UNITED STATES OF AMERICA

BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

Central Hudson Gas & Electric Corporation	)		
Consolidated Edison Company of New York, Inc.	)		
Long Island Lighting Company	)	Docket Nos.	ER97-1523-000
New York State Electric & Gas Corporation	)		OA97-470-000, and
Niagara Mohawk Power Corporation	)		ER97-4234-000
Orange and Rockland Utilities, Inc.	)		(not consolidated)
Rochester Gas and Electric Corporation	)		
Power Authority of the State of New York	)		
New York Power Pool	)		

Affidavit of William W. Hogan

2 December 1997

WILLIAM HOGAN TESTIMONY ON THE TCC AUCTION

William W. Hogan, being duly sworn, deposes and says:

I. INTRODUCTION

The purpose of my affidavit is to describe the TCC auction that the Transmission Providers propose to establish and to explain how it will fit into the overall energy and transmission pricing system that is proposed for the New York ISO. As described in my January 31, 1997, affidavit in this proceeding, the overall proposal of the Transmission Providers is designed to establish a competitive wholesale electricity market in New York and to create the institutions and rules necessary to make that market reliable, efficient and commercially flexible. If adopted, the proposal will provide all eligible market participants with open, nondiscriminatory access to the transmission system as well as provide an open, voluntary spot market in which buyers and sellers can buy and sell energy and transmission at market-based prices.

A key feature of the New York proposal is the mechanism by which the market will set prices for both energy and transmission. The proposal will establish a competitive, bid-based market for energy and transmission usage that will determine market-clearing prices at each location in the system. These locational market-clearing prices will provide the basis for the ISO's settlements with all suppliers, loads and transmission customers who participate in the market.

The proposal also provides for transmission reservations in the form of a financial obligation, called a transmission congestion contract (TCC). A TCC is a contract that provides for the payment to the holder of the transmission congestion charge that would be incurred if 1 MW were

injected at one location and withdrawn at another. TCCs will be financially equivalent to, but more flexible than, point-to-point firm transmission service. In effect, TCCs are perfectly tradable point-to-point transmission rights, which provide a means by which transmission users can fix in advance the price of transmission use between two locations. The payments to TCC owners that provide the hedge against transmission congestion are funded by the congestion rents that will be collected if the use of the transmission grid is governed by economic dispatch and locational-based marginal cost pricing (LBMP).[1]

TCCs are a method of defining transmission rights in an open-access transmission grid that is consistent with the physics of the transmission grid. They recognize loop flow and the inter-dependency of transmission capability, consistent with economic dispatch and competitive trading, and avoid the potential for withholding transmission capacity.

TCCs are linked to the physical transfer capability of the transmission grid through the revenue adequacy test, which ensures that absent transmission outages or unpriced loopflow, the congestion rents collected will be adequate to make the required payments to TCC holders. As discussed in greater detail in my initial testimony, the revenue adequacy test requires that the TCCs assigned to grid users be simultaneously feasible in a contingency-constrained dispatch of the actual transmission grid with the TCCs assigned modeled as net injections and loads at the points of injection and withdrawal and in the amount specified by the TCC.

Many TCCs will initially be allocated to existing firm transmission service customers that convert their firm rights to TCCs, or to the Transmission Providers whose native load customers currently rely on the transmission grid to link generation resources to load. But there will be other

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[1] TCCs were discussed at length in my earlier testimony in this proceeding. See section II D (pp. 67-81) and Appendix A.

TCCs that can be offered to grid users, i.e. that would be simultaneously feasible in a contingency-constrained dispatch in combination with all other outstanding TCCs.[2] These additional TCCs are principally the Residual TCCs initially allocated to Transmission Providers. The proposed TCC auction will provide a mechanism for making these additional TCCs available to grid users. In addition, the TCC auction will also provide a mechanism for allocating the TCCs that will gradually become available as existing transmission contracts expire over time and the associated transfer capability is available to support other TCCs. Finally, while the retail access plans of the transmission providers are not yet final, it is anticipated that they will provide for the introduction of retail competition as well as provide for the release of native load TCCs as responsibility for much native load shifts from the transmission provider to other load-serving entities (LSEs).[3] The TCC auction will provide a nondiscriminatory mechanism for releasing, allocating and valuing these native load TCCs as they are transferred to other market participants in conjunction with the introduction of retail competition.

Section II provides a brief overview of the TCC auction process proposed by the Transmission Providers. Section III discusses the workings of the auction in greater detail, particularly with respect to determining the winning bidders and TCC prices. Section IV discusses the potential for reconfiguration of TCCs sold through the TCC auction, and Section V discusses the multi-round feature of the auction in greater detail.

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2 This will include both the "residual" TCCs that will be allocated to the transmission providers prior to the first TCC auction and other TCCs that are in fact residual but not so allocated, as explained in Dr. Pope's affidavit.

3 The proposed ISO tariff contains a commitment that the primary owners of native load TCCs will release those TCCs on a non-discriminatory basis in amounts that are, at a minimum, consistent with their retail access settlements (Attachment M, section 1.0).

II. OVERVIEW OF THE TCC AUCTION PROCESS

The centralized TCC auction is a multi-round, pay-as-you-go auction designed to provide outcomes that are economically efficient and nondiscriminatory. Any creditworthy buyer will be eligible to purchase TCCs. In each auction TCCs will be sold for an auction period. Initially, the auction periods will be the two six-month capability periods in each year (a winter period from 1 November through 30 April and a summer period from 1 May through 31 October). For each capability period, separate TCC auctions will be conducted simultaneously for peak and off-peak periods. The peak period will include the hours from 7:00 a.m. to 11:00 p.m. Monday through Friday, and the off-peak period will include the remaining hours of the week.

The auction for a capability period will be conducted in two stages, with each stage including several auction rounds. The principal purpose of Stage 1 is to put into the market the residual TCCs assigned to the transmission providers and to provide information to potential buyers and sellers about the prices of TCCs. The TCCs available for sale in the auction will therefore include any residual TCCs assigned to the transmission providers not previously sold or released and any other TCCs that are simultaneously feasible in conjunction with the outstanding TCCs, as well as any other previously allocated TCCs offered for sale. The purpose of Stage 2 is to provide opportunities for all market participants to adjust their TCC ownership positions taking into account the TCC prices revealed in Stage 1 and earlier rounds of Stage 2.

Each stage is a multi-round, pay-as-you-go auction. This means that there will be multiple bidding rounds in each stage in which potential purchasers bid for and acquire TCCs. Each bid will specify the injection point for power, the withdrawal point, the capacity in megawatts (MW), and the bid price in dollars per MW. Point-to-point TCCs will be awarded to the high bidders subject to constraints imposed by system security requirements, overall system capacity and existing

transmission rights (arising from grandfathering, prior sale of TCCs by transmission providers or purchases of TCCs in previous auction rounds). Winning bidders in each round will pay the market-clearing price for the TCCs they have been awarded, and sellers will be paid the market-clearing price for the TCCs they sell into the auction.

