr. Felak indicated that he would need time to consider this.

1.6 Next Meeting

The next meeting is scheduled for December 7 at the NYISO, 290 Washington Avenue Extension, Albany, NY.

2. Chairman's Report

2.1 Correspondence

Mr. Hajagos discussed correspondence with Mike Schiavone, SOAS Chair, regarding the formation of a joint SOAS/TPAS working group to review the ongoing reactive studies.

2.2 Operating Committee Feedback

Mr. Hajagos reported the LIPA Holtsville – Pilgrim 138 kV Transmission Project Study Scope and the Class Year 2002 Cost Allocation Report were approved at the last Operating Committee. Mr. Hajagos stated that there were a number of NYSRC proposed rule changes that are out for comment. The proposed changes are posted at NYSRC.org; comments may be made at the website as well.

3. Review of Study Scopes

3.1 Gotham Power Zerega – Bronx I Project

Steve Corey, NYISO Manager – Transmission Planning, stated that this was an updated scope; the original scope was approved about 3 years ago, but the project had not moved forward. Mr. Corey reported that the NYISO had reviewed the scope and had received comments from Con Edison which were integrated into the scope. NYISO staff recommended approval of the scope. Howard Fromer referred to the modeling of the A, B, and C lines and he asked when the NYISO will consider changing the modeling on these lines, since a protocol is being worked on. John Buechler commented that FERC has extended the discussion period for the parties to determine an operating protocol until mid January. Mr. Corey stated that until an operating protocol is established, the NYISO will continue using the same assumptions. Mr. Fromer suggested doing an alternate assumption along with the study to enhance the reliability aspect of the study since it will most likely be changing. Francesco Elmi stated that these numbers were used because this is what was in the 2004 Area Transmission Review and that Con Edison wanted to be consistent with the most recent studies. Mr. Bob Snow of PSE&G suggested that study should use a balance between the A, B, C lines, since this is how the lines are mostly used and the study should be based on realistic operating conditions. Mr. Corey commented that the NYISO bases their assumptions on the agreed upon schedules for 2004 with neighboring control areas. Mr. Fromer asked if changes are agreed to regarding the current assumptions, would all the scopes approved up to that point be grandfathered. Mr. Corey stated if there are changes, this would apply to studies from that point forward and not to studies that have been completed or are substantially in progress. A number of questions regarding Appendix A were raised; it was agreed that Athens should be taken off the list and the Empire Connection should be added. Glenn Haake asked how the Linden Co-Gen uprates are modeled. Mr. Corey stated that the changes are captured in the annual base case updates. MPs asked for the status of the wind projects listed in Appendix A. Mr. Corey stated that all the wind projects that are included in the list have an approved SRIS.

Members agreed to forward the study scope, as amended, to the OC with a recommendation for approval. Mr. Snow of PSE&G objected, indicating that his objection was due to the modeling of the A, B, and C lines in the scope. There was one abstention (PSEG Power).

4. Studies Under Consideration for Recommendations for OC Approval-none

5. Review of Projects Re: New Interconnection or Material Change Criteria-none

5.1 Change to the Caithness Bellport Project (Queue Position #107)

Mr. Corey reported that during collection of the responses of the October 1 notice, the developer informed the NYISO that they had revised the size of the project from 290 MW to 309.6 MW, a 10.6 % increase. The NYISO has reviewed the change and determined this is non-material change. Mr. Corey stated that the project has not completed an SRIS or a scope yet but will maintain its queue position. Mr. Fromer asked what the significance is of changing the queue position. Mr. Corey stated in the future, projects with lower queue position will be required to model higher queue positions. Mr. Fromer asked what standard is used to determine that the change is non-material. Mr. Corey stated the NYISO Planning Department uses OC approved criteria for determining material changes. Mr. Corey added the recently approved Standard Large Facility Interconnection Procedures have different criteria, which will be used in the future once the transition of pre-existing projects in the queue has been completed. *Mr. Hajagos suggested Mr. Corey provide a summary of the changes to criteria for determining material changes under the new procedures at the next meeting.*

The group agreed there was no material change to the project; this will be reported to the OC for information.

6. Review of Transmission and Interconnection Issues

Mr. Buechler reviewed various updates to the Interconnection Related Tariff Changes Action Item List.

The next IITF meeting is scheduled for Tuesday; the Deliverability Study and a number of issues listed on the first page of the Interconnection Related Tariff Changes are scheduled for discussion. Mr. Hajagos asked if a modified scope for the Deliverability Study had been completed. Mr. Buechler indicated that this will be provided for next week's IIRF meeting. The NYISO has retained two consultants to assist with the analysis, which is not yet complete. Mr. Buechler stated that FERC had issued an Order for the ISO-NE compliance filing; the Order accepted the New England minimum interconnection standard, but required ISO-NE to develop a locational deliverability product, including the impact on the proposed LICAP markets and set a deadline of September 2005 to complete this. In addition, FERC rejected the NE TO's proposed changes for interconnections to local facilities and deemed the FERC pro-forma LGIP and LGIA to be in effect after January 20, 2005.

