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MEMORANDUM

DATE: AUGUST 7, 2000

TO: DAVE CLARKE, SCOTT ENGLANDER, JOE GREDDER, TOM PAYNTER, ROY SHANKER, GREG WILLIAMS

FROM: MIKE CADWALADER

RE: FOURTH DRAFT OF RFP FOR CONSULTANT ON TRANSMISSION EXPANSION ISSUES

The New York Independent System Operator (NYISO) is seeking consulting assistance in its development of procedures for determining awards to be made to entities that fund expansions of the transmission system in New York. This Request for Proposal (RFP) describes the work to be performed.

BACKGROUND

As part of the locational pricing system implemented last year by the NYISO for electricity markets it operates in New York State, the NYISO issues transmission congestion contracts (TCCs). Each TCC specifies an injection location and a withdrawal location, and the holder of each TCC is entitled to receive the difference between the congestion component of locational prices of 1 MW of energy at the TCC's injection location and the TCC's withdrawal location, as determined in the NYISO's day-ahead market. This provides a mechanism for market participants to hedge themselves against differences in locational prices.

The NYISO funds its financial obligations to the holders of TCCs using congestion revenues, which are the revenues it collects as a result of locational price differences in its day-ahead market when there is transmission congestion in that market. In order to ensure that its congestion revenues are likely to be sufficient to fund the net amount it must pay to holders of TCCs, the NYISO will ensure that the set of TCCs to be defined on the transmission system passes a simultaneous feasibility test, which ensures that if one MW were simultaneously to be injected and withdrawn on the grid at the injection and withdrawal locations of each TCC, no transmission limit would be violated in any contingency monitored by the NYISO. The NYISO will always collect sufficient funds from the operation of the day-ahead market to fund its obligations to TCC holders if the set of TCCs passes this simultaneous feasibility test, as long as the system transfer capability used when conducting the day-ahead market is not less than that assumed when performing the simultaneous feasibility test. (It may collect sufficient funds from the operation of the day-ahead market to fund its obligations to TCC holders even if the set of TCCs does not pass this simultaneous feasibility test, but this is not assured.)

Expansion of the transmission system will make it possible for the set of TCCs that passes the simultaneous feasibility test to be expanded. Consequently, the NYISO Open Access

Transmission Tariff calls for entities that fund transmission expansions to receive Incremental TCCs, which "will be a set of point-to-point TCCs that derive from the increase or decrease in Total Transfer Capability"[1] associated with the upgrade. Awarding Incremental TCCs to these investors will help encourage investment in transmission expansions on a market basis.

While conceptually it is easy to describe the concept that investors in expansions ought to receive the TCCs made possible by those expansions, in practice it is more difficult to determine just which TCCs have been made possible by an expansion. The NYISO's Market Structure Working Group (MSWG) has considered a number of mechanisms for determining which TCCs should be awarded to investors in a transmission expansion, and has developed a proposed procedure for conducting this analysis. However, while the MSWG has put a great deal of thought into the development of this proposed procedure, it is sufficiently complex that it has become difficult to think through all of the possible implications of this procedure, and to ensure that it does not have any unintended consequences, without the assistance of a model.

The intent of this RFP is to identify a consultant who will assist in that effort. The consultant will:

- Model the proposed procedure for identifying Incremental TCCs that has been approved by the MSWG, identify any parts of that procedure that have not been fully specified, and propose additional detail as necessary in order to ensure that the MSWG procedure is completely specified.

- Test that procedure, using a power grid incorporating realistic features and a variety of scenarios, in order to make sure that certain objectives for the award process are met, and propose modifications to this procedure, if necessary, to permit these objectives to be met.

These tasks are described in further detail below.

TASK 1: MODELING THE PROPOSED PROCEDURE

The core of the MSWG's proposed procedure is as follows:

1. The NYISO conducts an auction of TCCs. The set of TCCs awarded in this auction, in combination with all other outstanding TCCs and grandfathered rights,[2] must be simultaneously feasible on the transmission grid as it existed as of NYISO start-up (i.e., before the addition of any post-start-up transmission expansions).[3]

[1] NYISO Open Access Transmission Tariff, Original Sheet No. 87.

[2] A grandfathered transmission right is the right to inject power at one location and withdraw it at another without paying congestion costs. The simultaneous feasibility test will represent a grandfathered transmission right for 1 MW from a given location (A) to another location (B) in the same way as it represents a TCC from and to those same locations: as a 1 MW injection at A and a 1 MW withdrawal at B. The generic term "rights" used in the remainder of this description includes both TCCs and grandfathered rights.

[3] Existing procedures include provisions for instances in which existing TCCs and grandfathered rights are not simultaneously feasible on the base case grid.

2. Investors in the first post-start-up expansion are permitted to request both long-term and short-term TCCs.

3. The NYISO tests to see whether the addition of the expansion to the grid makes the set of outstanding rights infeasible. If it does, the applicants must assume TCCs that will make the overall set of rights feasible on the expanded grid.