It is proposed that within each stage of the auction TCCs will be sold in rounds. Before the Stage 1 auction, the ISO will announce the number of rounds that will be conducted (there will be at least four) and the proportion of the uncommitted transfer capability that will be sold in each round. For example, Stage 1 could be conducted in four rounds with 25 percent of the total auctionable capacity sold in each round. Alternatively, Stage 1 could be conducted in four rounds with 10, 20, 30 and 40 percent of the total auctionable capacity sold in rounds one through four, respectively. TCCs purchased during earlier rounds of Stage 1 cannot be resold in later rounds of Stage 1 (but may be sold in Stage 2). By the end of the last Stage 1 round, all of the residual TCCs assigned to the transmission providers will be sold.

Any holder of transmission rights will be entitled to sell TCCs in Stage 2 of the auction. These sellers could include owners of TCCs received through grandfathering or TCC owners who purchased their TCCs in Stage 1 or a previous round of Stage 2 of the current auction.[4] In addition, any transmission grid capacity not committed to support TCCs in an earlier round of the auction would continue to be available in Stage 2 of the auction. In Stage 2, bidding will continue until no TCCs are offered for sale in a round, no TCCs change hands for two consecutive rounds or other criteria determined by the ISO occur.[5] As in the first stage, each round of the centralized auction will determine market prices for all feasible TCCs and the ISO will post these prices on the

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4 Some purchasers of TCCs through sales conducted by individual TCC owners over the OASIS will be permitted to sell those TCCs in either stage of the auction.

5 ISO Tariff, Attachment M, section 6.1.

OASIS. The ISO will also post the injection point, withdrawal point, and MW of the TCCs actually bought and sold in each round.

Both stages of the auction will be conducted in several rounds in order to provide participants with the opportunity to obtain information about TCC prices while the auction is still in progress. The auctions are pay-as-you-go in the sense that each round of bidding is a separate auction in which TCCs are awarded and the buyers pay the market-clearing price. Making TCC awards and requiring real payments in each round provides incentives for potential purchasers to bid their true reservation prices early in the auction, and it obviates the need for complex activity rules governing bidding. Such activity rules were imposed on Federal Communication Commission (FCC) spectrum auctions because no awards were made and no payments were required based on the bids in the preliminary rounds of those auctions. As I describe below, activity rules of the type employed in the FCC auctions would work at cross purposes with the objectives of the centralized TCC auction. The workings and rationale for the multi-round auction are discussed at greater length in Section V of my testimony, below.

The proposed TCC auction has two related characteristics that distinguish it at a fundamental level from other auctions and that are central to understanding the structure of the auction The first is that the set of TCCs that are available is not defined *ex ante* by the ISO but is instead defined by the bids of the entities participating in the auction. The second is that the set of TCCs purchased through the auction may be different from the set of TCCs that is sold into the auction Both characteristics of the auction are related to the concept of reconfiguration, which is discussed below in Section IV of my affidavit. These characteristics of the auction reflect important aspects of the physics governing electricity transmission. In particular, they reflect the fundamental characteristic of the transmission grid that its transfer capability between any two

points depends on the other injections and withdrawals on the grid. For this reason, one cannot define the transfer capability that will be available in the auction until all the transfers by grid users are known. The TCC auction is designed to reflect this interdependency, and the TCCs available in each round are determined both by the configuration of the grid and by the TCCs demanded by auction participants.

III. TCC AWARDS

After the bid submission process is complete, the ISO (or the Auctioneer) will determine the set of TCCs that maximizes the total value of the awarded TCCs (as valued by the buyers' bids)[6] subject to a constraint that the awarded TCCs be simultaneously feasible in a contingency-constrained dispatch in conjunction with all outstanding TCCs. The simultaneous feasibility test will therefore take into account the following constraints:

- Existing grandfathered transmission rights;
- TCCs not offered for sale in the auction;
- TCCs purchased in previous rounds of the auction in Stages 1 and 2 and not yet resold in the auction; and
- System operating limits, which include load flow constraints and security constraints used in the security-constrained dispatch (SCD).

The price paid for each TCC will be the market-clearing price for that TCC. This means that all buyers or sellers of TCCs between the same injection and withdrawal points in any given round

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6 The application of this criterion is illustrated in the discussion of Figures 2, 4 and 5, below.

will pay or be paid the same price. The ISO will post the awards from the auction along with the market-clearing price of TCCs from the reference bus to all other buses.

Several significant elements of the auction process described above deserve further discussion. First, the market-clearing price for each TCC will be determined by the opportunity cost of that TCC in that round of the auction. An important implication of this price determination method and the resulting interdependence among the market prices of all TCCs is that each round of the auction determines the market price of every feasible TCC, even if that TCC was neither bought nor sold in that round of the auction. This will enable the ISO to post the market prices determined in each round of the auction (in the form of prices for TCCs to and from the reference bus) on the OASIS for every feasible TCC, as well as announce the TCCs actually bought and sold in each round. This price information will enable all TCC buyers and sellers to assess alternative hedging strategies and evaluate whether TCCs they hold would be worth more if sold into the auction for reconfiguration to meet the hedging needs of others.

The interdependency among TCC prices arises because the price of every TCC is determined by the value (as bid) of the marginal TCC that it displaces, that is, the marginal TCC that cannot be awarded because it would not be simultaneously feasible. This trade-off will exist among all TCCs that have an impact on a common transmission constraint, whether that constraint is the post-contingency flows over a thermally limited line, the pre-contingency flows over an interface or the post-contingency voltage at a bus. Each constraint that limits the number of TCCs that can be awarded in that round of the auction has an opportunity cost in terms of the value of the TCCs that could be awarded if that constraint could be slightly relaxed, and the prices of all TCCs affecting that constraint are linked by the product of this opportunity cost and the impact of each TCC on that constraint.

If there were only one binding constraint limiting the number of TCCs issued in the auction, then the value of every TCC would be determined by the opportunity cost of that constraint and the impact on the constraint of injections and withdrawals corresponding to the TCC. With more than one binding constraint on the number of TCCs awarded, the price of each TCC would be determined by the impact of injections and withdrawals corresponding to the TCC on each of the binding constraints.

The determination and interrelationships among TCC prices can be illustrated using a simple three-bus system like that shown in Figure 1.[7] The system has three buses -- A, B and C -- and the lines between them are identical except that there is a thermal constraint of 600 MW between A and C. It can be seen in Figure 1 that the transfer capability of this transmission system depends on where power is injected. If all power is injected at Bus A, then only 900 MW of power can be delivered to Bus C. If all power is injected at Bus B, then 1800 MW can be transferred to Bus C. Moreover, the more power that is injected at A, the less that can be injected at Bus B.