Mr. Haake asked if the NYISO had considered filing for a further extension because there will not be much time to compile a filing after the Deliverability Study has been completed. Mr. Buechler stated that this needs to be discussed further, and noted that the rehearing requests on this issue are still pending. Mr. Buechler also noted that the NYISO made a final compliance filing on October 6. No comments have been made and the NYISO expects this to be approved, as the filing was made in response to FERC's August 6th Order. The Attachment S compliance filing related to the Keyspan Settlement was made October 15. Comments have been filed by NYPA requesting a change to one of the provisions. Mr. Buechler indicated that the NYISO will file a response to the NYPA request. Mr. Fromer asked when this filing would be made and he voiced concern that this could affect the roll out of the CY02 cost allocation. Karen Gach, NYISO Attorney, indicated that this filing will be made soon. Mr. Fromer stated that until the tariff is changed, there will be an inconsistency between the existing headroom procedures and the Settlement Agreement. Charlie Pratt commented that per the settlement, the Class Year 2002 will not get the advantage of the tariff amendments; these changes will apply to the catch up class and subsequent class years. Mr. Fromer was concerned about who the CY02 developers post their security to; under the old tariff, they post to the TOs and under the new tariff, they post to the CY01 developers.

Mr. Buechler reported the NYISO is preparing another redline of the Merchant Transmission Interconnection Agreement (MTIA) based upon comments received. The NYTO's have indicated that they will be submitting additional comments by the end of this week. The revised NYISO redline will be distributed to TPAS and the NYISO will be scheduling another meeting. Ralph Rufrano asked how the NYISO would proceed if an MT developer comes forward before the MTIA is completed. Mr. Buechler stated this would be handled on a case by case basis but the NYISO should be notified of all such interconnection requests in accordance with the new procedures.

6.1 August 6 FERC Order – Implementation/Transition Issues

Mr. Corey reported that the NYISO had issued a notice on October 1 to all projects in the queue, as of August 6; the notice requested responses for the transition to new procedures with a due date of October 15. On November 2, the NYISO issued withdrawal notices to 24 projects that had not responded. These developers have 15 business days to respond; the NYISO has received responses from two developers and their projects have been re-instated. Mr. Hajagos asked to have the queue list re-issued after the end of the cure period. Mr. Haake asked if the developers are required to post security when they respond. Mr. Corey indicated this was not requested. The NYISO has received 6 new interconnection requests since the new procedures went into effect.

6.2 CY01 Settlement Implementation – Status

6.3 CY02 Cost Allocation Status

The CY02 Cost Allocation Report was approved at the October 28 OC. Mr. Corey reported that a notice had been sent to the CY02 developers the same day and responses are due by November 29.

6.4 CY03 – 05 ("Catch Up Class") ATRA and Cost Allocation

It is expected that FERC will approve the Attachment S filing implementing the CY02 settlement by the end of the year and the preparatory work for the Catch-up Class would begin in January. Mr. Hajagos asked if the next FERC base case filing (FERC 715 Filing) would be used for this class year. Mr. Corey stated that the data collection/modeling update process takes place in the first quarter of the year for the FERC 715 Filing and the NYISO plans on using this. Mr. Haake asked if this included projects through March 1, 2005. Mr. Corey indicated if they did not make the March 1 date, they would go to the next class year. Ms. Grisaru noted that the final settlement called for the restart of cost allocation upon completion of certain items, and that the restart date could be after March 1; in that case, the revised tariff would allow all Developers who had met the required milestones by the later date to go into the Catch-up Class. *MPs asked for clarification on this; Ms. Grisaru indicated this could be clarified at the next TPAS meeting.* Mr. Felak asked if a Class Year Working Group would be developed. Mr. Corey stated that this has worked well with the CY02 and would continue for this Class Year group as well.

6.5 Other Interconnection Issues

7. <u>Study Reports Under Review</u>

7.1 Con Edison Mott Haven Substation SRIS

This study was received about two weeks ago and the review still in progress. The NYISO was not prepared to make a recommendation at this meeting.

7.2 2004 New York Area Transmission Review

Thinh Nguyen, NYISO Engineer, presented "2004 Intermediate Area Transmission Review (Study Year 2009)". This study is conducted annually for compliance with NPCC and NYSRC requirements. Mr. Nguyen provided an overview of the analysis areas included in the study and a summary of the baseline assumptions (for the year 2009) used to conduct the study. A table outlining the major changes to bulk power transmission facilities was provided. Mr. Nguyen discussed the methods used and results of the thermal analysis, voltage analysis, and stability analysis. The extreme contingency analysis and short circuit analysis were also discussed.

Mr. Hajagos asked if the same base case was used for the Area Transmission Review as used for the reactive studies. Mr. Corey stated that the base cases for this study are developed as part of the base case development process which includes updates from the TOs. Mr. Corey added that the NYISO has not made any changes to the base case as a result of the Reactive Studies. Mr. Hajagos asked about the extreme contingency analysis and if the NYISO should be analyzing events such as the June 17th event. Mr. Corey stated that the June 17 event did not match any particular extreme contingencies that are evaluated and that this particular event is beyond the scope of NPCC extreme contingency criteria. Mr. Haake asked how the report could conclude that that the NYISO is in compliance with NPCC since a number of over-dutied breakers had been identified. Mr. Nguyen stated that the overdutied breakers are currently or will be resolved by affected facility owners or by System Upgrade Facility studies. Comments may be submitted to Thinh Nguyen by November 23.

