NEW YORK INDEPENDENT SYSTEM OPERATOR
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March 1, 2010

VIA ELECTRONIC MAIL

Hon. Jaclyn A. Brilling, Secretary
Public Service Commission of the State of New York
Three Empire State Plaza
Albany, New York 12223-1350

Subject: Case 08-E-0751 - Proceeding on Motion of the Commission to Identify Sources of Electric System Losses and the Means of Reducing Them.

Dear Secretary Brilling:

Enclosed for filing by electronic mail in the above-entitled proceeding are the Comments of the New York Independent System Operator, Inc. on Technologies to Reduce Real and Reactive Power Losses on the New York Power System, together with a Certificate of Service of these comments on all parties on the Active Parties List in this proceeding. Should you have any questions, I can be reached at the above address, by phone at (518) 356-6220 or by e-mail at cpatka@nyiso.com.

Very truly yours,

/s/Carl F. Patka
Carl F. Patka
Senior Attorney

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

Case 08-E-0751 - Proceeding on Motion of the Commission to Identify Sources of Electric System Losses and the Means of Reducing Them.

COMMENTS OF THE NEW YORK INDEPENDENT SYSTEM OPERATOR, INC. ON TECHNOLOGIES TO REDUCE REAL AND REACTIVE POWER LOSSES ON THE NEW YORK POWER SYSTEM

I. Introduction and Background

The New York Independent System Operator, Inc. ("NYISO") respectfully offers these comments in response to the New York State Public Service Commission's ("PSC" or "Commission") December 8, 2009 Notice of Technical Conference in the above-captioned proceeding. The NYISO supports the implementation of technologies to reduce power system losses. During the Energy Efficiency Portfolio Standard ("EEPS") collaboration, the NYISO proposed that energy efficiency savings could be realized by making cost-effective equipment upgrades to transmission and distribution ("T&D") systems. The stakeholders, Administrative Law Judges and the Commission agreed to explore this issue, and established the above-captioned proceeding on reducing electric system losses.

The Commission's July 17, 2008 Order[1] clarifying the scope of this proceeding cited the June 23, 2008 Order[2] Establishing an Energy Efficiency Portfolio Standard and stated that:

> the June 23 Order directs Staff to "work with the New York Independent System Operator (ISO) and the transmission owners to examine the potential loss reduction that could result from utilizing Optimal Power Flow technology in dispatching the bulk electric system in New York."[3] We clarify that Staff, the ISO, and the transmission owners should explain the pros and cons of OPF technology and identify and describe, in detail, existing technology other than OPF that might aid in loss reductions on the bulk electric system.

In April 2009 the NYISO sent its report, "Benefits of Reducing Electric System Losses"[4] ("April 2009 Report") — a summary of the potential benefits that could be

[1] PSC Case No. 08-E-0751 – Order Clarifying Scope of Proceeding (Issued and Effective July 17, 2008), at 2.
[2] PSC Case 07-M-0548 – Order Establishing Energy Efficiency Portfolio Standard and Approving Programs (Issued and Effective June 23, 2008).
[3] June 23 Order at 62.
[4] New York Independent System Operator, Inc. Benefits of Reducing Electric System Losses. April 9, 2009.

achieved through the installation of capacitors on the State's T&D systems — to the Commission.

In its September 22, 2009 Order Adopting Reactive Power Tariffs with Modifications in PSC Case No. 07-M-0548, the Commission acknowledged, after adopting reactive power tariffs for all utilities, that "open issues remain, such as optimum system power factor targets and the smallest level of customer usage demand above which the reactive power charges should apply."

To address these issues, Department of Public Service Staff ("Staff") held a technical conference on January 28, 2010. At the technical conference, Zach Smith, the NYISO's Manager of Transmission Studies, presented key findings from the NYISO's April 2009 Report. Moreover, Rick Gonzales, the NYISO's Vice President of Operations, discussed NYISO and New York transmission owner efforts to reduce electric system losses.

II. Comments

A. Technical Conference Presentation – Transmission Losses Study

In his presentation, Mr. Smith explained that real power losses are the amount of power consumed by the delivery system from electric current overcoming the resistance of the wires, transformers, and other power system components, which results in power being converted into heat (*i.e.,* I^2R losses). Reactive power flow causes additional losses in AC systems. Two to three percent of New York's electricity is consumed by transmission system losses, and an additional four to eight percent is consumed by losses in the distribution system.