Suppose there are six bidders for TCCs, three for TCCs from A to C and three for TCCs from B to C. The bids, awards and market-clearing prices are shown in Table 2.1 and the injections, withdrawals and flows corresponding to the winning bids are shown in Figure 2. It can be seen that the fifth bid, for 300 MW from A to C, is the marginal bid that determines the prices of all of the TCCs in the auction. It is marginal in the sense that all higher priced bidders are awarded all of the TCCs they wished to purchase, and no lower price bidder is awarded any TCCs. The

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7 In the illustrative TCC auction discussed in my affidavit, Bus C is the reference bus. The choice of the reference bus, the Marcy 345 kV bus, for the New York ISO, does not affect the level of locational prices but does affect the decomposition of the locational prices between the price at the reference bus, congestion relative to the reference bus, and marginal losses relative to the reference bus.

market price of TCCs from B to C is $150, while the market price of TCCs from A to C is $300. The reason for the difference in price of a B to C and A to C TCC is that injections and withdrawals corresponding to a TCC from B to C would cause lower flows over the line A to C than would the injections corresponding to a TCC from A to C. Thus, by comparing Figures 2 and 3, it can be seen that, because of the simultaneous feasibility condition, in order to award 1 additional TCC from A to C there would have to be two fewer TCCs awarded from B to C.

This example also illustrates how the auction process takes into account the inter-dependencies among all TCC bids and offers. In the example in Figure 2, the marginal bidder for TCCs between A and C is Bidder 5. Because of the physics of the transmission system, one-half MW can be transferred from B to C for every MW transferred from A to C. In other words, for every TCC that can be offered from A to C, two can be offered from B to C. Consequently, Bidder 5 determines the value both of TCCs from A to C and B to C. This interdependency is readily taken into account both in awarding TCCs and determining market-clearing prices and has the advantage that it links the values of all TCCs so that every auction values every feasible TCC.

A second significant element of the auction process is that the set of TCCs to be awarded will be determined by choosing the set of simultaneously feasible TCCs that maximizes the value of the awarded TCCs as valued by the buyers' bids. This criterion ensures that the ISO awards the set of TCCs. and allocates them among auction participants, in a way that maximizes consumer welfare Since there are no production costs for TCCs in the short run (i.e., holding the transfer capability of the grid constant), the allocation of TCCs that maximizes the value of the awarded TCCs to the buyers also maximizes consumer welfare if the bids of the TCC buyer reflects the buyer's reservation prices (i.e., the value to the buyer of the TCC). Because the auctioneer's objective is to maximize the value of the TCCs awarded to bidders, as determined by

their bids, it will not withhold any TCCs. Rather, it will use the transmission capability available to it to create and allocate as many TCCs as possible, so long as bidders place positive values on those TCCs (i.e., so long as bidders are willing to pay for those TCCs).

The application of this bid value criterion can be illustrated with reference to the simple three bus grid and auction described above. As shown in Table 2.2, the value of the TCCs awarded in the auction (valued based on their bids) would be $880,000. This is the highest valued combination of TCCs that is simultaneously feasible. Thus, as shown in Figures 4 and 5 and Tables 4 and 5, combinations including either more TCCs from B to C or more TCCs from A to C would each be worth less to the buyers, because the simultaneous feasibility test would require that TCC buyers give up other TCCs that they value more highly. For example, it can be seen in Table 4 that if 50 more A to C TCCs were awarded to bidder 5, then 100 fewer B to C TCCs could be awarded to bidder 2, and bidder 2 values the TCCs it would lose more highly than does bidder 5 the TCCs it would thereby obtain.

A third significant feature of the price-determination mechanism is that since all TCCs are priced at the market-clearing price, every buyer and seller of a given TCC pays or is paid the same price This feature of the auction is important in two respects.

- The pricing mechanism is nondiscriminatory in that all purchasers buying the same product will pay the same price, and all sellers of the same product will be paid the same price; and
- TCCs will be allocated to bidders and priced so that total net benefits to users are maximized, and price equals the marginal opportunity cost.

One alternative to the competitive pricing rule proposed for the TCC auction would be the pricing rule used in a "discriminatory auction." In a discriminatory auction each purchaser pays the price it bids.[8] If the buyers and sellers in such an auction bid their true reservation prices, then the margin collected from the sale of TCCs would be greater under the discriminatory auction pricing rule than under the market pricing rule. This theoretical possibility is sometimes offered as a rationale for employing a discriminatory auction, but such an argument is flawed because auction participants will bid differently if they understand that they will pay or be paid their bid than if they expect that they will pay or be paid the market price.

In a discriminatory auction there is a strong incentive for each potential purchaser to bid less than its true reservation price and for sellers to bid more than their true reservation price. These incentives exist because buyers pay the price they bid, and by bidding a price lower than their reservation price, they will usually pay less while still purchasing the TCCs they seek. Similarly, because sellers would be paid their bid, by bidding more than their reservation price they will usually be paid more, while still selling their TCCs. Consequently, in a discriminatory auction all purchasers (sellers) can potentially affect the price they pay (receive) by reducing (increasing) their bids, and inframarginal purchasers (sellers) can reduce (increase) the price they pay (are paid) by lowering (raising) their bids without affecting the amount of transmission capacity they purchase (sell). Thus, bidders expecting to pay their bid for a TCC in a discriminatory auction will bid some fraction of their assessment of the market price of the TCC, rather than bidding their assessment of the value to them of the TCC. This asymmetry in incentives is eliminated or greatly reduced with market-clearing pricing (all buyers and sellers of the same TCC pay and are paid the market-clearing price).

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8 Since there would be both buyers and sellers in the proposed centralized auction, in such a discriminatory auction sellers would presumably be paid their reservation bids rather than the market-clearing price.

Compared to the discriminatory auction, the pricing mechanism in the centralized TCC auction provides a greater incentive for potential buyers and sellers to bid their valuation of TCCs. This difference in incentives arises because if TCCs are sold at the market-clearing price (i.e., the price offered by the marginal bidder), the price bid is not necessarily the price paid. Thus, if a buyer lowers its bid below its actual reservation price, this will usually have no effect on the price it pays for the TCC. Indeed, the only situation in which the buyer would affect the price it pays for the TCC by lowering its bid is when it is or becomes the marginal bidder, which is precisely the situation in which it may lose the opportunity to purchase the desired TCC in the current round if it reduces its bid. If the potential purchaser is not marginal, but is instead inframarginal (i.e., it is not the lowest priced bidder awarded a TCC), then lowering its bid a small amount has no effect on the price it pays. This asymmetry in the effects of making lower bids, if all TCCs are bought and sold at market-clearing prices, encourages potential purchasers to bid the true value they place on TCCs. The nondiscriminatory auction proposed here therefore simplifies the bidding process, offers better incentives for an efficient outcome, avoids the expenditure of ISO resources for the purpose of price discriminating among market participants and provides the extra benefit of determining the market price of every feasible TCC in each round of the auction. Furthermore, it is doubtful that a discriminatory auction would award TCCs to bidders who value them most, or even result in the same amount of buying and selling of TCCs as would occur if TCCs were bought and sold at the market price. Hence, the discriminatory auction would not be likely to yield greater revenue or make the same awards.

IV. AUCTIONS AND RECONFIGURATION

An important role of the proposed periodic centralized TCC auction is to provide a mechanism for the sale of TCCs between market participants. The TCC auction, however, is not meant to

supplant bilateral transactions involving TCCs in secondary markets and no limits are imposed on such sales. Bilateral sales of TCCs in secondary markets, on the other hand, provide a complement to, but not a substitute for, the periodic centralized TCC auction. This is because the centralized TCC auction provides a mechanism for the reconfiguration of the TCCs sold into and purchased in the auction. This potential for reconfiguration is one of the most important characteristics of the centralized TCC auction.