Mr. Fromer asked about the reductions of transfer capabilities into New York City and if this would result in modifications to assumptions and if it would affect the TCC markets. It was explained that the reduction in transfer capability is the result of system changes for the year 2009; this does not affect the system in the year 2005. Mr. Fromer asked if the NYISO would consider using different modeling for the A, B, C lines since this study was for the year 2009. Mr. Corey stated that this will be looked at when an inter area protocol has been completed. Mr. Fromer was concerned that the transfer limits from this study would affect the 2005 studies and would be binding. NYISO staff indicated that the transfer limits from the study are not binding and will not affect any of the 2005 base cases.

8. Status of NYISO Studies/Activities

8.1 Comprehensive Planning Study

The NYISO plans on conducting the first Comprehensive Planning Study next year. The ESPWG is scheduled to meet next week.

8.2 NYISO-NYSERDA Wind Generation Integration Study

The report is expected to be issued in the December – January timeframe.

8.3 August 14 Blackout Investigation

Mr. Corey reported the NPCC Blackout Investigation is continuing. The NERC Major System Disturbance Working Group is in the process of writing their report; this study will show events up to the breakup of the system.

8.4 Reactive Criteria Working Group

Mr. Hajagos reported that he had contacted Mike Schiavone, SOAS Chair to discuss the formation of a joint working group to include members of both SOAS and TPAS for review and discussion of the Reactive Studies. Mr. Hajagos suggested the group review the study scope that had been developed and distributed in October 2000.

Mr. Elmi asked if a distinction had been made between the operational issues and the planning issues. Mr. Elmi stated that another issue that had been discussed at the last meeting was that there is no incentive for providing Var support. Mr. Elmi recalled at the last meeting, he had commented that if the system is dispatched differently, voltage problems could be alleviated. Mr. Hajagos suggested the group should look at how the base cases are created and what criteria are needed to address voltage issues. Mr. Fromer asked if the group would be addressing business issues, such as standardization of leading/lagging Vars and cost issues. Mr. Hajagos suggested the IITF could address issues like these. Mr. Haake asked if the group would be looking at TO's power factors. Mr. Hajagos thought the group would be discussing this as well as other criteria. Mr. Fromer was concerned that the NYISO had not adopted the FERC Pro-Forma with regards to reactive support to be included in the LGIA and he asked which group would resolve this issue. Mr. Buechler stated this would be the appropriate group if they are discussing both operational and planning issues. Mr. Fromer was concerned that there are business and cost issues involved and this may not be the appropriate group for these type of issues. *Mr. Hajagos requested the NYISO to distribute the scope to TPAS and SOAS members. A scope will be developed and brought to SOAS and TPAS for approval.*

8.5 Determination of Bulk Power System Facilities

The NPCC CP11 Working Group is scheduled to meet later this week. The group's primary focus will be on the Bulk Power System definition and methodology for determination of

Bulk Power System Facilities. The group is also updating the NPCC glossary of terms.

8.6 NPCC/NYSRC Activities

There are a number of proposed revisions to NYSRC Reliability Rules; these are posted on the NYSRC website.

9. Status of Interconnection Studies in Progress

Unless otherwise noted, the projects listed below had no new progress to report on.

9.1 East Coast Power Linden Generation Expansion
9.2 Calpine Sullivan County Power Project
9.3 Mirant Lovett 3 Repowering
9.4 Calpine Waterford Energy Center
9.5 Amerada Hess Redhook Energy
9.6 TransEnergy US PJM-NYC DC
9.7 Calpine Titan/Smith Street Project
9.8 Calpine Maspeth Project
9.9 River Hill Project
9.10 East Coast Power Linden VFT Inter-Tie
9.11 SIS for Liberty NYC Transmission Reinforcements
9.12 Leeds-Pleasant Valley Reconductoring
9.13 Airtricity Hartsville Wind Farm
9.14 Invenergy Sheldon Wind Farm
9.15 LIPA Mobile Generators 2005-07
9.16 Invenergy Stamford Wind Project
9.17 Other

10. Other Business

NYISO staff and members of TPAS thanked Mr. Hajagos for his commitment to the subcommittee and his devotion over the past year.

Action Items – November 9, 2004

Action Item	Description	Responsibility
1	Mr. Hajagos suggested Mr. Corey provide a summary of the changes to criteria for determining material changes under the new procedures at the next meeting.	Corey
2	MPs asked for clarification on the close date of the "Catch-Up" Class year (March 1, 2005?)	Grisaru
3	Distribute the Reactive Studies scope to TPAS and SOAS members.	Corey/Cardone
4	Develop a scope for the new Reactive Studies Working Group; distribute the draft scope to SOAS and TPAS for approval.	Hajagos

EXHIBIT NO. 20

PROJECT LETTER
(FEBRUARY 26, 2010)

Linden VFT LLC

800 Long Ridge Road
Stamford, CT 06927

February 26, 2010

Steven Corey
Manager Interconnection Projects
New York Independent System Operator
10 Krey Boulevard
Rennsalear, NY 12144

Subject: Linden VFT – Merchant Transmission Facility Interconnection Request for an additional 15 MW's of CRIS and ERIS

Dear Mr. Corey:

Linden VFT requests NYISO commence the Interconnection request process per the LFIR tariff. Further Linden VFT requests a waiver of the feasibility study requirements and requests the NYSIO begin with the SRIS in accordance with the tariff, ATT X, sect 6, sheet 771. The LFIR Appendix 1 is provided with this request for your review.

The required payment for the cost of the interconnection request for $ 10,000 plus a refundable study deposit of 30,000 totaling $ 40,000 has been mailed to your attention at the NYISO under separate cover letter.