4. Next, the NYISO tests whether the TCCs requested by the applicant are feasible in combination with the outstanding rights (and any TCCs allocated in step 3), before the expansion is added to the grid. If so, corresponding injections and withdrawals are modeled before the next step. The purpose of this step is to avoid awarding TCCs that were already feasible without the expansion.

5. Finally, the NYISO tests whether the TCCs requested by the investors in the expansion are feasible in combination with the outstanding rights (plus any TCCs allocated in step 3 and fixed injections and withdrawals added in step 4), after the expansion has been added to the grid. If those TCCs can be added to the set of outstanding rights while maintaining simultaneous feasibility, then they are awarded to the applicant. If only some of the TCCs requested by the applicant were made feasible by the expansion, the applicant will receive only some of the TCCs it requested. The determination of which TCCs are awarded to the applicant, among the set of TCCs it has requested, will be made using a set of weights to be specified by the applicant.

6. The preceding three steps are then repeated for the second and subsequent expansions, in sequence.

7. After all awards to investors in transmission expansions have been determined, the NYISO conducts an auction of TCCs. The set of TCCs awarded in this auction, in combination with all outstanding rights (including all TCCs that were awarded in steps 2-6 above) must be simultaneously feasible on the transmission grid that includes all transmission expansions.

8. Long-term TCCs awarded under this procedure would be fixed. Short-term TCCs awarded under this procedure would only last for six months. At the conclusion of each six months, the investor would be permitted to request a different set of six-month TCCs. The NYISO would verify that the requested TCCs were made feasible by the expansion, using the procedures described above, and to the extent they were made feasible by the expansion, the requested TCCs would be allocated to the applicant.

A complete description of the proposed award procedure, which is being developed by the MSWG's transmission expansion subgroup (TES) will be available from the NYISO separately.

This procedure will be conducted assuming that all TCC auctions will be conducted using the NYISO's end-state TCC auction structure, which is scheduled to take effect beginning with TCC auctions held in the Spring of 2001. Under the end-state structure, TCCs for the next five years will be auctioned simultaneously in six-month segments. Bidders who wish to purchase TCCs may submit bids for any of those six-month segments, or for any combination of those six-month segments (e.g.: for all five years, for just the first three years, or for all five summers but none of

the winters). A complete description of the end-state auction structure will also be available from the NYISO separately.

The consultant will need the ability to model the proposed award procedure, and to identify any deficiencies in the specification. If parts of the proposal have not been completely defined—meaning that the proposed award procedure (given a set of input parameters, such as the set of weights to be defined by the investors in the transmission expansion) might not yield a unique result—the consultant must be able to identify those deficiencies, to propose additional elements of the procedures that would resolve any such incompleteness, and to identify the advantages and disadvantages associated with those proposed additions (if there are multiple possible additions).

TASK 2: TESTING THE PROPOSED PROCEDURE

Once the model has been completely specified, the consultant will need to be able to test the model. The objective of this testing is to ensure that the procedure meets the following criteria:

- The procedure does not over-reward investors in a transmission expansion, in that it only awards TCCs to investors in an expansion if those TCCs were made possible by the expansion. In particular, the procedure should not lead to situations in which the set of TCCs allocated on the grid are not simultaneously feasible on the grid, it should not present investors in transmission expansions with opportunities to game the award of TCCs for those expansions, and it should not permit investors in one expansion to receive TCCs made possible by another expansion.

- The procedure does not under-reward the investors in a transmission expansion, in that it awards TCCs to investors in an expansion if those TCCs were made possible by the expansion.

- The procedure does not lead to perverse awards. So, for example, if the net effect of a transmission expansion is to increase transfer capability, thereby permitting the cost of serving load to decrease, the investors in that expansion should not be awarded a portfolio of TCCs whose net market value is negative. Likewise, investors in expansions that decrease transfer capability should not be awarded a portfolio of TCCs whose net market value is positive.[4]

- The use of the pre-expansion grid to determine prices in the TCC auction conducted in step 1 above does not lead to unusual prices or awards in the auction that might given rise to gaming opportunities or that would give auction participants incentives to place bids not equal to the value they place upon the TCC they are bidding to purchase.

- There are no other errors in the specification that cause the award procedure not to converge.

[4] It is unlikely that NYISO interconnection approval procedures would permit the construction of an expansion that results in a net decrease in transfer capability. However, reduction of transfer capability as the result of retirement of existing transmission facilities is quite possible. The consequences of reducing transfer capability, whether due to expansion or retirement, should be the same. So if the award procedure properly calculates the TCCs that would be assumed by investors in transmission expansions that reduce transfer capability, it should also properly calculate the TCCs that would be assumed by entities who reduce transfer capability by retiring facilities.