Adding static VAr compensation (power factor correction) close to loads reduces the losses that result from moving VArs over long distances, leaving room in the T&D systems to move more real power from generators to loads where it is needed. This approach most efficiently utilizes the thermal capacity of the existing transmission system.

Reducing losses also results in cost savings. Ratepayers ultimately pay for the energy consumed by T&D systems losses. The cost of losses is reflected in the delivered price of power to end users. Cost savings result from reduced purchases of power from generators, reduced need for distribution capability, and potential increases in transfer limits for transmission interfaces that are limited by voltage. Accordingly, reducing real and reactive power losses in the T&D systems offers significant potential energy savings for New York consumers. Moreover, reducing losses increases efficiency, reduces fuel consumption, and reduces emissions associated with avoided power generation, supporting New York's energy and environmental policies.

B. NYISO Transmission Losses Study

The NYISO, in coordination with New York Transmission Owners ("TOs"), conducted a comprehensive transmission study based on power flow analysis to identify the locations on the transmission and sub-transmission systems where losses are the greatest and where equipment upgrades will be most effective.

To determine the optimal locations of additional compensation, an optimal power flow ("OPF") software tool was used to select voltage control devices settings such that losses were minimized. This was done for seven load level "snapshots" representing different periods of a given year. Then capacitor banks were added to these base cases in optimal locations that were determined to result in minimized losses. The OPF was unable, however, to consider factors such as what physical limitations might exist at a particular location or what commercially available capacitor bank unit sizes would be available for installation. As a result, the list of capacitor banks was reviewed by the TOs and revised to reflect more feasible locations.

The collaborative list included approximately 950 MVArs of capacitor banks at 233 locations, primarily on the sub-transmission system (less than 100 kV); closer to the load. This equipment, when installed, will result in an estimated annual energy savings of 48.7 GWh, equating to an annual cost savings of $9.7 million (energy and capacity) and CO_2 reductions of 58,440 tons.

C. Technical Conference Presentation – Efforts to Reduce Electric System Losses

In his presentation, Mr. Gonzales explained that in current NYISO operations, the Security Constrained Unit Commitment ("SCUC") and Security Constrained Economic Dispatch ("SCD") processes already consider the impact of statewide bulk electric system ("BES") losses when determining optimal generating unit power output schedules. The SCUC for the Day-Ahead Market and the SCD for the Real-Time Energy Markets determine the optimal generating unit MW schedules, accounting for the impact of BES losses on New York transmission system facilities of 69 kV and higher voltages. The resulting Day-Ahead and Real-Time Energy Market Locational Based Marginal Prices ("LBMP") include a marginal loss pricing component consistent with the SCUC and SCD generation schedules. Most relevant to this proceeding, the NYISO SCUC and SCD determine the optimal generating unit schedules by developing a sensitivity of transmission system losses for each unit's real power injection and using the loss sensitivity factor in the unit commitment and economic dispatch processes.

1. Optimal Power Flow Background

In addition to accounting for losses through the SCUC and SCD processes, BES losses could be further reduced by the implementation of software technology such as OPF technology. Optimal Power Flow technology could be used to aid in BES loss reductions by identifying periodic adjustments to voltage and reactive control devices. Voltage and reactive control devices include the tap position settings of transformers, capacitor switching, and the voltage set-points and reactive outputs of generating units.

2. Optimal Power Flow Issues

While OPF technology could be used to aid in loss reductions on the BES, it would come with significant infrastructure and recurring costs. The NYISO estimates the cost of implementing real-time OPF for reactive power control scheduling to include one-time costs of about $1.2 million and annual recurring costs of about $1.0 million due to additional staffing requirements necessary to operate the OPF system. These cost estimates do not include any one-time or recurring costs that would be incurred by the transmission owners for additional manpower and software implementation associated with the necessary communications infrastructure.

3. Optimal Power Flow Alternatives

The expected outcome of implementing OPF technology is that the BES voltage profile should normally be operated at the highest levels allowable by equipment ratings. This expected outcome is based on the engineering principle that transmission facility current [ampere] flows are inversely related to operating voltages, and transmission losses are a function of the square of the facility current flows. Given this understanding, the NYISO worked with the TOs to determine whether technology exists or NYISO processes could be modified to achieve loss reductions similar to what they would be with OPF technology.