Notwithstanding the request contained herein, Linden VFT reserves the right to dispute the determination of the NYISO (conveyed by letter dated January 15, 2009) rejecting Linden VFT's request for an additional 15MW of UDRs and require a separate Interconnection request. Nothing contained herein should be construed to imply agreement with such determination or a waiver of any rights and remedies of Linden VFT with respect thereto

Please contact me if you require additional information or clarification.

Sincerely,

Daniel Walsh

Asset Manager

EIG
John Marczewski

NYISO
Henry Chao

GE
Chris Seiple
John Nutter
Parker Hobson
William Bradley

Instructions for Submittal of a Large Facility Interconnection Request to the NYISO

Introduction

The NYISO Standard Large Facility Interconnection Procedures (LFIP), contained in Attachment X of the NYISO Open Access Transmission Tariff (OATT), apply to Generating Facilities that exceed 20 MW and to Merchant Transmission Facilities. The following instructions are for Developers that wish to submit an Interconnection Request to the NYISO under the LFIP.

Note that if there is anything in these instructions that is inconsistent with the LFIP, it is the LFIP as approved that will govern.

Submittal of an Interconnection Request to the NYISO

To initiate an Interconnection Request, a Developer must submit all of the following: (i) a $10,000 deposit, (ii) a completed application in the form of Appendix 1 of the LFIP (see attached), and (iii) demonstration of Site Control or a posting of an additional deposit of $10,000. To facilitate processing, NYISO prefers these items to be submitted electronically (deposit via wire transfer, application form and documentation of Site Control by e-mail). However, submittal in hard copy form by mail is also acceptable. The completed application and documentation should be submitted (via e-mail or mail) to:

Steven L. Corey
Manager, Interconnection Projects
New York Independent System Operator
10 Krey Blvd.
Rensselaer, New York 12144
Phone No. (518) 356-6134
E-mail: scorey@nyiso.com
Cc: jgamache@nyiso.com

Wire transfers are preferred for making deposits. Please request wiring instructions via e-mail from:

Amy Curley
Senior Staff Accountant, Finance
Phone No. (518) 356-8820
E-mail: acurley@nyiso.com

If paying by check, make deposit check(s) payable to: *New York Independent System Operator, Inc.*

A separate Interconnection Request must be submitted for each site and multiple Interconnection Requests may be submitted for a single site. A deposit must be submitted for each Interconnection Request even when more than one request is submitted for a single site. An Interconnection Request to evaluate one site at two different voltage levels shall be treated as two Interconnection Requests.

Upon Receipt of an Interconnection Request

Within five (5) business days of receipt of an Interconnection Request, the NYISO will:

- Acknowledge Receipt of the Interconnection Request,
- Forward a copy of the Interconnection Request to the connecting Transmission Owner(s),
- Review the Interconnection Request and notify the Developer and connecting Transmission Owner(s) if the request is determined to be invalid and the reasons for such determination,
- If the Interconnection Request is determined to be valid, provide a form Interconnection Feasibility Study Agreement to the Developer and connecting Transmission Owner(s).

Within ten (10) business days after receipt of a valid Interconnection Request, the NYISO will establish a date agreeable to the Developer and connecting Transmission Owner(s) for a Scoping Meeting.

S. Corey
Revised 4/6/2009

APPENDIX 1 TO LFIP

INTERCONNECTION REQUEST

1. The undersigned Developer submits this request to interconnect its Large Generating Facility or Merchant Transmission Facility with the New York State Transmission System pursuant to the Large Facility Interconnection Procedures in the NYISO OATT.

2. This Interconnection Request is for (check one):

   ____ A proposed new Large Generating Facility, named ________________.

   ____ A proposed new Merchant Transmission Facility, named ____________.

   __X_ An increase in the capacity of an existing Large Generating Facility or existing Merchant Transmission Facility.

3. The type of interconnection service evaluation requested for Class Year Interconnection Facilities Study:

   __X_ Energy Resource Interconnection Service

   __X_ Capacity Resource Interconnection Service

   ____ Partial Capacity Resource Interconnection Service

   NOTE: Linden VFT is capable of bidirectional operation, therefore this 15 MW of increase is also intended for bidirectional use (i.e. power flow from PJM to NYISO and NYISO to PJM).

4. The Developer provides the following information:

   a. Address or location or the proposed new Large Facility site (to the extent known) or, in the case of an existing Generating Facility or Merchant Transmission Facility, the name and specific location of that existing facility;

      Linden VFT merchant transmission facility located within the Bayway refinery in Linden, NJ; original queue position no. 125

   b. Maximum summer at ______ degrees C and winter at _____ degrees C megawatt electrical output of the proposed new Large Facility or the amount of megawatt increase in the capacity of an existing facility;

Existing facility rating;	**300 MW**
Proposed increase;	**15 MW**
Total facility rating after increase:	**315 MW**

   c. Megawatt allocation for partial CRIS evaluation; **N/A**

d. General description of the equipment configuration;

Original facility rating for queue position no. 125 was estimated at 300 MW. Testing during commissioning determined that full facility capability is 315 MW (summer and winter) while operating within all design parameters. This 15 MW increase is not due to any facility additions or modifications.

e. In-Service Date, and Commercial Operation Date, by day, month, and year;