Because of the potential for reconfiguration, the proposed TCC auction will not only permit buyers to purchase the TCCs offered into the auction by sellers, but also will enable buyers to purchase TCCs that are different from any of the TCCs sold into the auction by sellers as long as the TCCs purchased are simultaneously feasible in combination with all of the TCCs that remain outstanding. To illustrate this requirement and the potential for reconfiguration, let us return to the illustrative grid we discussed above.

Suppose that the TCCs outstanding at the end of Stage 1 of the auction are as shown in Table 6.1 and bids in the first round of Stage 2 are as shown in Table 6.2. It can be seen that, although there are bids for 50 TCCs from A to B, no such TCCs are offered into the auction and indeed no such TCCs are outstanding. The availability of TCCs from A to B, B to C and A to C are all related, however, by their impact on the transmission limit between A and C. The simultaneous feasibility test that is at the core of the auction will therefore determine that TCCs from A to B can be simultaneously feasible if some of the TCCs from B to C that are offered into the auction are retired, that is, sold into the auction. In this example, each TCC from B to C that is retired makes feasible 1 additional TCC from A to B and 0.5 TCC from A to C. The relationship among the TCC

market prices determined in the auction is shown in Table 6.3.[9] In this hypothetical auction, TCCs from B to C are sold into the auction and TCCs from A to B and A to C are acquired in the auction.

This simple example is useful in illustrating how TCCs are reconfigured in the auction. But to achieve this simplicity it omits elements of the real world transmission grid that are important in understanding why reconfiguration would be important to market participants. In the example, there is only one transmission constraint, and market participants could actually hedge themselves against the risk of congestion between any two buses by holding the appropriate number of any of the three TCCs.[10] This feature of the example cannot be generalized to a grid in which there is more than one transmission constraint that could be binding in the actual dispatch. In a grid with many transmission constraints that are potentially affected by the transaction a market participant wishes to hedge, a market participant would generally incur some degree of congestion risk if it were not able to acquire a TCC matching the transaction it wished to hedge.[11]

The secondary market also provides an opportunity for potential buyers and sellers to trade TCCs, but only the existing set of TCCs or combinations of those TCCs can be traded in

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9 It should be noted that in this simple example, the buyer seeking a TCC from A to B could in fact acquire the equivalent of a TCC from A to B through bilateral transactions by purchasing a TCC from A to C and selling a TCC from B to C This is a result of the limited number of buses in our example and the resulting fact that there are outstanding TCCs that originate or terminate at every bus. In a real electric grid, this will not necessarily be the case

10 Thus the risk of congestion between B and C could be hedged by holding 1 TCC from B to C, 1 TCC from A to B, or 0 5 TCC from A to C

11 The same risks exist in a system with physical or zonal transmission rights. Because the actual impact of injections and withdrawals on transmission limits usually depends on the injection and withdrawal points, allowing market participants to hedge a wide variety of transactions with a single transmission right, as in a zonal based system, requires either that the ISO must restrict the set of transmission rights that are made available or that the real time reconfiguration costs (i.e., out-of-merit dispatch) must be charged to other grid users.

such a bilateral market.[12] For example, in the secondary market a market participant who wants to hedge purchases from a generator at bus A for delivery to customers at bus B must identify holders of TCCs that hedge congestion between these two buses.[13] The same market participant bidding in the auction for a TCC from A to B would not identify specific holders of TCCs between these points (if such TCCs even exist). Instead, the auction will take into account not only all bids involving A (whether or not they involve B) and B (whether or not they involve A) to provide the A to B hedge, but also all of the TCCs offered for sale into the auction that affect the same transmission constraints as an injection at A and withdrawal at B and all of the uncommitted transfer capability of the existing transmission grid. This is done in the process of awarding TCCs to maximize their value to purchasers while making sure all existing rights (e.g., grandfathered rights) are honored and all system reliability constraints are satisfied. In effect, the auction ensures the availability of the full capacity of the transmission grid to hedge energy market transactions, and that available hedges are not limited to some arbitrary set of point-to-point rights.

The reconfiguration process takes into account all of the outstanding TCCs as well as the transfer capability of the existing transmission grid. Because the simultaneous feasibility test takes into account the full transfer capability of the existing grid, it can award TCCs that are different from any of the TCCs sold into the auction and thus can make available TCCs that could not be assembled from bilateral transactions with primary TCC owners. Each TCC auction round therefore provides opportunities to purchase TCCs that would not be available through bilateral

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12 Of course, this limitation applies only to the resale of TCCs backed by the congestion rents collected by the ISO in the process of pricing use of the transmission grid. Market participants could also seek to purchase financial instruments analogous to TCCs that insure them against congestion risk from entities unrelated to the ISO. These financial instruments would essentially be insurance contracts and relatively risky ones since they would provide insurance against changes in relative energy prices and load growth. No such purely financial instruments hedging the cost of congestion across interfaces in New York have to date been available in financial markets.

13 This can be one holder of a TCC between A and B, or it may require identifying holders of TCCs between multiple points such as A and C, C and D, and D and B to provide a route from A and B.

transactions in a secondary market. These opportunities arise because each auction round can result in a reconfiguration of the TCCs bid in by sellers to meet the demands of buyers in that round. Thus, the auction would potentially enable a TCC holder to sell a TCC from A to C into the auction and another market participant to purchase a TCC from B to C that is thereby made feasible.

In the example above, the interactions are easily identified. Thus, as noted above, the ISO could establish a rule for the grid in the example that 1 TCC from B to C could be converted either into 1 TCC from A to B or 0.5 TCC from A to C. This rule would support private trading of TCCs. Alternatively, as noted above, the market participants could use any of the TCCs in the appropriate proportion to hedge congestion on the constrained line. These alternatives will generally not be available to market participants, however, in larger real-world transmission systems. In these real-world transmission systems network interactions, including loop flow, are numerous and complicated and many transmission constraints will likely be binding at different times over the life of the TCC. While the trading rule described above would be accurate if there were only one transmission constraint in the TCC auction, a different rule would be required if there were two binding transmission constraints and that rule would depend on which two constraints were binding.

Nevertheless, the underlying principle is clear. There is a set of prices and reconfiguration rules that will allow private trading or reconfiguration of TCCs, but what that rule is depends on which TCCs are demanded. The TCC auction is in essence a mechanism to determine which TCCs are demanded and then to determine the appropriate reconfiguration rule and the resulting TCC prices Consequently, the ISO cannot announce such a reconfiguration rule in advance of the auction because the rule is determined by the auction. Without such a reconfiguration rule,

potential buyers of transmission rights would be unable to replicate through bilateral trading the TCCs available in the auction.