Initial testing should be performed using a relatively small linearized DC model. In order to facilitate the diagnosis of any problems with the MSWG's proposed procedure, this model should not be excessively complicated. However, it will need to include a certain degree of complexity in order for it to capture certain vital characteristics of the transmission grid. In particular, the model would need to include multiple loops and contingency analysis, but it need not include a large number of buses. The testing should examine a number of different scenarios including different transmission expansions affecting different parts of the grid, different sets of pre-existing TCCs, beliefs regarding the future worth of TCCs that change over time, and different requests for long-term or short-term TCCs in order to ensure that the model will be sufficiently robust to implement in widely varied real-world settings. When performing the testing, the consultant should work through and illustrate all of the details of determining just which TCCs are awarded to the investor in each transmission expansion in each scenario. The scenarios should be selected with an eye towards testing whether the proposed procedure has the problems described in the bullets at the beginning of this section. The procedure is probably most likely to encounter difficulties in examples which include multiple expansions or examples in which TCCs covering multiple time periods are being awarded, simply because those are the scenarios whose circumstances are most difficult to think through without the assistance of a model, so the testing should include a variety of such scenarios.

Final testing will be performed by the consultant with assistance from NYISO Staff using a AC model of the New York power system, in order to verify that no problems are introduced by the use of such a model. The scenarios included in final testing can be the same as or similar to those used in initial testing of the model, since the intent of final testing is merely to ensure that the use of the AC power flow does not introduce additional problems. NYISO staff would run the test scenarios on this model, and would jointly review the results of this testing with the consultant.

The consultant should not develop models that cannot be run without using proprietary software that is not available to the NYISO. The models produced by the consultant to conduct initial or final testing should be available to the NYISO for use following the completion of the engagement, in order to permit the NYISO to conduct additional testing as it sees fit. These models should also be available to the NYISO during the course of the engagement, at the NYISO's request, if it wishes to conduct additional testing during the course of the engagement.

To the extent that either initial or final testing uncovers problems with the procedure that has been proposed, the consultant should be able to propose changes to the procedure that would remedy these problems and to identify the advantages and disadvantages associated with each such proposed change. While the first objective should be to test and evaluate the MSWG's proposal against the criteria above, if there are fundamental flaws with that proposal that require modification of the proposal, the consultant will be free to suggest modifications, and with approval of NYISO and the TES, test those modifications or others that may be proposed by NYISO and the TES in response to the consultant's findings. Additionally, to the extent that the consultant can propose modifications to the procedure that would streamline it without adversely affecting it in any other way, the consultant should make such recommendations. If a fundamental flaw with the proposal cannot be resolved by the consultant in collaboration with NYISO and the TES, the matter will be referred back to the MSWG, which will use the consultant's findings and recommendations to develop an alternative approach. In that event, the

consultant may subsequently be asked to evaluate an approach fundamentally different from that referred to in this RFP. Such evaluation is beyond the scope of this RFP.

ADDITIONAL TASKS

In addition to the work included within the scope of this RFP, there are a number of possible extensions of this work which the consultant may be requested to perform. While these tasks are not included in this RFP, the consultant selected should keep in mind the likelihood that it will be requested to perform these tasks when developing the model.

- In Task 1, if the consultant identifies deficiencies in the specification of the award procedure, it will be necessary to adapt the model to incorporate whatever additional procedures that the MSWG or the TES adopt in order to complete the specification of the award procedure.

- In Task 2, if the consultant identifies other problems with the MSWG's proposed award procedures, it will be necessary to modify the model to incorporate whatever additional procedures that the MSWG or the TES adopt to address those problems, and to test the award procedure using the modified model.

- Other award procedures, in addition to the MSWG's proposed award procedure, have been discussed in the MSWG. Although testing of those alternative approaches is not included in the scope of this RFP, it is possible that the consultant will be asked to test alternative award procedures at some point in the future. Consequently, the model that the consultant prepares should be designed with an eye towards minimizing the expense and effort that would be required to test alternative approaches to determining awards to investors in transmission expansions.

- The MSWG and the TES are currently developing special rules that will govern the determination of awards made to investors in transmission expansions consisting partly or wholly of controllable facilities. The model that the consultant develops should be sufficiently flexible to accommodate modifications of the award procedures described above in order to reflect these special rules.

- Recent FERC rulings raise the possibility that the NYISO will be required to offer TCCs as financial options as well as financial obligations. Offering TCCs as financial options would require the NYISO to modify the simultaneous feasibility test it currently uses to ensure that the congestion revenues it collects will be sufficient to fund the amount it must pay to the holders of TCCs. While this RFP only includes testing of the MSWG's proposed award procedures using the simultaneous feasibility tests currently used by the NYISO, the consultant should develop its model so that it can easily be adapted to test the award procedure using a different simultaneous feasibility test.

- This RFP envisions that the NYISO will conduct all power flows in the final testing phase of Task 2. Alternatively, the consultant could conduct these power flows, using a AC model either of the New York system, or of a system whose size and complexity is

similar to that of the New York power system. Costs that the consultant would incur in performing such testing, including software licensing fees, are not included in this RFP.