Linden VFT commenced commercial operation on November 1, 2009. The additional 15 MW capability is available immediately.

f. Name, title, company address, telephone number, FAX number and e-mail address of the Developer's contact person;

<u>Developer:</u>
Daniel S. Walsh,
Linden VFT, LLC
800 Long Ridge Road
Stamford, CT 06902-1227
Phone: (203) 357-4740
Fax: (203) 894-8087

<u>Technical:</u>
John J. Marczewski
Energy Initiatives Group, LLC
176 Worcester-Providence Turnpike, Suite 102
Sutton, MA 01590
Phone: (508) 865-8021 x102
Fax: (508) 865-8035

g. Approximate location of the proposed Point of Interconnection (optional); and

The facility POI remains as defined for the original project in queue no. 125.

h. Interconnection Customer Data (set forth in Attachment A)

No changes to existing facility data is needed except for top rating of 315 MW.

5. Applicable deposit amount as specified in the LFIP.

6. Evidence of Site Control as specified in the LFIP (check one)

____ Is attached to this Interconnection Request

____ Will be provided at a later date in accordance with the Large Facility Interconnection Procedures

N/A, this is an existing facility.

7. This Interconnection Request shall be submitted to the representative indicated below:

Name:	Steven L. Corey
Title:	Manager, Interconnection Projects
Address:	New York Independent System Operator 10 Krey Blvd. Rensselaer, NY 12144
Telephone No.	(518) 356-6134
FAX No.	(518) 356-7524
E-mail Addr.	scorey@nyiso.com

8. Representative of the Developer to contact:

Developer:
Daniel S. Walsh,
Linden VFT, LLC
800 Long Ridge Road
Stamford, CT 06902-1227
Phone: (203) 357-4740
Fax: (203) 894-8087

9. This Interconnection Request is submitted by:

Name of Developer:

____

By (signature): ______________________________

Name (type or print): ______________________________

Title: ______________________________

Date: ______________________________

LARGE GENERATING FACILITY DATA

UNIT RATINGS

kVA ________ °F __________ Voltage _________

Power Factor _________

Speed (RPM) _________ Connection (e.g. Wye) _________

Short Circuit Ratio _________ Frequency, Hertz _________

Stator Amperes at Rated kVA _________ Field Volts _________

Max Turbine MW _________ °F _________

COMBINED TURBINE-GENERATOR-EXCITER INERTIA DATA

Inertia Constant, H = __________________ kW sec/kVA

Moment-of-Inertia, WR2 = __________________ lb. ft.2

REACTANCE DATA (PER UNIT-RATED KVA)

	DIRECT AXIS	QUADRATURE AXIS
Synchronous - saturated	Xdv _________	Xqv _________
Synchronous - unsaturated	Xdi _________	Xqi _________
Transient - saturated	X'dv _________	X'qv _________
Transient - unsaturated	X'di _________	X'qi _________
Subtransient - saturated	X"dv _________	X"qv _________
Subtransient - unsaturated	X"di _________	X"qi _________
Negative Sequence - saturated	X2v _________	
Negative Sequence - unsaturated	X2i _________	

Zero Sequence - saturated X0v __________

Zero Sequence - unsaturated X0i __________

Leakage Reactance Xlm __________

FIELD TIME CONSTANT DATA (SEC)

Open Circuit T'do __________ T'qo __________

Three-Phase Short Circuit Transient T'd3 __________ T'q __________

Line to Line Short Circuit Transient T'd2 __________

Line to Neutral Short Circuit Transient T'd1 __________

Short Circuit Subtransient T"d __________ T"q __________

Open Circuit Subtransient T"do __________ T"qo __________

ARMATURE TIME CONSTANT DATA (SEC)

Three Phase Short Circuit Ta3 __________

Line to Line Short Circuit Ta2 __________

Line to Neutral Short Circuit Ta1 __________

NOTE: If requested information is not applicable, indicate by marking "N / A."

MW CAPABILITY AND PLANT CONFIGURATION

LARGE GENERATING FACILITY DATA

ARMATURE WINDING RESISTANCE DATA (PER UNIT)

Positive	R1 __________
Negative	R2 __________
Zero	R0 __________

Rotor Short Time Thermal Capacity I_2^2t	=	__________
Field Current at Rated kVA, Armature Voltage and PF	=	__________ amps
Field Current at Rated kVA and Armature Voltage, 0 PF	=	__________ amps
Three Phase Armature Winding Capacitance	=	__________ microfarad
Field Winding Resistance	=	______ ohms _____°C
Armature Winding Resistance (Per Phase)	=	______ ohms _____°C

CURVES

Provide Saturation, Vee, Reactive Capability, Capacity Temperature Correction curves. Designate normal and emergency Hydrogen Pressure operating range for multiple curves.

GENERATOR STEP-UP TRANSFORMER DATA

RATINGS

Capacity Self-cooled/maximum nameplate

__________/________________kVA

Voltage Ratio (Generator side/System side/Tertiary)

__________/__________/__________kV

Winding Connections (Low V/High V/Tertiary V (Delta or Wye))

__________/__________/__________

Fixed Taps Available ____

Present Tap Setting ____

IMPEDANCE

Positive Z1 (on self-cooled kVA rating) __________ % ________ X/R

Zero Z0 (on self-cooled kVA rating) __________ % ________ X/R

EXCITATION SYSTEM DATA

Identify appropriate IEEE model block diagram of excitation system and power system stabilizer (PSS) for computer representation in power system stability simulations and the corresponding excitation system and PSS constants for use in the model.