In summary, because of the potential for reconfiguration, the centralized TCC auction provides options for market participants that would not be available through purely bilateral transactions in secondary markets:

- The TCC auction provides opportunities for market participants to acquire TCCs not held by any primary TCC owner and thus not available through bilateral transactions in the secondary market;
- The configuration of the TCCs established through grandfathering does not determine or limit the configuration of the TCCs that will be available to buyers in the auction; and
- The auction determines the market prices of all potential TCCs, not merely those sold into and bought through the auction.

V. MULTI-ROUND, PAY-AS-YOU-GO AUCTION

Another significant feature of the proposed auction is that it will be a multi-round auction conducted in two stages rather than a periodic one-round auction. The multi-round auction is motivated by the following objectives:

- The auction should allow potential buyers and sellers to make or change bids based on the prices revealed in earlier rounds of the auction; and
- Buyers and sellers should have the incentive to base their bids on their true reservation prices as early as possible in the auction in order to provide better

information in the bidding process, to facilitate the timely completion of the auction and to expand the size of the market.

The first objective is important because there is no historical experience with TCC auctions or TCC market values in New York. For this reason, buyers and sellers may find it difficult to assess the value of TCCs in advance of the auction. In principle, a very large set of possible TCCs would need to be evaluated for submission of bids. Lacking such assessments of the likely level of market prices, buyers may fail to evaluate some hedging options and potential sellers may fail to evaluate the price at which they would be willing to offer some TCCs in the auction. Buyers that incorrectly assess TCC prices may fail to win the TCCs on which they bid while failing to evaluate other TCCs that could have been awarded. Similarly, sellers that incorrectly assess TCC prices may fail to offer TCCs for sale in the auction, despite market prices for those TCCs that would exceed the sellers' actual reservation price. The market-limiting effects of the initial price uncertainty may be aggravated by the cost of valuing transmission rights, which may cause buyers and sellers to focus their evaluations on a handful of possible TCCs for purchase or sale.

A multi-round auction will provide potential buyers and sellers with an opportunity to change their bidding strategies in response to information regarding the market prices of TCCs in the auction that will be revealed while the auction is still in progress. The multi-round auction will provide potential bidders with the opportunity to gather information about TCC market prices by observing and/or participating in the initial rounds of the auction that determine the allocation of the residual TCCs assigned to the transmission providers. This price information will enable both buyers and sellers to focus their evaluations on the sets of TCCs that are actually economically relevant at market prices.

Another way to allow buyers and sellers to make or change bids based on prices revealed in earlier rounds has been to establish iterative auctions, such as the FCC spectrum auctions. Because no sales were made based on bids in the early rounds of the FCC auctions, a procedure was needed to provide incentives for realistic bidding. For this reason, activity rules were established for the FCC auctions that included minimum bids, minimum increments to bids, constraints on withdrawing bids and prior announcement of the total quantity of bids. A purpose of those rules was to provide incentives for bidders to reveal their true reservation prices as early as possible, to provide better information in the bidding process and to facilitate the timely completion of the auction.

Although such rules may have been appropriate in the FCC auctions, where the product sold had quite different economic characteristics from TCCs, these rules do not translate well into the context of a TCC auction. The kinds of activity rules imposed in the FCC auctions would prevent exactly the kind of behavior that the proposed TCC auction is intended to facilitate. For example, activity rules used in the FCC spectrum auctions required bids on minimum numbers of licenses, based on the number of licenses a bidder stated it intended to win at the beginning of the auction. These rules also required that bids be increased from round to round by amounts that equaled or exceeded predetermined minimum increments. Such rules prevented potential purchasers from coming into the bidding in later rounds without participating in earlier rounds. These activity rules also prevented bidders from decreasing bid prices. However, in part because of the network interactions among TCCs, just this type of behavior might be appropriate in the case of the TCC auction. For instance, early rounds of bidding may reveal the value of counterflow TCCs that might not have been evident prior to the auction. Activity rules that would preclude sellers from offering such counterflow TCCs in the later rounds would defeat one of the purposes in implementing an iterative auction in the first place. Similarly, one purpose of the multi-

round auction is to allow bidders who realize they will be outbid for the TCCs they initially sought to purchase to, in effect, change their approach and bid for a different configuration of TCCs. This kind of change in approach would also appear to be precluded by FCC-type activity rules. In short, activity rules intended to encourage the bidding of true reservation prices early in the auction would limit the ability of auction participants to change their bids and to enter the bidding at a later stage in the auction in response to the prices revealed in earlier rounds of the auction.

The multi-round, pay-as-you-go auction proposed for the sale of TCCs avoids the restrictions associated with FCC-type activity rules by obviating the need for activity rules, which are, in effect, constraints to compensate for the fact that bids in the early rounds would otherwise lack financial consequences. TCCs will be sold in each round of the centralized TCC auction, cash will be paid and received and the market-clearing results will be announced to all bidders. Consequently, each round of the auction will provide information and an opportunity for learning -- the objective of multi-round auctions. Moreover, because TCCs will actually be sold at the prices determined in each round, the price information will reflect actual transaction prices and market assessments.

In Stage 1 total residual auctionable capacity will be made available in rounds so that all TCCs available in that stage will not be sold in the initial round.[14] Then in Stage 2, additional auction rounds will be conducted to allow bidders to buy and sell TCCs to adjust their market positions based on what they have learned from prior rounds. Importantly, the multi-round, pay-as-you-go TCC auction does not require other complicated activity rules. Each bidding round will

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[14] The market-clearing prices determined for each TCC in Stage 1, and the awards of TCCs to bidders in Stage 1, will be the same as the prices and awards of TCCs that would have occurred if Stage 1 had been conducted in a single round, provided that (1) each bidder bids its true reservation price for each TCC in each Stage 1 round; and (2) the ratio of the number of TCCs that each bidder bids to purchase in each Stage 1 round to the total number of TCCs it wishes to purchase in Stage 1 is equal to the proportion of the total auctionable capacity available for sale in each Stage 1 round

result in actual TCC awards for which winners will pay -- this is the pay-as-you-go aspect of the auction. There is no requirement for participation in any prior bidding round to bid in the current round, and there is no requirement for minimum aggregate bids or minimum bid increments from round to round.

Since each round will result in sales for which bidders must pay, bidders will have an incentive to bid their true reservation price. If a bidder holds back and submits artificially low bids in an early round of the pay-as-you-go auction, someone else will potentially be able to buy TCCs more cheaply than would otherwise have been the case. In contrast, in multi-round auctions like those used by the FCC, awards are not made in preliminary rounds, and (absent activity rules) there are incentives to game the system by not bidding true reservation prices in those preliminary rounds. In the centralized TCC auction, not all of the TCCs will be sold in one round of the auction, but some will be sold in every round. Consequently, there will be an opportunity for bidders to use what is learned from earlier rounds to formulate bids in later rounds of Stage 1 before all capacity has been sold.

The practical operation of the pay-as-you-go auction can be illustrated again by our simple example. Assume that the auction in the first round of Stage 1 would result in awards of 100 TCCs between buses A and B if all of the available capacity were auctioned, and assume that 25 percent of total auctionable capacity is being sold in this round. Then the actual first round award of TCCs from A to B would be 25 TCCs, potentially leaving 75 TCCs from A to B for future rounds [15]

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15 There are "potentially" 75 TCCs available for future rounds, because what is actually sold will depend on bids in future rounds of Stage 1 and the TCC awards that maximize benefits to users.