4. NYISO / Transmission Owner Efforts

Since NYISO has historically maintained operating voltages only to within reliability based limits, the objective of reducing BES losses was not previously considered. A review of existing operating practices found that NYISO and transmission owner procedures for operating voltage control devices could be modified to aid in BES loss reductions. These loss reductions will capture equivalent savings that could be achieved by an OPF at the NYISO without the costs associated with an OPF implementation. To achieve these savings, the NYISO and TOs are establishing a set of target voltage levels that result in a higher operating voltage profile of the BES. Such operation complements existing NYISO and transmission owner reliability practices. The proposed target voltage levels include an allowable range in order to minimize the need for frequent and inefficient BES capacitor and transformer tap switchings.

In addition to the target voltage levels, the ISO and transmission owners are developing procedures to define daily operational responsibilities for BES voltage control devices. To aid in the effectiveness of the operating procedures, the NYISO will implement monitoring and alarm capability when BES voltages deviate from target voltage levels. The NYISO expects that these operating procedures will be in place prior to the Summer 2010 Capability Season.

III. NYISO's Answers to Staff's Questions for Topic #3: Economic Power Factor

In its December 8, 2009 Notice of Technical Conference, the Commission provided a list of questions to be addressed by conference participants and in written comments. Questions 1-5 for Topic #3 and the NYISO's answers follow:

1. The goal of establishing an economic power factor standard is to promote the economically efficient operation of the state's electric grid. Do you agree with this goal?

   Answer: Yes. Efficient voltage control and reactive resource management should be a goal for the state's grid operation.

2. Is a minimum power factor standard the best approach for achieving this goal? If not, what other approach would accomplish the goal of maximizing the economically efficient operation of the state's electric grid?

   Answer: Load power factor criteria would be effective for reducing system losses. Other power factor criteria could be applied on a zonal or T&D basis; this issue continues to be evaluated in the NYISO's Reactive Power Working Group.

3. Do studies exist or are studies underway that shed light on the benefits of a power factor standard or alternative? Are additional studies necessary to determine the benefits of a power factor standard or other approach? If so, who should perform such studies?

   Answer: Studies do exist. The NYISO report "Benefits of Reducing Electric System Losses" and its supporting studies shed light on the benefits of power factor correction.

4. If the Commission were to adopt a power factor standard, at what locational point or points on the system (*e.g.* between bulk and local transmission systems, at distribution substations) should the standard be applied?

   Answer: The most beneficial point for power factor correction is nearest the load, but other locations could be beneficial as well (see #2 above).

5. If a power factor standard were to be implemented, should it be uniform across the state? If not, what list of factors do you suggest be used to determine the standard to be applied (1) to the local transmission or (2) local distribution system?

   Answer: The various zones of the New York Control Area are each unique in their own way, therefore any power factor standards should consider factors of the local transmission and distribution systems, such as cable charging.

With respect to Questions 6 and 7, the NYISO does not oppose implementation of a load power factor standard for economic reasons. Nevertheless, the NYISO does not have specific recommendation on the level or usage period of such a load power factor standard.

IV. Conclusion

The NYISO strongly supports the PSC's goal in this proceeding to reduce real and reactive power losses by implementing power system improvements, including the installation of additional system capacitance at the transmission and distribution levels. The NYISO hopes that these comments will assist the Commission and DPS Staff in better understanding some options for reducing line losses as well as the uses of, and alternatives to, OPF technology.

The NYISO believes that OPF tools are beneficial for system planning, but that OPF technology would not be a cost effective application to operating processes. While OPF technology would facilitate loss reductions, it would be expensive to implement and operate. Another option, which the NYISO and TOs are currently implementing, is the modification of NYISO and transmission owner procedures to provide target voltages for key interfaces on the power system. These modifications will not only facilitate loss reductions, but will also complement existing ISO and transmission owner reliability practices. This solution will provide loss reductions equivalent to what OPF technology would provide, but without the cost OPF technology would incur.

Respectfully submitted,

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Dated: March 1, 2010

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CERTIFICATE OF SERVICE

I hereby certify that I am over the age of eighteen years, and that on March 1, 2010 I caused to be served by electronic mail upon the persons on the Active Party List in the above-captioned proceeding the Comments of the New York Independent System Operator, Inc. on Technologies to Reduce Real and Reactive Power Losses on the New York Power System.

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Dated: March 1, 2010