GOVERNOR SYSTEM DATA

Identify appropriate IEEE model block diagram of governor system for computer representation in power system stability simulations and the corresponding governor system constants for use in the model.

WIND GENERATORS

Number of generators to be interconnected pursuant to this Interconnection Request: ________

Elevation: __________ ________ Single Phase _______ Three Phase

Inverter manufacturer, model name, number, and version:

____

List of adjustable setpoints for the protective equipment or software:

____

Note: A completed General Electric Company Power Systems Load Flow (PSLF) data sheet or other compatible formats, such as IEEE and PTI power flow models, must be supplied with the Interconnection Request. If other data sheets are more appropriate to the proposed device, then they shall be provided and discussed at Scoping Meeting.

INDUCTION GENERATORS:

(*) Field Volts: ________________

(*) Field Amperes: ________________

(*) Motoring Power (kW): ________________

(*) Neutral Grounding Resistor (If Applicable): ________________

(*) I_2^2t or K (Heating Time Constant): ________________

(*) Rotor Resistance: ________________

(*) Stator Resistance: ________________

(*) Stator Reactance: ________________

(*) Rotor Reactance: ________________

(*) Magnetizing Reactance: ________________

(*) Short Circuit Reactance: ________________

(*) Exciting Current: ________________

(*) Temperature Rise ________________

(*) Frame Size: ________________

(*) Design Letter: ________________

(*) Reactive Power Required In Vars (No Load): ________________

(*) Reactive Power Required In Vars (Full Load): ________________

(*) Total Rotating Inertia, H: ___________ Per Unit on KVA Base

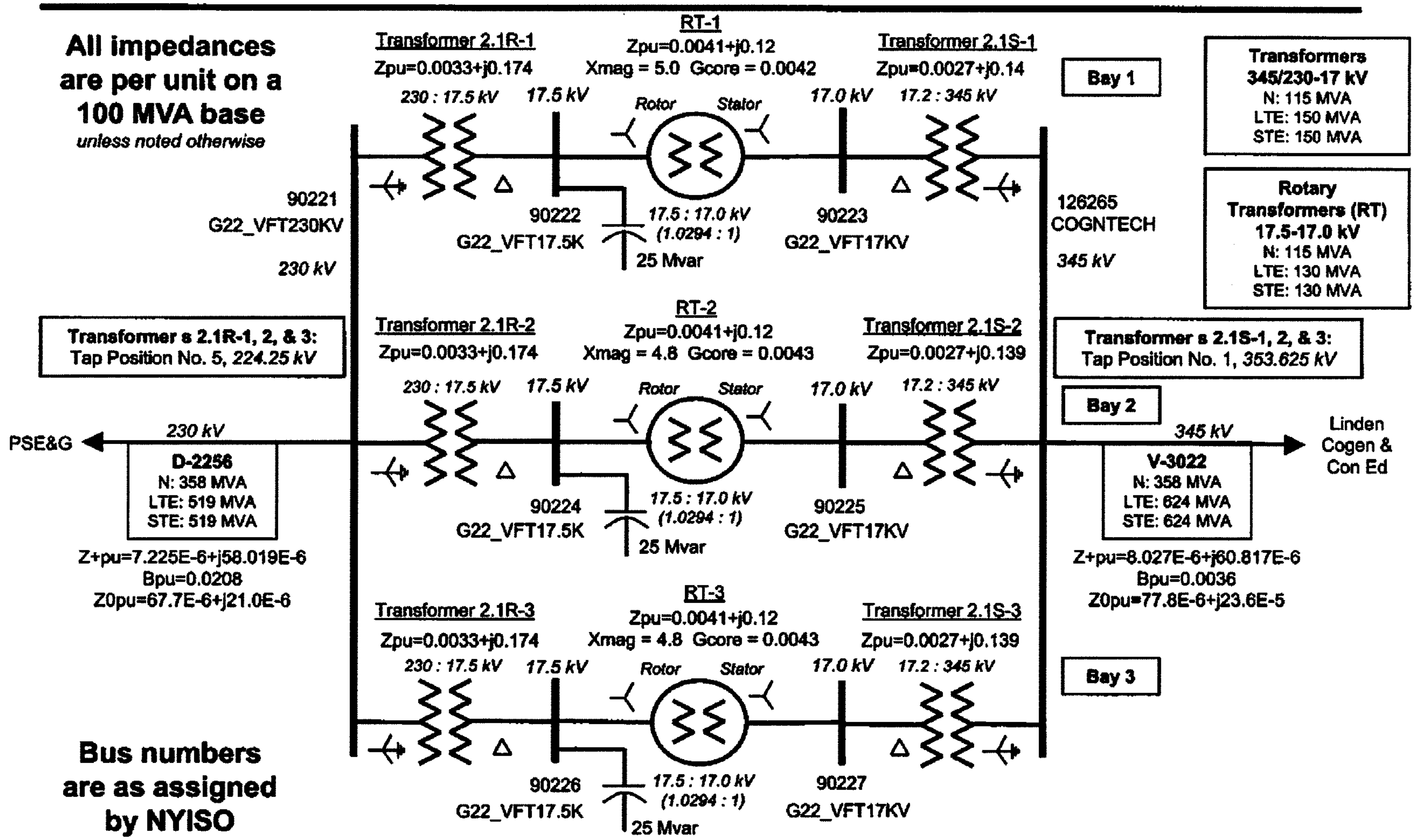
Note: Please consult the NYISO prior to submitting the Interconnection Request to determine if the information designated by (*) is required.