Further, examples of Stage 1 and Stage 2 auction rounds are found in Attachment M of the New York ISO Tariff.[16] In the Stage 1 example there are four Stage 1 auction rounds, and one-fourth of the transmission capacity that has been offered for sale in Stage 1 is sold in each round. In the example 100 residual TCCs are offered for sale between two locations. In the first round there are four bidders, 25 TCCs between the two locations are awarded at a market-clearing price of $5 and, consequently, the winning bidders pay a total of $125 for these TCCs. In Round 2 there are again four bidders, 25 TCCs are awarded at a market-clearing price of $6 and the winning bidders pay a total of $150 for the 25 TCCs. Rounds 3 and 4 are conducted in the same manner.

The auction rounds of Stage 2 will be conducted after the completion of Stage 1. As noted above, and as illustrated in the example in Attachment M, Stage 2 will provide additional opportunities to buy and sell TCCs. In this example two holders of TCCs release them into the first round of the Stage 2 auction. One holder will receive the TCCs as a result of a grandfathered agreement, and the other will purchase its TCCs in a round of the Stage 1 auction. In total, these holders will release 70 TCCs. There are three bidders for the TCCs. Two will receive awards for a total of 70 TCCs, the market-clearing price is $5 and the winning bidders will pay a total of $350 for the 70 TCCs awarded.

Stage 2 will function as a secondary market in which TCC buyers and sellers can take advantage of the purchase and sale opportunities identified by the prices determined in Stage 1. The transmission capacity available for auction in Stage 2 will not be limited to the residual and grandfathered capacity supplied in Stage 1. Any holder of a TCC that meets creditworthiness standards will be able to offer it for auction in any Stage 2 auction round, including holders of

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16 See section 6.9 of Attachment M.

grandfathered TCCs that were not offered for auction in Stage 1 and holders who purchased TCCs in prior rounds of Stage 1 or Stage 2 or in bilateral sales conducted over the OASIS.

From the point of view of the purchaser of TCCs, the multi-round, pay-as-you-go TCC auction provides open access to any auction round for any creditworthy bidder. Similarly, from the point of view of the primary owner and potential seller of TCCs, the multi-round, pay-as-you-go TCC auction provides open access to any Stage 2 auction round and to Stage 1 if the announcement to sell is made before the first round of Stage 1. As a result, the proposed TCC auction will provide the opportunity for participants to learn about purchase and sale opportunities in the market and to make bids and offers based on what they have learned. Thus, the auction will result in an efficient allocation of transmission resources by allocating TCCs to users who value them most.

Figure 1
TRANSFER CAPABILITY DEPENDS ON FLOWS

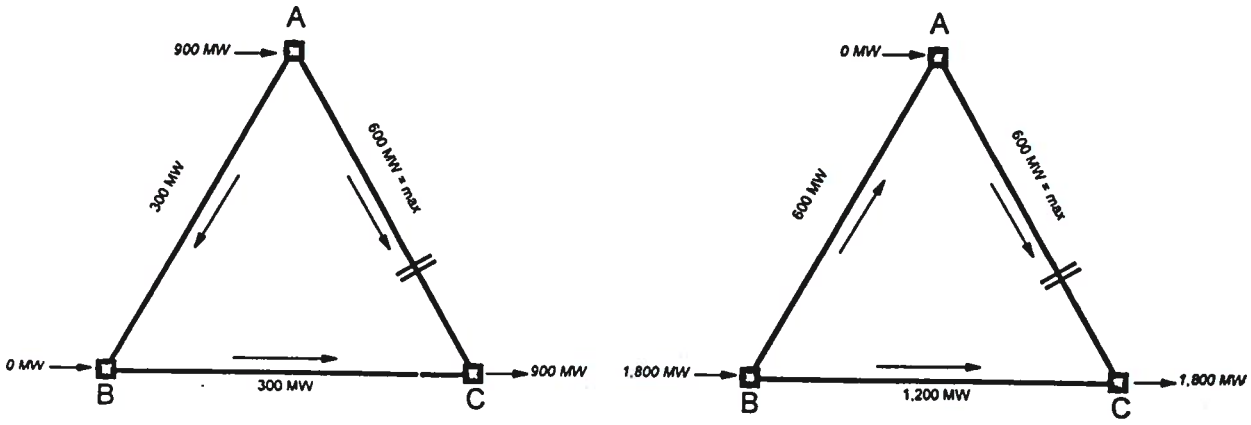

Figure 2
TCC AUCTIONS PRICE ALL POTENTIAL TCCs

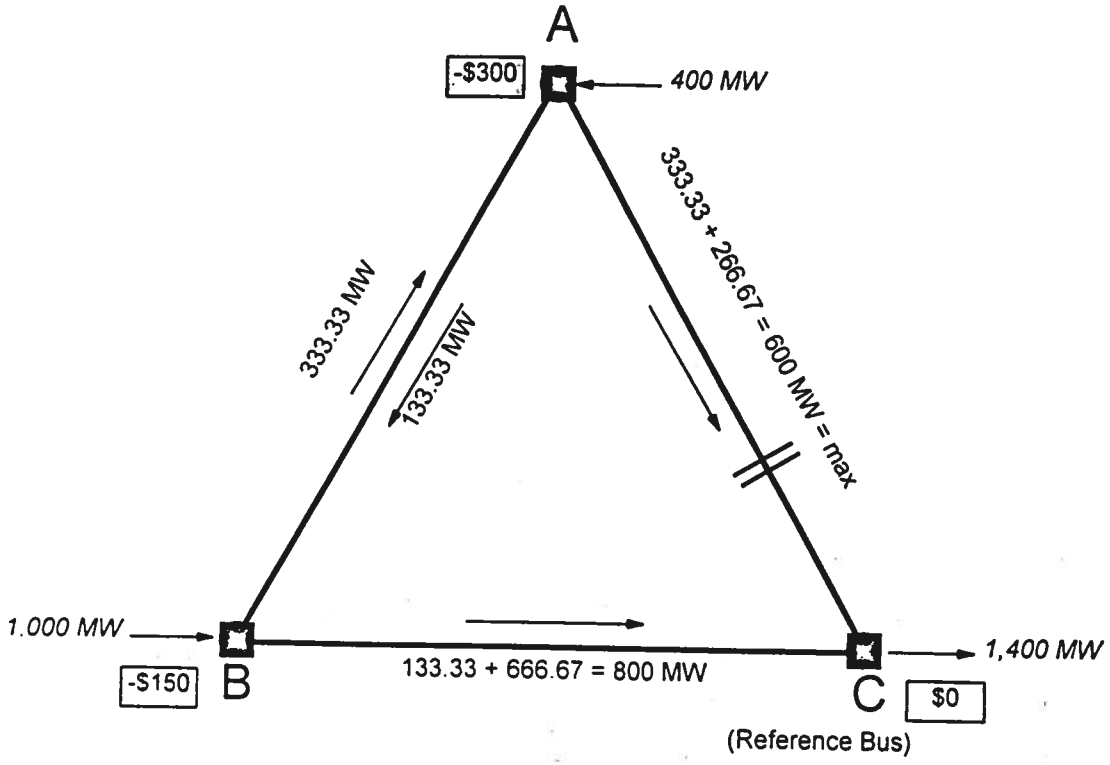

Table 2

TCC AUCTIONS PRICE ALL POTENTIAL TCCs

Table 2.1

TCC Auction Bids				TCC Auction Results	
Bidder	TCC	Bid Quantity	Bid Price ($)	Number of TCCs Awarded	Market Clearing Price ($/TCC)
1	B to C	500	900	500	150
2	B to C	500	500	500	150
3	B to C	1000	100	0	NA
4	A to C	300	500	300	300
5	A to C	300	300	100	300
6	A to C	500	200	0	NA