MERCHANT TRANSMISSION FACILITIES:

Note: Please consult with the NYISO prior to submitting the Interconnection Request for guidance on the information required for Merchant Transmission Facilities.

Existing data for Linden VFT current as of its commercial operation date, or as may be amended prior to commencement of studies under this request, should be used for modeling this facility. Please see the attached document *Linden VFT Project Power Flow Model Data* dated 3-1-2010 for the existing impedances and circuit element ratings, also showing increased ratings for each rotary transformer.

Linden VFT Project
Power Flow Model Data



Energy Initiatives Group

Prepared by J. Marczewski ,11-14-2009
Data From *As Built Power Flow Model Data Report*, dated 11-14-2009
Modified for +15 MW interconnection request (yellow highlight) 3-1-2010

EXHIBIT NO. 21

PROJECT LETTER
(SEPTEMBER 27, 2011)

Linden VFT LLC
800 Long Ridge Road
Stamford, CT 06927

September 27, 2011

Dr. Henry Chao
Vice President, System & Resource Planning
New York Independent System Operator
10 Krey Boulevard
Rennsalear, NY 12144

Re: Notice of Dispute

Dear Dr. Chao:

On June 13, 2008, NYISO granted the Linden VFT facility (the "Project") 300 MW of Unforced Capacity Delivery Rights ("UDRs") effective upon commercial operation. In a letter dated November 13, 2009, following performance testing to establish the actual net transfer capability of the Project, we requested that NYISO update the number of UDRs granted to the Project to 315 MW to reflect the actual transmission transfer capability of the Project. We received a letter from you on behalf of NYISO on January 15, 2010 denying that request. The letter explained that in order to recognize *any* increase in the capacity of the Project above 300 MW, Linden VFT must submit a separate Interconnection Request for the increase under the NYISO Standard Large Facility Interconnection Procedures. Linden VFT submitted a separate Interconnection Request while reserving the right to dispute that determination.

We disagree with NYISO's determination that Linden VFT should be required to submit a separate Interconnection Request in order to recognize the actual net transfer capability of the Linden VFT facility and to receive any additional UDRs (the "Dispute"). Pursuant to Section 30.13.5 of NYISO's Standard Large Facility Interconnection Procedures we hereby provide this "Notice of Dispute" and request that the Dispute be referred to senior representatives of NYISO and Linden VFT so that we can begin the dispute resolution process as soon as practicable.

Amanuel Haile-Mariam will be Linden VFT's senior representative for purposes of this Dispute and can be reached at (203) 961-5212 (amanuel.haile-mariam@ge.com). We look forward to working with you towards a satisfactory resolution to the Dispute.

Sincerely,

Chauhan

LINDEN VFT, LLC
By: Vimal Chauhan
its Authorized Representative

CC: <u>NYISO</u>
Richard T. Gonzales, C.O.O.
Robert E. Fernandez, Esq.

<u>Stroock & Stroock & Lavan LLP</u>
Jon R. Mostel, Esq.

EXHIBIT NO. 22

STAKEHOLDER COMMENTS ON STANDARD MERCHANT TRANSMISSION INTERCONNECTION AGREEMENT (OCTOBER 12, 2004 TPAS MEETING)

TPAS Meeting – October 12, 2004
Stakeholder comments on Standard Merchant Transmission Interconnection Agreement

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Definitions – 857

Commercial Operation
Change to "transmitting electricity for sale" to "provides Transmission Service"

Commercial Operation Date
Strike "of a unit"

Definitions – Sheet 860

Initial Synchronization Date
Change to "Initial Energization Date – the date upon which the Merchant transmission Facility is initially energized and upon which the Trial Operation begins."

Definitions - Sheet 862

Merchant Transmission Facility
***Placeholder for a 3rd category*:** Under the CRP process the potential exists for someone to put on the table a non-TO transmission facility under a regulated rate. Therefore the definition of MTF may need to be revised.
Howard suggested adding "Merchant transmission facility shall also be deemed to apply to projects selected as the preferred project to address an identified reliability need."
(Anyone other than TO's connecting to the grid should come through this agreement)
Ken Lotterhos: asked whether the definition should expressly include SVCs, FACTS devices and control system upgrades.

Merchant Transmission Facility Capacity
Placeholder - Steve Corey asked if there should be a merchant transmission facility capacity definition? Ask where in the generator equivalent in this agreement the capacity is used. *Steve stated that are two concepts: capacity or rating of a transmission facility and the transfer capability across an interface.*

Minimum Interconnection Standard
Change "Large Generating Facility" to "Merchant Transmission Facility"

Network Access Interconnection Service
Add "inject and or receive"..."to and or from" *the Merchant Transmission Facility*

TPAS Meeting – October 12, 2004
Stakeholder comments on Standard Merchant Transmission Interconnection Agreement

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Definitions - Sheet 864

Site Control
Change to "Property Control" and use TO definition from 8/9/04 mark-up. (Janos brought up the issue of Wind Power with respect to Property Control.) Need to determine how/where this term is used in the IA.