Table 2.2

Bidder	TCC	Bid Quantity	Bid Price ($)	Number of TCCs Awarded	Market Clearing Price ($)
1	B to C	500	900	500	$ 450,000
2	B to C	500	500	500	$ 250,000
4	A to C	300	500	300	$ 150,000
5	A to C	300	300	100	$ 30,000
Total					$ 880,000

Figure 3
A 1 MW INCREASE IN TCCs FROM A TO C REQUIRES
A 2 MW DECREASE IN TCCs FROM B TO C

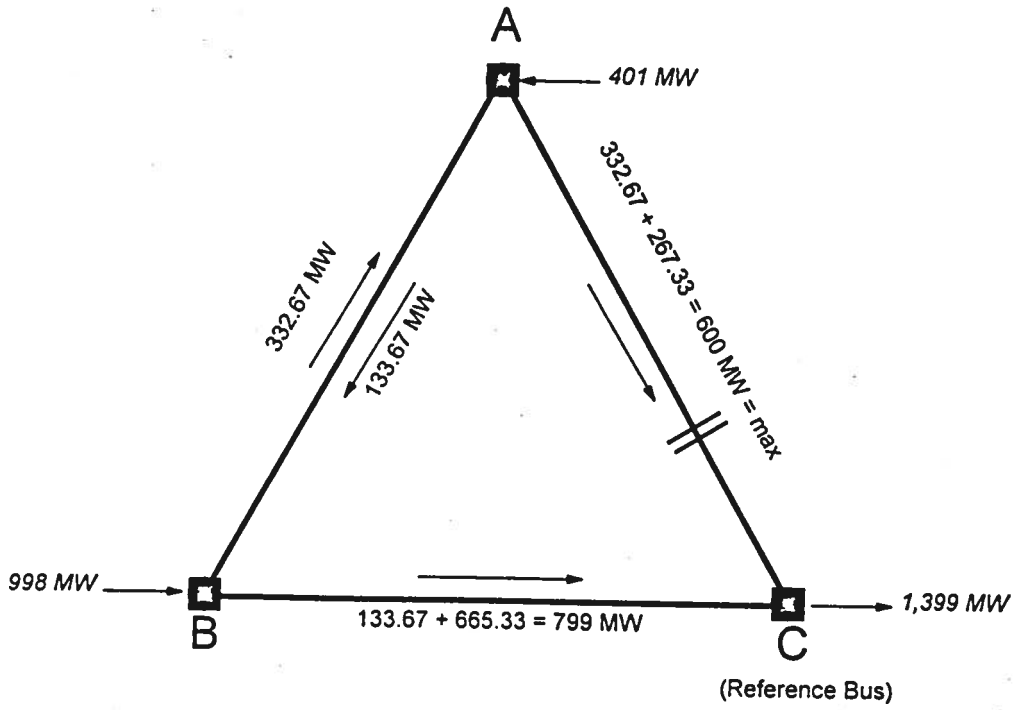

Figure 4
VALUE OF AWARDED TCCs TO BIDDERS IF MORE A TO C TCCs ARE AWARDED

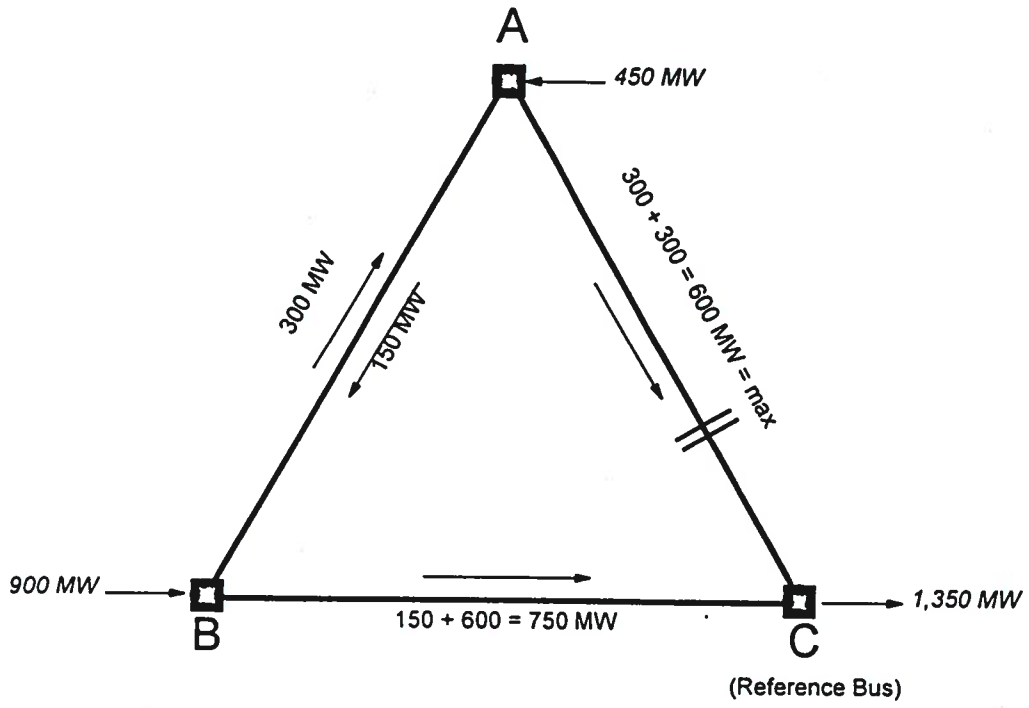

Table 4

VALUE OF AWARDED TCCs TO BIDDERS IF MORE A TO C TCCs ARE AWARDED

Value of Awarded TCCs					
Bidder	TCC	Bid Quantity	Bid Price ($)	Number of TCCs Awarded	Market Clearing Price ($)
1	B to C	500	900	500	$ 450,000
2	B to C	500	500	400	$ 200,000
4	A to C	300	500	300	$ 150,000
5	A to C	300	300	150	$ 45,000
Total					$ 845,000

Figure 5
VALUE OF AWARDED TCCs TO BIDDERS IF MORE B TO C TCCs ARE AWARDED

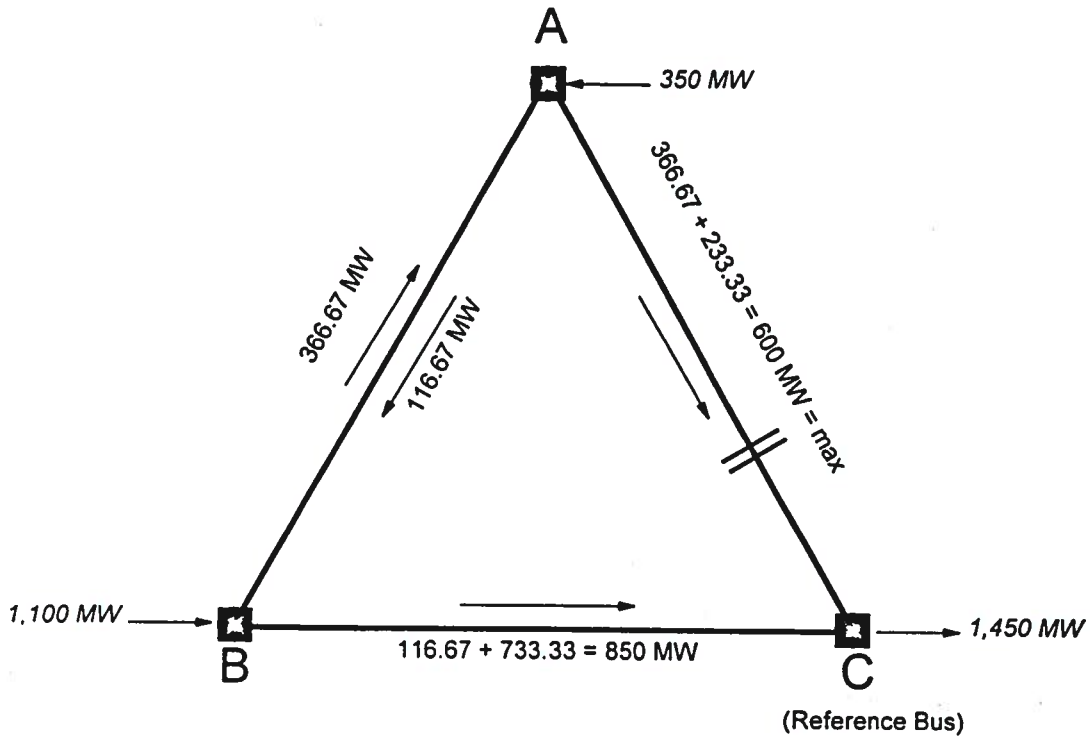

Table 5

VALUE OF AWARDED TCCs TO BIDDERS IF MORE B TO C TCCs ARE AWARDED

Value of Awarded TCCs					
Bidder	TCC	Bid Quantity	Bid Price ($)	Number of TCCs Awarded	Market Clearing Price ($)
1	B to C	500	900	500	$ 450,000
2	B to C	500	500	500	$ 250,000
3	B to C	1000	100	100	$ 10,000
4	A to C	300	500	300	$ 150,000
5	A to C	300	300	50	$ 15,000
Total					$ 875,000

Figure 6
TCCs SOLD CAN DIFFER FROM TCCs PURCHASED

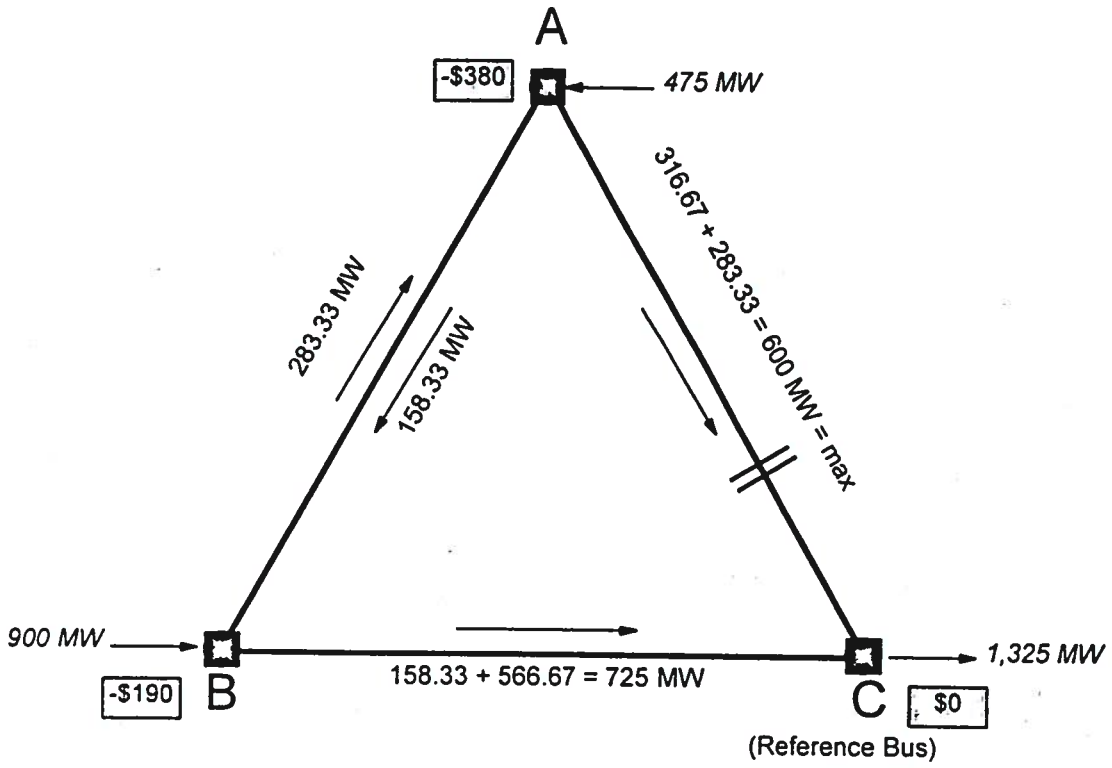

Table 6

TCCs SOLD CAN DIFFER FROM TCCs PURCHASED

Table 6.1

TCCs Outstanding	
TCC	Number of TCCs
B to C	1000
A to C	400

Table 6.2

Offer to Buy and Sell TCCs			
TCC	Bid Price ($)	Purchase Bid Quantity	Sale Bid Quantity
B to C	125	100	
B to C	175		100
A to C	380	50	
A to B	200	50	

Table 6.3

Auction Transactions and Prices			
TCC	Price ($)	Sales	Purchases
B to C	190	100	
A to B	190		50
A to C	380		25

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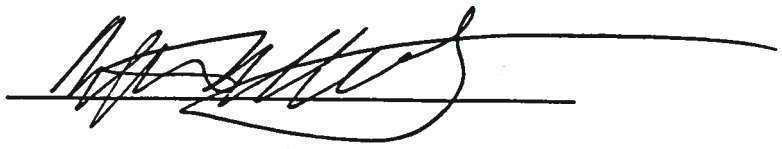

William W. Hogan

Signed and sworn to before me on this 2nd day of December 1997.

Notary Public

MARY JANE ROSE
Notary Public
Commission Expires:
October 18, 2002