Article 2

2.3.1 Written Notice
Revise Large Generating Facility to Merchant Transmission Facility.

Action item: – Need to look into how termination would impact the TCC market. Potentially this could be addressed in the TCC rules for expansion

2.5 Termination Costs

Agreement to add provisions for TOs to acquire a terminated MT facility (*See TO mark-up dated 8.6.04)*

Article 4

4.1.2 Control and Scheduling
Add "operation and" prior to "scheduling" in the last sentence.
Howard asked for clarification on which control area takes the lead. He expressed concern that this provision should not preclude a Developer's right to choose which ISO would be responsible for scheduling.

4.2 No Transmission Delivery Service

There was agreement to add a provision that: . "Prior to going commercial, the developer must make available to everyone its rates, terms, conditions of the service they will be providing". Merchant transmission facility should post their terms, rates, and conditions on the oasis site. *(See TO mark-up dated 8/6/04: New Article 6)*

May need explanation to FERC that this is in reference to rates. Last sentence may not be needed – read Neptune agreement/filing as a reference. FERC would not allow a separate tariff for Neptune see: Executive summary of FERC ruling. As an alternative, the last sentence might be limited to the rate provisions for the MT facility.

Action Item: NYISO to review Neptune Order and revise this section as appropriate.

Article 5

TPAS Meeting – October 12, 2004
Stakeholder comments on Standard Merchant Transmission Interconnection Agreement

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5.1 Options
Change to "Initial Energization Date"

5.1.2 Alternate Options
Change to "Initial Energization Date"

Action item: Look into possible oversight: "System Upgrade Facilities" is not included in the first paragraph. NYISO to review the pro-forma IA as published by FERC

5.4 Technical Requirements applicable to MT Facilities

Upon removal of "Power System Stabilizers" as not applicable to MT facilities, the TO's suggested that a general section on "Technical Requirements" be added to Article 5 with a reference to Appendix C for the specific design requirements.
Howard: Article 5 – covers construction, and Article 9 – operations. Can construction be added to operations? He wants to add the studies say you need to do a,b c and you need to install a, b, c.

Action Item: NYISO to review Articles 9.3 and 9.6.3 to determine whether Article 5.4 is needed. If so, design requirements should be patterned after the operations requirements in Article 9. Include a cross reference to Appendix C for specific requirements.

5.10.1 DAF Specifications
Change to "Initial Energization Date"

5.12 Access Rights

Discussion concerning the need to add language to address access rights for a "long line" MT facility. There was agreement that such provisions would be covered in easements and there is no need to modify Article 5.12

5.13 Lands of Other Property Owners

Replace the term 'affiliated generation" with "affiliated facilities"

Action Item: TOs to consider adding language to clarify the use of their eminent domain authority.

5.17 – Taxes

This is not a NYISO issue, nor one that the NYISO has expertise in.

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Action Item: Both the TOs and MT Developers were asked to speak to their tax authorities and come back with specific language together with the rationale why such provisions should differ between generation and MT facilities.

5.19.3 - Modification Costs

Add TO language for modifications necessary to connect a third party to a MT facility. (See TO mark-up dated 8/6/04)

Article 6

6.1 – Pre-Commercial Operation Date

Change last sentence to read "Developer shall test operation of the merchant facility only if it has arranged for such testing in accordance with the NYISO procedures."

NOTE re: Articles 7, 8 & 9: There was agreement to retain the generic language in these sections but to refer to an Appendix for the specific requirements for Metering, Communications and Protection that will likely vary for each MT facility.

Article 7

7.1 General

"MVAR" should be added back in. Add last sentence to read "specific metering equipment and the data to be reported shall be specified in Attachment __."

Article 8

8.1 Developer Obligations

Change "Large Generating Facility" to "Merchant Transmission Facility"

8.2 Remote terminal unit

Change to "Initial Energization Date"

Article 9

9.4 Start up and ____

TPAS Meeting – October 12, 2004
Stakeholder comments on Standard Merchant Transmission Interconnection Agreement

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Change "synchronization" to "energization" in both the title and the text

9.5 Reactive Power

Yanos suggested the need for TPAS input and more discussion with NYISO operations staff as well regarding the reactive requirements for MT facilities. Dan Lorden indicated that eactive requirements will differ by technology (e.g. AC vs DC facilities) and are likely to be case specific. Roger Clayton suggested the need to dentify the various categories and define the criteria to be used.

Action Item: Developers/ and TO's to look at their existing interconnection agreements and come back with detail that should go in the front of the reactive section. NYISO will review other tariffs to see if there is anything we can propose for the next draft

9.6.2 Interruption of Services

TOs asked for modification of this section. Need to consider whether the impact that a merchant transmission facility would have on the system would be greater than a generation facility.

Action item: NYISO to check on existing operating procedures for interruption of service.

9.6.4 Requirements for Protection

Revise the first sentence to include NYSRC requirements.(This may also need to be included in the LGIA.)

9.6.5 Power Quality

This issue may already be addressed in other documents. Other industry standards may apply to MT facilities as compared with generation facilities.

Action Item: NYISO to review power quality criteria and requirements and propose modified language as appropriate

Article 24

24.4 Information Supplementation

Include placeholder bracket for first sentence of 2nd paragraph. What does NYISO want developer to test for and demonstrate is working?

TPAS Meeting – October 12, 2004
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Action Item: For NYISO to put up a few strawman examples specifying test conditions. Review with Operations.

JPB//12/31/04